

# Merge DICOM Toolkit™

5.20.0

C/C++ REFERENCE MANUAL

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Merge Healthcare Incorporated  
900 Walnut Ridge Drive  
Hartland, WI 53029

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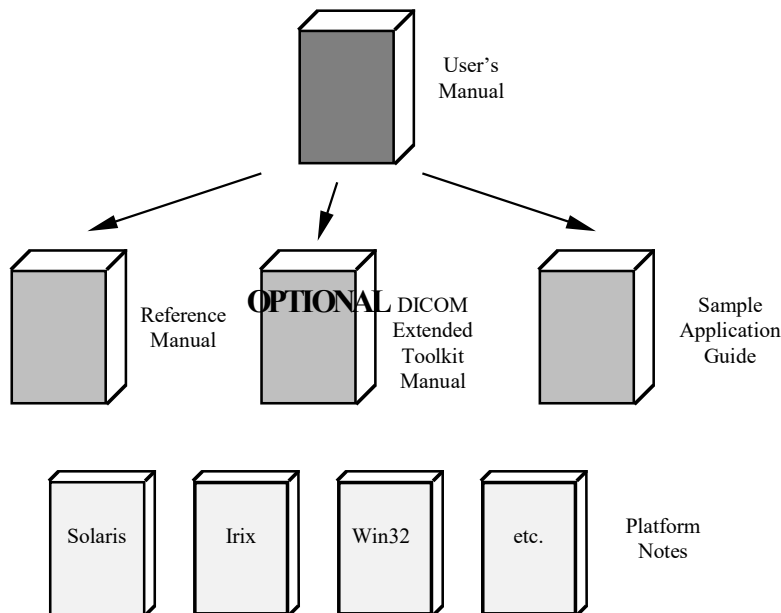
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# Overview

This reference manual contains a detailed description of the functionality of the Merge DICOM Toolkit Library. This includes library configuration, application programmer's interface (API) specification, and a DICOM conformance statement for the toolkit.

## Structure of Documentation

The Merge DICOM Toolkit documentation is structured as shown in *Figure 1*.



*Figure 1: Merge DICOM Toolkit Documentation Roadmap*

### Read Me FIRST!

The User's Manual is the foundation for all other documentation because it explains the concepts of DICOM and the toolkit. Before plunging into the Reference Manual or Sample Application Guide you should be comfortable with the material in the User's Manual.

The Reference Manual is where you go for detailed information on the DICOM Toolkit. This includes the Application Programming Interface (API), toolkit configuration, the runtime object database, and status logging. The Reference Manual also includes a DICOM conformance statement for the toolkit.

The DICOM Extended Toolkit Manual is an optional extension that describes the organization of the Merge DICOM Toolkit DICOM Database and how to use it to extend standard services and define your own private services. Tools are supplied for converting the contents of the database into the binary runtime object database.

## Sample applications

The Sample Application Guide describes approaches to developing specific classes of DICOM applications. It presents the pertinent information from Parts 3 or 4 of the DICOM Standard in a more readable way and in the context of the DICOM Toolkit. The Application Guide also details the DICOM messages that can be passed between applications on the network. Also, a sample application is described, and the application supplied in source form for your platform.

Platform specific information required to use the DICOM Toolkit on your target platform are specified in Platform Notes. This includes supported compilers, compiler options, link options, configuration, and run-time related issues.

## Conventions

This manual follows a few formatting conventions.

Terms that are being defined are presented in **boldface**.

## Sample Margin Note

Margin notes (in the left margin) are used to highlight important points or sections of the document.

## Performance Tuning

Portions of the document that can relate directly to the performance of your application are marked with the special margin note **Performance Tuning**.

Sample commands appear in **bold courier** font, while sample output, source code, and function calls appear in standard `Courier` font.

Hexadecimal numbers are written with a trailing H. For example, 16 decimal is equivalent to 10H hexadecimal.

# Configuration

Toolkit configuration is accomplished through the use of initialization or configuration files. Initialization files, also called “ini” files, contain configuration information the toolkit will use to initialize its internal settings.

Each of the four toolkit initialization files use the same format. The format of the initialization files is the same format that is used by others in the industry, namely Microsoft. Configuration files are broken down into sections for easier organization and grouping of parameters. Each section has a section heading enclosed in square brackets. Next, parameters are defined by putting the parameter name to the left of an equal sign and its initial value to the right. Figure 2 illustrates the format of an “ini” file.

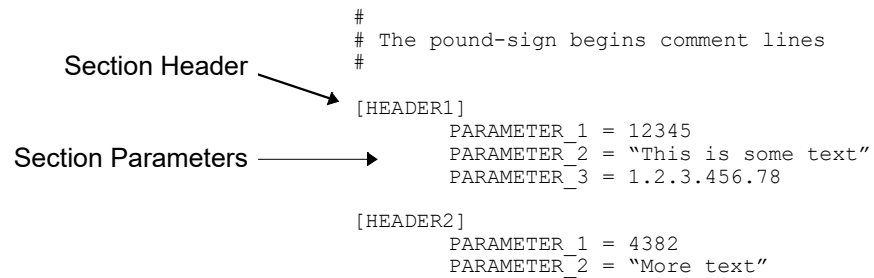


Figure 2: Format of a configuration file.

Notice that parameter names are relative to their header sections. For example, `PARAMETER_1` and `PARAMETER_2` are defined twice in the above example “ini” file. But, since each is defined in a different section, they are considered different entities.

Since the Merge DICOM Toolkit is very versatile and configurable, it uses initialization files extensively. The toolkit makes use of four configuration files: the Merge Initialization File, the Library Profile, the Application Profile and the Service Profile. The *Appendix B: Configuration Parameters* discusses each of these files in detail.

Any application using the Merge DICOM Toolkit library is required to initialize the library using the `MC_Library_Initialization()` call. In most cases the first parameter passed to this function will be `NULL` and initialization of the library will occur from the configuration files described in this section.

The `genconf` utility (described later in this section) can be used to convert these configuration files into a function that can be compiled into an object file and linked directly into your application. This generated function can also be specified as the first parameter to `MC_Library_Initialization()`. This approach should only be used in environments where the configuration is not likely to be updated in the field, where performance at initialization time is of great concern, or you running in an embedded environment (without a file system) with the embedded version of the library.



## Initialization File Integration

The Merge DICOM Toolkit allows initialization files to be integrated into an application at “link” time. The toolkit provides utilities to “compile” your initialization files into ANSI-C source code files that can then be compiled and linked into an object file. This object file is linked into the application thus allowing your application to access the initial values at run-time. This is a great advantage to systems that require limited disk access and the only option for embedded systems.

As with all “compiled programs”, the disadvantage is that when initial values change, the files must be “recompiled” and re-linked into your application.

### Performance Tuning

### Generating a Static Configuration Function (`genconf`)

The `genconf` utility supplied with Merge DICOM Toolkit allows you to convert the four configuration files (the Initialization file, the Application profile, the System Profile and the Service Profile) into an ANSI-C function that can be compiled into an object file and statically linked to your application along with the toolkit library.

**In most cases this approach should not be used, since it forces you to re-run `genconf` and re-link your application whenever you wish to change the initial configuration values.** It can be used in environments where high performance at initialization time is critical, or in embedded environments. It may also be of use in end user applications to reduce installation confusion.

To use `genconf`, follow these steps:

1. Make your current directory (i.e., `cd` to) the directory that contains the Initialization File (i.e. `merge.ini`).
2. Make certain that the `MERGE_INI` environment variable is pointing to the Initialization File.
3. Make certain that the parameters dealing with locations of other configuration files within the Initialization File are correct. For example, make sure `MERGE_COM_3_PROFILE` contains the path list of the System Profile.
4. Make sure that the initial values in ALL configuration files are set to the initial values you desire. Remember, if the initial values need to be changed, you must rerun `genconf`, recompile and re-link your application.
5. Run `genconf`.

When `genconf` starts, it will display a banner similar to the following:

```
% genconf

MergeCOM (tm) Configuration Source Generator Version 3.9.0
(c) 2008 Merge OEM. All rights reserved.
```

An ANSI-C source file named `mc3cfg.c` is generated that defines several structures and a configuration function called `MC_Config_Values()`. Compile and link this source file into your application. You can then use this configuration function by specifying the `MC_Config_Values()` function as the first parameter of the `MC_Library_Initialization()` call.

**Never modify the `mc3cfg.c` to change configuration parameters. Always modify the configuration files and rerun `genconf`.** Note that the `genconf` application MUST ONLY be used with the version of the toolkit that was shipped to you. Using mixed version of the library and `genconf` will cause your applications to fail.

### Generating a Static Dictionary Function (`gendict`)

#### Performance Tuning

The `gendict` utility supplied with Merge DICOM Toolkit allows you to convert the data dictionary into an ANSI-C function that can be compiled into an object file and statically linked to your application along with the toolkit library.

In most cases this approach should not be used, since it forces you to re-run `gendict` and re-link your application whenever you wish to change the initial configuration values. It can be used in environments where high performance at initialization time is critical, or in embedded environments. It may also be of use in end user applications to reduce installation confusion.

To use `gendict`, follow these steps:

1. Make your current directory (i.e., `cd` to) the directory that contains the data dictionary (i.e. `mrgcom3.dct`).
2. Make certain that the `MERGE_INI` environment variable is pointing to the Initialization File.
3. Make certain that the `DICTIONARY_FILE` parameter in the System Profile (i.e., `mergecom.pro`) is set correctly.
4. Run `gendict`.

When `gendict` starts, it will display a banner similar to the following:

```
% gendict

MergeCOM (tm) DICOM Dictionary Source Generator Version 3.9.0
(c) 2008 Merge OEM. All rights reserved.
```

An ANSI-C source file named `mc3dict.c` is generated that defines several structures and a configuration function called `MC_Dictionary_Values`. Compile and link this source file into your application. You can then use this configuration function by specifying the `MC_Dictionary_Values` function as the second parameter of the `MC_Library_Initialization()` call.

**Never modify the `mc3dict.c` to change configuration parameters. Always modify the configuration files and rerun `genconf`.**

# Application Programming Interface

## Overview of API

Merge DICOM Toolkit provides functions which are used to construct and manipulate “message objects” and “file objects” as well as functions to establish a communication session with other DICOM systems to exchange DICOM messages.

“Message objects” and “file objects” are defined in the DICOM standard and in the conformance statements of DICOM applications.

The functions of the base API may be divided into eleven major groups:

- 1. Library initialization and reset functions**  
Must be called initially and when wishing to reset the library to its initially configured state.
- 2. Run time configuration**  
Allow your application to change configurable parameters at runtime.
- 3. Application Registration**  
Register your DICOM application entity with the library.
- 4. Association functions**  
Deal with opening DICOM associations and querying the characteristics of a proposed or open association.
- 5. Message object functions**  
Deal with the creation and manipulation of message objects.
- 6. Item object functions**  
Deal with the creation and freeing of the item objects that are contained in attributes of message objects that are of value representation SQ.
- 7. File object functions**  
Deal with the creation, manipulation, and freeing of file objects.
- 8. Message, file and item object functions**  
Used in the encoding, decoding, and manipulation of the attributes of messages, files and items. This includes the handling of private attributes.
- 9. Message Transfer**  
These are used in sending and receiving DICOM messages over an open association.
- 10. DICOMDIR Object Functions**  
These deal with the upkeep and manipulation of DICOMDIR objects.
- 11. Structured Reporting Object Functions**  
These deal with the upkeep and manipulation of Structured Reporting (SR) objects.
- 12. Miscellaneous Functions.**

---

Additional to the base API the toolkit provides higher level functionality that can facilitate the manipulation of specific DICOM objects. The current version of the toolkit contains the following categories of high level functions:

1. **DICOMDIR Manipulation Functions (MC\_DDH\_functions)**

These functions provide enhanced access to DICOMDIR files.

2. **Structured Report Manipulation Functions (MC\_SRH\_functions)**

These functions provide enhanced access to Structured Reporting (SR) objects.

## Library Initialization and Reset

The Merge DICOM Toolkit library initialization functions follow:

- MC\_Library\_Initialization
- MC\_Library\_Release
- MC\_Library\_Reset
- MC\_Set\_MergeINI
- MC\_Get\_Version\_String

## Run Time Configuration Functions

The Merge DICOM Toolkit run-time configuration functions follow:

- MC\_Release\_Library\_Exception\_Handler
- MC\_Set\_Bool\_Config\_Value
- MC\_Set\_Int\_Config\_Value
- MC\_Set\_Library\_Exception\_Handler
- MC\_Set\_Log\_Destination
- MC\_Set\_Long\_Config\_Value
- MC\_Set\_String\_Config\_Value
- MC\_Get\_Bool\_Config\_Value
- MC\_Get\_Int\_Config\_Value
- MC\_Get\_Log\_Destination
- MC\_Get\_Long\_Config\_Value
- MC\_Get\_String\_Config\_Value

## Application Registration

The Merge DICOM Toolkit application registration functions may be grouped as follows:

- MC\_Register\_Application
- MC\_Release\_Application
- MC\_Register\_Callback\_Function
- MC\_Register\_pCallback\_Function
- MC\_Release\_Callback\_Function
- MC\_Set\_Message\_Callbacks

## Association Functions

The Merge DICOM Toolkit association functions may be grouped as follows:

---

**1. Association object creation and release.**

MC\_Open\_Association  
MC\_Open\_Association\_With\_Connect\_Timeout  
MC\_Open\_Association\_With\_Identity  
MC\_Open\_Association\_With\_Identity\_With\_Reject\_Info  
MC\_Open\_Association\_With\_Identity\_With\_Reject\_Info\_With\_Connect\_Timeout  
MC\_Open\_Association\_With\_Reject\_Info  
MC\_Open\_Association\_With\_Callback  
MC\_Open\_Association\_With\_All\_Optional\_Parameters  
MC\_Open\_Secure\_Association  
MC\_Open\_Secure\_Association\_With\_Reject\_Info  
MC\_Close\_Association  
MC\_Abort\_Association  
MC\_Release\_Parent\_Association

MC\_Wait\_For\_Association  
MC\_Wait\_For\_Association\_On\_Port  
MC\_Wait\_For\_Connection  
MC\_Wait\_For\_Connection\_On\_Port  
MC\_Wait\_For\_Secure\_Association  
MC\_Wait\_For\_Secure\_Association\_On\_Port  
MC\_Close\_Listen\_Port  
MC\_Process\_Association\_Request  
MC\_Process\_Secure\_Association\_Request  
MC\_Accept\_Association  
MC\_Accept\_Association\_With\_Identity  
MC\_Reject\_Association  
MC\_Reject\_Association\_With\_Reason\_Codes

MC\_Set\_Negotiation\_Info (depracated)  
MC\_Set\_Negotiation\_Info\_For\_Association  
MC\_Get\_Negotiation\_Info  
MC\_Clear\_Negotiation\_Info (depracated)

MC\_NewProposedServiceList  
MC\_NewProposedServiceListAsync  
MC\_NewServiceFrom... Functions  
MC\_NewSyntaxList  
MC\_FreeServiceList  
MC\_FreeService  
MC\_FreeSyntaxList

---

## 2. Query of association characteristics.

MC\_Get\_Association\_Info  
MC\_Get\_Listen\_Socket  
MC\_Get\_Listen\_Socket\_For\_Port  
MC\_Get\_First\_Acceptable\_Service  
MC\_Get\_Next\_Acceptable\_Service  
MC\_Get\_User\_Identity\_Info  
MC\_Get\_User\_Identity\_Length

## Message Object Functions

The Merge DICOM Toolkit message object functions may be grouped as follows:

### 1. Message object creation and release.

MC\_Open\_Message  
MC\_Free\_Message  
MC\_Open\_Empty\_Message  
MC\_Set\_Service\_Command

### 2. Message duplication

MC\_Duplicate\_Message

### 3. Clearing all message attribute values.

MC\_Empty\_Message

### 4. Message validation functions: those dealing with ensuring that a message does not violate DICOM or conformance rules.

MC\_Validate\_Message  
MC\_Validate\_Attribute  
MC\_Get\_Next\_Validate\_Error

### 5. Message streaming functions: those dealing with retrieving message values from a DICOM stream or creating a DICOM stream from message values.

MC\_Message\_To\_Stream  
MC\_Stream\_To\_Message  
MC\_Stream\_To\_Message\_With\_Offset  
MC\_Get\_Stream\_Length

### 6. Message attribute information functions: those functions which report which attributes are in a message and information about message attributes.

MC\_List\_Message

### 7. Message XML conversion functions: those dealing with converting a message to an XML string or reading attributes from an XML string into a message using either Merge DICOM Model or Native DICOM Model.

---

MC\_Message\_To\_XML  
MC\_XML\_To\_Message

MC\_Message\_To\_XML\_Native  
MC\_XML\_Native\_To\_Message

8. Message JSON conversion functions: those dealing with converting a message to an JSON string or reading attributes from a JSON string into a message using DICOM JSON Model.

MC\_Message\_To\_Json  
MC\_Json\_To\_Message

## Item Object Functions

The Merge DICOM Toolkit message object functions may be grouped as follows:

1. Functions supporting attributes with a value representation of SQ (Sequence of Items):

MC\_Open\_Item  
MC\_Free\_Item  
MC\_Empty\_Item  
MC\_List\_Item

## File Object Functions

The Merge DICOM Toolkit file object functions may be grouped as follows:

1. File object creation and release.

MC\_Create\_File  
MC\_Create\_Empty\_File  
MC\_Free\_File

2. Clearing all file attribute values.

MC\_Empty\_File

3. Message validation functions: those dealing with ensuring that a message does not violate DICOM or conformance rules.

MC\_Validate\_File  
MC\_Get\_Next\_Validate\_Error

4. File opening, closing and information functions: those dealing with retrieving and writing DICOM file objects from or to media as well as getting information about the file object.

MC\_Open\_File  
MC\_Open\_File\_Bypass\_OBOW  
MC\_Open\_File\_Upto\_Tag  
MC\_Open\_File\_Upto\_Tag\_Bypass\_Value  
MC\_Write\_File  
MC\_Write\_File\_By\_Callback  
MC\_Get\_File\_Length

- 
5. File manipulation functions: those functions that manipulate the elements that are specific to a file.

MC\_Reset\_Filename  
MC\_Get\_Filename  
MC\_Set\_File\_Preamble  
MC\_Get\_File\_Preamble

6. File transformation functions: those dealing with changing “file objects” to “message objects”.

MC\_File\_To\_Message  
MC\_Message\_To\_File

7. Message attribute information functions: those functions which report which attributes are in a message and information about message attributes.

MC\_List\_File

## Message, File and Item Object Functions

The Merge DICOM Toolkit message and item object functions can be grouped as follows:

1. Message attribute information functions: those functions which report which attributes are in a message and information about message attributes.

MC\_Get\_First\_Attribute  
MC\_Get\_Next\_Attribute  
MC\_Get\_Attribute\_Info  
MC\_Get\_pAttribute\_Info

2. Message attribute manipulation.

MC\_Add\_Standard\_Attribute  
MC\_Add\_Nonstandard\_Attribute  
MC\_Add\_Private\_Attribute  
MC\_Add\_Private\_Block  
MC\_Byte\_Swap\_OBOW  
MC\_Delete\_Attribute  
MC\_Delete\_Current\_Value  
MC\_Delete\_Private\_Attribute  
MC\_Delete\_Private\_Block  
MC\_Delete\_Range

3. Functions to change the value representation of a message attribute from Unknown\_VR to a valid value representation code:

MC\_Set\_Value\_Representation  
MC\_Set\_pValue\_Representation

4. Setting values for standard attributes.



---

MC\_Set\_Value... Functions  
MC\_Set\_Value\_From\_Function  
MC\_Set\_Next\_Value... Functions  
MC\_Set\_Value\_To\_NULL  
MC\_Set\_Next\_Value\_To\_NULL  
MC\_Set\_Value\_To\_Empty  
MC\_Set\_Encapsulated\_Value\_From\_Function  
MC\_Set\_Next\_Encapsulated\_Value\_From\_Function  
MC\_Close\_Encapsulated\_Value

5. Setting values for private attributes.

MC\_Set\_pValue... Functions  
MC\_Set\_pValue\_From\_Function  
MC\_Set\_Next\_pValue... Functions  
MC\_Set\_pValue\_To\_NULL  
MC\_Set\_Next\_pValue\_To\_NULL  
MC\_Set\_pValue\_To\_Empty

6. Getting values of standard attributes.

MC\_Get\_Value... Functions  
MC\_Get\_Value\_To\_Function  
MC\_Get\_Value\_Count  
MC\_Get\_Value\_Length  
MC\_Get\_Next\_Value...Functions  
MC\_Get\_Encapsulated\_Value\_To\_Function  
MC\_Get\_Next\_Encapsulated\_Value\_To\_Function  
MC\_Get\_Frame\_To\_Function  
MC\_Get\_Offset\_Table\_To\_Function

7. Getting values of private attributes.

MC\_Get\_pValue... Functions  
MC\_Get\_pValue\_To\_Function  
MC\_Get\_pValue\_Count  
MC\_Get\_pValue\_Length  
MC\_Get\_Next\_pValue... Functions

## Message Transfer

The Merge DICOM Toolkit message transfer functions follow:

MC\_Send\_Request\_Message  
MC\_Send\_Request\_Message\_For\_Service  
MC\_Send\_Request  
MC\_Send\_Request\_For\_Service  
MC\_Send\_Response\_Message  
MC\_Send\_Response  
MC\_Read\_Message

---

MC\_Read\_Message\_To\_Tag  
MC\_Continue\_Read\_Message  
MC\_Continue\_Read\_Message\_To\_Tag  
MC\_Read\_To\_Stream  
MC\_Reset\_Message\_Transfer\_Syntax  
MC\_Set\_Message\_Transfer\_Syntax  
MC\_Get\_Message\_Transfer\_Syntax

## DICOMDIR Object Functions

The DICOMDIR object functions may be grouped as follows:

1. DICOMDIR entity functions: those functions that deal with the manipulation of DICOMDIR entities.

MC\_Dir\_Root\_Entity  
MC\_Dir\_Next\_Entity  
MC\_Dir\_Add\_Entity  
MC\_Dir\_Delete\_Referenced\_Entity

2. DICOMDIR directory record functions: those functions that deal with the manipulation of DICOMDIR directory records.

MC\_Dir\_First\_Record  
MC\_Dir\_Next\_Record  
MC\_Dir\_Add\_Record  
MC\_Dir\_Delete\_Record

3. DICOMDIR MRDR directory record functions: those functions which allow users to create MRDR (Multi-referenced file directory record) records and set up references to them.

MC\_Dir\_Open\_MRDR  
MC\_Dir\_Reference\_MRDR  
MC\_Dir\_Remove\_Ref\_MRDR

4. DICOMDIR statistical functions: those functions which allow users to obtain counts of the over all items and entities contained within a DICOMDIR object.

MC\_Dir\_Root\_Count  
MC\_Dir\_Entity\_Count  
MC\_Dir\_Item\_Count

5. DICOMDIR sorting functions: this function which allow users to sort the record types in each DICOMDIR entity, and the record entries within each record type in order within a DICOMDIR object.

MC\_Dir\_Sort

6. DICOMDIR storage functions: this function which allows users to set the storage for specific directory records in a DICOMDIR. This routine reduces memory usage for DICOMDIRs.

MC\_Dir\_Stream\_Directory\_Record

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## Structured Reporting Object Functions

The Structured Reporting object functions are grouped as follows:

1. Getting values of SR objects:

- MC\_SR\_Get\_First\_Child
- MC\_SR\_Get\_Next\_Child
- MC\_SR\_Get\_Child\_Count
- MC\_SR\_Get\_Root

2. Adding values to SR objects:

- MC\_SR\_Add\_Child
- MC\_SR\_Add\_Root
- MC\_SR\_Get\_Location

3. Converting messages to or from SR objects:

- MC\_Message\_To\_SR
- MC\_SR\_To\_Message

4. Deleting child SR objects:

- MC\_SR\_Delete\_Child

## Miscellaneous Functions

The following miscellaneous functions are available:

- MC\_Error\_Message
- MC\_Get\_Message\_Service
- MC\_Get\_MergeCOM\_Service
- MC\_Get\_UID\_From\_MergeCOM\_Service
- MC\_Get\_Tag\_Info
- MC\_Get\_pTag\_Info
- MC\_Get\_Tag\_Keyword
- MC\_Get\_Enum\_From\_Transfer\_Syntax
- MC\_Get\_Transfer\_Syntax\_From\_Enum
- MC\_Set\_Log\_Prefix
- MC\_Enable\_Unicode\_Conversion
- MC\_Byte\_To\_Unicode
- MC\_Unicode\_To\_Byte
- MC\_Register\_Network\_Capture\_Callbacks

## Enhanced DICOMDIR Manipulation Functions

The enhanced DICOMDIR manipulation functions may be grouped as follows:

1. DICOMDIR file functions: functions that deal with reading and creating DICOMDIR files.

- MC\_DDH\_Create
- MC\_DDH\_Open

2. Directory record navigation functions: functions that deal with the traversal of the directory record hierarchy.

MC\_DDH\_Get\_First\_Lower\_Record  
MC\_DDH\_Get\_Next\_Record  
MC\_DDH\_Get\_Parent\_Record  
MC\_DDH\_Traverse\_Records  
MC\_DDH\_Release\_Record  
MC\_DDH\_Get\_Record\_Type

3. DICODIR modification function: functions that deal with modifying the directory record hierarchy:

MC\_DDH\_Add\_Record  
MC\_DDH\_Delete\_Record  
MC\_DDH\_Update  
MC\_DDH\_Copy\_Values

## High Level Structured Reporting Manipulation Functions

The High Level Structured Reporting (SR) manipulation functions are grouped as follows:

1. SR creation and setup function:

MC\_SRH\_Create\_SR  
MC\_SRH\_Free\_SR  
MC\_SRH\_Add\_TEXT\_Child  
MC\_SRH\_Add\_CODE\_Child  
MC\_SRH\_Set\_NUM\_Qualifier  
MC\_SRH\_Set\_NUM\_Next\_Data  
MC\_SRH\_Add\_NUM\_Child  
MC\_SRH\_Add\_DATETIME\_Child  
MC\_SRH\_Add\_DATE\_Child  
MC\_SRH\_Add\_TIME\_Child  
MC\_SRH\_Add\_UIDREF\_Child  
MC\_SRH\_Add\_PNAME\_Child  
MC\_SRH\_Add\_SCOORD\_Child  
MC\_SRH\_Set\_SCOORD\_Next\_Data  
MC\_SRH\_Add\_TCOORD\_R\_Child  
MC\_SRH\_Set\_TCOORD\_R\_Next\_Data  
MC\_SRH\_Add\_TCOORD\_O\_Child  
MC\_SRH\_Set\_TCOORD\_O\_Next\_Data  
MC\_SRH\_Add\_TCOORD\_D\_Child  
MC\_SRH\_Set\_TCOORD\_D\_Next\_Data  
MC\_SRH\_Add\_COMPOSITE\_Child  
MC\_SRH\_Add\_IMAGE\_Child  
MC\_SRH\_Set\_IMAGE\_Frames  
MC\_SRH\_Add\_WAVEFORM\_Child  
MC\_SRH\_Set\_WAVEFORM\_Channels  
MC\_SRH\_Add\_CONTAINER\_Child

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MC\_SRH\_Add\_TABLE\_Child  
MC\_SRH\_Set\_TABLE\_Next\_Row\_Definition  
MC\_SRH\_Set\_TABLE\_Next\_Column\_Definition  
MC\_SRH\_Set\_TABLE\_Next\_Cell\_Values  
MC\_SRH\_Set\_Concept\_Name

2. SR parsing and reading functions:

MC\_SRH\_Get\_NodeType  
MC\_SRH\_Get\_First\_Child  
MC\_SRH\_Get\_Next\_Child  
MC\_SRH\_Get\_Concept\_Name  
MC\_SRH\_Get\_TEXT\_Data  
MC\_SRH\_Get\_CODE\_Data  
MC\_SRH\_Get\_NUM\_Data  
MC\_SRH\_Get\_NUM\_Next\_Data  
MC\_SRH\_Get\_NUM\_Qualifier  
MC\_SRH\_Get\_DATETIME\_Data  
MC\_SRH\_Get\_DATE\_Data  
MC\_SRH\_Get\_TIME\_Data  
MC\_SRH\_Get\_UIDREF\_Data  
MC\_SRH\_Get\_PNAME\_Data  
MC\_SRH\_Get\_SCOORD\_First\_Data  
MC\_SRH\_Get\_SCOORD\_Next\_Data  
MC\_SRH\_Get\_TCOORD\_D\_First\_Data  
MC\_SRH\_Get\_TCOORD\_D\_Next\_Data  
MC\_SRH\_Get\_TCOORD\_O\_First\_Data  
MC\_SRH\_Get\_TCOORD\_O\_Next\_Data  
MC\_SRH\_Get\_TCOORD\_R\_First\_Data  
MC\_SRH\_Get\_TCOORD\_R\_Next\_Data  
MC\_SRH\_Get\_COMPOSITE\_Data  
MC\_SRH\_Get\_IMAGE\_Data  
MC\_SRH\_Get\_IMAGE\_Frames  
MC\_SRH\_Get\_WAVEFORM\_Data  
MC\_SRH\_Get\_WAVEFORM\_Channels  
MC\_SRH\_Get\_TABLE\_First\_Cell\_Values\_Counts  
MC\_SRH\_Get\_TABLE\_First\_Column\_Definition  
MC\_SRH\_Get\_TABLE\_First\_Row\_Definition  
MC\_SRH\_Get\_TABLE\_Next\_Cell\_Values\_Counts  
MC\_SRH\_Get\_TABLE\_Next\_Column\_Definition  
MC\_SRH\_Get\_TABLE\_Next\_Row\_Definition  
MC\_SRH\_Get\_TABLE\_Cell\_Values\_Item  
MC\_SRH\_Get\_CONTAINER\_Data  
MC\_SRH\_Get\_Reference

### 3. SR utility functions:

MC\_SRH\_Add\_Child  
 MC\_SRH\_Add\_Reference  
 MC\_SRH\_Create\_TEXT\_Node  
 MC\_SRH\_Create\_CODE\_Node  
 MC\_SRH\_Create\_NUM\_Node  
 MC\_SRH\_Create\_DATETIME\_Node  
 MC\_SRH\_Create\_DATE\_Node  
 MC\_SRH\_Create\_TIME\_Node  
 MC\_SRH\_Create\_UIDREF\_Node  
 MC\_SRH\_Create\_PNAME\_Node  
 MC\_SRH\_Create\_SCOORD\_Node  
 MC\_SRH\_Create\_TCOORD\_R\_Node  
 MC\_SRH\_Create\_TCOORD\_O\_Node  
 MC\_SRH\_Create\_TCOORD\_D\_Node  
 MC\_SRH\_Create\_COMPOSITE\_Node  
 MC\_SRH\_Create\_IMAGE\_Node  
 MC\_SRH\_Create\_WAVEFORM\_Node  
 MC\_SRH\_Create\_TABLE\_Node  
 MC\_SRH\_Create\_CONTAINER\_Node

## API Function Reference

The next section of this manual contains an alphabetically arranged function reference section. Each function reference provides:

- A brief description of the API function
- A synopsis of the API function which contains a list of include files required to use the function, the function prototype and a description of each function parameter
- Remarks outlining the use of the function
- A list of status codes returned by the function
  - A “See also” cross reference to other functions.

### MC\_Abort\_Association

Terminates an open association immediately.

#### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Abort_Association (
    int *AssociationID
)
```

*AssociationID*      Address of the association object’s identification number

**Remarks**

**MC\_Abort\_Association** abruptly terminates the DICOM association. In effect, this function is used to tell the remote system that the association is no longer valid.

It is the responsibility of the requester of an association (client) to close a DICOM association. If a service provider (server) cannot proceed with the association it should use **MC\_Abort\_Association** to terminate the association. The service user (client) uses **MC\_Close\_Association** for normal association completion, or **MC\_Abort\_Association** if an error situation occurs.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>AssociationID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	* <i>AssociationID</i> is not a valid association object ID.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

**See Also**

**MC\_Close\_Association**  
**MC\_Open\_Association**  
**MC\_Open\_Secure\_Association**  
**MC\_Wait\_For\_Association**  
**MC\_Wait\_For\_Secure\_Association**

**MC\_Accept\_Association MC\_Accept\_Association\_With\_Identity**

Accept a remote application's request for a DICOM association.

**Synopsis**

```
#include "mergecom.h"

MC_STATUS MC_Accept_Association (
    int AssociationID
)

MC_STATUS MC_Accept_Association_With_Identity (
    int AssociationID,
    void *ServerResponse,
    unsigned short ServerResponseLength
)
```

<i>AssociationID</i>	The association object's identification number
<i>ServerResponse</i>	A server response to a User Identity request from the association request as defined in DICOM Supplement 99
<i>ServerResponseLength</i>	The length of the buffer passed in the <i>ServerResponse</i> parameter. If <i>ServerResponse</i> is NULL, <i>ServerResponseLength</i> should be set to 0.

### Remarks

If a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function completes normally, one of two functions must be called. **MC\_Accept\_Association** informs the remote application that the association can proceed. Use **MC\_Reject\_Association** to reject the association request.

**MC\_Accept\_Association\_With\_Identity** can be used to send a user identity response to the association request when requested for the association as defined in DICOM Supplement 99. User Identity information within the association request can be retrieved through the use of the **MC\_Get\_Association\_Info**, **MC\_Get\_User\_Identity\_Info**, and **MC\_Get\_User\_Identity\_Length** functions.

If the association request does not request a positive response or if no user identity information was contained in the association request, the **MC\_Accept\_Association** function should be used. When a positive response is requested, the **MC\_Accept\_Association\_With\_Identity** function can be used. If no server response information is required, the *ServerResponse* field can be set to NULL and the *ServerResponseLength* field can be set to 0.

If **MC\_Accept\_Association** returns **MC\_ASSOCIATION\_ABORTED** or **MC\_SYSTEM\_ERROR** no further calls may be made for the association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_NO_REQUEST_PENDING</b>	There are no pending association request for this <i>AssociationID</i> .
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted.

### See Also

<b>MC_Wait_For_Association</b>	<b>MC_Get_Association_Info</b>	<b>MC_Get_User_Identity_Info</b>
<b>MC_Get_User_Identity_Length</b>	<b>MC_Open_Association_With_Identity</b>	
<b>MC_Wait_For_Secure_Association</b>	<b>MC_Reject_Association</b>	



## MC\_Add\_Nonstandard\_Attribute

Adds a new non-DICOM standard attribute to a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Add_Nonstandard_Attribute (
    int MsgFileItemID,
    unsigned long Tag,
    MC_VR ValueRep
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies this attribute.

*ValueRep* A code identifying the value representation of the attribute. The **MC\_VR** enumerated type is defined in "mc3msg.h".

The valid codes are:  
**AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ**

### Remarks

**MC\_Add\_Nonstandard\_Attribute** adds a nonstandard (and non-private) attribute that does not exist in the DICOM Data Dictionary to an existing message. A message can not have nonstandard attributes and still conform to DICOM. This implies **MC\_Validate\_Message** will return an error when validating a message with nonstandard attributes. This function should only be used in extreme cases: when communicating with non-conformant implementations of DICOM 3.0. Private attributes should be used to extend the standard, not nonstandard attributes.

Because nonstandard attributes are not defined in the Data Dictionary, you must supply the Value Representation code: *ValueRep*. If, however, an attempt is made to add an attribute which is in the Data Dictionary, an error status will be returned.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The attribute with an ID of <i>Tag</i> is a standard attribute found in the Data Dictionary. Instead, use <b>MC_Add_Standard_Attribute</b> .
<b>MC_TAG_ALREADY_EXISTS</b>	The message already contains an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_VR_CODE</b>	<i>ValueRep</i> is invalid.

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID, or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Private_Block</b>	<b>MC_Delete_Private_Block</b>
	<b>MC_Delete_Range</b>

## MC\_Add\_Private\_Attribute

Adds a private DICOM attribute to a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Add_Private_Attribute (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_VR ValueRep
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private Group is to "own" the new attribute.
<i>Group</i>	The number identifying the private group. It must be an odd number.
<i>ElementByte</i>	The number identifying this attribute within the private block.
<i>ValueRep</i>	A code identifying the value representation of the attribute. The <b>MC_VR</b> enumerated type is defined in "mc3msg.h". The valid codes are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, SV, UV, AT, SL, UL, FL, FD, OB, OW, OV, OL, OD, OF, SQ</b>

## Remarks

**MC\_Add\_Private\_Attribute** adds an attribute that does not exist in the Data Dictionary (a private attribute) to an existing message. A message can have private attributes and still conform to DICOM, as long as the attributes are not equivalent to and do not replace standard attributes. Private attributes are stored in an odd-number *Group* (the high-order portion of a DICOM tag). An identifying *PrivateCode* must be supplied to differentiate one owner's block of private attributes from another in any given *Group*. Since the attribute is not in the Data Dictionary, it is necessary to supply the value representation of the attribute's values: *ValueRep*.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID, or item object ID.
<b>MC_NOT_FOUND</b>	There is no private block identified by <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> is not an odd number.
<b>MC_INVALID_VR_CODE</b>	<i>ValueRep</i> is invalid.
<b>MC_TAG_ALREADY_EXISTS</b>	The private attribute already exists in the message object.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Nonstandard_Attribute</b>	<b>MC_Delete_Private_Block</b>
	<b>MC_Delete_Range</b>

## MC\_Add\_Private\_Block

Creates a new DICOM private attribute block descriptor in a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Add_Private_Block (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*PrivateCode* The code string which identifies the block which is being added to Group.

*Group* The number identifying the private group. It must be an odd number.

### Remarks

**MC\_Add\_Private\_Block** adds an attribute to a given *Group* to identify a block of private attributes in the group. This must be done before **MC\_Add\_Private\_Attribute** can be used to add attributes for the private block. The first unused tag in the range gggg0010 through gggg00FF will be assigned to this block and given *PrivateCode* as its value (gggg is *Group*).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_GROUP</b>	<i>Group</i> is not an odd number.
<b>MC_INVALID_VR_CODE</b>	<i>ValueRep</i> is invalid.
<b>MC_TOO_MANY_BLOCKS</b>	There already exists the maximum 240 private blocks in the group.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Nonstandard_Attribute</b>	<b>MC_Delete_Private_Block</b>
<b>MC_Delete_Range</b>	

**MC\_Add\_Standard\_Attribute**

Adds a new DICOM standard attribute to a message object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Add_Standard_Attribute (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

**Remarks**

**MC\_Add\_Standard\_Attribute** adds an attribute that exists in the DICOM Data Dictionary (a standard attribute) to an existing message. Adding this attribute may make the message non-conformant to DICOM since all necessary attributes should be determined by the service and command specified in the **MC\_Open\_Message** function. This implies **MC\_Validate\_Message** would report an error when used to validate such a message. This function might be used to construct a message to communicate with another non-conformant application.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_TAG_ALREADY_EXISTS</b>	The message already contains an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_TAG</b>	The Data Dictionary does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_Add_Nonstandard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Private_Block</b>	<b>MC_Delete_Private_Block</b>
<b>MC_Delete_Range</b>	

**MC\_Byte\_To\_Unicode**

A utility function to convert DICOM character set to Unicode.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Byte_To_Unicode (
    char *DefaultCharset,
    const char *Val,
    int InLen,
    int BufferSize,
    int *OutLen,
    MC_Uchar *OutVal
)
```

<i>DefaultCharset</i>	The DICOM specific character set name for the default character set.
<i>Val</i>	Input bytes array
<i>InLen</i>	Input bytes count (excluding NULL terminator)
<i>BufferSize</i>	Output buffer size
<i>OutLen</i>	Output length (returned by this call)
<i>OutVal</i>	Output buffer to hold the Unicode

**Remarks**

**MC\_Byte\_To\_Unicode** requires **MC\_Enable\_Unicode\_Conversion** being called first.

*DefaultCharset* should be set to the first character set of (0008,0005). If set to NULL or empty string, the default ISO-IR 6 (ASCII) will be used.

*InLen* can be set to -1 and the toolkit will calculate length if the input buffer is NULL terminated.

When the return status is **MC\_NORMAL\_COMPLETION**, *OutVal* contains the output Unicode string with U+0000 terminator. *OutLen* contains the number of Unicode characters present in the *OutVal* buffer (excluding the U+0000 terminator).

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_CANNOT_COMPLY</b>	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
<b>MC_BUFFER_TOO_SMALL</b>	The output buffer doesn't have enough space to hold the output.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Byte\_To\_Long\_Unicode**  
**MC\_Unicode\_To\_Byte**  
**MC\_Long\_Unicode\_To\_Byte**  
**MC\_Enable\_Unicode\_Conversion**  
**MC\_Get\_Value\_To\_UnicodeString**  
**MC\_Get\_Next\_Value\_To\_UnicodeString** **MC\_Set\_Value\_From\_UnicodeString**  
**MC\_Set\_Next\_Value\_From\_UnicodeString**

## MC\_Byte\_To\_Long\_Unicode

A utility function to convert large DICOM character set to Unicode string.

### Synopsis

```

#include "mc3msg.h"

MC_STATUS MC_Byte_To_Long_Unicode (
    char *DefaultCharset,
    const char *Val,
    unsigned long long InLen,
    unsigned long long BufferSize,
    unsigned long long *OutLen,
    MC_Uchar *OutVal
)

```

<i>DefaultCharset</i>	The DICOM specific character set name for the default character set.
<i>Val</i>	Input bytes array
<i>InLen</i>	Input bytes count (excluding NULL terminator)
<i>BufferSize</i>	Output buffer size
<i>OutLen</i>	Output length (returned by this call)
<i>OutVal</i>	Output buffer to hold the Unicode

### Remarks

**MC\_Byte\_To\_Long\_Unicode** requires **MC\_Enable\_Unicode\_Conversion** being called first.

*DefaultCharset* should be set to the first character set of (0008,0005). If set to NULL or empty string, the default ISO-IR 6 (ASCII) will be used.

*InLen* can be set to -1 and the toolkit will calculate length if the input buffer is NULL terminated.

When the return status is `MC_NORMAL_COMPLETION`, *OutVal* contains the output Unicode string with U+0000 terminator. *OutLen* contains the number of Unicode characters present in the *OutVal* buffer (excluding the U+0000 terminator).

### Return Value

One of these enumerated `MC_STATUS` codes defined in “`mcstatus.h`”:

Value	Meaning
<code>MC_NORMAL_COMPLETION</code>	The function completed normally.
<code>MC_CANNOT_COMPLY</code>	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
<code>MC_BUFFER_TOO_SMALL</code>	The output buffer doesn't have enough space to hold the output.
<code>MC_SYSTEM_ERROR</code>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

`MC_Byte_To_Unicode`

`MC_Unicode_To_Byte`

`MC_Long_Unicode_To_Byte`

`MC_Enable_Unicode_Conversion`

`MC_Get_Value_To_UnicodeString`

`MC_Get_Next_Value_To_UnicodeString` `MC_Set_Value_From_UnicodeString`

`MC_Set_Next_Value_From_UnicodeString`

## MC\_Byte\_Swap\_OBOW

Byte swaps an attribute of value representation OB, OW, or OF.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Byte_Swap_OBOW (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID* The identifier assigned to this object by the `MC_Open_Message`, `MC_Open_Empty_Message`, `MC_Create_File`, `MC_Create_Empty_File`, or `MC_Open_Item` functions.

*Tag* DICOM tag which identifies the attribute to byte swap.

### Remarks

`MC_Byte_Swap_OBOW` byte swaps attributes of value representation OB, OW, or OF.



**MC\_Byte\_Swap\_OBOW** can be of use when encoding or decoding 8-bit pixel data. A discussion of 8-bit pixel data is contained in the *Merge DICOM Toolkit User's Manual*.

When data is OB, no operation is performed, and **MC\_NORMAL\_COMPLETION** is returned.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID, or item object ID.
<b>MC_INVALID_TAG</b>	<i>Tag</i> is not a valid tag in <i>MsgFileItemID</i> .
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_INCOMPATIBLE_VR</b>	The VR of <i>Tag</i> was not OB, OW, OD or OF.
<b>MC_CALLBACK_REGISTERED</b>	This function is not allowed when the <b>MC_Register_Callback_Function</b> function was issued for the same attribute.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Set\_Value\_From\_Function**      **MC\_Get\_Value\_To\_Function**

## MC\_Cleanup\_Memory

Releases memory allocated but not in use by the Merge DICOM Toolkit library.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Cleanup_Memory (
    int Timeout
)
```

*Timeout*      Maximum time, in seconds, that this function should attempt to cleanup memory.

### Remarks

**MC\_Cleanup\_Memory** allows an application to reduce the amount of memory consumed by the toolkit. The Merge toolkit uses an internal memory management system to increase performance. This increase in performance is at the expense of keeping allocated memory block available by not freeing them to the operating system. This call allows memory blocks not in use to be returned to the operating system.

This call can take a significant amount of time if a large amount of memory is to be freed. The timeout can be used to make incremental improvements in the memory usage. Calls to this function pick up where the previous call left off. If the timeout expires before the function is complete, MC\_TIMEOUT is returned

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	Call made prior to library initialization
<b>MC_TIMEOUT</b>	The timeout expired before the entire cleanup was finished.
<b>MC_VALUE_OUT_OF_RANGE</b>	The timeout was less than 0.

### See Also

## MC\_Clear\_Negotiation\_Info

De-registers extended negotiation information.

**NOTE:** Use of this call is deprecated.

**MC\_Set\_Negotiation\_Info\_For\_Association** and setting of extended negotiation information through service lists should be used in place of this call and **MC\_Set\_Negotiation\_Info**.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Clear_Negotiation_Info (
    int ApplicationID,
    char *ServiceName
)
```

*ApplicationID*      The identification number for the registered application.

*ServiceName*      The name given to a valid DICOM service.

### Remarks

The DICOM standard allows application entities to exchange “extended negotiation information” when establishing an association. The contents of the negotiation information must be known to both the association requestor application and the association acceptor application. Such extended negotiation is not often used for DICOM services, but some services may require it.

**MC\_Set\_Negotiation\_Info** allows the caller to supply Merge DICOM Toolkit with extended negotiation information which it will use when establishing associations.

When a **MC\_Open\_Association**, **MC\_Open\_Association\_With\_Identity** or **MC\_Open\_Secure\_Association** call is made, Merge DICOM Toolkit sends any registered extended

negotiation information to the association acceptor. The acceptor normally returns an updated version of the negotiation information which can be accessed using the **MC\_Get\_Negotiation\_Info** call.

When a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call is made, Merge DICOM Toolkit stores any received extended negotiation information. This information may be accessed using the **MC\_Get\_Negotiation\_Info** call. **MC\_Set\_Negotiation\_Info** may be used to “update” the extended negotiation information before calling **MC\_Accept\_Association** to accept the association. Merge DICOM Toolkit will return any registered negotiation information to the remote application.

**MC\_Clear\_Negotiation\_Info** is used to remove extended information previously registered for a service using the **MC\_Set\_Negotiation\_Info** call.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> is not a valid application identifier.
<b>MC_NULL_POINTER_PARM</b>	<i>ServiceName</i> was NULL.
<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files.
<b>MC_NO_INFO_REGISTERED</b>	There was no extended negotiation information registered for <i>ServiceName</i> for this application.

### See Also

**MC\_Get\_Negotiation\_Info**  
**MC\_Set\_Negotiation\_Info\_For\_Association**  
**MC\_Set\_Negotiation\_Info**

## MC\_Close\_Association

Gracefully shuts down an open association with a remote DICOM application.

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Close_Association (
    int *AssociationID
)
```

*AssociationID* The identifier assigned to this object by the **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.

### Remarks

**MC\_Close\_Association** gracefully shuts down the association connection and releases system resources used by the association. This function is used to end an association which has proceeded with no errors.

It is the responsibility of the requester of an association (client) to close a DICOM association. If a service provider (server) cannot proceed with the association it should use **MC\_Abort\_Association** to terminate the association. The service user (client) uses **MC\_Close\_Association** for normal association completion, or **MC\_Abort\_Association** if an error situation occurs.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>AssociationID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	* <i>AssociationID</i> is not a valid association object ID.
<b>MC_ASSOCIATION_ABORTED</b>	There was an error while closing the association. Error message logged.

### See Also

**MC\_Abort\_Association**  
**MC\_Open\_Association**  
**MC\_Open\_Secure\_Association**  
**MC\_Wait\_For\_Association**  
**MC\_Wait\_For\_Secure\_Association**

## MC\_Close\_Encapsulated\_Value

Terminates an encapsulated value by placing the end delimiter in the stream.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Close_Encapsulated_Value (
    int MsgFileItemID
    unsigned long Tag
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	The attribute which contains encapsulated data, but no end delimiter.

### Remarks

**MC\_Close\_Encapsulated\_Value** places an end delimiter for encapsulated data. This should only be done when at least **MC\_Set\_Encapsulated\_Value\_From\_Function** has been used to store encapsulated data in the message for the attribute, and can also be used after **MC\_Set\_Next\_Encapsulated\_Value\_From\_Function**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .

### See Also

**MC\_Set\_Encapsulated\_Value\_From\_Function**  
**MC\_Set\_Next\_Encapsulated\_Value\_From\_Function**

## MC\_Close\_Listen\_Port MC\_Close\_Listen\_Port\_On\_Address

Stops listening for incoming DICOM connections on a port

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Close_Listen_Port (
    int Port
)

MC_STATUS MC_Close_Listen_Port_On_Address (
    int Port
    const char *Address
)
```

<i>Port</i>	Listen port opened by a call to <b>MC_Wait_For_Association</b> , <b>MC_Wait_For_Association_On_Port</b> , <b>MC_Wait_For_Association_On_Address</b> , <b>MC_Wait_For_Connection</b> , <b>MC_Wait_For_Connection_On_Port</b> , <b>MC_Wait_For_Connection_On_Address</b> , <b>MC_Wait_For_Secure_Association</b> , <b>MC_Wait_For_Secure_Association_On_Port</b> or <b>MC_Wait_For_Secure_Association_On_Address</b> function.
<i>Address</i>	The network name or IP address of the network interface on which the listener was started by a call to <b>MC_Wait_For_Association_On_Address</b> , <b>MC_Wait_For_Connection_On_Address</b> or <b>MC_Wait_For_Secure_Association_On_Address</b> function, exactly as passed to those functions.

### Remarks

**MC\_Close\_Listen\_Port** causes Merge DICOM Toolkit to stop listening for incoming DICOM associations on a TCP/IP listen port. The port may be the default listen port as configured by the `TCPIP_LISTEN_PORT` option from **MC\_Wait\_For\_Association**, **MC\_Wait\_For\_Connection** or **MC\_Wait\_For\_Secure\_Association**. It may also be a listen port specified in a call to the **MC\_Wait\_For\_Association\_On\_Port**, **MC\_Wait\_For\_Connection\_On\_Port**, or **MC\_Wait\_For\_Secure\_Association\_On\_Port** functions. If a specific network interface was specified for the listener via a call to **MC\_Wait\_For\_Association\_On\_Address**, **MC\_Wait\_For\_Connection\_On\_Address** or **MC\_Wait\_For\_Secure\_Association\_On\_Address**, **MC\_Close\_Listen\_Port\_On\_Address** should be used to stop the listener.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “`mcstatus.h`”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_INVALID_PORT_NUMBER</b>	<i>Port</i> is not a valid listen port.

### See Also

<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Association_On_Port</b>
<b>MC_Wait_For_Connection</b>	<b>MC_Wait_For_Connection_On_Port</b>
<b>MC_Wait_For_Secure_Association</b>	<b>MC_Wait_For_Association_On_Address</b>
<b>MC_Wait_For_Connection_On_Address</b>	
<b>MC_Wait_For_Secure_Association_On_Port</b>	
<b>MC_Wait_For_Secure_Association_On_Address</b>	

## MC\_Continue\_Read\_Message

Continues the reading of the current message that arrived from the remote application up until the end of the message. Continuing requires that a previous **MC\_Read\_Message\_To\_Tag** or **MC\_Continue\_Read\_Message\_To\_Tag** function was called.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Continue_Read_Message (
    int AssociationID,
    int *MessageID,
)
```

*AssociationID*      The association object's identification number.

*MessageID*          The ID of the message to be continued up until *StopTag*.

### Remarks

**MC\_Continue\_Read\_Message** reads from after previous stop tag, up to the end of the message.

The message passed in must have been previously read with **MC\_Read\_Message\_To\_Tag**, or **MC\_Continue\_Read\_Message\_To\_Tag** with a stop tag less than (FFFF,FFFF).

**MC\_Read\_Message\_To\_Tag**, or **MC\_Read\_Message** may be used immediately following this function to receive a new message from the remote application.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.

**MC\_INVALID\_MESSAGE\_RECEIVED** An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Read\_Message**                      **MC\_Continue\_Read\_Message\_To\_Tag**  
**MC\_Read\_Message\_To\_Tag**          **MC\_Continue\_Read\_Message\_To\_Stream**

## MC\_Continue\_Read\_Message\_To\_Stream

Continues the reading of the current message that arrived from the remote application to a callback function. Continuing requires that a previous **MC\_Read\_Message\_To\_Tag** or **MC\_Continue\_Read\_Message\_To\_Tag** function was called.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Continue_Read_Message_To_Stream (
    int AssociationID,
    int *MessageID,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number.
<i>MessageID</i>	The ID of the message to be continued.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to provide blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void* CUserInfo,
    int CBdataSize,
    void* CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CUserInfo</i>	Address of data which is being passed from the <b>MC_Continue_Read_Message_To_Stream</b> function. This may be NULL.



<i>CBdataSize</i>	The number of bytes of stream data being provided to you in <i>CbdataBuffer</i> .
<i>CBdataBuffer</i>	The buffer containing stream data from the message object.
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

### Remarks

**MC\_Continue\_Read\_Message\_To\_Stream** reads from after previous stop tag until the end of the message. The message passed in must have been read with **MC\_Read\_Message\_To\_Tag**, or **MC\_Continue\_Read\_Message\_To\_Tag**.

**MC\_Continue\_Read\_Message\_To\_Stream** can be used to increase performance by not having Merge DICOM Toolkit process a message and pass it directly to disk as it is being read off of the network. The **MC\_Read\_Message\_To\_Tag** can be used to get basic information about the message such as the SOP Instance UID of the message from the Affected SOP Instance UID tag or the SOP Class UID of the message from the Affected SOP Class UID tag. The transfer syntax that the message is encoded in can be determined from the **MC\_Get\_Message\_Transfer\_Syntax** function after the message has been initially read with **MC\_Read\_Message\_To\_Tag**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID or <b>MC_Read_Message_To_Tag</b> was not called for <i>MessageID</i> .
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_STATE_VIOLATION</b>	<i>AssociationID</i> is not a valid association that has been accepted.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<u>The association is dropped if any of the following are returned:</u>	
<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.

**MC\_INVALID\_MESSAGE\_RECEIVED** An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_CALLBACK\_CANNOT\_COMPLY** *YourReceiveStreamFunction* returned an error.

### See Also

**MC\_Read\_Message**

**MC\_Read\_Message\_To\_Tag**

**MC\_Continue\_Read\_Message**

**MC\_Get\_Message\_Transfer\_Syntax**

## MC\_Continue\_Read\_Message\_To\_Tag

Continues the reading of the current message that arrived from the remote application up to and including the specified tag. Continuing requires that a previous **MC\_Read\_Message\_To\_Tag** or **MC\_Continue\_Read\_Message\_To\_Tag** function was called.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Continue_Read_Message_To_Tag (
    int AssociationID,
    unsigned long StopTag,
    int *MessageID,
)
```

*AssociationID*      The association object's identification number.

*StopTag*            The tag to stop a read from the remote application.

*MessageID*         The ID of the message to be continued up until *StopTag*.

### Remarks

**MC\_Continue\_Read\_Message\_To\_Tag** reads from after previous stop tag, up to and including *StopTag*.

The message passed in must have been read with **MC\_Read\_Message\_To\_Tag**, or **MC\_Continue\_Read\_Message\_To\_Tag** with a stop tag less than *StopTag*.

The message returned must be read until the last tag (FFFF,FFFF) either explicitly with **MC\_Continue\_Read\_Message\_To\_Tag**, or by calling **MC\_Continue\_Read\_Message** before using **MC\_Read\_Message\_To\_Tag**, or **MC\_Read\_Message** again.

**MC\_Continue\_Read\_Message\_To\_Tag** may be called multiple times with increasing stop tags.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.

<b>MC_INVALID_TAG</b>	<i>StopTag</i> was within the command set (less than (0001,0000)), or the tag requested has already been read in.
<b>MC_MUST_CONTINUE_BEFORE_READING</b>	A previous message was not finished before this call
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Read_Message</b>	<b>MC_Read_Message_To_Tag</b>
<b>MC_Continue_Read_Message</b>	
<b>MC_Continue_Read_Message_To_Stream</b>	

## MC\_Create\_Empty\_File

Creates a new empty file object

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Create_Empty_File (
    int *FileIDPtr,
    char *Filename
)
```

*FileIDPtr*      Upon successful completion, the file object identifier is returned here.

*Filename*      String filename to be associated with this file object.

### Remarks

The **MC\_Create\_Empty\_File** function creates a "file object" which contains no attributes. The resulting file object is given an identification number which is returned in *\*FileIDPtr*. All functions dealing with this file must provide this file ID number.

The opened file object is not associated with any particular DICOM service or command. If the file object is going to be converted to a message and sent to a network partner, or if **MC\_Validate\_File** is to be called for the file object, **MC\_Set\_Service\_Command** must be called first to associate the file object with a given DICOM service and command.

If a file is opened using **MC\_Create\_Empty\_File**, it is not necessary to add attributes to the file object before setting attribute values. If one of the set value functions (e.g. **MC\_Set\_Value\_From\_String**) is used for an attribute, the attribute will automatically be added to the file object before the value is set.

**NOTE:** This is not the case if a file object is opened with **MC\_Create\_File** or if **MC\_Set\_Service\_Command** is called for the file. In these cases, the file is associated with a given service/command pair and attributes other than those associated with that service and command must be explicitly added to the file before setting values for the added attributes

If a file object generated by this function is to be used as a DICOMDIR, the **MC\_Set\_Service\_Command** function must be called for the object in order for the **MC\_Dir\_...** functions to work.

**NOTE:** **MC\_Set\_Service\_Command** will not parse attributes contained in a file object. If directory records are contained in a file created with **MC\_Create\_Empty\_File** and **MC\_Set\_Service\_Command** is called on the object, the **MC\_Dir\_...** functions will not recognize the directory records.

The DICOM file prefix for the new file object is set to "DICM". All bytes in the file preamble are set to 00H.

Reference the "DICOM V3.0 Standard, Final Text - October 29, 1993" for more information about commands associated with messages and files.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>FileIDPtr</i> or <i>Filename</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment.

### See Also

<b>MC_Create_File</b>	<b>MC_Open_Message</b>
<b>MC_Open_Item</b>	<b>MC_Reset_Filename</b>

## MC\_Create\_File

Creates a new file object

## Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Create_File (
    int *FileIDPtr,
    char *Filename,
    char *ServiceName,
    MC_COMMAND Command
)
```

*FileIDPtr* Upon successful completion, the file object identifier is returned here.

*Filename* Filename associated with file object.

*ServiceName* String name of a DICOM service to be associated with this message object. Name are found in the file mergecom.srv.

*Command* The **MC\_COMMAND** enumerated values are defined in "mc3msg.h".

## Remarks

The **MC\_Create\_File** function creates a "file object" which contains all the attributes of a DICOM file which will be used for the given *ServiceName* and *Command*. The resulting file object is given an identification number which is returned in *\*FileIDPtr*. All functions dealing with this file must provide this file ID number. The *ServiceName* and *Command* are used to access configuration information which describes the attributes of the file. If such configuration information is not available, an empty file object is created and a warning message is logged.

This function can also be used to create a DICOMDIR object. When the service is set for a DICOMDIR, Merge DICOM Toolkit creates the internal data structures needed to manipulate a DICOMDIR. An empty root directory entity is created in the new DICOMDIR object and the root directory record offset attributes are initialized.

**MC\_Create\_File** generates in each file object created the DICOM File Meta Information attributes used by DICOM media services. The user is responsible for filling in these attributes. The DICOM prefix for the file is set to "DICM". All bytes in the file preamble are set to 00H.

**MC\_Create\_Empty\_File** should be used if the service and command are not yet known, or if there is no need to validate that values will be set only for attributes assigned to a given service/command pair.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>FileIDPtr</i> , <i>Filename</i> , or <i>ServiceName</i> parameter was NULL.
<b>MC_INVALID_COMMAND</b>	<i>Command</i> is not a supported command.

<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Create_Empty_File</b>	<b>MC_Open_Message</b>
<b>MC_Open_Item</b>	

## MC\_Delete\_Attribute

Removes an attribute from a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Delete_Attribute (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

### Remarks

**MC\_Delete\_Attribute** removes an attribute (standard or nonstandard) from an existing message. Removing this attribute may make the message non-conformant to DICOM since all necessary attributes are determined by the service and command provided by **MC\_Open\_Message**. This implies **MC\_Validate\_Message** might report an error when used to validate such a message. This function could be used to clean up a message from a non-conformant application.

**NOTE:** If the attribute has a value representation of SQ, the item objects identified by the attribute's values are automatically freed (by calling **MC\_Free\_Item**). If the freed item object is in use as a value in any other sequence of items, the value in those sequences is cleared.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .

**MC\_INVALID\_MESSAGE\_ID** *MsgFileItemID* is not a valid message object ID, file object ID or item object ID.

### See Also

**MC\_Add\_Standard\_Attribute**      **MC\_Delete\_Range**  
**MC\_Add\_Private\_Attribute**      **MC\_Delete\_Private\_Attribute**  
**MC\_Add\_Private\_Block**          **MC\_Delete\_Private\_Block**  
**MC\_Add\_Nonstandard\_Attribute**

## MC\_Delete\_Current\_Value

Deletes the current value within an attribute's value list.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Delete_Current_Value (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID*      The identifier assigned to this object by the  
*D*                      **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**,  
                         **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or  
                         **MC\_Open\_Item** functions.

*Tag*                      DICOM tag which identifies the attribute.

### Remarks

The **MC\_Delete\_Current\_Value** function deletes the current value within an attribute's value list. The current value is defined as the last value retrieved with a call to the **MC\_Get\_Next\_Value...** or **MC\_Get\_Value...** functions.

**MC\_Delete\_Current\_Value** will not work with attributes whose value representation is OB, OW, or OF.

**NOTE:**      If the attribute has a value representation of SQ, the item objects identified by the attribute's value are automatically freed (by calling **MC\_Free\_Item**). If the freed item object is in use as a value in other sequence of items, the value in those sequences is cleared.

### Performance Tuning

Calling this function for an attribute that has a large enough value to be stored in a temporary file is not recommended for performance reasons. For this condition, all of the attribute's values are read into memory, the specific value within the attribute is deleted, and the remaining values are re-written to the temporary file.

Reference the "DICOM V3.0 Standard, Final Text - October 29, 1993" for more information about these commands.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NO_MORE_VALUES</b>	There are no more values for this attribute.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The function was called to delete an attribute value whose value representation (VR) was OB, OW, or OF.
<b>MC_NULL_VALUE</b>	The attribute's value was set to NULL.
<b>MC_EMPTY_VALUE</b>	The attribute is empty.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Get\_Value... Functions**

**MC\_Get\_Next\_Value... Functions**

## MC\_Delete\_Private\_Attribute

Removes a private attribute from a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Delete_Private_Attribute (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned short ElementByte
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*PrivateCode* The code string which identifies which block in the private *Group* "owns" the attribute.

*Group* The number identifying the private group. It must be an odd number.

*ElementByte* The number identifying this attribute within the private block.

### Remarks

**MC\_Delete\_Private\_Attribute** deletes an attribute that does not exist in the Data Dictionary (a private attribute) to an existing message. A message can have private attributes and still conform to DICOM, as long as the attributes are not equivalent to and do not replace standard attributes. Private attributes



are stored in an odd-number *Group* (the high-order portion of a DICOM tag). An identifying *PrivateCode* must be supplied to differentiate one owner's block of private attributes from another in any given *Group*. The block number assigned to *PrivateCode* along with the *ElementByte* form the effective tag of the private attribute

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> was NULL.
<b>MC_INVALID_TAG</b>	The private attribute does not exist in the message object.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_NOT_FOUND</b>	The private block identified by <i>PrivateCode</i> was not in <i>Group</i> .

### See Also

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Range</b>
<b>MC_Add_Private_Block</b>	<b>MC_Delete_Private_Block</b>
<b>MC_Add_Nonstandard_Attribute</b>	

## MC\_Delete\_Private\_Block

Removes a private block descriptor and its attributes from a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Delete_Private_Block (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> is to be deleted.
<i>Group</i>	The number identifying the private group. It must be an odd number.

**Remarks**

**MC\_Delete\_Private\_Block** removes a block of private attributes from an existing message. A block of private attributes are all attributes in the private group having the same specified *PrivateCode*. The private block's identification attribute is also removed from the message.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_NOT_FOUND</b>	The private block identified by <i>PrivateCode</i> was not in <i>Group</i>

**See Also**

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Private_Block</b>	<b>MC_Delete_Range</b>
<b>MC_Add_Nonstandard_Attribute</b>	

**MC\_Delete\_Range**

Removes a range of attributes from a message object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Delete_Range (
    int MsgFileItemID,
    unsigned long FirstTag,
    unsigned long LastTag
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>FirstTag</i>	Identifier of the first attribute which is to be removed from the message object.
<i>LastTag</i>	Identifier of the last attribute which is to be removed from the message object.

**Remarks**

**MC\_Delete\_Range** removes a range of attributes (standard or nonstandard) from an existing message. Removing these attributes may make the message non-conformant to DICOM since all necessary attributes are determined by the service and command specified by **MC\_Open\_Message**. All attributes with tags equal to or greater than *FirstTag* and equal to or less than *LastTag* will be removed. *FirstTag* and *LastTag* need not exist in the message.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.

**See Also**

<b>MC_Add_Standard_Attribute</b>	<b>MC_Delete_Attribute</b>
<b>MC_Add_Private_Attribute</b>	<b>MC_Delete_Private_Attribute</b>
<b>MC_Add_Private_Block</b>	<b>MC_Delete_Private_Block</b>
<b>MC_Add_Nonstandard_Attribute</b>	

**MC\_Dir\_Add\_Entity**

Adds a lower level directory entity to a specified DICOMDIR directory record and creates the first directory record in the new directory entity

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Add_Entity (
    int DirID,
    int ItemID,
    char *NewItemName,
    int *NewEntityID,
    int *NewItemID
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>ItemID</i>	The identifier assigned to the record to which the lower level entity is to be added.
<i>NewItemName</i>	String name of the item to be associated with this item object.
<i>NewEntityID</i>	Upon successful completion, the entity object identifier is returned here.
<i>NewItemID</i>	Upon successful completion, the item object identifier of the first directory record in the new entity object is returned here.

**Remarks**

**MC\_Dir\_Add\_Entity** creates a new lower level directory entity referenced by the item object *ItemID*, and places it in the DICOMDIR object identified by *DirID*. **MC\_Dir\_Add\_Entity** creates the first directory record, of type *NewItemName*, within the new directory entity.

The new directory record is placed in *DirID*'s directory record sequence and all internal links to the new entity are adjusted by Merge DICOM Toolkit.

*NewItemName* is used to access configuration information which describes the attributes of the new directory record. If such configuration information is not available, an empty item object is created, and a warning message is logged.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid directory record object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>NewEntityID</i> , <i>NewItemID</i> , or <i>NewItemName</i> parameter was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_LOWER_DIR_RECORD</b>	The directory record type specified by <i>NewItemName</i> is an invalid lower level type for the directory record <i>ItemID</i> .
<b>MC_BAD_DIR_RECORD_TYPE</b>	The directory record type specified in the directory record <i>ItemID</i> is invalid.

**See Also**

**MC\_Dir\_Add\_Record**                      **MC\_Dir\_Delete\_Referenced\_Entity** **MC\_Dir\_First\_Record**  
**MC\_Dir\_Next\_Entity** **MC\_Dir\_Next\_Record**  
**MC\_Dir\_Root\_Entity**

**MC\_Dir\_Add\_Record**

Adds a DICOMDIR directory record to a specified directory entity

**Synopsis**

```
#include "mc3media.h"

MC_STATUS MC_Dir_Add_Record (
    int DirID,
    int EntityID,
```

```

    char *NewItemName,
    int *NewItemID
)

```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>EntityID</i>	The identifier of the directory entity object in which the directory record is being added.
<i>NewItemName</i>	String name of the item to be associated with this item object. See mergecom.srv item table for list of names.
<i>NewItemID</i>	Upon successful completion, the item object identifier of the new directory record is returned here.

### Remarks

**MC\_Dir\_Add\_Record** creates a new directory record of type *NewItemName* and appends it to the end of the entity object specified by *EntityID*. A pointer to the new directory record is returned in *NewItemID*.

The *NewItemName* parameter is used to access configuration information which describes the attributes of the new directory record. If such configuration information is not available, an empty item object is created, and a warning message is logged.

The new directory record is placed in *DirID*'s directory record sequence attribute and all internal links are adjusted by Merge DICOM Toolkit to reflect the new record.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ENTITY_ID</b>	The <i>EntityID</i> value is not a valid entity object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>NewItemID</i> or <i>NewItemName</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_LOWER_DIR_RECORD</b>	The directory record type specified by <i>NewItemName</i> is an invalid lower level type for the parent directory record of <i>EntityID</i> .

**MC\_BAD\_DIR\_RECORD\_TYPE** The directory record type specified in the parent directory record of *EntityID* is invalid.

### See Also

**MC\_Dir\_Add\_Entity**                      **MC\_Dir\_Delete\_Record** **MC\_Dir\_Delete\_Referenced\_Entity**  
**MC\_Dir\_First\_Record** **MC\_Dir\_Next\_Entity**  
**MC\_Dir\_Next\_Record** **MC\_Dir\_Root\_Entity**

## MC\_Dir\_Delete\_Record

Deletes a DICOMDIR directory record and any directory entities it references

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Delete_Record (
    int DirID,
    int ItemID
)
```

*DirID*                      The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

*ItemID*                    The identifier assigned to the record to be deleted.

### Remarks

**MC\_Dir\_Delete\_Record** deletes the directory record pointed to by *ItemID*. The resources allocated to the item are automatically freed. All lower level directory entities referenced by that item are also freed.

If the record is the only entry in a directory entity, the directory entity object will also be deleted. If the deleted record is the last one to point to an MRDR the MRDR will be deleted. The resources allocated to the directory entities and records are automatically freed.

All internal links will be adjusted within the affected directory records by Merge DICOM Toolkit.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid record object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>DirID</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC\_Dir\_Add\_Entity**

**MC\_Dir\_Add\_Record** **MC\_Dir\_Delete\_Referenced\_Entity**  
**MC\_Dir\_First\_Record** **MC\_Dir\_Next\_Entity**  
**MC\_Dir\_Next\_Record**

**MC\_Dir\_Delete\_Referenced\_Entity**

Deletes the lower level directory entity of a specified DICOMDIR directory record

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Delete_Referenced_Entity (
    int DirID,
    int ItemID
)
```

*DirID*            The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

*ItemID*           The identifier assigned to the directory record whose next lower level directory entity is being deleted.

**Remarks**

**MC\_Dir\_Delete\_Referenced\_Entity** deletes the directory record which is referenced by *ItemID*. If the deleted record is the last one to point to a multiple reference directory record (MRDR) the MRDR will be deleted.

If there was no referenced entity for *ItemID*, **MC\_Dir\_Delete\_Referenced\_Entity** will return **MC\_NORMAL\_COMPLETION**.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid record object ID.
<b>MC_INVALID_ENTITY_ID</b>	The <i>EntityID</i> value is not a valid entity object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>DirID</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .

**MC\_SYSTEM\_ERROR** An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Dir\_Add\_Entity**                      **MC\_Dir\_Add\_Record** **MC\_Dir\_Delete\_Record**  
**MC\_Dir\_First\_Record** **MC\_Dir\_Next\_Entity**  
**MC\_Dir\_Next\_Record** **MC\_Dir\_Root\_Entity**

## MC\_Dir\_Entity\_Count

Returns a count of the number of items contained within a particular DICOMDIR entity.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Entity_Count (
    int DirID,
    int EntityID,
    int *Count
)
```

*DirID*                      The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

*EntityID*                      The identifier assigned to the DICOMDIR entity which is going to be counted.

*Count*                      Upon successful completion, the number of items contained within a particular entity is returned here.

### Remarks

The count returned by **MC\_Dir\_Entity\_Count** is maintained internally whenever items and entities are added or deleted from a DICOMDIR. Because this count is maintained internally, there is no performance penalty associated with this function call. The entity referenced by *EntityID* can be obtained by a call to **MC\_Dir\_Add\_Entity**, **MC\_Dir\_Next\_Entity**, **MC\_Dir\_First\_Record**, **MC\_Dir\_Next\_Record**, or **MC\_Dir\_Root\_Entity**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid directory record object ID.
<b>MC_INVALID_ENTITY_ID</b>	The <i>EntityID</i> value is not a valid DICOMDIR entity object ID.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	The <i>DirID</i> value does not contain a reference to a valid root item.



<b>MC_NULL_POINTER_PARM</b>	The <i>Count</i> parameter was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Dir\_Root\_Count**

**MC\_Dir\_Item\_Count**

## MC\_Dir\_First\_Record

Retrieve a pointer to the first directory record in a DICOMDIR directory entity

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_First_Record (
    int DirID,
    int EntityID,
    int *ItemID,
    char **ItemName,
    int *IsLast
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>EntityID</i>	The identifier assigned to this directory entity object.
<i>ItemID</i>	Upon successful completion, the item object identifier of the first directory record in the directory entity <i>EntityID</i> is returned here.
<i>ItemName</i>	Upon successful completion, a pointer to the string name of the item associated with this item object is returned here.
<i>IsLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the first record is also the last record in the directory entity (i.e., it is the only element)

### Remarks

**MC\_Dir\_First\_Record** retrieves the identifier of the first directory record in the directory entity *EntityID*.

The item type for *ItemID* is also returned in the parameter *ItemName*. This item type can be used to create another record with **MC\_Dir\_Add\_Record** or a new record in a new entity with **MC\_Dir\_Add\_Entity**.

If *EntityID* is an empty root directory entity, *\*IsLast* is set to non-zero, *ItemID* is set to 0 and *ItemName* is set to NULL.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ENTITY_ID</b>	The <i>EntityID</i> value is not a valid entity object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>ItemID</i> , <i>ItemName</i> , or <i>IsLast</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .
<b>MC_EMPTY_ROOT_ENTITY</b>	The entity requested is empty.

**See Also**

**MC\_Dir\_Next\_Entity**                      **MC\_Dir\_Next\_Record** **MC\_Dir\_Root\_Entity**

**MC\_Dir\_Item\_Count**

Returns a count of the number of items contained "below" a particular DICOMDIR item, including the starting item.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Item_Count (
    int DirID,
    int ItemID,
    int *Count
)
```

*DirID*                      The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

*ItemID*                    The identifier assigned to the DICOMDIR item the counting process is starting from.

*Count*                     Upon successful completion, the number of items contained "below" a particular item is returned here.

**Remarks**

The count returned by **MC\_Dir\_Item\_Count** is computed during this function call. Because this count is generated on the fly, there is a performance penalty associated with this function call. During this function call, each entity referenced by the given item is traversed, and the total number of items is generated.

The item referenced by *ItemID* can be obtained by a call to **MC\_Dir\_Add\_Record**, **MC\_Dir\_First\_Record** or **MC\_Dir\_Next\_Record**.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid directory record object ID.
<b>MC_INVALID_ENTITY_ID</b>	The <i>EntityID</i> value is not a valid DICOMDIR entity object ID.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	The <i>DirID</i> value does not contain a reference to a valid root item.
<b>MC_NULL_POINTER_PARM</b>	The <i>Count</i> parameter was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

**MC\_Dir\_Root\_Count**

**MC\_Dir\_Entity\_Count**

## MC\_Dir\_Next\_Entity

Retrieves a pointer to the next lower directory entity linked to a specified DICOMDIR directory record

## Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Next_Entity (
    int DirID,
    int ItemID,
    int *NextEntityID,
    int *NextItemID,
    char **NextItemName,
    int *IsLast
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>ItemID</i>	The item object identifier of the directory record to retrieve the next lower directory entity from.
<i>NextEntityID</i>	Upon successful completion, the entity object identifier of the next lower directory entity referenced by <i>ItemID</i> is returned here.
<i>NextItemID</i>	Upon successful completion, the item object identifier of the first directory record in the directory entity <i>NextEntityID</i> is returned here.

---

<i>NextItemName</i>	Upon successful completion, a pointer to the string name of the item associated with the item object <i>NextItemID</i> is returned here.
<i>IsLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the first record in the directory entity <i>NextEntityID</i> is also the last record (i.e., it is the only element)

### Remarks

**MC\_Dir\_Next\_Entity** returns *NextEntityID*, the entity object identifier of the next lower directory entity linked to *ItemID*, and the identifier *NextItemID* and type *NextItemName* of the first directory record of *NextEntityID*.

The item type for *NextItemID* is also returned in *NextItemName*. This item type can be used to create another record with **MC\_Dir\_Add\_Record** or a new record in a new entity with **MC\_Dir\_Add\_Entity**

If *ItemID* does not contain a referenced entity, *NextEntityID* and *NextItemID* are set to zero, and *ItemName* is set to NULL.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>NextEntityID</i> , <i>NextItemID</i> , or <i>NextItemName</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .

## See Also

**MC\_Dir\_First\_Record**                      **MC\_Dir\_Next\_Record** **MC\_Dir\_Root\_Entity**

## MC\_Dir\_Next\_Record

Retrieves the next directory record in a directory entity

## Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Next_Record (
    int DirID,
    int EntityID,
    int *ItemID,
    char **ItemName,
    int *IsLast
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>EntityID</i>	The identifier assigned to this directory entity object.
<i>ItemID</i>	Upon successful completion, the item object identifier of the directory record is returned here.
<i>ItemName</i>	Upon successful completion, a pointer to the string name of the item associated with the item object <i>ItemID</i> is returned here.
<i>IsLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the retrieved directory record is the last record in <i>EntityID</i> .

**Remarks**

**MC\_Dir\_Next\_Record** retrieves the next directory record in the directory entity specified by *EntityID*. If no records have been fetched from this entity, **MC\_Dir\_Next\_Record** behaves the same as **MC\_Dir\_First\_Record**. If one or more records have been fetched from this entity, the next record will be returned.

*IsLast* is nonzero if the retrieved directory record is the last record in *EntityID*. If **MC\_Dir\_First\_Record** is called after the last record was retrieved, *IsLast* will be non-zero, *ItemID* will be set to 0, and *ItemName* will be NULL. If *EntityID* is an empty root directory entity, *IsLast* will be non-zero, *ItemID* will be set to 0, and *ItemName* will be NULL.

The first call to **MC\_Dir\_Next\_Record** after **MC\_Dir\_Root\_Entity** or **MC\_Dir\_Next\_Entity** was called for *EntityID* will return the second record in *EntityID*.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item or record object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>ItemID</i> , <i>ItemName</i> , or <i>isLast</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .

**See Also**

**MC\_Dir\_First\_Record**                      **MC\_Dir\_Next\_Entity** **MC\_Dir\_Root\_Entity**

**MC\_Dir\_Open\_MRDR**

Creates a DICOMDIR multiple reference directory record (MRDR) and references it with a directory record

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Open_MRDR (
    int DirID,
    int ItemID,
    char *MrdrName,
    int *MrdrID
)
```

*DirID*                      The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

<i>ItemID</i>	The identifier of the directory record that will reference the MRDR.
<i>MrdrName</i>	The string name of the item to be associated with the MRDR.
<i>MrdrID</i>	Upon successful completion, the item object identifier of the MRDR created will be returned here.

### Remarks

**MC\_Dir\_Open\_MRDR** creates a new MRDR and associates it with the directory record specified by *ItemID*. The use count attribute of the MRDR is initialized and the internal links are adjusted by Merge DICOM Toolkit. To remain DICOM conformant, the parameter *MrdrName* should always be the default data dictionary name for an MRDR item.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item or record object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>MrdrID</i> or <i>MrdrName</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by <i>DirID</i> .
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Dir\_Reference\_MRDR**                      **MC\_Dir\_Remove\_Ref\_MRDR**

## MC\_Dir\_Reference\_MRDR

Causes a DICOMDIR directory record to reference a multiple reference directory record (MRDR)

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Reference_MRDR (
    int DirID,
    int ItemID,
    int MrdrID
)
```

*DirID*                      The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

<i>ItemID</i>	The item object identifier of the directory record that will reference the MRDR.
<i>MrdrID</i>	The identifier of the MRDR that <i>ItemID</i> will reference.

### Remarks

**MC\_Dir\_Reference\_MRDR** references an MRDR with a standard directory record. Merge DICOM Toolkit adjusts the use count attribute of the MRDR and the internal links within the affected directory records. The user is responsible for filling the other attributes within the MRDR and the directory record *ItemID*.

If *ItemID* already references another MRDR, **MC\_Dir\_Reference\_MRDR** deletes that reference.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item object ID.
<b>MC_INVALID_MRDR_ID</b>	The <i>MrdrID</i> value is not a valid MRDR object ID.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Dir\_Open\_MRDR**

**MC\_Dir\_Remove\_Ref\_MRDR**

## MC\_Dir\_Remove\_Ref\_MRDR

Removes a reference from a DICOMDIR directory record to a multiple reference directory record (MRDR)

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Remove_Ref_MRDR (
    int DirID,
    int ItemID
)
```

*DirID* The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

*ItemID* The item object identifier of the directory record that the reference to an MRDR will be removed from.



**Remarks**

**MC\_Dir\_Remove\_Ref\_MRDR** removes the reference from a directory record to an MRDR. Merge DICOM Toolkit decrements the use count attribute of the MRDR. If the use count equals zero, the MRDR will be automatically freed.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item or record object ID.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC\_Dir\_Open\_MRDR****MC\_Dir\_Reference\_MRDR****MC\_Dir\_Root\_Count**

Returns the total number of items contained within a DICOMDIR.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Root_Count (
    int DirID,
    int *Count
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>Count</i>	Upon successful completion, the total number of items contained with a DICOMDIR is returned here.

**Remarks**

The count returned by **MC\_Dir\_Root\_Count** is maintained internally whenever items and entities are added or deleted from a DICOMDIR. Because this count is maintained internally, there is no performance penalty associated with this function call.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	The <i>DirID</i> value does not contain a reference to a valid root item.
<b>MC_NULL_POINTER_PARM</b>	The <i>Count</i> parameter was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Dir\_Entity\_Count**

**MC\_Dir\_Item\_Count**

## MC\_Dir\_Root\_Entity

Retrieves a pointer to the root entity of a specified DICOMDIR

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Root_Entity (
    int DirID,
    int *RootEntityID,
    int *ItemID,
    char **ItemName,
    int *IsLast
)
```

<i>DirID</i>	The identifier assigned to this DICOMDIR object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>RootEntityID</i>	Upon successful completion, the root entity object identifier is returned here.
<i>ItemID</i>	Upon successful completion, the item object identifier of the first directory record in the root entity is returned here.
<i>ItemName</i>	Upon successful completion, a pointer to the string name of the item associated with the item object <i>ItemID</i> is returned here.
<i>IsLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the first record in the directory entity <i>RootEntityID</i> is also the last record (i.e., it is the only element)

### Remarks

**MC\_Dir\_Root\_Entity** returns the identifier of the root entity of the DICOMDIR. It also returns the identifier, *ItemID*, and type, *ItemName*, of the first directory record in *RootEntityID*.

The item type returned in *ItemName* can be used to create another record with **MC\_Dir\_Add\_Record** or a new record in a new entity with **MC\_Dir\_Add\_Entity**. If the root entity is empty, *ItemID* is set to zero, and *ItemName* is set to NULL.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>RootEntityID</i> , <i>ItemID</i> , or <i>ItemName</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.

### See Also

**MC\_Dir\_First\_Record**

**MC\_Dir\_Next\_Entity MC\_Dir\_Next\_Record**

## MC\_Dir\_Sort

Sorts a DICOMDIR. See remarks section for specific ordering.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Sort (
    int DirID
)
```

*DirID*                      The ID number of a DICOMDIR to sort

### Remarks

Each DICOMDIR Entity will first sort by record type in the following order:

- PATIENT
- STUDY
- SERIES
- IMAGE
- OVERLAY
- MODALITY LUT
- VOI LUT
- CURVE
- TOPIC
- VISIT
- RESULTS
- INTERPRETATION
- STUDY COMPONENT

---

STORED PRINT  
RT DOSE  
RT STRUCTURE SET  
RT PLAN  
RT TREAT RECORD  
PRESENTATION  
WAVEFORM  
SR DOCUMENT  
PRIVATE  
MRDR

Within each record type the record entries shall be sorted in the in the following order:

**PATIENT**

Sorted first by Patient Name (0010,0010) ascending alphabetically if present

If Patient Name not present these records shall be placed at the end of the list.

Second the records within each unique patient name shall be sorted by the Patient ID.

**STUDY**

Sorted first by Study Date ascending

Sorted second by Study Time ascending within each Study Date

**SERIES**

Sorted first by Modality ascending alphabetically.

Sorted within each unique Modality by series number.

**IMAGE**

Sorted by instance number.

**OVERLAY**

Sorted by overlay number.

**MODALITY LUT**

Sorted by Lookup table number.

**VOI LUT**

Sorted by lookup table number.

**CURVE**

Sorted by curve number.

**TOPIC**

---

Sorted by Topic Title

VISIT

Sorted by Admitting Date if present. Those records without an admitting date shall be grouped as entered by the application as the end of the list.

RESULTS

Instance Creation Date if present. Those records without an instance creation date will be placed at the end of the list in the order as supplied by the application.

INTERPRETATION

Sorted by the Interpretation transcription date.

STUDY COMPONENT

Shall be sorted by Modality

STORED PRINT

Sorted by Instance Number if present.

RT DOSE

Sorted by Instance Number

RT STRUCTURE SET

Sorted by Instance Number

RT PLAN

Sorted by Instance Number

RT TREAT RECORD

Sorted by Instance Number

PRESENTATION

First sorted by Presentation Creation Date ascending

Second sorted by Presentation Creation Time ascending within each unique date

WAVEFORM

Sorted first sorted by Content Date ascending.

Second sorted by Content Time ascending within each unique Content Date.

SR DOCUMENT

Sorted first sorted by Content Date ascending.

Second sorted by Content Time ascending within each unique Content Date.

---

Sorted third by Instance number.

PRIVATE  
Not Sorted

MRDR  
Not Sorted.

Calls to the library to retrieve records will receive them in sorted order after calling this function. Also, when the DICOMDIR is written to a file, the records will be streamed sorted, depth first. The sort is not maintained if new items are added.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_INVALID_DICOMDIR_ID</b>	<i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_LOWER_DIR_RECORD</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an invalid item ID contained in a lower-level directory entity attribute.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
<b>MC_VALUE_OUT_OF_RANGE</b>	While trying to traverse the DICOMDIR object pointed to by <i>DirID</i> , Merge DICOM Toolkit found an item ID that contained an attribute with an invalid value.
<b>MC_SYSTEM_ERROR</b>	An unrecoverable error occurred (i.e. no memory available, no disk space, etc). A log has been written to the log file describing the problem.

### MC\_Dir\_Stream\_Directory\_Record

Stores a DICOMDIR directory record internally in stream format to reduce memory usage.

#### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Dir_Stream_Directory_Record (
    int DirID,
    int ItemID
)
```

*DirID*                    The identifier assigned to this DICOMDIR object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** functions.

---

*ItemID* The item object identifier of the directory record whose storage method will be changed.

### Remarks

**MC\_Dir\_Stream\_Directory\_Record** changes the internal method for storing a directory record. When called, Merge DICOM Toolkit changes the storage method for the specified directory record to a DICOM byte stream instead of Merge DICOM Toolkit's internal structure. Storing as a DICOM byte stream reduces the memory required by Merge DICOM Toolkit. This can be especially useful when creating and working with large DICOMDIRs.

When a directory record is stored as a DICOM byte stream, Merge DICOM Toolkit will automatically change it back to its internal format if a tag is accessed within the directory record.

When reading a DICOMDIR from disk, the **DICOMDIR\_STREAM\_STORAGE** configuration option can also be used to change how directory records are stored. When enabled, this option will force all directory records in a DICOMDIR to be stored as a DICOM byte stream. .

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>DirID</i> value is not a valid DICOMDIR object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item or record object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_Duplicate\_Message

Creates a message identical to the source message. If the transfer syntax on the destination differs from the source, the new message will be changed to the new transfer syntax. This includes changing from one compression transfer syntax to another. This function will also register the compressor/decompressor with the new message.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Duplicate_Message (
    int SourceMsgID,
    int *DestMsgID,
    TRANSFER_SYNTAX DestMsgTransferSyntax,
    MC_STATUS (*YourDestMsgCompressionCallback),
    MC_STATUS (*YourDestMsgDecompressionCallback)
)
```

---

<i>SourceMsgID</i>	The identifier assigned to the source message by the <code>MC_Open_Message</code> or <code>MC_Open_Empty_Message</code> function.
<i>DestMsgID</i>	Upon successful completion, the message object identifier is returned here.
<i>DestMsgTransferSyntax</i>	The DICOM transfer syntax to be used for the destination message. One of the enumerated <code>TRANSFER_SYNTAX</code> types defined in “ <code>mc3msg.h</code> ”.
<i>YourDestMsgCompressionCallback</i>	Name of a function to be registered as the Compression callback function for the destination message. To use the built in compressor, set this to <b>MC_Standard_Compressor</b> . To use the build in RLE compressor, set this to <b>MC_RLE_Compressor</b> .
<i>YourDestMsgDecompressionCallback</i>	Name of a function to be registered as the Decompression callback function for the destination message. To use the built in decompressor, set this to <b>MC_Standard-Decompressor</b> . To use the built in RLE decompressor, set this to <b>MC_RLE-Decompressor</b> .

The functions must be prototyped as follows:

```
MC_STATUS YourDestMsg (De) CompressionCallback (
    int CBmsgID,
    void** CBcontext,
    unsigned long CBdataLength,
    void* CBdataValue,
    unsigned long* CBoutdataLength,
    void** CBoutdataValue,
    int CBisFirst,
    int CBisLast
    int CBrelease
)
```

<i>CBmsgID</i>	The identifier assigned to this message object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> functions.
<i>CBcontext</i>	A data structure that contains user data and has to be preserved between compression calls. The first call to the callback function should initialize this structure.
<i>CBdataLength</i>	The length of the incoming data pointed to by <code>CBdataValue</code> .
<i>CBdataValue</i>	Pointer to incoming data.



---

<i>CBoutdataLength</i>	The length of the outgoing data pointed to by <i>CBoutdataValue</i> .
<i>CBoutdataValue</i>	Pointer to the outgoing data.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <b><i>YourDestMsg(De)CompressionCallback</i></b> is being called.
<i>CBisLast</i>	This is TRUE (not zero) the last time <b><i>YourDestMsg(De)CompressionCallback</i></b> is being called.
<i>CBrelease</i>	This is TRUE (not zero) if the callback should release all the context memory and return.

### Remarks

Registering **MC\_Standard\_Compressor** and/or **MC\_Standard-Decompressor** for the destination message will use the standard compressor/decompressor built into the library. You may also register your own (de)compression callbacks for the destination message. The source message can have a decompressor/compressor registered prior to duplication by calling **MC\_Register\_Compression\_Callbacks** for the source message.

The **MC\_Duplicate\_Message** function is used to duplicate a message, however the transfer syntax may be different on the destination message. The following syntaxes may be switched when using the built in compressor/decompressor **MC\_Standard\_Compressor/MC\_Standard-Decompressor**:

```

IMPLICIT_LITTLE_ENDIAN
IMPLICIT_BIG_ENDIAN
EXPLICIT_LITTLE_ENDIAN
EXPLICIT_BIG_ENDIAN
DEFLATED_EXPLICIT_LITTLE_ENDIAN
ENCAPSULATED_UNCOMPRESSED_ELE
JPEG_BASELINE
JPEG_EXTENDED_2_4
JPEG_LOSSLESS_HIER_14
JPEG_2000
JPEG_2000_LOSSLESS_ONLY

```

**NOTE:** Only the transfer syntax may be different when using the built in compressor/decompressor **MC\_Standard\_Compressor/MC\_Standard-Decompressor**.

Registering **MC\_RLE\_Compressor** and/or **MC\_RLE-Decompressor** will use Merge DICOM Toolkit's built in RLE compressor and decompressor.

**NOTE:** The built in compressor/decompressor **MC\_Standard\_Compressor/MC\_Standard-Decompressor** is only available on platforms supported by the Pegasus libraries from Accusoft (Windows, Solaris, and Linux). The built in compressor/decompressor **MC\_RLE\_Compressor/MC\_RLE-Decompressor** is supported on all Merge DICOM Toolkit platforms.

## Performance Tuning

The destination message should be freed via **MC\_Free\_Message** when it is no longer needed.

If an encapsulated transfer syntax is being duplicated into a message with the same encapsulated transfer syntax, it is possible to bypass the compressor/decompressor by ensuring that ALL of the following cases are true:

1. The source message does not have a decompressor registered
2. A decompressor is not being passed in for the destination message.
3. The transfer syntaxes are identical

### **YourDestinationMsg(De)CompressionCallback**

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourDestMsg(De)CompressionCallback* is called. This provides a clear mechanism for the function to know it is being called the first time.

*CBisLast* is set to TRUE the last time *YourDestMsg(De)CompressionCallback* is called. This provides a clear mechanism for the function to know it is being called the last time.

*YourDestMsg(De)CompressionCallback* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_COMPRESSOR_REQUIRED</b>	A compression function must be passed in for the destination message.
<b>MC_DECOMPRESSOR_REQUIRED</b>	A decompression function must be registered with the source message.
<b>MC_INVALID_MESSAGE_ID</b>	<i>SourceMsgID</i> is not a valid message object ID.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourDestMsg(De)CompressionCallback</i> returned with <b>MC_CANNOT_COMPLY</b> , or the callback function registered for this attribute, and providing data, returned <b>MC_CANNOT_COMPLY</b> .

**See Also**

**MC\_Free\_Message**  
**MC\_Register\_Compression\_Callbacks**

**MC\_Empty\_File**

Sets all the attributes in a DICOM file to empty

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Empty_File (
    int FileID
)
```

*FileID*            The identifier assigned to this item object by the **MC\_Create\_File** function.

**Remarks**

**MC\_Empty\_File** sets the value of each attribute in the file identified by *FileID* to empty" (i.e. value length of zero). This is equivalent to calling **MC\_Set\_Value\_To\_Empty** for each attribute in an item. This function is useful for client applications which reuse a file and want to ensure there are no attribute values remaining from the last instance of the file.

**NOTE:**        If the file contains an attribute with a value representation of SQ, setting the file values to empty causes the SQ attribute's sequence item objects to be freed.

The DICOM prefix for the file is set to "DICM". All bytes in the file preamble are set to 00H.

When the file object identified by *FileID* was a DICOMDIR object, after each attribute is set to empty, an empty root directory entity is created in the object and the root directory record offset attributes are initialized. If the file object was not a DICOMDIR object, but it is to be used as a DICOMDIR object, **MC\_Set\_Service\_Command** should be called for the file object before the **MC\_Dir\_...** functions are called for the object.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.

**See Also**

**MC\_Empty\_Message**                      **MC\_Empty\_Item** **MC\_Set\_Value\_To\_Empty**  
**MC\_Set\_pValue\_To\_Empty**

## MC\_Empty\_Item

Sets all the attributes in an item to empty.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Empty_Item (
    int ItemID
)
```

*ItemID*            The identifier assigned to this item object by the **MC\_Open\_Item** function.

### Remarks

**MC\_Empty\_Item** sets the value of each attribute in the item identified by *ItemID* to “empty” (i.e. value length of zero). This is equivalent to calling **MC\_Set\_Value\_To\_Empty** for each attribute in an item. This function is useful for client applications which reuse an item and want to ensure there are no attribute values remaining from the last instance of the item.

**NOTE:** If the item contains an attribute with a value representation of SQ, setting the item values to empty causes the SQ attribute’s sequence item objects to be freed (i.e. **MC\_Free\_Item** is automatically called for any items used by the item being emptied).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid item object ID.

### See Also

**MC\_Empty\_Message**  
**MC\_Set\_Value\_To\_Empty**  
**MC\_Set\_pValue\_To\_Empty**

## MC\_Empty\_Message

Sets all the attributes in a message to empty.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Empty_Message (
    int MessageID
)
```

*MessageID* The identifier assigned to this object by the `MC_Open_Message` function or the `MC_Open_Item` function.

### Remarks

**MC\_Empty\_Message** sets the value of each attribute in the message identified by *MessageID* to “empty” (i.e. value length of zero). This is equivalent to calling **MC\_Set\_Value\_To\_Empty** for each attribute in a message. This function is useful for client applications which reuse a message and want to ensure there are no attribute values remaining from the last instance of the message.

**NOTE:** If the message contains an attribute with a value representation of SQ, setting the message values to empty causes the SQ attribute’s sequence item objects to be freed (i.e. **MC\_Free\_Item** is automatically called for any items used by the message being emptied).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “`mcstatus.h`”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.

### See Also

**MC\_Empty\_Item**  
**MC\_Set\_Value\_To\_Empty**  
**MC\_Set\_pValue\_To\_Empty**

## MC\_Enable\_Unicode\_Conversion

Enable/disable Unicode conversion functions.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Enable_Unicode_Conversion (
    int Enable
)
```

*Enable* Set to non-zero to load the Unicode conversion library and enable its conversion functions. Set to zero to unload the Unicode conversion library and disable its conversion functions.

### Remarks

**MC\_Enable\_Unicode\_Conversion** set to non-zero initializes the Unicode conversion library by loading the Unicode shared objects and its dependency files as specified in Platform Notes. When success, all Unicode conversion functions are available for use. When sets to zero, the function

unloads the Unicode conversion library shared objects, its dependency files and disable all Unicode conversion functions.

**NOTE:** If enabling Unicode conversion fails, check the location of shared objects or dependency files, or loading path as specified in the Platform Notes.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_CANNOT_COMPLY</b>	The Unicode library fails to initialize or load.

### See Also

**MC\_Byte\_To\_Unicode**                      **MC\_Unicode\_To\_Byte** **MC\_Get\_Value\_To\_UnicodeString**

**MC\_Get\_Next\_Value\_To\_UnicodeString** **MC\_Set\_Value\_From\_UnicodeString**  
**MC\_Set\_Next\_Value\_From\_UnicodeString**

## MC\_Error\_Message

Returns a string description of a Merge DICOM Toolkit status code.

### Synopsis

```
#include "mc3msg.h"

char *MC_Error_Message (
    MC_STATUS StatusCode
)
```

*StatusCode*      A Merge DICOM Toolkit status code.

### Remarks

It is often useful to log a descriptive message when an error status is received. **MC\_Error\_Message** returns a string message describing a given **MC\_STATUS** code.

### Return Value

Pointer to the descriptive string.

## MC\_File\_To\_Message

Converts a file object into a message object.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_File_To_Message (
    int FileID
)
```

*FileID*            The identifier assigned to this object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

### Remarks

**MC\_File\_To\_Message** changes the file object pointed to by *FileID* into a message object. In the process, the DICOM File Meta Information attributes are removed from the object, and the “command type” attributes used by most DICOM services are added to the new message object. While Merge DICOM Toolkit sets the values of many of these “command type” attributes automatically, some services require the application to set them. Refer to the description of **MC\_Send\_Request\_Message** for more information).

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.

### See Also

**MC\_Message\_To\_File**

## MC\_Free\_Item

Releases a Merge DICOM Toolkit item object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Free_Item (
    int *ItemID
)
```

*ItemID*            A pointer to the identifier assigned to this item object by the **MC\_Open\_Item** function.

### Remarks

The **MC\_Free\_Item** function frees the system resources used by the item object. The variable pointed to by *ItemID* is set to -1 (an invalid item ID).

**NOTE:** If the item object being freed contains an attribute with a value representation of SQ, freeing the item causes the SQ attribute's sequence item objects to be freed also (i.e. **MC\_Free\_Item** is automatically called for any items used by the item identified by *ItemID*). If any of the items thus freed also contain sequences of items, those item in turn are recursively freed.

**NOTE:** The **ELIMINATE\_ITEM\_REFERENCES** configuration value will determine if a freed item object that is in use as a value in another sequence of items should be cleared.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ITEM_ID</b>	The <i>*ItemID</i> value is not a valid item object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>ItemID</i> was NULL.

### See Also

**MC\_Free\_File**  
**MC\_Free\_Message**  
**MC\_Open\_Item**

## MC\_Free\_File

Releases a Merge DICOM Toolkit file object

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Free_File (
    int *FileID
)
```

*FileID* A pointer to the identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

### Remarks

The **MC\_Free\_File** function frees the system resources used by the file object. The variable pointed to by *FileID* is set to -1 (an invalid file ID).

**NOTE:** If the file contains an attribute with a value representation of SQ, freeing the file causes the SQ attribute's sequence item objects to be freed also. If any of the items thus freed also contain sequences of items, those items in turn are recursively freed.



**NOTE:** The **ELIMINATE\_ITEM\_REFERENCES** configuration value will determine if a freed item object that is in use as a value in another sequence of items should be cleared.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>*FileID</i> value is not a valid file object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>FileID</i> was NULL.

### See Also

**MC\_Free\_Item**  
**MC\_Free\_Message**

## MC\_Free\_Message

Releases a Merge DICOM Toolkit message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Free_Message (
    int *MessageID
)
```

*MessageID* A pointer to The identifier assigned to this object by the **MC\_Open\_Message** function or the **MC\_Open\_Item** function.

### Remarks

The **MC\_Free\_Message** function frees the system resources used by the message object. The variable pointed to by *MessageID* is set to -1 (an invalid message ID);

**NOTE:** If the message object being freed contains an attribute with a value representation of SQ, freeing the message causes the SQ attribute's sequence item objects to be freed also (i.e. **MC\_Free\_Item** is automatically called for any items used by the message identified by *MessageID*).

**NOTE:** If any of the items thus freed also contain sequences of items, those item in turn are recursively freed.

**NOTE:** The **ELIMINATE\_ITEM\_REFERENCES** configuration value will determine if a freed item object that is in use as a value in another sequence of items should be cleared.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>*MessageID</i> value is not a valid message object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>MessageID</i> was NULL.

### See Also

**MC\_Open\_Message**  
**MC\_Free\_Item**  
**MC\_Free\_File**

## MC\_FreeService

Releases a Merge DICOM Toolkit service that was dynamically created using **MC\_NewService**.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_FreeService (  
    char *ServiceName  
)
```

*ServiceName* Service name assigned by the application in the **MC\_NewService** call

### Remarks

The **MC\_FreeService** function frees the system resources used by the service objects.

**NOTE:** If the service being freed is already in use in a service list an error is returned. The service list must be freed prior to freeing the service.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_SERVICE_IN_USE</b>	The service is in use in a service list
<b>MC_INVALID_SERVICE_NAME</b>	The service name does not represent a name currently defined.

**See Also**

**MC\_NewService**  
**MC\_NewProposedServiceList**  
**MC\_FreeServiceList**

**MC\_FreeServiceList**

Releases a Merge DICOM Toolkit service list.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_FreeServiceList (  
    char *ServiceListName  
)
```

*ServiceListName* Service list name assigned by the application in the MC\_NewProposedServiceList call

**Remarks**

The **MC\_FreeServiceList** function frees the system resources used by service list objects that were dynamically created using the MC\_NewProposedServiceList function.

**NOTE:** Extreme care must be taken to assure that no association is currently using the service list.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SERVICE_LIST_NAME</b>	The service list name does not represent a name currently defined.

**See Also**

**MC\_NewService**  
**MC\_NewProposedServiceList**  
**MC\_FreeService**

## MC\_FreeSyntaxList

Releases a Merge DICOM Toolkit message object.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_FreeSyntaxList (
    char *SyntaxlistName
)
```

*SyntaxListName*    Syntax list name assigned by the application in the MC\_NewSyntaxList call

### Remarks

The **MC\_FreeSyntaxList** function frees the system resources used by the syntax list objects.

**NOTE:**    If the syntax list is currently in use in a service an error is returned. The service must be freed prior to freeing the syntax list.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SYNTAX_LIST_NAME</b>	The syntax list name does not represent a name currently defined.
<b>MC_SYNTAX_IN_USE</b>	The syntax list is in use by a service definition.

### See Also

**MC\_NewSyntaxList**  
**MC\_ServiceServiceList**  
**MC\_FreeService**

## MC\_Get\_Association\_Info

Retrieves information about a given association, including the number of proposed and accepted services, the remote application title and remote host name.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Association_Info (
    int AssociationID,
    AssocInfo *AssociationInfo
)
```

- AssociationID* The identifier assigned to this object by the **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.
- AssociationInfo* A structure of type AssocInfo you have declared that is filled with information about the association. AssocInfo is defined in mergecom.h as:

```
typedef enum {
    NO_USER_IDENTITY = 0,
    USERNAME = 1,
    USERNAME_AND_PASSCODE = 2,
    KERBEROS_SERVICE_TICKET = 3,
    SAML_ASSERTION = 4
} USER_IDENTITY_TYPE;

typedef struct MC_Assoc_Info {
    int NumberOfProposedServices; /* from service list */
    int NumberOfAcceptableServices; /* Acceptable both sides */
    char RemoteApplicationTitle[20]; /* 16-characters max */
    char RemoteHostName[40]; /* Network node name */
    MC_SOCKET Tcp_socket; /* the TCP socket the
                           association is using */
    char RemoteIPAddress[40]; /* Network IP address */
    char LocalApplicationTitle[20]; /* 16-characters max */
    char RemoteImplementationClassUID[66]; /* 64-characters max */
    char RemoteImplementationVersion[20]; /* 16-characters max */
    unsigned long LocalMaximumPDUSize;
    unsigned long RemoteMaximumPDUSize;
    unsigned short MaxOperationsInvoked; /* Negotiated Max operations
                                         invoked by the assoc
                                         requestor */
    unsigned short MaxOperationsPerformed; /* Negotiated Max operations
                                           erformed by the assoc
                                           requestor */
    USER_IDENTITY_TYPE UserIdentityType; /* User Identity negotiation
                                           type as defined in DICOM
                                           Supplement 99 */
    unsigned char PositiveResponseRequested; /* Set according to if a
                                             positive response is
                                             requested when User
                                             Identity is specified */
    unsigned char PositiveResponseReceived; /* Set for association
                                             requestors if a positive
                                             response was received from
                                             the association acceptor */
} AssocInfo;
```

## Remarks

**MC\_Get\_Association\_Info** retrieves information about an established association identified by *AssociationID*. This association information is returned in the structure pointed to by *AssociationInfo* detailed above. Specific information regarding the accepted services is not specified in this structure and needs to be obtained through the **MC\_Get\_First\_Acceptable\_Service** and **MC\_Get\_Next\_Acceptable\_Service** calls.

This function is to be called after an **MC\_Open\_Association**, **MC\_Open\_Association\_With\_Identity**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call, and before any **MC\_Read\_Message**, **MC\_Send\_Request\_Message**, **MC\_Send\_Request**, **MC\_Send\_Response\_Message** or **MC\_Send\_Response** calls.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>AssociationInfo</i> pointer had a null value.
<b>MC_STATE_VIOLATION</b>	The call was made after messages have been exchanged over the association.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_First_Acceptable_Service</b>	<b>MC_Get_Next_Acceptable_Service</b>
<b>MC_Library_Initialization</b>	<b>MC_Get_Listen_Socket</b>
<b>MC_Get_Listen_Socket_For_Port</b>	

## MC\_Get\_Attribute\_Info

Retrieves information about a given attribute in a message.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Attribute_Info (
    int MsgFileItemID,
    unsigned long Tag,
    MC_VR *ValueRep,
    int *NumValues
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying a message attribute.
<i>ValueRep</i>	The attribute's value representation code is returned here.

Possible return codes (defined in “mc3msg.h”) are:

**AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR,  
UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL,  
OD, OF, SQ, UNKNOWN\_VR**

*NumValues* The number of values assigned to the attribute is placed here.  
(Note: will be one (1) if the attribute’s value is NULL.)

### Remarks

**MC\_Get\_Attribute\_Info** retrieves information about a message attribute identified by *Tag*. The attribute’s Value Representation code is returned at *ValueRep*, and the number of values stored for the attribute is returned at *NumValues*. *ValueRep* and *NumValues* parameters may be NULL, in which case the corresponding information is not returned. If the attribute is “empty”, *NumValues* will contain zero (0). If the attribute’s value is NULL, *NumValues* will contain one (1).

**MC\_Get\_Attribute\_Info** sets an internal “attribute pointer” such that **MC\_Get\_Next\_Attribute** will retrieve the attribute following this one.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .

### See Also

<b>MC_Get_First_Attribute</b>	<b>MC_Get_Tags_Dict_Info</b>
<b>MC_Get_Next_Attribute</b>	<b>MC_Get_pAttribute_Info</b>

## MC\_Get\_Bool\_Config\_Value

Used to get the value of a boolean toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Bool_Config_Value (
    BoolParm Parm,
    int *Value
)
```

*Parm* An enumerated constant identifying the boolean configuration parameter to get. *Parm* can have any of the following values:

ACCEPT\_ANY\_APPLICATION\_TITLE  
ACCEPT\_ANY\_CONTEXT\_NAME  
ACCEPT\_ANY\_HOSTNAME

---

ACCEPT\_ANY\_PRESENTATION\_CONTEXT  
ACCEPT\_DIFFERENT\_IC\_UID  
ACCEPT\_DIFFERENT\_VERSION  
ACCEPT\_MULTIPLE\_PRES\_CONTEXTS  
ACCEPT\_RELATED\_GENERAL\_SERVICES  
ACCEPT\_STORAGE\_SERVICE\_CONTEXTS  
ALLOW\_COMMA\_IN\_DS\_FL\_FD\_STRINGS  
ALLOW\_EMPTY\_PDV\_LENGTH  
ALLOW\_INVALID\_PRIVATE\_ATTRIBUTES  
ALLOW\_INVALID\_PRIVATE\_CREATOR\_CODES  
ALLOW\_LIBRARY\_EXCEPTION\_HANDLER  
ALLOW\_OUT\_OF\_RANGE\_BITS\_JPEG\_LOSSLESS  
ATT\_00081190\_USE\_UT\_VR  
ATT\_00287FE0\_USE\_UT\_VR  
ATT\_0040E010\_USE\_UT\_VR  
ATT\_0074100A\_USE\_ST\_VR  
AUTO\_ECHO\_SUPPORT  
BLANK\_FILL\_LOG\_FILE  
CALCULATE\_DEFINED\_LENGTH\_FOR\_CB  
COMPRESSION\_ALLOW\_FRAGS  
COMPRESSION\_J2K\_LOSSY\_USE\_QUALITY  
COMPRESSION\_USE\_HEADER\_QUERY  
COMPRESSION\_WHEN\_J2K\_USE\_LOSSY  
CREATE\_OFFSET\_TABLE  
DEFLATE\_ALLOW\_FLUSH  
DICOMDIR\_STREAM\_STORAGE  
DUPLICATE\_ENCAPSULATED\_ICON  
ELIMINATE\_ITEM\_REFERENCES  
EMPTY\_PRIVATE\_CREATOR\_CODES  
EXPLICIT\_VR\_TO\_UN\_FOR\_LENGTH\_GT\_64K  
EXPORT\_EMPTY\_PRIVATE\_CREATOR\_CODES  
EXPORT\_GROUP\_LENGTHS\_TO\_MEDIA  
EXPORT\_GROUP\_LENGTHS\_TO\_NETWORK  
EXPORT\_PRIVATE\_ATTRIBUTES\_TO\_MEDIA  
EXPORT\_PRIVATE\_ATTRIBUTES\_TO\_NETWORK  
EXPORT\_UN\_VR\_TO\_MEDIA  
EXPORT\_UN\_VR\_TO\_NETWORK  
EXPORT\_UNDEFINED\_LENGTH\_SQ  
EXPORT\_UNDEFINED\_LENGTH\_SQ\_IN\_DICOMDIR  
FORCE\_OPEN\_EMPTY\_ITEM  
HARD\_CLOSE\_TCP\_IP\_CONNECTION  
INSURE\_EVEN\_UID\_LENGTH  
LIST\_UN\_ATTRIBUTES  
LOG\_FILE\_BACKUP  
MSG\_FILE\_ITEM\_OBJ\_TRACE  
NETWORK\_CAPTURE  
PRIVATE\_SYNTAX\_1\_ENCAPSULATED  
PRIVATE\_SYNTAX\_1\_EXPLICIT\_VR  
PRIVATE\_SYNTAX\_1\_LITTLE\_ENDIAN  
PRIVATE\_SYNTAX\_2\_ENCAPSULATED  
PRIVATE\_SYNTAX\_2\_EXPLICIT\_VR  
PRIVATE\_SYNTAX\_2\_LITTLE\_ENDIAN  
REJECT\_INVALID\_VR  
RELEASE\_SQ\_ITEMS  
REMOVE\_PADDING\_CHARS



---

```

REMOVE_SINGLE_TRAILING_SPACE
RETURN_COMMA_IN_DS_FL_FD_STRINGS
REWRITE_CAPTURE_FILES
SEND_ECHO_PRIORITY
SEND_LENGTH_TO_END
SEND_MSG_ID_RESPONSE
SEND_RECOGNITION_CODE
SEND_RESPONSE_PRIORITY
SEND_SOP_CLASS_UID
SEND_SOP_INSTANCE_UID
TCPIP_DISABLE_NAGLE
TOLERATE_INVALID_IN_DEFAULT_CHARSET
UPDATE_GROUP_0028_ON_DUPLICATE
USE_FREE_DATA_CALLBACK

```

These names are the same as those given to the parameters in the toolkit configuration files.

*Value* The boolean value to which *Parm* is set is returned here.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to get boolean configurable parameters specified in these files at runtime. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was NULL.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
<b>MC_Get_Long_Config_Value</b>	<b>MC_Set_Long_Config_Value</b>
<b>MC_Get_String_Config_Value</b>	<b>MC_Set_String_Config_Value</b> <b>MC_Set_Bool_Config_Value</b>

## MC\_Get\_Encapsulated\_Value\_To\_Function

Retrieves the first frame of encapsulated pixel data from a message. If a decompressor is registered, then the data will be decompressed.

### Synopsis

```

#include "mc3msg.h"

MC_STATUS MC_Get_Encapsulated_Value_To_Function (
    int MsgFileItemID,

```

```

    unsigned long Tag,
    void *UserInfo,
    void *YourGetFunction,
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying a message attribute containing pixel data.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```

MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void *CBUserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)

```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Encapsulated_Value_To_Function</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC\_Get\_Encapsulated\_Value\_To\_Function** function is used to fetch the value of the first frame of an attribute which has a value representation of OB or OW and is encapsulated. If a decompressor is registered, the data will be decompressed. Such attributes tend to have values of great length. To

accommodate this, one passes the **MC\_Get\_Encapsulated\_Value\_To\_Function** function the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to provide blocks of the attribute’s data value. If a decompressor is registered for this message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC\_Get\_Encapsulated\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

**MC\_Get\_Encapsulated\_Value\_To\_Function** sets an internal frame pointer such that **MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** will retrieve the next frame following this one.

### *YourGetFunction*

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned <b>MC_CANNOT_COMPLY</b> .
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.

**MC\_MISSING\_DELIMITER**

The expected delimiter can not be detected

**See Also****MC\_Get\_Next\_Encapsulated\_Value\_To\_Function****MC\_Get\_Frame\_To\_Function****MC\_Get\_Offset\_Table\_To\_Function****MC\_Register\_Compression\_Callbacks****MC\_Get\_Enum\_From\_Transfer\_Syntax**

Converts the DICOM UID for a transfer syntax into an enumerated value.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Enum_From_Transfer_Syntax (  
    char *Uid,  
    TRANSFER_SYNTAX *SyntaxType  
)
```

*Uid* The transfer syntax UID for conversion is specified here.

*SyntaxType* The DICOM transfer syntax is returned here. One of the enumerated TRANSFER\_SYNTAX types defined in "mc3msg.h" is returned:

---

IMPLICIT\_LITTLE\_ENDIAN  
IMPLICIT\_BIG\_ENDIAN  
EXPLICIT\_LITTLE\_ENDIAN  
EXPLICIT\_BIG\_ENDIAN  
DEFLATED\_EXPLICIT\_LITTLE\_ENDIAN  
ENCAPSULATED\_UNCOMPRESSED\_ELEMENT  
RLE  
JPEG\_BASELINE  
JPEG\_EXTENDED\_2\_4  
JPEG\_EXTENDED\_3\_5  
JPEG\_SPEC\_NON\_HIER\_6\_8  
JPEG\_SPEC\_NON\_HIER\_7\_9  
JPEG\_FULL\_PROG\_NON\_HIER\_10\_12  
JPEG\_FULL\_PROG\_NON\_HIER\_11\_13  
JPEG\_LOSSLESS\_NON\_HIER\_14  
JPEG\_LOSSLESS\_NON\_HIER\_15  
JPEG\_EXTENDED\_HIER\_16\_18  
JPEG\_EXTENDED\_HIER\_17\_19  
JPEG\_SPEC\_HIER\_20\_22  
JPEG\_SPEC\_HIER\_21\_23  
JPEG\_FULL\_PROG\_HIER\_24\_26  
JPEG\_FULL\_PROG\_HIER\_25\_27  
JPEG\_LOSSLESS\_HIER\_28  
JPEG\_LOSSLESS\_HIER\_29  
JPEG\_LOSSLESS\_HIER\_14  
JPEG\_2000\_LOSSLESS\_ONLY  
JPEG\_2000  
JPEG\_LS\_LOSSLESS  
JPEG\_LS\_LOSSY  
HEVC\_H265\_M10P\_LEVEL\_5\_1  
HEVC\_H265\_MP\_LEVEL\_5\_1  
JPIP\_REFERENCED  
JPIP\_REFERENCED\_DEFLATE  
MPEG2\_MPML  
MPEG2\_MPHL  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D  
MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2  
JPEG\_2000\_MC\_LOSSLESS\_ONLY  
JPEG\_2000\_MC  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTIVE\_VIDEO  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIVE\_VIDEO

SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO  
PRIVATE\_SYNTAX\_1  
PRIVATE\_SYNTAX\_2

### Remarks

**MC\_Get\_Enum\_From\_Transfer\_Syntax** converts a DICOM transfer syntax UID into a Merge DICOM Toolkit enumerated value. The UID values used by **MC\_Get\_Enum\_From\_Transfer\_Syntax** are specified in Merge DICOM Toolkit's configuration files. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	<i>Uid</i> is not registered in the Merge DICOM Toolkit configuration files.

### See Also

**MC\_Get\_Transfer\_Syntax\_From\_Enum**  
**MC\_Get\_MergeCOM\_Service**  
**MC\_Get\_UID\_From\_MergeCOM\_Service**

## MC\_Get\_File\_Length

Gets the length in bytes of a file object.

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Get_File_Length (
    int FileID,
    unsigned long *FileLength
)
```

*FileID* The identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

*FileLength* The file object size is returned here.

### Remarks

**MC\_Get\_File\_Length** returns the number of bytes it would take to write a file object in DICOM Part 10 format. This function assumes the transfer syntax UID is contained in the group 2 elements. Note that a possible value for *FileLength* is undefined length (i.e., 0xffffffff), when the file object is encoded in an encapsulated transfer syntax. Also note that the file length may change. The padding is specified when calling **MC\_Write\_File**.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The transfer syntax UID contained in the file objects group 2 elements was incorrect.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_NULL_POINTER_PARM</b>	<i>FileLength</i> was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment.

**MC\_Get\_File\_Preamble**

Gets the preamble for a file object.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_Get_File_Preamble (
    int FileID,
    char *Preamble
)
```

*FileID*            The identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

*Preamble*        A pointer to a user allocated 128 byte buffer in which the preamble associated with the file object *FileID* is copied.

**Remarks**

**MC\_Get\_File\_Preamble** retrieves the preamble associated with a file object. The function stores the DICOM file preamble for the file object *FileID* in the buffer pointed to by *Preamble*.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>Preamble</i> was NULL.

**See Also**

**MC\_Set\_File\_Preamble**

## MC\_Get\_Filename

Gets the filename associated with a file object.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Get_Filename (
    int FileID,
    char *FileName,
    int FileSize,
)
```

*FileID*            The identifier assigned to this object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*Filename*        A pointer to a string where the filename will be returned.

*FileSize*        The length in bytes of *Filename*.

### Remarks

The **MC\_Get\_Filename** function retrieves the filename associated with a file object.

The filename is passed to the user's callback function when the **MC\_Write\_File** function is called.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>Filename</i> was NULL.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Filename</i> was too small to contain the complete filename.

### See Also

<b>MC_Write_File</b>	<b>MC_Empty_File</b>
----------------------	----------------------

## MC\_Get\_First\_Acceptable\_Service

Retrieves the first of possibly many services that have been accepted over an association.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_First_Acceptable_Service (
    int AssocID,
    ServiceInfo *AServiceInfo
)
```



---

<i>AssocID</i>	The identifier assigned to this object by the <b>MC_Open_Association</b> , <b>MC_Open_Secure_Association</b> , <b>MC_Process_Association_Request</b> , <b>MC_Process_Secure_Association_Request</b> , <b>MC_Wait_For_Association</b> or <b>MC_Wait_For_Secure_Association</b> function.
<i>AserviceInfo</i>	A structure of type ServiceInfo you have declared that is filled with information about the accepted service. ServiceInfo is defined in mergecom.h as:

```
typedef struct MC_Service_Info {
    char ServiceName[50]; /* Merge DICOM Toolkit service
                          name */
    TRANSFER_SYNTAX SyntaxType; /* transfer syntax negotiated for
                                  the service */
    ROLE_TYPE RoleNegotiated; /* The role negotiated for the
                                service */
    int PresentationContextID; /* Presentation Context ID */
    char SOPClassUID[66]; /* SOP Class UID associated
                           with ServiceName */
    char ServiceClassUID[66]; /* Optional Service Class UID
                               for the service if defined
                               in the association request */
    int NumberRelatedSOPClasses; /* Number of related general
                                   SOP Classes contained in
                                   the association request */
    RelatedSOPClass RelatedSOPClasses[10]; /* Array containing
                                             Related general SOP classes for
                                             this negotiated service */
} ServiceInfo;
```

“TRANSFER\_SYNTAX” and “ROLE\_TYPE” are defined in mc3msg.h.

### Remarks

The Merge DICOM Toolkit service name and transfer syntax negotiated is returned for the first service negotiated for and acceptable to both sides. These values are returned in the structure detailed above.

**MC\_Get\_First\_Acceptable\_Service** sets an internal “service pointer” such that **MC\_Get\_Next\_Acceptable\_Service** will retrieve the service following this one.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssocID</i> is not a valid association object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_STATE_VIOLATION</b>	Call was made after reading or sending a message.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_END_OF_LIST</b>	No services were accepted.

**See Also**

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_Get_Next_Acceptable_Service</b>	

**MC\_Get\_First\_Attribute**

Retrieves information about the first attribute in a message.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_First_Attribute (
    int MsgFileItemID,
    unsigned long *Tag,
    MC_VR *ValueRep,
    int *NumValues
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	The attribute's tag is returned here.
<i>ValueRep</i>	The attribute's value representation code is returned here. Possible return codes (defined in "mc3msg.h") are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ, UNKNOWN_VR</b>
<i>NumValues</i>	The number of values assigned to the attribute is returned here. (Note: Will return one (1) if the attribute's value is NULL.)

**Remarks**

**MC\_Get\_First\_Attribute** retrieves information about the first attribute in a message. The attribute's tag is returned at *Tag*, the attribute's Value Representation code is returned at *ValueRep* and the number of values stored for the attribute is returned at *NumValues*. Any of the *Tag*, *ValueRep* or *NumValues* parameters may be NULL, in which case the corresponding information is not returned. If the attribute is "empty" *NumValues* will contain zero (0). If the attribute's value is NULL, *NumValues* will contain 1.

**MC\_Get\_First\_Attribute** sets an internal "attribute pointer" such that **MC\_Get\_Next\_Attribute** will retrieve the attribute following this one.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_MESSAGE_EMPTY</b>	There are no attributes in the message.

### See Also

<b>MC_Get_Next_Attribute</b>	<b>MC_Get_Attribute_Info</b>
<b>MC_Get_pAttribute_Info</b>	

## MC\_Get\_Frame\_To\_Function

Retrieves the requested frame of encapsulated or non-encapsulated pixel data from a message. For encapsulated data, if a decompressor is registered, then the data will be returned decompressed.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Frame_To_Function (
    int    MsgFileItemID,
    int    Frame,
    void *UserInfo,
    void *YourGetFunction(),
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Frame</i>	An integer identifying a frame number of encapsulated pixel data (starting from 0).
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int    CBMsgFileItemID,
    unsigned long CBtag,
    void *CBUserInfo,
    int    CBdataSize,
    void *CBdataBuffer,
    int    CBisFirst,
    int    CBisLast
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Frame_To_Function</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

### Remarks

The **MC\_Get\_Frame\_To\_Function** function is used to fetch an encapsulated or non-encapsulated frame of a pixel data attribute. In the encapsulated case, the functionality is similar to **MC\_Get\_Encapsulated\_Value\_To\_Function** and **MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** except that the user can retrieve the encapsulated frame by its number (starting from 0).

As pixel data attributes usually have values of great length the most effective way to handle it is to use **MC\_Open\_File\_Upto\_Tag\_Bypass\_Value** and the callback mechanism with **MC\_Register\_Callback\_Function** to retrieve the attribute values from media.

The (*YourGetFunction*) function is used to provide repeatedly the blocks of the attribute's data value. If a decompressor is registered for this message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC\_Get\_Frame\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

### *YourGetFunction*

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned <b>MC_CANNOT_COMPLY</b> .
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.
<b>MC_MISSING_DELIMITER</b>	The expected delimiter can not be detected

### See Also

**MC\_Get\_Encapsulated\_Value\_To\_Function**

**MC\_Get\_Next\_Encapsulated\_Value\_To\_Function**

**MC\_Open\_File\_Upto\_Tag\_Bypass\_Value MC\_Register\_Compression\_Callbacks**

## MC\_Get\_Int\_Config\_Value

Used to get the value of an integer toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Int_Config_Value (
    IntPtr Parm,
    int *Value
)
```

*Parm* An enumerated constant identifying the integer configuration parameter to get. *Parm* can have any of the following values:  
ARTIM\_TIMEOUT

---

```

ASSOC_REPLY_TIMEOUT
COMPRESSION_CHROM_FACTOR
COMPRESSION_J2K_LOSSY_QUALITY
COMPRESSION_J2K_LOSSY_RATIO
COMPRESSION_LUM_FACTOR
CONNECT_TIMEOUT
DEFLATE_COMPRESSION_LEVEL
DESIRED_LAST_PDU_SIZE
FLATE_GROW_OUTPUT_BUF_SIZE
IGNORE_JPEG_BAD_SUFFIX
INACTIVITY_TIMEOUT
LARGE_DATA_SIZE
LIST_SQ_DEPTH_LIMIT
LIST_VALUE_LIMIT
LOG_FILE_LINE_LENGTH
LOG_FILE_SIZE
LOG_MEMORY_SIZE
MAX_PENDING_CONNECTIONS
NUM_HISTORICAL_LOG_FILES
NUMBER_OF_CAP_FILES
OBOW_BUFFER_SIZE
PEGASUS_NUMBER_OF_THREADS
RELEASE_TIMEOUT
TCPIP_KEEP_ALIVE_TIME
TCPIP_KEEP_ALIVE_INTERVAL
TCPIP_LISTEN_PORT
TCPIP_RECEIVE_BUFFER_SIZE
TCPIP_SEND_BUFFER_SIZE
WORK_BUFFER_SIZE
WRITE_TIMEOUT

```

These names are the same as those given to the parameters in the toolkit configuration files. A description of the options can be found in Appendix B.

*Value*                      *Parm's* integer value is returned here.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to get integer configurable parameters specified in these files at runtime. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was NULL.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_MUST_BE_POSITIVE</b>	Parameter value cannot be negative.

**MC\_LIBRARY\_NOT\_INITIALIZED** The library has not been properly initialized.

### See Also

**MC\_Set\_Int\_Config\_Value**

**MC\_Get\_Log\_Destination**

**MC\_Get\_Long\_Config\_Value**

**MC\_Get\_String\_Config\_Value**

**MC\_Set\_Log\_Destination**

**MC\_Set\_Long\_Config\_Value**

**MC\_Set\_String\_Config\_Value**

## MC\_Get\_Listen\_Socket

Returns the id of the socket being listened on

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_Listen_Socket (
    MC_SOCKET *AlistenSocket
)
```

*AlistenSocket* The socket being listened on.

### Remarks

**MC\_Get\_Listen\_Socket** returns the DICOM listen socket. It will return the current listen port used by calls to **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association**.

**MC\_Get\_Listen\_Socket\_For\_Port** must be used when listening is done with **MC\_Wait\_For\_Association\_On\_Port** or **MC\_Wait\_For\_Secure\_Association\_On\_Port**.

In specialized cases where the server application is waiting on several asynchronous events, not just the association event, the **MC\_Get\_Listen\_Socket** call can be made to request the file descriptor for the DICOM listen socket. In this way the server application can do a `select()` system call on this and other file descriptors. When the `select` returns with an event on the DICOM listen socket descriptor, the application can call **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** and get an immediate response.

Similarly, once the association is established, both the client and server applications can use the **MC\_Get\_Association\_Info** call to get the file descriptor for the socket over which message exchange will occur. Again, `select()` can be used to wait asynchronously for a DICOM request or response message.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>AlistenSocket</i> was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment.

**See Also****MC\_Get\_Association\_Info****MC\_Get\_Listen\_Socket\_For\_Port**

Returns the id of the socket being listened on for a specific port

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_Listen_Socket_For_Port (
    int Port
    int *ListenSocket
)
```

*Port*                    The port number to check for the listen socket

*ListenSocket*        The socket being listened on.

**Remarks**

**MC\_Get\_Listen\_Socket\_For\_Port** returns the DICOM listen socket for a specific port. It can be used to get the default listen port from a call to **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association**. It can also be used to get the listen socket for a specific listen port from calls to **MC\_Wait\_For\_Association\_On\_Port** and **MC\_Wait\_For\_Secure\_Association\_On\_Port**.

In specialized cases where the server application is waiting on several asynchronous events, not just the association event, the **MC\_Get\_Listen\_Socket\_For\_Port** call can be made to request the file descriptor for the DICOM listen socket. In this way the server application can do a `select()` system call on this and other file descriptors. When the `select` returns with an event on the DICOM listen socket descriptor, the application can call **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** and get an immediate response.

Similarly, once the association is established, both the client and server applications can use the **MC\_Get\_Association\_Info** call to get the file descriptor for the socket over which message exchange will occur. Again, `select()` can be used to wait asynchronously for a DICOM request or response message.

**Return Value**One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>ListenSocket</i> was NULL.
<b>MC_INVALID_PORT_NUMBER</b>	<i>Port</i> is not currently being listened on.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment.



**See Also****MC\_Get\_Association\_Info****MC\_Get\_Log\_Destination**

Used to get the value of a integer toolkit configuration parameter at runtime.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Log_Destination (
    LogParm Parm,
    int *Destination
)
```

*Parm* An enumerated constant identifying the class of logging that is to be retrieved. *Parm* can have any of the following values:

```
ERROR_DESTINATIONS,
WARNING_DESTINATIONS,
INFO_DESTINATIONS,
T1_DESTINATIONS,
T2_DESTINATIONS,
T3_DESTINATIONS,
T4_DESTINATIONS,
T5_DESTINATIONS,
T6_DESTINATIONS,
T7_DESTINATIONS,
T8_DESTINATIONS,
T9_DESTINATIONS
```

*Destination* A defined term specifying where the logging is being directed. *Value* can have any of the following values:

```
File_Destination,
Memory_Destination,
Screen_Destination,
Bitbucket_Destination
```

These values can also be OR'ed together to indicate multiple destinations.

**Remarks**

This call allows you to retrieve the logging of error, warning, and info messages at runtime. The [DEFAULT\_LIBRARY] section of the Merge DICOM Toolkit initialization file contains the setting used at startup. Please see the detailed description of toolkit configuration elsewhere in this manual.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was NULL.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Set_Int_Config_Value</b>	<b>MC_Get_Int_Config_Value</b> <b>MC_Set_Long_Config_Value</b>
	<b>MC_Get_Long_Config_Value</b>
<b>MC_Set_String_Config_Value</b>	<b>MC_Get_String_Config_Value</b>
<b>MC_Set_Log_Destination</b>	

## MC\_Get\_Long\_Config\_Value

Used to get the value of a long integer toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Long_Config_Value (
    LongParm Parm,
    long int *Value
)
```

*Parm* An enumerated constant identifying the long integer configuration parameter to get. *Parm* can have only the following values:

```
CAPTURE_FILE_SIZE,
PDU_MAXIMUM_LENGTH,
CALLBACK_MIN_DATA_SIZE,
PIXEL_BUFFER_SIZE
```

These names are the same as those given to the parameters in the toolkit configuration files.

*Value* *Parm*'s long integer value is returned here.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to get long integer configurable parameters specified in these files at runtime. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was NULL.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

**See Also**

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
<b>MC_Set_Long_Config_Value</b>	<b>MC_Get_String_Config_Value</b>
<b>MC_Set_String_Config_Value</b>	

**MC\_Get\_MergeCOM\_Service**

Returns the Merge DICOM Toolkit service name associated with a DICOM SOP Class UID.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_MergeCOM_Service (
    char *UID,
    char *ServiceName,
    int BufferSize
)
```

*UID*            The SOP class UID for which to find the associated Merge DICOM Toolkit service name.

*ServiceName*    The name of the Merge DICOM Toolkit service associated with *UID* is returned here.

*BufferSize*     The length of *ServiceName* in bytes.

**Remarks**

**MC\_Get\_MergeCOM\_Service** returns the service name for *UID*. This function is often useful in conjunction with **MC\_Set\_Service\_Command** to set the message type for a message before validation or sending across the network.

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these SOP Class UIDs.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>UID</i> or <i>ServiceName</i> was NULL.
<b>MC_BUFFER_TOO_SMALL</b>	<i>ServiceName</i> was not large enough to contain the Merge DICOM Toolkit service name.
<b>MC_INVALID_SOP_CLASS_UID</b>	<i>UID</i> does not contain a Merge DICOM Toolkit supported SOP Class UID.

**See Also**

**MC\_Set\_Service\_Command**                    **MC\_Get\_Tag\_Info**  
**MC\_Get\_pTag\_Info**                        **MC\_Get\_Enum\_From\_Transfer\_Syntax**  
**MC\_Get\_Transfer\_Syntax\_From\_Enum**  
**MC\_Get\_UID\_From\_MergeCOM\_Service**

**MC\_Get\_MergeCOM\_Service\_From\_UID**

Converts a DICOM SOP Class UID into a Merge DICOM Toolkit service name.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_MergeCOM_Service_From_UID (
    char *Uid,
    char *ServiceName,
    int ServiceNameLength
)
```

*Uid*                                        The service's SOP Class UID is returned here.  
*ServiceName*                            String name of a DICOM service  
*ServiceNameLength*                    The length in bytes of *ServiceName* buffer

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Uid</i> is not large enough to contain the unique identifier.

**See Also**

**MC\_Get\_MergeCOM\_Service**  
**MC\_Get\_Enum\_From\_Transfer\_Syntax**  
**MC\_Get\_Transfer\_Syntax\_From\_Enum**  
**MC\_Get\_UID\_From\_MergeCOM\_Service**

**MC\_Get\_Message\_Service**

Returns the service name and command ID association with a message.

**Synopsis**

```
#include "mergecom.h"
```

---

```

MC_STATUS MC_Get_Message_Service (
    int MessageID,
    char **ServiceName,
    MC_COMMAND *Command
)

```

*MessageID* The message object's identification number.

*ServiceName* The name of the service associated with the message is returned here.

*Command* The command associated with this message is returned here. The **MC\_COMMAND** enumerated values are defined in "mergecom.h".

### Remarks

**MC\_Get\_Message\_Service** returns the service name and command which were specified when the message identified by *MessageID* was opened. This function is often useful in callback functions which are supporting more than one service or command. Note well that this memory is de-allocated when the **MC\_Free\_Message** API call is made for *MessageID*.

The following commands are supported by the Merge DICOM Toolkit:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request

N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>ServiceName</i> or <i>Command</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.

### See Also

**MC\_Register\_Callback\_Function**

## MC\_Get\_Message\_Transfer\_Syntax

Returns the transfer syntax over which a message was received over the network.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_Message_Transfer_Syntax (
    int MessageID,
    TRANSFER_SYNTAX *TransferSyntax
)
```

*MessageID* The message object’s identification number.

*TransferSyntax* The name of the transfer syntax associated with the message is returned here. It will be one of the enumerated TRANSFER\_SYNTAX types defined in “**mc3msg.h**” (see **MC\_Get\_Transfer\_Syntax\_From\_Enum**).

**Remarks**

**MC\_Get\_Message\_Transfer\_Syntax** returns the DICOM transfer syntax over which a message was received on the network. This function is often useful when encapsulated (compressed) and standard transfer syntaxes are both negotiated for a service. The transfer syntax is needed in this case to determine how the pixel data in a message should be decoded

Reference the *Merge DICOM Toolkit User's Manual* for a discussion on negotiating multiple transfer syntaxes for a service.

**MC\_Get\_Message\_Transfer\_Syntax** can also be used to get the transfer syntax of a DICOM file object. When used with a DICOM file object, the routine will return the transfer syntax set for the tag (0002,0010) Transfer Syntax UID in the file object.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>TransferSyntax</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The transfer syntax of the DICOM file or message is not set.

**See Also**

**MC\_Set\_Message\_Transfer\_Syntax**    **MC\_Read\_Message**    **MC\_Reset\_Message\_Transfer\_Syntax**

**MC\_Get\_Meta\_ServiceName**

Returns the meta service name corresponding to the presentation context in which a message was received over the network.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_Meta_ServiceName (
    int AssociationID,
    char *Value,
    int BufferSize
)
```

*AssociationID*    An association identification number returned by a **MC\_Wait\_For\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request** or **MC\_Wait\_For\_Secure\_Association** call.

*Value*    The name of the meta service of the most recent request message is returned here.

*BufferSize*    The size of the Value buffer in bytes

**Remarks**

**MC\_Get\_Meta\_ServiceName** returns the DICOM meta service name for a request message that was received on the network. This function is only useful on the receiving end of a **MC\_Send\_Request\_Message\_For\_Service** or **MC\_Send\_Request\_For\_Service**. An example is the Filmbox when both BASIC\_GRAYSCALE\_PRINT\_MANAGEMENT and BASIC\_COLOR\_PRINT\_MANAGEMENT are negotiated. The **MC\_Send\_Request\_Message\_For\_Service** would specify which of the services should be used. On the receiving end, **MC\_Read\_Message** or **MC\_Read\_To\_Stream** returns BASIC\_FILM\_BOX as the service name, but does not contain any information on the meta SOP. This function will return the meta SOP based on the most recent received message's presentation context.

This function should only be used immediately after receiving a request message.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	The association ID passed in was not valid.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was NULL.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Value</i> is not large enough.
<b>MC_NOT_META_SOP</b>	The most recent received message was not sent on a presentation context that belongs to a Meta SOP.
<b>MC_NOT_FOUND</b>	The meta SOP for the most recently received message could not be found.

**See Also**

**MC\_Read\_Message**  
**MC\_Read\_To\_Stream**  
**MC\_Send\_Request\_Message\_For\_Service**  
**MC\_Send\_Request\_For\_Service**

**MC\_Get\_Negotiation\_Info**

Retrieves received extended negotiation information.

**Synopsis**

```
#include "mergecom.h"

MC_STATUS MC_Get_Negotiation_Info (
    int AssociationID,
    char *ServiceName,
    void **ExtInfoBuffer,
    int *ExtInfoLength
)
```



---

<i>AssociationID</i>	An association identification number returned by a <b>MC_Wait_For_Association</b> , <b>MC_Process_Association_Request</b> , <b>MC_Process_Secure_Association_Request</b> or <b>MC_Wait_For_Secure_Association</b> call.
<i>ServiceName</i>	The name given to a valid DICOM service.
<i>ExtInfoBuffer</i>	A pointer to the buffer containing extended negotiation information will be returned here.
<i>ExtInfoLength</i>	The number of bytes contained in the <i>ExtInfoBuffer</i> will be returned here.

### Remarks

The DICOM standard allows application entities to exchange “extended negotiation information” when establishing an association. The contents of the negotiation information must be known to both the association requestor application and the association acceptor application. Such extended negotiation is not often used for DICOM services, but some services may require it.

**MC\_Get\_Negotiation\_Info** allows the caller to retrieve any extended negotiation information which may have been received during a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call. If the remote application sent negotiation information for *ServiceName*, the negotiation information is returned at *ExtInfoBuffer* and its length at *ExtInfoLength*. If no negotiation information was received, the function will return a status of **MC\_EXT\_INFO\_UNAVAILABLE**.

**MC\_Set\_Negotiation\_Info\_For\_Association** may be used to set the extended negotiation information before calling **MC\_Accept\_Association** to accept the association. Merge DICOM Toolkit will only return extended negotiation information to the remote application that has been registered with **MC\_Set\_Negotiation\_Info\_For\_Association**.

Note also that **MC\_Set\_Negotiation\_Info** may be used to set extended negotiation for all associations accepted with **MC\_Accept\_Association**. Any service with extended negotiation information in the association request will have the extended negotiation information registered in **MC\_Set\_Negotiation\_Info** returned by **MC\_Accept\_Association**. Use of **MC\_Set\_Negotiation\_Info** is deprecated.

Use **MC\_Clear\_Negotiation\_Info** to remove extended information registered using the **MC\_Set\_Negotiation\_Info** function call.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association identifier.
<b>MC_NULL_POINTER_PARM</b>	Either <i>ServiceName</i> or <i>ExtInfoBuffer</i> or <i>ExtInfoLength</i> was NULL.

<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files.
<b>MC_EXT_INFO_UNAVAILABLE</b>	No extended negotiation information was received for <i>ServiceName</i> .

### See Also

**MC\_Set\_Negotiation\_Info**                      **MC\_Clear\_Negotiation\_Info**  
**MC\_Set\_Negotiation\_Info\_For\_Association**

## MC\_Get\_Next\_Acceptable\_Service

Retrieves additional services that have been accepted over an association, after **MC\_Get\_First\_Acceptable\_Service** has been called to retrieve the first.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Get_Next_Acceptable_Service (
    int AssocID,
    ServiceInfo *AServiceInfo
)
```

*AssocID*                      The identifier assigned to this object by the **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.

*AServiceInfo*                A structure of type `ServiceInfo` you have declared that is filled with information about the accepted service. `ServiceInfo` is defined in `mergecom.h` as:

```
typedef struct MC_Service_Info {
    char ServiceName[50]; /* Merge DICOM Toolkit service name */
    TRANSFER_SYNTAX SyntaxType; /* transfer syntax negotiated
    for the service */
    ROLE_TYPE RoleNegotiated; /* The role negotiated for the
    service */
    int PresentationContextID; /* Presentation Context ID */
    char SOPClassUID[66]; /* SOP Class UID associated
    with ServiceName */
    char ServiceClassUID[66]; /* Optional Service Class UID
    for the service if defined
    in association request */
    int NumberRelatedSOPClasses; /* Number of related general
    SOP Classes contained in
    the association request */
    RelatedSOPClass RelatedSOPClasses[10]; /* Array containing
    Related general SOP classes
    for this negotiated
    service */
} ServiceInfo;
```

"TRANSFER\_SYNTAX" and "ROLE\_TYPE" are defined in mc3msg.h.

### Remarks

The Merge DICOM Toolkit service name and transfer syntax negotiated is returned for the first service negotiated for and acceptable to both sides. These values are returned in the structure detailed above.

When there are no more services in the list of accepted services **MC\_END\_OF\_LIST** is returned.

**MC\_Get\_Next\_Acceptable\_Service** sets an internal "service pointer" such that **MC\_Get\_Next\_Acceptable\_Service** can be called again to retrieve the service following the current one.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssocID</i> is not a valid association object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_STATE_VIOLATION</b>	Call was made after reading or sending a message.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_END_OF_LIST</b>	No more services in list of accepted services.

### See Also

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_Get_First_Acceptable_Service</b>	<b>MC_Process_Association_Request</b>
<b>MC_Process_Secure_Association_Request</b>	

## MC\_Get\_Next\_Attribute

Retrieves information about the next attribute in a message.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Next_Attribute (
    int MsgFileItemID,
    unsigned long *Tag,
    MC_VR *ValueRep,
    int *NumValues
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* The attribute's tag is returned here.

<i>ValueRep</i>	The attribute's value representation code is returned here. Possible return codes (defined in "mc3msg.h") are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ, UNKNOWN_VR</b>
<i>NumValues</i>	The number of values assigned to the attribute is returned here. (Note: Will be one (1) if the attribute's value is NULL.)

### Remarks

**MC\_Get\_Next\_Attribute** retrieves information about the next attribute in a message. **MC\_Get\_First\_Attribute**, **MC\_Get\_Attribute\_Info** or **MC\_Get\_pAttribute\_Info** must be used first to set a current attribute location. The attribute's tag is returned at *Tag*, the attribute's Value Representation code is returned at *ValueRep*, and the number of values stored for the attribute is returned at *NumValues*. Any of the *Tag*, *ValueRep* or *NumValues* parameters may be NULL, in which case the corresponding information is not returned. If the attribute is "empty", *NumValues* will contain zero (0). If the attribute's value is NULL, *NumValues* will contain one (1).

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_MESSAGE_EMPTY</b>	The message contains no attributes.
<b>MC_NO_MORE_ATTRIBUTES</b>	There are no more attributes in the message.

### See Also

<b>MC_Get_First_Attribute</b>	<b>MC_Get_Attribute_Info</b>
<b>MC_Get_pAttribute_Info</b>	

## MC\_Get\_Next\_Encapsulated\_Value\_To\_Function

Retrieves the next frame of encapsulated pixel data from a message. If a decompressor is registered, then the data will be decompressed.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Next_Encapsulated_Value_To_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    void *YourGetFunction,
)
```

---

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying a message attribute containing pixel data.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void *CBUserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBMsgFileItemID</i>	The message identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Next_Encapsulated_Value_To_Function</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** function is used to fetch the value of the next frame of an attribute which has a value representation of OB or OW and is encapsulated. If a decompressor is registered, the data will be decompressed. Such attributes tend to have values of great length. To accommodate this, one passes the **MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** function the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This "callback" function is called repeatedly to provide blocks of the attribute's data value. If a decompressor is registered for this

message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

**MC\_Get\_Next\_Encapsulated\_Value\_To\_Function** sets an internal frame pointer such that subsequent calls will retrieve the next frame following this one.

### *YourGetFunction*

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and this was the last frame in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned MC_CANNOT_COMPLY.
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.

**See Also****MC\_Get\_Encapsulated\_Value\_To\_Function****MC\_Get\_Frame\_To\_Function****MC\_Get\_Offset\_Table\_To\_Function****MC\_Register\_Compression\_Callbacks****MC\_Get\_Next\_pValue... Functions**

Retrieves the next value of a private attribute in a message object

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Next_pValue (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_DT DataType,
    MC_size_t BufferSize,
    void *Value,
    int *ValueSize
)

```

```
MC_STATUS MC_Get_Next_pValue_To_Float (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    float *Value
)

```

```
MC_STATUS MC_Get_Next_pValue_To_Double (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    double *Value
)

```

```
MC_STATUS MC_Get_Next_pValue_To_ShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    short int *Value
)

```

```
MC_STATUS MC_Get_Next_pValue_To_UShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned short *Value
)

```

```
MC_STATUS MC_Get_Next_pValue_To_Int (

```

---

```
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    int *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_UInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned int *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_LongInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    long int *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_ULongInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned long *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_LongLong (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    long long *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_ULongLong (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned long long *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_String (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    MC_size_t BufferSize,  
    char *Value  
)  
MC_STATUS MC_Get_Next_pValue_To_UnicodeString (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    MC_size_t BufferSize,
```



---

	<b>int</b> * <i>ValueSize</i> ,																								
	<b>MC_Uchar</b> * <i>Value</i> )																								
<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.																								
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.																								
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .																								
<i>DataType</i>	One of the enumerated codes identifying the data type of the value in <i>Value</i> . The MC_DT enumerated type is defined in “mc3msg.h”. They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
<b>String_Type</b>	Null-terminated character string																								
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<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number																								
<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute’s value will be returned here.																								
<i>ValueSize</i>	The size of the returned value is returned here.																								
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes. This parameter is type <i>size_t</i> on 64-bit Windows and <i>int</i> on all other platforms.																								

### Remarks

These functions fetch the next value of a multi-valued private attribute. If no value has yet been fetched from this attribute, these functions behave identically to the functions of similar names, with “\_Next” removed from the name. If one or more values have already been fetched from this attribute, the next value will be returned.

If **MC\_Get\_Next\_pValue** is used, the data type of the fetched value is specified by the *DataType* parameter. The other function names imply the data type requested. For example: **MC\_Get\_Next\_pValue\_To\_Int** is the same as calling **MC\_Get\_Next\_pValue** with *DataType* specified as **Int\_Type**. Each function will return the value requested in *Value*, which must be prototyped as the appropriate type. In the case of **MC\_Get\_Next\_pValue\_To\_String** and **MC\_Get\_Next\_pValue\_To\_UnicodeString**, an additional parameter (*BufferSize*) is required to specify

the size of the buffer to receive the string value. For **MC\_Get\_Next\_pValue**, *BufferSize* must be large enough to contain the data type requested.

For **MC\_Get\_Next\_pValue\_To\_UnicodeString**, it is required to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

Function	May be used to retrieve values from attributes with these Value Representations
MC_Get_Next_pValue_To_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_UlongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_UlongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_pValue_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Get_Next_pValue_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

The same rules apply to the **MC\_Get\_Next\_pValue** function, based on the value used in the *DataType* parameter.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_NO_MORE_VALUES</b>	There are no more values for this attribute.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC_Get_Next_pValue</b> and <b>MC_Get_Next_pValue_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using <b>MC_Get_pValue_To_Int</b> when the value is 123.45; or instances where the value's sign (+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.

### See Also

**MC\_Get\_pValue... Functions**                      **MC\_Get\_Value... Functions**  
**MC\_Get\_Next\_Value... Functions**

## MC\_Get\_Next\_Validate\_Error

Used to retrieve additional validation error blocks created by the **MC\_Validate\_Message** function.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Next_Validate_Error (
    int MessageID,
    VAL_ERR **ErrorInfo
)
```

*MessageID*      The message object's identification number

*ErrorInfo* The address of a validation error block describing the violation encountered is returned here if a status of **MC\_NORMAL\_COMPLETION** is returned. The block is the **VAL\_ERR** type defined in “mc3msg.h”.

```
typedef struct ValErr_struct
{
    unsigned long Tag; /* Tag of attribute with validation
                       violation */
    int MsgItemID; /* ID of message or item object
                   containing the attribute */
    int ValueNumber; /* Value number involved - zero if no
                     value involved */
    MC_STATUS Status; /* Validation violation status code */
    int ParentMsgID; /* ID of parent of message or item
                     object containing the attribute */
    int MsgLevel; /* Nesting level in data set hierarchy
                  of the message or item object
                  containing the attribute; */
} VAL_ERR;
```

**MC\_Get\_Next\_Validate\_Error** returns additional validation error blocks created by a previous call to **MC\_Validate\_Message**. The next validation violation error block is returned at *ErrorInfo* if another violation exists. If not, this function returns **MC\_END\_OF\_LIST**.

The VAL\_ERR data structure is de-allocated when MC\_Free\_File, MC\_Empty\_File or MC\_Empty\_Message are called.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	Another validation violation exists and its information is returned at <i>ErrorInfo</i> .
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>ErrorInfo</i> was NULL.
<b>MC_END_OF_LIST</b>	The error list has been exhausted, or no <b>MC_Validate_Message</b> call has been made for this message.

### Validation Violations

If a status of **MC\_NORMAL\_COMPLETION** is returned, the status of the next validation violation is returned at *ErrorInfo->Status*. The violation status codes are defined in “mcstatus.h”. They are arranged by violation type below:

#### INFO MESSAGES:

<b>MC_NO_CONDITION_FUNCTION</b>	The attribute’s DICOM type is “1C” or “2C” and no function was available to check the condition. A user-defined condition function was not correctly linked with the program.
---------------------------------	---

**MC\_UNABLE\_TO\_CHECK\_CONDITION**

Not enough information is available to check whether or not a DICOM type “1C” or “2C” attribute is required.

**WARNINGS:****MC\_NOT\_ONE\_OF\_DEFINED\_TERMS**

A value set for this attribute is not one of the valid defined terms assigned to this attribute.

**MC\_NON\_SERVICE\_ATTRIBUTE**

The attribute is not one of those defined for the message’s service. Note that private attributes will not cause this violation

**ERRORS:****MC\_INVALID\_VR\_CODE**

The attribute’s value representation is unknown.

**MC\_REQUIRED\_ATTRIBUTE\_MISSING**

An attribute which is required for the message service has been deleted from the message object.

**MC\_REQUIRED\_VALUE\_MISSING**

The attribute is required to have a value and does not.

**MC\_VALUE\_MAY\_NOT\_BE\_NULL**

The attribute is DICOM type “1” or type “1C” and it has been encoded with a NULL value.

**MC\_VALUE\_NOT\_ALLOWED**

This DICOM type “1C” or type “2C” attribute may not have a value under current conditions.

**MC\_TOO\_FEW\_VALUES**

The attribute is required to have more values set.

**MC\_TOO\_MANY\_VALUES**

The attribute has more values set than are allowed.

**MC\_INVALID\_ITEM\_ID**

This sequence of items (SQ) attribute has an invalid value assigned to it.

**MC\_NOT\_ONE\_OF\_ENUMERATED\_VALUES**

A value set for this attribute is not one of the valid enumerated values assigned to this attribute.

**MC\_INVALID\_VALUE\_FOR\_VR**

A value for this attribute does not conform to the requirements of its value representation.

**MC\_INVALID\_CHARS\_IN\_VALUE**

A value for this attribute does not contain valid characters for its value representation.

**See Also**

**MC\_Validate\_Message**

**MC\_Get\_Next\_Value... Functions**

Retrieves the next value of an attribute in a message object

**Synopsis**

```
#include "mc3msg.h"

MC_STATUS MC_Get_Next_Value (
    int MsgFileItemID,
    unsigned long Tag,
```

```

    MC_DT DataType,
    MC_size_t BufferSize,
    void *Value,
    int *ValueSize
)
MC_STATUS MC_Get_Next_Value_To_Float (
    int MsgFileItemID,
    unsigned long Tag,
    float *Value
)
MC_STATUS MC_Get_Next_Value_To_Double (
    int MsgFileItemID,
    unsigned long Tag,
    double *Value
)
MC_STATUS MC_Get_Next_Value_To_ShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    short int *Value
)
MC_STATUS MC_Get_Next_Value_To_UShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned short *Value
)
MC_STATUS MC_Get_Next_Value_To_Int (
    int MsgFileItemID,
    unsigned long Tag,
    int *Value
)
MC_STATUS MC_Get_Next_Value_To_UInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned int *Value
)
MC_STATUS MC_Get_Next_Value_To_LongInt (
    int MsgFileItemID,
    unsigned long Tag,
    long int *Value
)
MC_STATUS MC_Get_Next_Value_To_ULongInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long *Value)
)
MC_STATUS MC_Get_Next_Value_To_LongLong (
    int MsgFileItemID,
    unsigned long Tag,
    long long *Value
)
MC_STATUS MC_Get_Next_Value_To_ULongLong (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long *Value)
)
MC_STATUS MC_Get_Next_Value_To_String (

```

```

    int MsgFileItemID,
    unsigned long Tag,
    MC_size_t BufferSize,
    char *Value
)
MC_STATUS MC_Get_Next_Value_To_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    MC_size_t BufferSize,
    int *ValueSize,
    MC_Uchar *Value
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>Tag</i>	DICOM tag which identifies the attribute.																								
<i>DataType</i>	One of the enumerated codes identifying the data type of the value in <i>Value</i> . The MC_DT enumerated type is defined in "mc3msg.h". They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
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<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute's value will be returned here.																								
<i>ValueSize</i>	The size of the returned value is returned here.																								
<i>BufferSize</i>	The size of <i>Value</i> buffer in bytes. This parameter is type <code>size_t</code> on 64-bit Windows and <code>int</code> on all other platforms.																								

### Remarks

These functions fetch the next value of a multi-valued attribute. If no value has yet been fetched from this attribute, these functions behave identically to the functions of similar names, with "\_Next" removed from the name. If one or more values have already been fetched from this attribute, the next value will be returned.

If **MC\_Get\_Next\_Value** is used, the data type of the fetched value is specified by the *DataType* parameter. The other function names imply the data type requested. For example:

**MC\_Get\_Next\_Value\_To\_Int** is the same as calling **MC\_Get\_Next\_Value** with *DataType* specified as **Int\_Type**. Each function will return the value requested in *Value*, which must be prototyped as the

appropriate type. In the case of **MC\_Get\_Next\_Value\_To\_String** and **MC\_Get\_Next\_Value\_To\_UnicodeString**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC\_Get\_Next\_Value**, *BufferSize* must be large enough to contain the data type requested.

For **MC\_Get\_Next\_Value\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC_Get_Next_Value_To_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_ULongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Next_Value_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Get_Next_Value_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT

The same rules apply to the **MC\_Get\_Next\_Value** function, based on the value used in the *Data Type* parameter.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
-------	---------



<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_NO_MORE_VALUES</b>	There are no more values for this attribute.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC_Get_Next_Value</b> and <b>MC_Get_Next_Value_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using <b>MC_Get_Value_To_Int</b> when the value is 123.45; or instances where the value's sign (+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.</b>

### See Also

<b>MC_Get_pValue... Functions</b>	<b>MC_Get_Next_pValue... Functions</b>
<b>MC_Get_Next_Value... Functions</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Enable_Unicode_Conversion</b>	

## MC\_Get\_Offset\_Table\_To\_Function

Retrieves the basic offset table of encapsulated pixel data from a message.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Offset_Table_To_Function (
    int    MsgFileItemID,
    void *UserInfo,
    void *YourGetFunction,
)
```

---

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the offset table

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CMsgFileItemID,
    unsigned long CTag,
    void* CUserInfo,
    int CdataSize,
    void* CdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CTag</i>	DICOM tag which identifies the attribute.
<i>CUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Offset_Table_To_Function</b> function. This may be NULL.
<i>CdataSize</i>	The number of bytes in <i>CdataBuffer</i> .
<i>CdataBuffer</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC\_Get\_Offset\_Table\_To\_Function** function is used to fetch a basic offset table of an encapsulated pixel data attribute.

The (*YourGetFunction*) function is used to provide a byte array which contains an offset table data. This byte array needs to be converted to array of integers, where every integer consists of four bytes. The first integer is the offset table length and all subsequential integer values are the corresponding frame offsets.

## **YourGetFunction**

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time **YourGetFunction** is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time **YourGetFunction** is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

**YourGetFunction** must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

## **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned MC_CANNOT_COMPLY.

## **See Also**

**MC\_Get\_Encapsulated\_Value\_To\_Function**  
**MC\_Get\_Next\_Encapsulated\_Value\_To\_Function**  
**MC\_Get\_Frame\_To\_Function**  
**MC\_Register\_Compression\_Callbacks**

## MC\_Get\_pAttribute\_Info

Retrieves information about a given private attribute in a message.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_pAttribute_Info (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_VR *ValueRep,
    int *NumValues
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>ValueRep</i>	The attribute's value representation code is returned here. Possible return codes (defined in "mc3msg.h") are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ, UNKNOWN_VR</b>
<i>NumValues</i>	The number of values assigned to the attribute is placed here. (Note: will be one (1) if the attribute's value is NULL.)

### Remarks

**MC\_Get\_pAttribute\_Info** retrieves information about a message attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. The attribute's Value Representation code is returned at *ValueRep*, and the number of values stored for the attribute is returned at *NumValues*. If the attribute is "empty", *NumValues* will contain zero (0). If the attribute's value is NULL, *NumValues* will contain one (1).

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.

### See Also

<b>MC_Get_First_Attribute</b>	<b>MC_Get_Next_Attribute</b>
<b>MC_Get_Attribute_Info</b>	

## MC\_Get\_pTag\_Info

Retrieves a descriptive string for a given private tag.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_pTag_Info (
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    char *Name,
    int NameLength
)
```

<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>Name</i>	The tag’s name is returned here.
<i>NameLength</i>	The length in bytes of <i>Name</i> .

### Remarks

**MC\_Get\_pTag\_Info** retrieves information about an attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. A descriptive test string for the attribute is returned at *Name*.

This function will only work with private attributes added to the Merge DICOM Toolkit’s data dictionary through use of an extended toolkit.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The Merge DICOM Toolkit data dictionary does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_DDFILE_ERROR</b>	An error occurred while trying to access the Merge DICOM Toolkit data dictionary. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MISSING_CONFIG_PARM</b>	This error occurs when the toolkit can not obtain the name of the data dictionary.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Name</i> is not large enough to contain the descriptive string.

**See Also****MC\_Get\_Tag\_Info****MC\_Get\_Attribute\_Info** **MC\_Get\_pAttribute\_Info****MC\_Get\_pTags\_Dict\_Info**

Retrieves all dictionary information for a given private tag.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_pTags_Dict_Info (
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    char *Name,
    int NameSize,
    MC_VR* ValueRep,
    unsigned short *ValueMult_low,
    unsigned short *ValueMult_high
)
```

<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>Tag</i>	A tag identifying a message attribute.
<i>Name</i>	A buffer to contain the tag's name.
<i>NameSize</i>	The size, in bytes, of <i>Name</i>

<i>ValueRep</i>	The attribute's value representation code is returned here. Possible return codes (defined in "mc3msg.h") are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ, UNKNOWN_VR</b>
<i>ValueMult_low</i>	The minimum multiplicity will be returned here
<i>ValueMult_high</i>	The maximum multiplicity will be returned here

### Remarks

**MC\_Get\_pTags\_Dict\_Info** retrieves information about a private attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. The attribute's name is returned at *Name*, the value representation code is returned at *ValueRep*, and the value multiplicities are returned in *ValueMult\_low* and *ValueMult\_high*.

This function will only work with private attributes added to the Merge DICOM Toolkit's data dictionary through use of an extended toolkit.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Name</i> , <i>ValueRep</i> , <i>ValueMult_low</i> , <i>ValueMult_High</i> , and/or <i>PrivateCode</i> are invalid.
<b>MC_BUFFER_TOO_SMALL</b>	<i>NameSize</i> is not large enough to contain <i>Name</i> .
<b>MC_MISSING_CONFIG_PARM</b>	This error occurs when the toolkit can not obtain the name of the data dictionary.
<b>MC_DDFILE_ERROR</b>	An error occurred while trying to access the Merge DICOM Toolkit data dictionary. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The Merge DICOM Toolkit data dictionary does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .

### See Also

<b>MC_Get_pTag_Info</b>	<b>MC_Get_Tags_Dict_Info</b>
-------------------------	------------------------------

## MC\_Get\_pValue... Functions

Retrieves the first or only value of a private attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_pValue (
    int MsgFileItemID,
    char *PrivateCode,
```

```
        unsigned short Group,  
        unsigned char ElementByte,  
        MC_DT DataType,  
        MC_size_t BufferSize,  
        void *Value,  
        int *ValueSize  
    )  
MC_STATUS MC_Get_pValue_To_Float (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    float* Value  
)  
MC_STATUS MC_Get_pValue_To_Double (  
    (  
        int MsgFileItemID,  
        char *PrivateCode,  
        unsigned short Group,  
        unsigned char ElementByte,  
        double *Value  
    )  
MC_STATUS MC_Get_pValue_To_ShortInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    short int *Value  
)  
MC_STATUS MC_Get_pValue_To_UShortInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned short *Value  
)  
MC_STATUS MC_Get_pValue_To_Int (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    int *Value  
)  
MC_STATUS MC_Get_pValue_To_UInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned int *Value  
)  
MC_STATUS MC_Get_pValue_To_LongInt (  
    (  
        int MsgFileItemID,  
        char *PrivateCode,  
        unsigned short Group,  
        unsigned char ElementByte,
```



```

        long int *Value
    )
MC_STATUS MC_Get_pValue_To_ULongInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long *Value
)
MC_STATUS MC_Get_pValue_To_LongLong (
(
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    long long *Value
)
MC_STATUS MC_Get_pValue_To_ULongLong (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long *Value
)
MC_STATUS MC_Get_pValue_To_String (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_size_t BufferSize,
    char *Value
)
MC_STATUS MC_Get_pValue_To_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_size_t BufferSize,
    int *ValueSize,
    MC_Uchar *Value
)
MC_STATUS MC_Get_pValue_To_Buffer (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_size_t BufferSize,
    void *Value,
    int *ValueSize
)

```

*MsgFileItemID* The identifier assigned to this object by the  
*D* **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**,  
**MC\_Create\_File**, **MC\_Create\_Empty\_File**, or  
**MC\_Open\_Item** functions.

<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.																								
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.																								
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .																								
<i>Data Type</i>	One of the enumerated codes identifying the data type which should be used for the returned value in <i>Value</i> . The MC_DT enumerated type is defined in “mc3msg.h”. They are: <table border="0" style="margin-left: 20px;"> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
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<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute’s value will be returned here.																								
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes. This parameter is type <code>size_t</code> on 64-bit Windows and <code>int</code> on all other platforms.																								
<i>ValueSize</i>	The size (in bytes) of the value returned in the <i>Value</i> buffer.																								

### Remarks

These functions fetch the first (or only) value of a private attribute identified by *ElementByte* for the *PrivateCode* within the given private *Group*. If more than one value exists for this attribute, the first one will be returned. If **MC\_Get\_pValue** is used, the data type of the fetched value is specified by the *Data Type* parameter. The other function names imply the data type requested. For example, **MC\_Get\_pValue\_To\_Int** is the same as calling **MC\_Get\_pValue** with *Data Type* specified as **Int\_Type**. Each function will return the value requested in *Value*, which must be prototyped as the appropriate type. For **MC\_Get\_pValue\_To\_String**, **MC\_Get\_pValue\_To\_UnicodeString** and **MC\_Get\_pValue\_To\_Buffer**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC\_Get\_pValue**, *BufferSize* must be large enough to contain the data type requested.

For **MC\_Get\_pValue\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC\_Get\_pValue\_To\_Buffer** is used to retrieve the value of a private attribute of a binary value representation of UN, OB, OW, OV, OL, OD or OF, or a text value representation of UR or UT, or an attribute whose value representation is unknown. This may occur if **MC\_Stream\_To\_Message** is used and one or more of the stream attributes is unknown. Using **MC\_Get\_pValue\_To\_Buffer** for attributes

whose Value Representation is known will result in an error. The attribute's value is simply copied (memcpy) to the *Value* buffer and its length is placed at *ValueSize*.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC_Get_pValue_To_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_ULongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_pValue_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Get_pValue_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC_Get_pValue_To_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT
MC_Get_pValue_To_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT

The same rules apply to the **MC\_Get\_pValue** function, based on the value used in the *DataType* parameter. The **MC\_Get\_pValue\_To\_Function** call is described in its own section.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC_Get_pValue</b> , <b>MC_Get_pValue_To_Buffer</b> and <b>MC_Get_pValue_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using <b>MC_Get_pValue_To_Int</b> when the value is 123.45; or instances where the value's sign(+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.

**See Also**

<b>MC_Get_pValue_To_Function</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Get_Next_pValue... Functions</b>	<b>MC_Get_Value... Functions</b>
<b>MC_Get_Next_Value... Functions</b>	

**MC\_Get\_pValue\_Count**

Returns the number of values assigned to a private attribute in a message object.

**Synopsis**

```
#include "mc3msg.h"

MC_STATUS MC_Get_pValue_Count (
    int MsgFileItemID,
    char *PrivateCode,
```

```

    unsigned short Group,
    unsigned char ElementByte,
    int *CountPtr
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>CountPtr</i>	The number of values the attribute contains is returned here.

### Remarks

**MC\_Get\_pValue\_Count** returns the number of values assigned to a private attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. The number of returned at *\*CountPtr*.

Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>CountPtr</i> was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.

### See Also

**MC\_Get\_Value\_Count**

## MC\_Get\_pValue\_Length

Returns the length of a private attribute value.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_pValue_Length (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    int ValueNumber,
    unsigned long *Length
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>ValueNumber</i>	Retrieve the length of this attribute value.
<i>Length</i>	The value's length is returned here.

### Remarks

**MC\_Get\_pValue\_Length** returns the length of a given value of an attribute in a message object. The size, in bytes, is returned at *\*Length*.

The function returns the length of value *ValueNumber*. The first value is number 1. Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_NULL_POINTER_PARM</b>	<i>Length</i> or <i>PrivateCode</i> was NULL.

<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.
<b>MC_INVALID_VALUE_NUMBER</b>	<i>ValueNumber</i> was negative or the attribute does not have that many values.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_TEMP_FILE_ERROR</b>	File I/O error accessing value information in temporary files.

### See Also

**MC\_Get\_Value\_Length**

## MC\_Get\_pValue\_To\_Function

Retrieves the value of a private attribute which has a binary value representation of OB, OW, OV, OL, OD or OF, or a numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or a text value representation of UR or UT, from a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_pValue_To_Function (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*YourGetFunction) ()
)
```

---

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide the function with blocks of the attribute’s value.

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void* CUserInfo,
    int CBdataSize,
    void* CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_pValue_To_Function</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	Address of the buffer containing a portion of the attribute’s value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.



## Remarks

The **MC\_Get\_pValue\_To\_Function** function is used to fetch the value of a private attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses the **MC\_Get\_pValue\_To\_Function** function to specify the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to provide blocks of the attribute’s data value.

An optional *UserInfo* parameter may be used to pass information between the **MC\_Get\_pValue\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourGetFunction

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute’s value representation was not OB, OW, or OF.
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

**See Also**

<b>MC_Get_Value</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Get_Value_To_Float</b>	<b>MC_Get_Value_To_Double</b>
<b>MC_Get_Value_To_ShortInt</b>	<b>MC_Get_Value_To_UShortInt</b>
<b>MC_Get_Value_To_LongInt</b>	<b>MC_Get_Value_To_Int</b>
<b>MC_Get_Value_To_ULongInt</b>	<b>MC_Get_Value_To_UInt</b>
<b>MC_Get_Value_To_NULL</b>	<b>MC_Get_Value_To_Empty</b>
<b>MC_Get_pValue</b>	<b>MC_Get_pValue_To_Double</b>
<b>MC_Get_pValue_To_Float</b>	<b>MC_Get_pValue_To_UShortInt</b>
<b>MC_Get_pValue_To_ShortInt</b>	<b>MC_Get_pValue_To_Int</b>
<b>MC_Get_pValue_To_LongInt</b>	<b>MC_Get_pValue_To_UInt</b>
<b>MC_Get_pValue_To_ULongInt</b>	<b>MC_Get_pValue_To_Empty</b>
<b>MC_Get_Next_Value</b>	<b>MC_Get_Next_Value_To_Double</b>
<b>MC_Get_Next_Value_To_Float</b>	<b>MC_Get_Next_Value_To_UShortInt</b>
<b>MC_Get_Next_Value_To_ShortInt</b>	<b>MC_Get_Next_Value_To_Int</b>
<b>MC_Get_Next_Value_To_LongInt</b>	<b>MC_Get_Next_Value_To_UInt</b>
<b>MC_Get_Next_Value_To_ULongInt</b>	
<b>MC_Get_Next_pValue</b>	<b>MC_Get_Next_pValue_To_Double</b>
<b>MC_Get_Next_pValue_To_Float</b>	<b>MC_Get_Next_pValue_To_UShortInt</b>
<b>MC_Get_Next_pValue_To_ShortInt</b>	<b>MC_Get_Next_pValue_To_Int</b>
<b>MC_Get_Next_pValue_To_LongInt</b>	<b>MC_Get_Next_pValue_To_UInt</b>
<b>MC_Get_Next_pValue_To_ULongInt</b>	

**MC\_Get\_Stream\_Length**

Returns the size of a DICOM stream which would result from using the **MC\_Message\_To\_Stream** function.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Stream_Length (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    unsigned long *LengthPtr,
    TRANSFER_SYNTAX SyntaxType
)
```

<i>MessageID</i>	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
<i>StartTag</i>	The DICOM tag identifying the first attribute which would be streamed.

---

<i>StopTag</i>	The DICOM tag identifying the last attribute which would be streamed
<i>LengthPtr</i>	Location where Merge DICOM Toolkit will return the stream length.
<i>SyntaxType</i>	Specify which DICOM transfer syntax is to be assumed for the stream data. Use one of the enumerated TRANSFER_SYNTAX types defined in "mc3msg.h": IMPLICIT_LITTLE_ENDIAN IMPLICIT_BIG_ENDIAN EXPLICIT_LITTLE_ENDIAN EXPLICIT_BIG_ENDIAN DEFLATED_EXPLICIT_LITTLE_ENDIAN ENCAPSULATED_UNCOMPRESSED_ELEMENTARY RLE JPEG_BASELINE JPEG_EXTENDED_2_4 JPEG_EXTENDED_3_5 JPEG_SPEC_NON_HIER_6_8 JPEG_SPEC_NON_HIER_7_9 JPEG_FULL_PROG_NON_HIER_10_12 JPEG_FULL_PROG_NON_HIER_11_13 JPEG_LOSSLESS_NON_HIER_14 JPEG_LOSSLESS_NON_HIER_15 JPEG_EXTENDED_HIER_16_18 JPEG_EXTENDED_HIER_17_19 JPEG_SPEC_HIER_20_22 JPEG_SPEC_HIER_21_23 JPEG_FULL_PROG_HIER_24_26 JPEG_FULL_PROG_HIER_25_27 JPEG_LOSSLESS_HIER_28 JPEG_LOSSLESS_HIER_29 JPEG_LOSSLESS_HIER_14 JPEG_2000_LOSSLESS_ONLY JPEG_2000 JPEG_LS_LOSSLESS JPEG_LS_LOSSY HEVC_H265_M10P_LEVEL_5_1 HEVC_H265_MP_LEVEL_5_1 JPIP_REFERENCED JPIP_REFERENCED_DEFLATE MPEG2_MPML MPEG2_MPHL MPEG4_AVC_H264_HP_LEVEL_4_1 MPEG4_AVC_H264_BDC_HP_LEVEL_4_1 MPEG4_AVC_H264_HP_LEVEL_4_2_2D MPEG4_AVC_H264_HP_LEVEL_4_2_3D

```

MPEG4_AVC_H264_STEREO_HP_LEVEL_4_2
JPEG_2000_MC_LOSSLESS_ONLY
JPEG_2000_MC
SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_A
CTIVE_VIDEO
SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_AC
TIVE_VIDEO
SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO
PRIVATE_SYNTAX_1
PRIVATE_SYNTAX_2

```

### Remarks

**MC\_Get\_Stream\_Length** returns the size of a DICOM stream which would result from using the **MC\_Message\_To\_Stream** function for the message identified by *MessageID*. The calculation is based on the assumption that the stream would be encoded using *SyntaxType* DICOM transfer syntax. It is also assumed that the stream would contain attributes with tags greater than or equal to *StartTag* and less than or equal to *StopTag*. The length is returned to the unsigned long at *\*LengthPtr*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	<i>SyntaxType</i> is not one of the <b>TRANSFER_SYNTAX</b> codes defined in “ <b>mc3msg.h</b> ”.
<b>MC_NULL_POINTER_PARM</b>	<i>LengthPtr</i> was NULL.

### See Also

**MC\_Message\_To\_Stream**

## MC\_Get\_String\_Config\_Value

Used to get the value of a character string toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```

MC_STATUS MC_Get_String_Config_Value (
    StringParm Parm,
    int ValueLength,
    char *Value
)

```

*Parm* An enumerated constant identifying the character string configuration parameter to get. *Parm* can have any of the following values:

---

MERGECOM\_3\_PROFILE  
MERGECOM\_3\_SERVICES  
MERGECOM\_3\_APPLICATIONS  
CAPTURE\_FILE  
COMPRESSION\_RGB\_TRANSFORM\_FORMAT  
DECODER\_PRIVATE\_TAG\_WHITELIST  
DECODER\_TAG\_FILTER  
DEFLATED\_EXPLICIT\_LITTLE\_ENDIAN\_SYNTAX  
DICTIONARY\_ACCESS  
DICTIONARY\_FILE  
ENCAPSULATED\_UNCOMPRESSED\_ELE\_SYNTAX  
EXPLICIT\_BIG\_ENDIAN\_SYNTAX  
EXPLICIT\_LITTLE\_ENDIAN\_SYNTAX  
HEVC\_H265\_M10P\_LEVEL\_5\_1\_SYNTAX  
HEVC\_H265\_MP\_LEVEL\_5\_1\_SYNTAX  
IMPLEMENTATION\_CLASS\_UID  
IMPLEMENTATION\_VERSION  
IMPLICIT\_BIG\_ENDIAN\_SYNTAX  
IMPLICIT\_LITTLE\_ENDIAN\_SYNTAX  
INITIATOR\_NAME  
IP\_TYPE  
JPEG\_2000\_LOSSLESS\_ONLY\_SYNTAX  
JPEG\_2000\_MC\_LOSSLESS\_ONLY\_SYNTAX  
JPEG\_2000\_MC\_SYNTAX  
JPEG\_2000\_SYNTAX  
JPEG\_BASELINE\_SYNTAX  
JPEG\_EXTENDED\_2\_4\_SYNTAX  
JPEG\_EXTENDED\_3\_5\_SYNTAX  
JPEG\_EXTENDED\_HIER\_16\_18\_SYNTAX  
JPEG\_EXTENDED\_HIER\_17\_19\_SYNTAX  
JPEG\_FULL\_PROG\_HIER\_24\_26\_SYNTAX  
JPEG\_FULL\_PROG\_HIER\_25\_27\_SYNTAX  
JPEG\_FULL\_PROG\_NON\_HIER\_10\_12\_SYNTAX  
JPEG\_FULL\_PROG\_NON\_HIER\_11\_13\_SYNTAX  
JPEG\_LOSSLESS\_HIER\_14\_SYNTAX  
JPEG\_LOSSLESS\_HIER\_28\_SYNTAX  
JPEG\_LOSSLESS\_HIER\_29\_SYNTAX  
JPEG\_LOSSLESS\_NON\_HIER\_14\_SYNTAX  
JPEG\_LOSSLESS\_NON\_HIER\_15\_SYNTAX  
JPEG\_LS\_LOSSLESS\_SYNTAX  
JPEG\_LS\_LOSSY\_SYNTAX  
JPEG\_SPEC\_HIER\_20\_22\_SYNTAX  
JPEG\_SPEC\_HIER\_21\_23\_SYNTAX  
JPEG\_SPEC\_NON\_HIER\_6\_8\_SYNTAX  
JPEG\_SPEC\_NON\_HIER\_7\_9\_SYNTAX  
JPIP\_REFERENCED\_DEFLATE\_SYNTAX  
JPIP\_REFERENCED\_SYNTAX  
LARGE\_DATA\_STORE  
LICENSE  
LOCAL\_APPL\_CONTEXT\_NAME  
LOG\_FILE  
MPEG2\_MPHL\_SYNTAX  
MPEG2\_MPML\_SYNTAX  
MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1\_SYNTAX  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1\_SYNTAX

---

MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D\_SYNTAX  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D\_SYNTAX  
 MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2\_SYNTAX  
 MSG\_INFO\_FILE  
 NULL\_TYPE3\_VALIDATION  
 PEGASUS\_DISP\_REG\_NAME  
 PEGASUS\_DISP\_REGISTRATION  
 PEGASUS\_OP\_D2SEPLUS\_NAME  
 PEGASUS\_OP\_D2SEPLUS\_REGISTRATION  
 PEGASUS\_OP\_J2KE\_NAME  
 PEGASUS\_OP\_J2KE\_REGISTRATION  
 PEGASUS\_OP\_J2KP\_NAME  
 PEGASUS\_OP\_J2KP\_REGISTRATION  
 PEGASUS\_OP\_JLSE\_NAME  
 PEGASUS\_OP\_JLSE\_REGISTRATION  
 PEGASUS\_OP\_JLSP\_NAME  
 PEGASUS\_OP\_JLSP\_REGISTRATION  
 PEGASUS\_OP\_LIE3PLUS\_NAME  
 PEGASUS\_OP\_LIE3PLUS\_REGISTRATION  
 PEGASUS\_OP\_LIP3PLUS\_NAME  
 PEGASUS\_OP\_LIP3PLUS\_REGISTRATION  
 PEGASUS\_OP\_SE2DPLUS\_NAME  
 PEGASUS\_OP\_SE2DPLUS\_REGISTRATION  
 PEGASUS\_OPCODE\_PATH  
 PRIVATE\_SYNTAX\_1\_SYNTAX  
 PRIVATE\_SYNTAX\_2\_SYNTAX  
 RECEIVER\_NAME  
 RLE\_SYNTAX  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTIVE\_VIDEO\_SYNTAX  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIVE\_VIDEO\_SYNTAX  
 SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO\_SYNTAX  
 TEMP\_FILE\_DIRECTORY  
 UNKNOWN\_VR\_CODE

These names are the same as those given to the parameters in the toolkit configuration files.

*ValueLength*      The length of *Value*.  
*Value*              A character string to copy the value of *Parm* into.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to get character string configurable parameters specified in these files at runtime. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_NULL_POINTER_PARM</b>	<i>Value</i> was a null pointer.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Value</i> is not large enough to contain the configuration string.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
<b>MC_Get_Long_Config_Value</b>	<b>MC_Set_Long_Config_Value</b>
<b>MC_Set_String_Config_Value</b>	

## MC\_Get\_Tag\_Info

Retrieves a descriptive string for a given tag.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Tag_Info (
    unsigned long Tag,
    char *Name,
    int NameLength
)
```

*Tag*            A tag identifying a message attribute.

*Name*           The tag's name is returned here.

*NameLength*    The length in bytes of *Name*.

### Remarks

**MC\_Get\_Tag\_Info** retrieves information about an attribute identified by *Tag*. A descriptive text string for the attribute is returned at *Name*.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The attribute identified by <i>Tag</i> is not a valid DICOM attribute.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_DDFILE_ERROR</b>	An error occurred while trying to access the Merge DICOM Toolkit data dictionary. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MISSING_CONFIG_PARM</b>	This error occurs when the toolkit can not obtain the name of the data dictionary.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Name</i> is not large enough to contain the descriptive string.

**See Also****MC\_Get\_pTag\_Info****MC\_Get\_Attribute\_Info MC\_Get\_pAttribute\_Info****MC\_Get\_Tags\_Dict\_Info**

Retrieves all dictionary information for a given tag.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Tags_Dict_Info (
    unsigned long Tag,
    char *Name,
    int NameSize,
    MC_VR *ValueRep,
    unsigned short *ValueMult_low,
    unsigned short *ValueMult_high
)
```

<i>Tag</i>	A tag identifying a message attribute.
<i>Name</i>	A buffer to contain the tag's name.
<i>NameSize</i>	The size, in bytes, of <i>Name</i>
<i>ValueRep</i>	The attribute's value representation code is returned here. Possible return codes (defined in "mc3msg.h") are: <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ, UNKNOWN_VR</b>
<i>ValueMult_low</i>	The minimum multiplicity will be returned here
<i>ValueMult_high</i>	The maximum multiplicity will be returned here

**Remarks**

**MC\_Get\_Tags\_Dict\_Info** retrieves information about an attribute identified by *Tag*. The attribute's Name is returned at *Name*, value representation code is returned at *ValueRep*, and the value multiplicities are returned in *ValueMult\_low* and *ValueMult\_high*. The values returned are from the dictionary file.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Name</i> , <i>ValueRep</i> , <i>ValueMult_low</i> , <i>ValueMult_High</i> , and/or <i>Tag</i> are invalid.
<b>MC_BUFFER_TOO_SMALL</b>	<i>NameSize</i> is not large enough to contain <i>Name</i> .
<b>MC_MISSING_CONFIG_PARM</b>	DICTIONARY_FILE is invalid
<b>MC_DDFILE_ERROR</b>	Data Dictionary problem



**MC\_INVALID\_TAG** Tag is not found

### See Also

**MC\_Get\_Attribute\_Info**

## MC\_Get\_Tag\_Keyword

Generates attribute's keyword for a given tag.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Tag_Keyword (
    unsigned long Tag,
    char *Keyword,
    int Length
)
```

*Tag* A tag identifying a message attribute.  
*Keyword* A buffer to contain the tag's keyword.  
*Length* The size, in bytes, of *Keyword*

### Remarks

**MC\_Get\_Tag\_Keyword** generates a keyword for standard attributes based on the name of the data element as described by section 6 part 6 in the DICOM standard. The attribute's Keyword is returned at *Keyword* and the length of the keyword buffer is returned at *Length*.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	Tag is not found or private tag
<b>MC_NULL_POINTER_PARM</b>	<i>Keyword</i> , <i>Length</i> and/or <i>Tag</i> are invalid.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Keyword Size</i> is not large enough to contain <i>Keyword</i> .
<b>MC_MISSING_CONFIG_PARM</b>	DICTIONARY_FILE is invalid
<b>MC_DDFILE_ERROR</b>	Data Dictionary problem
<b>MC_INVALID_TAG</b>	Tag is not found

## MC\_Get\_Transfer\_Syntax\_From\_Enum

Gets the DICOM UID for a transfer syntax.

### Synopsis

```
#include "mc3msg.h"
```

---

```

MC_STATUS MC_Get_Transfer_Syntax_From_Enum (
    TRANSFER_SYNTAX SyntaxType,
    char *Uid,
    int UidLength
)

```

*SyntaxType* Specify the DICOM transfer syntax for which to find a UID.

Use one of the enumerated TRANSFER\_SYNTAX types defined in mc3msg.h:

```

IMPLICIT_LITTLE_ENDIAN
IMPLICIT_BIG_ENDIAN
EXPLICIT_LITTLE_ENDIAN
EXPLICIT_BIG_ENDIAN
DEFLATED_EXPLICIT_LITTLE_ENDIAN
ENCAPSULATED_UNCOMPRESSED_ELEMENT
RLE
JPEG_BASELINE
JPEG_EXTENDED_2_4
JPEG_EXTENDED_3_5
JPEG_SPEC_NON_HIER_6_8
JPEG_SPEC_NON_HIER_7_9
JPEG_FULL_PROG_NON_HIER_10_12
JPEG_FULL_PROG_NON_HIER_11_13
JPEG_LOSSLESS_NON_HIER_14
JPEG_LOSSLESS_NON_HIER_15
JPEG_EXTENDED_HIER_16_18
JPEG_EXTENDED_HIER_17_19
JPEG_SPEC_HIER_20_22
JPEG_SPEC_HIER_21_23
JPEG_FULL_PROG_HIER_24_26
JPEG_FULL_PROG_HIER_25_27
JPEG_LOSSLESS_HIER_28
JPEG_LOSSLESS_HIER_29
JPEG_LOSSLESS_HIER_14
JPEG_2000_LOSSLESS_ONLY
JPEG_2000
JPEG_LS_LOSSLESS
JPEG_LS_LOSSY
HEVC_H265_M10P_LEVEL_5_1
HEVC_H265_MP_LEVEL_5_1
JPIP_REFERENCED
JPIP_REFERENCED_DEFLATE
MPEG2_MPML
MPEG2_MPHL
MPEG4_AVC_H264_HP_LEVEL_4_1
MPEG4_AVC_H264_BDC_HP_LEVEL_4_1
MPEG4_AVC_H264_HP_LEVEL_4_2_2D

```

MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D  
 MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2,  
 JPEG\_2000\_MC\_LOSSLESS\_ONLY  
 JPEG\_2000\_MC  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTI  
 VE\_VIDEO  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIV  
 E\_VIDEO  
 SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO  
 PRIVATE\_SYNTAX\_1  
 PRIVATE\_SYNTAX\_2

*Uid* The transfer syntax's UID is returned here.

*UidLength* The length in bytes of *Uid*.

### Remarks

**MC\_Get\_Transfer\_Syntax\_From\_Enum** converts a Merge DICOM Toolkit enumerated value that represents a DICOM transfer syntax into the UID for that transfer syntax. The UID values used by **MC\_Get\_Transfer\_Syntax\_From\_Enum** are specified in Merge DICOM Toolkit's configuration files. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	<i>SyntaxName</i> is not registered in the Merge DICOM Toolkit configuration files.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Uid</i> is not large enough to contain the unique identifier.

### See Also

**MC\_Get\_Enum\_From\_Transfer\_Syntax**  
**MC\_Get\_MergeCOM\_Service**  
**MC\_Get\_UID\_From\_MergeCOM\_Service**

## MC\_Get\_UID\_From\_MergeCOM\_Service

Converts a Merge DICOM Toolkit service name into a DICOM SOP Class UID.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_UID_From_MergeCOM_Service (
    char *ServiceName,
    char *Uid,
```

```
    int UidLength
)
```

*ServiceName* String name of a DICOM service  
*Uid* The service's SOP Class UID is returned here.  
*UidLength* The length in bytes of *Uid* buffer.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Uid</i> is not large enough to contain the unique identifier.

### See Also

**MC\_Get\_MergeCOM\_Service**  
**MC\_Get\_MergeCOM\_Service\_From\_UID**  
**MC\_Get\_Enum\_From\_Transfer\_Syntax**  
**MC\_Get\_Transfer\_Syntax\_From\_Enum**

## MC\_Get\_User\_Identity\_Info

Returns the contents of a user identity association negotiation related field.

### Synopsis

```
#include "mergecom.h"

typedef enum {
    PRIMARY_FIELD,
    SECONDARY_FIELD,
    SERVER_RESPONSE_FIELD
} USER_IDENTITY_FIELD_TYPE;

MC_STATUS MC_Get_User_Identity_Info (
    int AssocID,
    USER_IDENTITY_FIELD_TYPE FieldType,
    void *Field,
    unsigned short FieldLength
)
```

*AssocID* The identifier assigned to this object by the **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.

<i>FieldType</i>	An enumerated value specifying the User Identity related field to retrieve.
<i>Field</i>	A buffer into which the user identity field specified by <i>FieldType</i> is copied into. Note that if <i>Field</i> is a text field, a NULL termination character will not be included in the value returned in this parameter.
<i>FieldLength</i>	The length of <i>Field</i> in bytes.

### Remarks

**MC\_Get\_User\_Identity\_Info** returns the value of a field used in user identity association negotiation as defined in DICOM Supplement 99. It is used by an application accepting associations to determine the user identity related fields in an association request (the **PRIMARY\_FIELD** and **SECONDARY\_FIELD**), and it is used by applications opening associations to retrieve the user identity server response, if applicable (the **SERVER\_RESPONSE\_FIELD**).

The structure returned by the **MC\_Get\_Association\_Info** routine contains general information about the user identity negotiation such as the type of user identity information contained in the association negotiation, and if a server response has been requested in the association negotiation. For user identity types that contain additional fields, it is recommended that the **MC\_Get\_User\_Identity\_Length** routine be first used to determine the length of a specific user identity field. The **MC\_Get\_User\_Identity\_Info** routine can then be used to retrieve the actual field's value.

This function is to be called after an **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call, and before any **MC\_Read\_Message**, **MC\_Send\_Request\_Message**, **MC\_Send\_Request**, **MC\_Send\_Response\_Message** or **MC\_Send\_Response** calls.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Field</i> was NULL.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Field</i> was not large enough to contain the user identity field requested.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssocID</i> is not a valid association object ID.
<b>MC_STATE_VIOLATION</b>	The call was made after messages have been exchanged over the association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC\_Open\_Association\_With\_Identity****MC\_Accept\_Association\_With\_Identity****MC\_Get\_User\_Identity\_Length****MC\_Get\_Association\_Info****MC\_Get\_User\_Identity\_Length**

Returns the length of a user identity association negotiation related field.

**Synopsis**

```
#include "mergecom.h"
```

```
typedef enum {
    PRIMARY_FIELD,
    SECONDARY_FIELD,
    SERVER_RESPONSE_FIELD
} USER_IDENTITY_FIELD_TYPE;

MC_STATUS MC_Get_User_Identity_Length (
    int AssocID,
    USER_IDENTITY_FIELD_TYPE FieldType,
    unsigned short *FieldLength
)
```

*AssocID* The identifier assigned to this object by the **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Process\_Association\_Request**, **MC\_Process\_Secure\_Association\_Request**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.

*FieldType* An enumerated value specifying the User Identity related field to retrieve.

*FieldLength* The length of *FieldType* in bytes is returned here.

**Remarks**

**MC\_Get\_User\_Identity\_Length** returns the length of a field used in user identity association negotiation as defined in DICOM Supplement 99. It is used by an application accepting associations to determine the length of the user identity related fields in an association request (the **PRIMARY\_FIELD** and **SECONDARY\_FIELD**), and it is used by applications opening associations to determine the length of the user identity server response, if applicable (the **SERVER\_RESPONSE\_FIELD**).

The structure returned by the **MC\_Get\_Association\_Info** routine contains general information about the user identity negotiation such as the type of user identity information contained in the association negotiation, and if a server response has been requested in the association negotiation. For user identity types that contain additional fields, it is recommended that the **MC\_Get\_User\_Identity\_Length** routine be first used to determine the length of a specific user identity field. The **MC\_Get\_User\_Identity\_Info** routine can then be used to retrieve the actual field's value.

This function is to be called after an **MC\_Open\_Association**, **MC\_Open\_Secure\_Association**, **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call, and before any **MC\_Read\_Message**, **MC\_Send\_Request\_Message**, **MC\_Send\_Request**, **MC\_Send\_Response\_Message** or **MC\_Send\_Response** calls.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>FieldLength</i> was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssocID</i> is not a valid association object ID.
<b>MC_STATE_VIOLATION</b>	The call was made after messages have been exchanged over the association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Open\_Association\_With\_Identity**  
**MC\_Accept\_Association\_With\_Identity**  
**MC\_Get\_User\_Identity\_Info**  
**MC\_Get\_Association\_Info**

## MC\_Get\_Value... Functions

Retrieves the first or only value of an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Value (
    int MsgFileItemID,
    unsigned long Tag,
    MC_DT DataType,
    MC_size_t BufferSize,
    void *Value,
    int *ValueSize
)
MC_STATUS MC_Get_Value_To_Float (
    int MsgFileItemID,
    unsigned long Tag,
    float *Value
)
MC_STATUS MC_Get_Value_To_Double (
    int MsgFileItemID,
    unsigned long Tag,
    double *Value
)
```

---

```
MC_STATUS MC_Get_Value_To_ShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    short int *Value
)
MC_STATUS MC_Get_Value_To_UShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned short *Value
)
MC_STATUS MC_Get_Value_To_Int (
    int MsgFileItemID,
    unsigned long Tag,
    int *Value
)
MC_STATUS MC_Get_Value_To_UInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned int *Value
)
MC_STATUS MC_Get_Value_To_LongInt (
    int MsgFileItemID,
    unsigned long Tag,
    long int *Value
)
MC_STATUS MC_Get_Value_To_ULongInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long *Value
)
MC_STATUS MC_Get_Value_To_LongLong (
    int MsgFileItemID,
    unsigned long Tag,
    long long *Value
)
MC_STATUS MC_Get_Value_To_ULongLong (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long *Value
)
MC_STATUS MC_Get_Value_To_String (
    int MsgFileItemID,
    unsigned long Tag,
    MC_size_t BufferSize,
    char *Value
)
MC_STATUS MC_Get_Value_To_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    MC_size_t BufferSize,
    int *ValueSize,
    MC_Uchar *Value
)
MC_STATUS MC_Get_Value_To_Buffer (
    int MsgFileItemID,
    unsigned long Tag,
```



```

    MC_size_t BufferSize,
    char *Value,
    int *ValueSize
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>Tag</i>	DICOM tag which identifies the attribute.																								
<i>DataType</i>	One of the enumerated codes identifying the data type which should be used for the returned value in <i>Value</i> . The MC_DT enumerated type is defined in “mc3msg.h”. They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
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<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute’s value will be returned here.																								
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes. This parameter is type <code>size_t</code> on 64-bit Windows and <code>int</code> on all other platforms.																								
<i>ValueSize</i>	The size (in bytes) of the value returned in the <i>Value</i> buffer. If <i>DataType</i> is <b>String_Type</b> , the length of the string (not including the trailing null) is returned.																								

## Remarks

These functions fetch the first (or only) value of an attribute with the given *Tag*. If more than one value exists for this attribute, the first one will be returned. If **MC\_Get\_Value** is used, the data type of the fetched value is specified by the *DataType* parameter. The other function names imply the data type requested. For example: **MC\_Get\_Value\_To\_Int** is the same as calling **MC\_Get\_Value** with *DataType* specified as **Int\_Type**. Each function will return the value requested in *Value*, which must be prototyped as the appropriate type. For **MC\_Get\_Value\_To\_String**, **MC\_Get\_Value\_To\_UnicodeString** and **MC\_Get\_Value\_To\_Buffer**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC\_Get\_Value**, *BufferSize* must be large enough to contain the data type requested.

For **MC\_Get\_Value\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC\_Get\_Value\_To\_Buffer** is used to retrieve the value of a standard attribute of a binary value representation of UN, OB, OW, OV, OL, OD or OF, or a text value representation of UR or UT, or an attribute whose value representation is unknown. Using **MC\_Get\_Value\_To\_Buffer** for attributes with other Value Representations will result in an error. The attribute's value is simply copied (memcpy) to the *Value* buffer and its length is placed at *ValueSize*.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC_Get_Value_To_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_UlongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_UlongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Get_Value_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Get_Value_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC_Get_Value_To_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT
MC_Get_Value_To_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT

The same rules apply to the **MC\_Get\_Value** function, based on the value used in the *DataType* parameter. The **MC\_Get\_Value\_To\_Function** call is described in its own section.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. it's length is zero).
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC_Get_Value</b> , <b>MC_Get_Value_To_Buffer</b> and <b>MC_Get_Value_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using <b>MC_Get_Value_To_Int</b> when the value is 123.45; or instances where the value's sign(+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.</b>

## See Also

<b>MC_Get_pValue... Functions</b>	<b>MC_Get_pValue_To_Function</b>
<b>MC_Get_Next_pValue... Functions</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Get_Next_Value... Functions</b>	<b>MC_Enable_Unicode_Conversion</b>

## MC\_Get\_Value\_Count

Returns the number of values assigned to an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Value_Count (
    int MsgFileItemID,
    unsigned long Tag,
    int *CountPtr
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>CountPtr</i>	The number of values the attribute contains is returned here.

### Remarks

**MC\_Get\_Value\_Count** returns the number of values assigned to an attribute in a message object. The number is returned at *\*CountPtr*.

Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>CountPtr</i> was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.

### See Also

**MC\_Get\_pValue\_Count**

## MC\_Get\_Value\_Length

Returns the length of an attribute value.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Get_Value_Length (
    int MsgFileItemID,
    unsigned long Tag,
    int ValueNumber,
    unsigned long *Length
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>ValueNumber</i>	Retrieve the length of this attribute value.
<i>Length</i>	The value's length is returned here.

### Remarks

**MC\_Get\_Value\_Length** returns the length of a given value of an attribute in a message object. The size, in bytes, is returned at *\*Length*.

The function returns the length of value *ValueNumber*. The first value is number 1. Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

For pixel data tag which has a default value representation of OW, the returned length can be odd or even depending on the actual size of pixel data and the effective VR. For example, if pixel data is generated by uncompressing encapsulated data with 8 bits allocation per pixel, the effective VR is set to OB. If actual uncompressed data size is odd, the function returns an odd size length (No padding has been applied). See **MC\_Get\_Attribute\_Info** for retrieving the effective VR of an attribute. However, if pixel data is retrieved from a file or stream, the length is always even size due to padding.

If the attribute has a value representation of SQ, the number of items in the sequence is returned in *\*Length*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Length</i> was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.
<b>MC_INVALID_VALUE_NUMBER</b>	<i>ValueNumber</i> was negative, or the attribute does not have that many values.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_TEMP\_FILE\_ERROR**

File I/O error accessing value information in temporary files.

**See Also****MC\_Get\_pValue\_Length****MC\_Get\_Value\_To\_Function**

Retrieves the value of an attribute which has a binary value representation of OB, OW, OV, OL, OD or OF, or a numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or a text value representation of UR or UT, from a message object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Value_To_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourGetFunction) ()
)
```

*MsgFileItemID*      The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag*                DICOM tag which identifies the attribute.

*UserInfo*           Address of data which will be passed on to *YourGetFunction* each time it is called. This may be NULL.

*YourGetFunction*   Name of a function which will be called repeatedly to provide the function with blocks of the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void* CUserInfo,
    int CBdataSize,
    void* CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

*CBMsgFileItemID*   The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*CBtag*                DICOM tag which identifies the attribute.

<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Value_To_Function</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

### Remarks

The **MC\_Get\_Value\_To\_Function** function is used to fetch the value of an attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. This function can also be used to fetch the value of an attribute which has a numeric value representation (SL, SS, SV, UL, US, UV, AT, FL, FD).

To accommodate this, one uses the **MC\_Get\_Value\_To\_Function** function to specify the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, will call. This “callback” function is called repeatedly to provide blocks of the attribute's data value. An optional *UserInfo* parameter may be used to pass information between the **MC\_Get\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourGetFunction

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB, OW, OF, SL, SS, UL, US, AT, FL or FD.
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

<b>MC_Get_Value... Functions</b>	<b>MC_Get_pValue... Functions</b>
<b>MC_Get_pValue_To_Function</b>	<b>MC_Get_Next_Value... Functions</b>
<b>MC_Get_Next_pValue... Functions</b>	

## MC\_Get\_Version\_String

Retrieves a descriptive string containing the toolkit version.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Get_Version_String (
    int VersionLength,
    char *Version
)
```

*VersionLengt*    The length in bytes of *Version*.  
*h*

*Version*            The Merge DICOM Toolkit version is returned here.

### Remarks

**MC\_Get\_Version\_String** retrieves a text string containing Merge DICOM Toolkit's version.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Version</i> was NULL.
<b>MC_BUFFER_TOO_SMALL</b>	<i>Version</i> is not large enough to contain the descriptive string.

### See Also

**MC\_Library\_Initialization**

## MC\_Json\_To\_Message

Reads attribute values from a DICOM JSON Model string into a message, file or item object.



## Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Json_To_Message (
    int MessageID,
    void *UserInfo,
    MC_STATUS (*YourGetJsonFunction) ()
)
```

*MessageID*                    The identifier of a message, file or item object.

*UserInfo*                    Address of data which will be passed on to *YourGetJsonFunction* each time it is called. This may be NULL.

*YourGetJsonFunction*        Name of a function which will be called repeatedly to get the JSON string.

The function must be prototyped as follows:

```
MC_STATUS YourGetJsonFunction (
    int CBmessageID,
    void* CBuserInfo,
    int* CBdataSize,
    void** CBdataBuffer,
    int CBisFirst,
    int* CBisLast
)
```

*CBmessageID*    The identifier assigned to the message object by the **MC\_Open\_Message** function.

*CBuserInfo*     Address of data which is being passed from the **MC\_Json\_To\_Message** function. This may be NULL.

*CBdataSize*     Set \*CBdataSize to the number of bytes you are providing.

*CBdataBuffer*   Set \*CBdataBuffer to the address of the data you are providing.

*CBisFirst*      Set to TRUE (not zero) by the toolkit on the first call.

*CBisLast*       Set \*CBisLast to TRUE (not zero) when you are returning with the last block of JSON data.

## Remarks

**MC\_Json\_To\_Message** requests that the DICOM JSON Model string buffer be converted into a DICOM message. The JSON data is requested from the user in blocks by calling *YourGetJsonFunction* repeatedly until the entire JSON content has been received by the Merge DICOM Toolkit.

### *YourGetJsonFunction*

*YourGetJsonFunction* will be called repeatedly to get blocks of data from it. Merge DICOM Toolkit sets *CBisFirst* to TRUE(non-zero) the first time it calls *YourGetJsonFunction* for this message and *YourGetJsonFunction* should set *CBisLast* to TRUE(non-zero) when it gives Merge DICOM Toolkit the final block of data to be converted.

*\*\*CBdataBuffer* is set to the address of a buffer containing the data block to be converted, and *CBdataSize* is set to the number of bytes to be placed at *\*\*CBdataBuffer*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	YourGetJsonFunction parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<b>YourGetJsonFunction</b> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

### See Also

**MC\_Message\_To\_Json**

## MC\_Library\_Initialization

Prepares the Merge DICOM Toolkit library and provides optional information to the library.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Library_Initialization (
    void *(*CfgFunction) (void),
    void *(*DictionaryFunction) (void),
    void *(*FutureFunction) (void)
)
```

*CfgFunction*            The name of the function generated by the genconf utility, or NULL. (see below)

*DictionaryFunction*    The name of the function generated by the gendict utility, or NULL. (see below)

*FutureFunction*        NULL. This argument is reserved for future use.

### Remarks

**MC\_Library\_Initialization** prepares the library to accept other API function calls. If any of the three parameters are set to NULL, no special initialization options have been selected. If a parameter is not NULL, **MC\_Library\_Initialization** calls the functions specified to initialize configuration or dictionary data structures.

**MC\_Library\_Initialization must be the first library function call made!**

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_CONFIG_INFO_ERROR</b>	An error has occurred while trying to initialize configuration information. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_DDFILE_ERROR</b>	An error has occurred while trying to access the Merge DICOM Toolkit data dictionary. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_ALREADY_INITIALIZED</b>	The <b>MC_Library_Initialization</b> has already been called and the library is already initialized.
<b>MC_MISSING_CONFIG_PARM</b>	This error occurs when the toolkit can not obtain the name of the data dictionary.
<b>MC_NO_FILE_SYSTEM</b>	This error occurs only in toolkits running on platforms that do not have a file system. When this error occurs, no configuration function has been specified for the initialization of the configuration information.
<b>MC_NO_MERGE_INI</b>	This error occurs when the toolkit can not open the toolkit initialization file. See the section titled “Configuration” in this manual and the <i>Merge DICOM Toolkit Users Manual</i> for a detailed discussion of the initialization file(s).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

**MC\_Library\_Reset**  
**MC\_Set\_MergeINI**

**MC\_Library\_Release**

## MC\_Library\_Release

Releases all resources used by the Merge DICOM Toolkit library.

## Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Library_Release (void)
```

## Remarks

**MC\_Library\_Release** releases all resources used by the library. This option is normally used before exiting an application. **MC\_Library\_Initialization** must be called before the library can be used again.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been initialized by a call to <b>MC_Library_Initialization</b> .

**See Also**

<b>MC_Library_Initialization</b> <b>MC_Set_MergeINI</b>	<b>MC_Library_Reset</b>
--	-------------------------

**MC\_Library\_Reset**

Sets the Merge DICOM Toolkit library back to its initial state.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Library_Reset (void)
```

**Remarks**

**MC\_Library\_Reset** resets the library to its initial state. This call is normally used when the library is used for an embedded application. The same options specified by the **MC\_Library\_Initialization** function call will be in effect. This function is not normally called.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been initialized by a call to <b>MC_Library_Initialization</b> .
<b>MC_CONFIG_INFO_ERROR</b>	An error occurred while trying to initialize configuration information. A message describing the error is written to the Merge DICOM Toolkit log file.
<b>MC_DDFILE_ERROR</b>	An error occurred while trying to access the Merge DICOM Toolkit data dictionary. A message describing the error is written to the Merge DICOM Toolkit log file.
<b>MC_MISSING_CONFIG_PARM</b>	This error occurs when the toolkit cannot obtain the name of the data dictionary.
<b>MC_NO_FILE_SYSTEM</b>	This error occurs only in toolkits running on platforms that do not have a file system. When this error occurs, no configuration function has been specified for the initialization of the configuration information.

**MC\_NO\_MERGE\_INI** This error occurs when the toolkit cannot open the toolkit initialization file. Refer to *Configuration* in this manual and the *Merge DICOM Toolkit Users Manual* for more initialization-file details.

**MC\_SYSTEM\_ERROR** An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error is written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Library\_Initialization**  
**MC\_Set\_MergeINI**

**MC\_Library\_Release**

## MC\_List\_File (All toolkits except Windows versions)

Prepares a listing of the current contents of a file object.

### Synopsis

```
#include "mc3media.h"

void MC_List_File (
    int FileID,
    FILE *StreamHandle
)
```

*FileID* The identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

*StreamHandle* The handle of an open stream. If NULL, the listing will be directed to STDOUT.

### Remarks

**MC\_List\_File** prepares a report listing the current contents of the file object identified by *FileID*. The filename and preamble associated with the file object will also be listed. The report will be written to the stream identified by *StreamHandle*. Use NULL to direct the report to STDOUT.

**NOTE:** If the file object contains an attribute with a value representation of SQ (sequence of items), each item in the sequence will be listed. Each sequence of items is indented in the listing four spaces to the right of its owner DICOMDIR, file, message, or item.

### Return Value

There is no return value.

### See Also

**MC\_List\_Message**

**MC\_List\_Item**

## MC\_List\_File (Windows toolkit versions)

Prepares a listing of the current contents of a file object.

### Synopsis

```
#include "mc3media.h"

void MC_List_File (
    int FileID,
    char *Afilename
)
```

*FileID*            The identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

*Afilename*        The name of file to open. If NULL and using the static library, the listing will be directed to STDOUT. If NULL and using the DLL library, an exception will occur.

### Remarks

Because `FILE*` variables cannot be passed to a DLL, we have changed this function on Windows platforms to pass a filename instead. With the static library, the output will be sent to stdout when the `Afilename` parameter is set to NULL. If it is set to NULL when using the DLL, an exception error will occur. When `Afilename` is set to a filename, the message, item, or file object is listed to this text file.

**MC\_List\_File** prepares a report listing the current contents of the file object identified by *FileID*. The filename and preamble associated with the file object will also be listed. The report will be written to the file identified by *Afilename*. Use NULL to direct the report to STDOUT **only** when linked with the static toolkit library.

**NOTE:** If the file object contains an attribute with a value representation of SQ (sequence of items), each item in the sequence will be listed. Each sequence of items is indented in the listing four spaces to the right of its owner DICOMDIR, file, message, or item.

### Return Value

There is no return value.

### See Also

**MC\_List\_Message**

**MC\_List\_Item**

## MC\_List\_Item (All toolkits except Windows versions)

Creates a list of the current contents of an item object.

### Synopsis

```
#include "mc3msg.h"

void MC_List_Item (
    int ItemID,
```

**FILE** \**StreamHandle*  
 )

*ItemID*            The identifier assigned to this message object by the **MC\_Open\_Item** function.

*StreamHandle*    The handle of an open stream. If NULL, the listing will be directed to STDOUT.

### Remarks

**MC\_List\_Item** prepares a report listing the contents of the current contents of the item object identified by *ItemID*. The report will be written to the stream identified by *StreamHandle*. Use NULL to direct the report to STDOUT.

**NOTE:** An item is listed automatically if the owning message object is listed by **MC\_List\_Message**, or if the owning item object is listed by **MC\_List\_Item**.

### Return Value

There is no return value.

### See Also

**MC\_List\_Message**

## MC\_List\_Item (Windows toolkit versions)

Prepares a listing of the current contents of an item object.

### Synopsis

```
#include "mc3msg.h"

void MC_List_Item (
    int ItemID,
    char *Afilename
)
```

*ItemID*            The identifier assigned to this message object by the **MC\_Open\_Item** function.

*Afilename*        The name of file to open. If NULL and using the static library, the listing will be directed to STDOUT. If NULL and using the DLL library, an exception will occur.

### Remarks

Because `FILE*` variables cannot be passed to a DLL, we have changed this function on Windows platforms to pass a filename instead. With the static library, the output will be sent to stdout when the `Afilename` parameter is set to NULL. If it is set to NULL when using the DLL, an exception error will occur. When `Afilename` is set to a filename, the message, item, or file object is listed to this text file.

**MC\_List\_Item** prepares a report listing the contents of the current contents of the item object identified by *ItemID*. The report will be written to the stream identified by *Afilename*. Use NULL to direct the report to STDOUT **only** when linked with the static toolkit library.

**NOTE:** An item is listed automatically if the owning message object is listed by **MC\_List\_Message**, or if the owning item object is listed by **MC\_List\_Item**.

### Return Value

There is no return value.

### See Also

**MC\_List\_Message**

## MC\_List\_Message (All toolkits except Windows versions)

Prepares a listing of the current contents of a message object.

### Synopsis

```
#include "mc3msg.h"

void MC_List_Message (
    int MessageID,
    FILE *StreamHandle
)
```

*MessageID*      The identifier assigned to this object by the MC\_Open\_Message function or the MC\_Open\_Item function.

*StreamHandle*    The handle of an open stream. If NULL, the listing will be directed to STDOUT.

### Remarks

**MC\_List\_Message** prepares a report listing the contents of the current contents of the message object identified by *MessageID*. The report will be written to the stream identified by *StreamHandle*. Use NULL to direct the report to STDOUT.

**NOTE:** If the message object contains an attribute with a value representation of SQ (sequence of items), each item in the sequence will be listed. Each sequence of items is indented in the listing four spaces to the right of its owning message or item.

### Return Value

There is no return value.

### See Also

**MC\_List\_Item**



## MC\_List\_Message (Windows toolkit versions)

Prepares a listing of the current contents of a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
void MC_List_Message (
    int MessageID,
    char *Afilename
)
```

*MessageID*      The identifier assigned to this object by the MC\_Open\_Message function or the MC\_Open\_Item function.

*Afilename*      The name of file to open. If NULL and using the static library, the listing will be directed to STDOUT. If NULL and using the DLL library, an exception will occur.

### Remarks

Because FILE\* variables cannot be passed to a DLL, we have changed this function on Windows platforms to pass a filename instead. With the static library, the output will be sent to stdout when the Afilename parameter is set to NULL. If it is set to NULL when using the DLL, an exception error will occur. When Afilename is set to a filename, the message, item, or file object is listed to this text file.

**MC\_List\_Message** prepares a report listing the contents of the current contents of the message object identified by *MessageID*. The report will be written to the stream identified by *Afilename*. Use NULL to direct the report to STDOUT **only** when linked with the static toolkit library.

**NOTE:** If the message object contains an attribute with a value representation of SQ (sequence of items), each item in the sequence will be listed. Each sequence of items is indented in the listing four spaces to the right of its owning message or item.

### Return Value

There is no return value.

### See Also

**MC\_List\_Item**

## MC\_Long\_Unicode\_To\_Byte

A utility function to convert large Unicode string to DICOM character set.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Long_Unicode_To_Byte (
    char **Charsets,
```

```

    int NumCharsets,
    const MC_UChar *Val,
    unsigned long long InLen,
    unsigned long long BufferSize,
    unsigned long long *OutLen,
    char *OutVal
)

```

<i>Charsets</i>	An array of character strings from the DICOM specific character set attribute.
<i>NumCharsets</i>	Number of character set strings in the <i>Charsets</i> array
<i>Val</i>	Input Unicode array
<i>InLen</i>	Input Unicode character count
<i>BufferSize</i>	Output buffer size
<i>OutLen</i>	Output length (returned by this call)
<i>OutVal</i>	Output buffer to hold the byte

### Remarks

**MC\_Long\_Unicode\_To\_Byte** requires **MC\_Enable\_Unicode\_Conversion** being called first.

*Charsets* should be set to the value of (0008,0005) as an array of character strings. If *NumCharsets* is 0, *Charsets* is NULL or an empty string, the default ISO\_IR 6 (ASCII) character set will be used.

*InLen* can be set to -1 and the toolkit will calculate length if the input Unicode buffer is U+0000 terminated.

When the return status is MC\_NORMAL\_COMPLETION, *OutVal* contains the output multi-byte characters with a NULL terminator. *OutLen* contains the number of bytes present in the *OutVal*/buffer (excluding the terminator).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_CANNOT_COMPLY</b>	Fail to process the input. Check the Merge DICOM Toolkit log file for details of failure.
<b>MC_BUFFER_TOO_SMALL</b>	The output buffer doesn't have enough space to hold the output.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Byte\_To\_Unicode**  
**MC\_Byte\_To\_Long\_Unicode**  
**MC\_Unicode\_To\_Byte**

**MC\_Enable\_Unicode\_Conversion****MC\_Get\_Value\_To\_UnicodeString****MC\_Get\_Next\_Value\_To\_UnicodeString MC\_Set\_Value\_From\_UnicodeString****MC\_Set\_Next\_Value\_From\_UnicodeString****MC\_MemoryLog\_To\_Function**

Retrieves the messages that have been placed in the memory log buffer.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_MemoryLog_To_Function (
    int AclearLog,
    MC_STATUS (*UserFunction) ()
)
```

*AclearLog*            Memory log will be cleared if this is true.

*UserFunction*        The name of a function that will be called once for each message (line) in the memory buffer.

*UserFunction* must be prototyped as follows:

```
MC_STATUS UserFunction (
    char *LogLine,
    int CBisFirst,
    int CBisLast
)
```

*LogLine*            Address of the log message passed to the user function.

*CBisFirst*          This is TRUE (not zero) the first time *UserFunction* is being called.

*CBisLast*          This is TRUE (not zero) the last time *UserFunction* is being called.

**Remarks**

The **MC\_MemoryLog\_To\_Function** function is used to fetch the contents of the memory log. The user specifies the name of a function (*UserFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to provide lines from the memory log.

**UserFunction**

Each message (or line) in the memory log is returned in *LogLine*.

*CBisFirst* is set to TRUE the first time *UserFunction* is called. This provides a clear mechanism for the function to know it is being called the first time. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *UserFunction* is called. This provides a clear mechanism for the function to know it is being called the last time. Users often close a file at this time.

*UserFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>UserFunction</i> parameter was NULL.
<b>MC_LOG_EMPTY</b>	The memory log buffer has not been created yet or is empty.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>UserFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

**MC\_Set\_Log\_Destination**

**MC\_Register\_MemoryLog\_Function** **MC\_Register\_Enhanced\_MemoryLog\_Function**

## MC\_Message\_To\_File

Changes a message object into a file object

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Message_To_File (
    int MessageID,
    char *Filename
)
```

*MessageID*      The identifier assigned to this object by the **MC\_Open\_Message** function.

*Filename*      A pointer to a string containing the filename to be associated with the new file object.

### Remarks

**MC\_Message\_To\_File** changes the message object pointed to by *MessageID* into a file object. In the process, the “command type” attributes are removed from the message object, and the DICOM File Meta Information attributes are added to the new file object. These new attributes must be given values by the user. If the message was opened as an empty message and the command and service were not set, the command and service must be set for the converted file object before validating.

The DICOM prefix for the file is set to “DICM”. All bytes in the file preamble are set to 00H.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>Filename</i> has a value of NULL.

**See Also**

**MC\_File\_To\_Message**

**MC\_Message\_To\_Json**

Converts a DICOM message, file or item into a JSON string based on DICOM JSON Model and passes the converted data to the user.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Message_To_Json (
    int MessageID,
    void *UserInfo,
    JSON_OPTIONS JsonOptions,
    MC_STATUS (*YourReceiveJsonFunction)()
)
```

<i>MessageID</i>	The identifier of a message, file or item object.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveJsonFunction</i> each time it is called. This may be NULL.
<i>JsonOptions</i>	Combination of the JSON configuration flags that are defined in the JSON_OPTIONS enumerator list: <ul style="list-style-type: none"> <li>JsonOptDefault</li> <li>JsonOptIncludeBulks</li> <li>JsonOptIncludePixelData</li> <li>JsonOptExcludeSequences</li> <li>JsonOptExcludePrivateAttributes</li> <li>JsonOptIndentation</li> </ul>
<i>YourReceiveJsonFunction</i>	Pointer to a function which will be called repeatedly by the toolkit to receive the JSON string.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveJsonFunction (
    int CBmessageID,
```

```

    void *CBUserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)

```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_Message_To_Json</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes of JSON data being provided to you in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	The buffer containing JSON data from the message object.
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of JSON data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of JSON data.

## Remarks

**MC\_Message\_To\_Json** requests that the contents of the message identified by *MessageID* be converted into a JSON string. The converted message is passed to the user in blocks by calling *YourReceiveJsonFunction* repeatedly until the entire converted message has been transferred.

**MC\_Message\_To\_Json** can pass data to *YourReceiveJsonFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourReceiveJsonFunction* in *CBUserInfo* each time it is called. *UserInfo* may be NULL.

*JsonOptions* specify the configuration flags for the DICOM to JSON conversion. The enumerated *JSON\_OPTIONS* flags are defined in "mc3msg.h":

Value	Meaning
<b>JsonOptDefault</b>	Use the default JSON conversion settings.
<b>JsonOptIncludeBulks</b>	Store bulk attributes (VR is OB or OW) in the JSON.
<b>JsonOptIncludePixelData</b>	Store Pixel Data buffer in the JSON.
<b>JsonOptExcludeSequences</b>	Do not store Sequence attributes in the JSON.
<b>JsonOptExcludePrivateAttributes</b>	Do not store Private attributes in the JSON.
<b>JsonOptIndentation</b>	Use default indentation in the generated JSON.

## *YourReceiveJsonFunction*

*YourReceiveJsonFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *CBisFirst* to TRUE(non-zero) the first time it calls *YourReceiveJsonFunction* for this message and it sets *CBisLast* to TRUE(non-zero) when it calls *YourReceiveJsonFunction* with the final block of converted data.

*CBdataBuffer* is set to the address of a buffer containing the converted data block, and *CBdataSize* is set to the number of bytes placed at *CBdataBuffer*. *The data buffer is valid only for the duration of the call to YourReceiveJsonFunction.*

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>YourReceiveJsonFunction</i> parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The message has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourReceiveJsonFunction</i> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

### See Also

**MC\_Json\_To\_Message**

## MC\_Message\_To\_SR

Converts a message created with the toolkit's message API calls (**MC\_Open\_Message**, etc) into an SR tree management object.

### Synopsis

```
#include "mc3sra.h"
```

```
MC_STATUS MC_Message_To_SR (
    int MsgID
)
```

*MsgID*            The identifier assigned to a SR message object by the **MC\_Open\_Message** functions.

### Remarks

**MC\_Message\_To\_SR** converts a message that was created with the toolkit's message API calls into an SR tree management object.

For example, a **STANDARD\_BASIC\_TEXT\_SR**, **C\_STORE\_RQ** message has been created and manipulated by the toolkit messaging API calls, **MC\_Message\_To\_SR** can be used to convert this message object into an SR tree management object. Once this function call has been issued, further changes to the SR toolkit message can be accomplished through the use of the **MC\_SR...** API calls.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MsgID</i> value is not a valid object ID.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

## MC\_Message\_To\_Stream

Request that the values of a message object be returned as a DICOM stream.

## Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Message_To_Stream (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>MessageID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> function or the <b>MC_Open_Item</b> function.
<i>StartTag</i>	The DICOM tag identifying the first attribute which should be streamed.
<i>StopTag</i>	The DICOM tag identifying the last attribute which should be streamed



*SyntaxType*

Specify which DICOM transfer syntax is to be used to encode the stream data. Use one of the enumerated TRANSFER\_SYNTAX types defined in “mc3msg.h”:

IMPLICIT\_LITTLE\_ENDIAN  
 IMPLICIT\_BIG\_ENDIAN  
 EXPLICIT\_LITTLE\_ENDIAN  
 EXPLICIT\_BIG\_ENDIAN  
 DEFLATED\_EXPLICIT\_LITTLE\_ENDIAN  
 ENCAPSULATED\_UNCOMPRESSED\_ELEMENTARY  
 RLE  
 JPEG\_BASELINE  
 JPEG\_EXTENDED\_2\_4  
 JPEG\_EXTENDED\_3\_5  
 JPEG\_SPEC\_NON\_HIER\_6\_8  
 JPEG\_SPEC\_NON\_HIER\_7\_9  
 JPEG\_FULL\_PROG\_NON\_HIER\_10\_12  
 JPEG\_FULL\_PROG\_NON\_HIER\_11\_13  
 JPEG\_LOSSLESS\_NON\_HIER\_14  
 JPEG\_LOSSLESS\_NON\_HIER\_15  
 JPEG\_EXTENDED\_HIER\_16\_18  
 JPEG\_EXTENDED\_HIER\_17\_19  
 JPEG\_SPEC\_HIER\_20\_22  
 JPEG\_SPEC\_HIER\_21\_23  
 JPEG\_FULL\_PROG\_HIER\_24\_26  
 JPEG\_FULL\_PROG\_HIER\_25\_27  
 JPEG\_LOSSLESS\_HIER\_28  
 JPEG\_LOSSLESS\_HIER\_29  
 JPEG\_LOSSLESS\_HIER\_14  
 JPEG\_2000\_LOSSLESS\_ONLY  
 JPEG\_2000  
 JPEG\_LS\_LOSSLESS  
 JPEG\_LS\_LOSSY  
 HEVC\_H265\_M10P\_LEVEL\_5\_1  
 HEVC\_H265\_MP\_LEVEL\_5\_1  
 JPIP\_REFERENCED  
 JPIP\_REFERENCED\_DEFLATE  
 MPEG2\_MPML  
 MPEG2\_MPHL  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1  
 MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D  
 MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2  
 JPEG\_2000\_MC\_LOSSLESS\_ONLY  
 JPEG\_2000\_MC

---

	SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_ACTIVE_VIDEO
	SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_ACTIVE_VIDEO
	SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO
	PRIVATE_SYNTAX_1
	PRIVATE_SYNTAX_2
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to provide blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void *CBuserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBuserInfo</i>	Address of data which is being passed from the <b>MC_Message_To_Stream</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes of stream data being provided to you in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	The buffer containing stream data from the message object.
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

## Remarks

**MC\_Message\_To\_Stream** requests that the contents of the message identified by *MessageID* be “streamed” (i.e. put in the form defined by the DICOM standard). The streamed message is passed to the user in blocks by calling *YourReceiveStreamFunction* repeatedly until the entire streamed message has been transferred.

**MC\_Message\_To\_Stream** can pass data to *YourReceiveStreamFunction* by specifying the data’s address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourReceiveStreamFunction* in *CBuserInfo* each time it is called. *UserInfo* may be NULL.

*StartTag* and *StopTag* specify which attributes in the message are to be placed in the stream. Any attributes in the message with tags less than *StartTag* or greater than *StopTag* will be ignored. Neither *StartTag* nor *StopTag* need be in the message.

*SyntaxType* must be set to **one of the values listed above**. The transfer syntax specifies the byte order used in the streamed message, whether or not each attribute's value representation is explicitly encoded in the stream, and how the pixel data is encoded in the message.

**NOTE:** If the message contains “group length” attributes (i.e. attributes with tags of the form gggg0000: any group, element zero), **MC\_Message\_To\_Stream** will automatically calculate the group length value when the message is streamed.

### YourReceiveStreamFunction

*YourReceiveStreamFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *\*CBisFirst* to TRUE (non-zero) the first time it calls *YourReceiveStreamFunction* for this attribute and it sets *\*CBisLast* to TRUE (non-zero) when it calls *YourReceiveStreamFunction* with the final block of streamed data.

*\*CBdataBuffer* is set to the address of a buffer containing the stream data block, and *\*CBdataSize* is set to the number of bytes placed at *\*CBdataBuffer*.

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The message has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourReceiveStreamFunction</i> returned a value other than MC_NORMAL_COMPLETION.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid code was used for the <i>SyntaxType</i> parameter.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.

### **See Also**

**MC\_Stream\_To\_Message**                      **MC\_Get\_Stream\_Length**

## MC\_Message\_To\_XML

Converts a DICOM message, file or item into an XML string based on Merge DICOM Model and passes the converted data to the user.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Message_To_XML (
    int MessageID,
    void *UserInfo,
    XML_OPTIONS XmlOptions,
    MC_STATUS (*YourReceiveXMLFunction) ()
)
```

<i>MessageID</i>	The identifier of a message, file or item object.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveXMLFunction</i> each time it is called. This may be NULL.
<i>XmlOptions</i>	Combination of the XML configuration flags that are defined in the XML_OPTIONS enumerator list: <ul style="list-style-type: none"> <li>XmlOptDefault</li> <li>XmlOptIncludeBulks</li> <li>XmlOptIncludePixelData</li> <li>XmlOptExcludeSequences</li> <li>XmlOptExcludePrivateAttributes</li> <li>XmlOptBase64Binary</li> </ul>
<i>YourReceiveXMLFunction</i>	Pointer to a function which will be called repeatedly by the toolkit to receive the XML string.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveXMLFunction (
    int CBmessageID,
    void *CBUserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_Message_To_XML</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes of XML data being provided to you in <i>CBdataBuffer</i> .

<i>CBdataBuffer</i>	The buffer containing XML data from the message object.
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of XML data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of XML data.

## Remarks

**MC\_Message\_To\_XML** requests that the contents of the message identified by *MessageID* be converted into an XML string. The converted message is passed to the user in blocks by calling *YourReceiveXMLFunction* repeatedly until the entire converted message has been transferred.

**MC\_Message\_To\_XML** can pass data to *YourReceiveXMLFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourReceiveXMLFunction* in *CBUserInfo* each time it is called. *UserInfo* may be NULL.

*XmlOptions* specify the configuration flags for the DICOM to XML conversion. The enumerated *XML\_OPTIONS* flags are defined in "mc3msg.h":

Value	Meaning
<b>XmlOptDefault</b>	Use the default XML conversion settings.
<b>XmlOptIncludeBulks</b>	Store bulk attributes (VR is OB or OW) in the XML.
<b>XmlOptIncludePixelData</b>	Store Pixel Data buffer in the XML.
<b>XmlOptExcludeSequences</b>	Do not store Sequence attributes in the XML.
<b>XmlOptExcludePrivateAttributes</b>	Do not store Private attributes in the XML.
<b>XmlOptBase64Binary</b>	Use Base64 encoding for bulks and UN VR attributes.

## YourReceiveXMLFunction

*YourReceiveXMLFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) the first time it calls *YourReceiveXMLFunction* for this message and it sets *CBisLast* to TRUE (non-zero) when it calls *YourReceiveXMLFunction* with the final block of converted data.

*CBdataBuffer* is set to the address of a buffer containing the converted data block, and *CBdataSize* is set to the number of bytes placed at *CBdataBuffer*. *The data buffer is valid only for the duration of the call to YourReceiveXMLFunction.*

## Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>YourReceiveXMLFunction</i> parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.

<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The message has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<b>YourReceiveXMLFunction</b> returned a value other than MC_NORMAL_COMPLETION.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

### See Also

**MC\_XML\_To\_Message**

## MC\_Message\_To\_XML\_Native

Converts a DICOM message, file or item into an XML string based on Native DICOM Model and passes the converted data to the user.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Message_To_XML_Native (
    int MessageID,
    void *UserInfo,
    XML_OPTIONS XmlOptions,
    MC_STATUS (*YourReceiveXMLFunction) ()
)
```

<i>MessageID</i>	The identifier of a message, file or item object.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveXMLFunction</i> each time it is called. This may be NULL.
<i>XmlOptions</i>	Combination of the XML configuration flags that are defined in the XML_OPTIONS enumerator list: <ul style="list-style-type: none"> <li>XmlOptDefault</li> <li>XmlOptIncludeBulks</li> <li>XmlOptIncludePixelData</li> <li>XmlOptExcludeSequences</li> <li>XmlOptExcludePrivateAttributes</li> <li>XmlOptBase64Binary</li> <li>XmlOptIndentation</li> </ul>
<i>YourReceiveXMLFunction</i>	Pointer to a function which will be called repeatedly by the toolkit to receive the XML string.

The function must be prototyped as follows:

```

MC_STATUS YourReceiveXMLFunction (
    int CBmessageID,
    void *CBUserInfo,
    int CBdataSize,
    void *CBdataBuffer,
    int CBisFirst,
    int CBisLast
)

```

- CBmessageID* The identifier assigned to the message object by the **MC\_Open\_Message** function.
- CBUserInfo* Address of data which is being passed from the **MC\_Message\_To\_XML\_Native** function. This may be NULL.
- CBdataSize* The number of bytes of XML data being provided to you in *CBdataBuffer*.
- CBdataBuffer* The buffer containing XML data from the message object.
- CBisFirst* Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of XML data.
- CBisLast* Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of XML data.

### Remarks

**MC\_Message\_To\_XML\_Native** requests that the contents of the message identified by *MessageID* be converted into an XML string based on Native DICOM Model. The converted message is passed to the user in blocks by calling *YourReceiveXMLFunction* repeatedly until the entire converted message has been transferred.

**MC\_Message\_To\_XML\_Native** can pass data to *YourReceiveXMLFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourReceiveXMLFunction* in *CBUserInfo* each time it is called. *UserInfo* may be NULL.

*XmlOptions* specify the configuration flags for the DICOM to Native DICOM XML conversion. The enumerated *XML\_OPTIONS* flags are defined in "mc3msg.h":

Value	Meaning
<b>XmlOptDefault</b>	Use the default XML conversion settings.
<b>XmlOptIncludeBulks</b>	Store bulk attributes (VR is OB or OW) in the XML.
<b>XmlOptIncludePixelData</b>	Store Pixel Data buffer in the XML.
<b>XmlOptExcludeSequences</b>	Do not store Sequence attributes in the XML.
<b>XmlOptExcludePrivateAttributes</b>	Do not store Private attributes in the XML.
<b>XmlOptBase64Binary</b>	Use Base64 encoding for bulks and UN VR attributes.
<b>XmlOptIndentation</b>	Use default indentation in the generated XML.

### *YourReceiveXMLFunction*

*YourReceiveXMLFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) the first time it calls *YourReceiveXMLFunction* for this message

and it sets *CBisLast* to TRUE(non-zero) when it calls *YourReceiveXMLFunction* with the final block of converted data.

*CBdataBuffer* is set to the address of a buffer containing the converted data block, and *CBdataSize* is set to the number of bytes placed at *CBdataBuffer*. *The data buffer is valid only for the duration of the call to YourReceiveXMLFunction.*

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>YourReceiveXMLFunction</i> parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The message has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourReceiveXMLFunction</i> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

### See Also

**MC\_XML\_Native\_To\_Message**

## MC\_NewProposedServiceList MC\_NewProposedServiceListAsync

Creates a new service list for use in association negotiation.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_NewProposedServiceList (
    char *ServiceListName,
    char *ServiceNameArray[]
)
```

```
MC_STATUS MC_NewProposedServiceListAsync (
    char *ServiceListName,
    char *ServiceNameArray[]
    unsigned short MaxOperationsInvoked,
    unsigned short MaxOperationsPerformed)
```

*ServiceListName*                      Application supplied name to associate with this list



<i>ServiceNameArray</i>	NULL terminated array of Service Names to be used in this list
<i>MaxOperationsInvoked</i>	The maximum operations invoked by the association requestor. Note that a setting of 0 means an unlimited number of operations can be invoked
<i>MaxOperationsPerformed</i>	The maximum operations performed by the association requestor. Note that a setting of 0 means an unlimited number of operations can be performed

### Remarks

**MC\_NewProposedServiceList** and **MC\_NewProposedServiceListAsync** establish a list of services to be used during the negotiation of an association. The ServiceListName can be used in **MC\_Open\_Association**, **MC\_Open\_Secure\_Association** and **MC\_Wait\_For\_Association**.

This functionality is used to dynamically create list normally found in the **mergecom.app** configuration file. This method of service list generation augments the existing configuration file.

Service names are generated using **MC\_NewServiceFromName** or **MC\_NewServiceFromUID**.

**MC\_NewProposedServiceListAsync** allows setting of a value for Max Operations Performed and Max Operations Invoked during association negotiation. These settings allow negotiation of the DICOM Asynchronous Operations Window. The negotiated results for the association requestor can be examined by calling **MC\_Get\_Association\_Info**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_DUPLICATE_NAME</b>	A Duplicate Name is present in the ServiceNameArray or the request service list name is already in use.

### See Also

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_NewServiceFromName</b>	<b>MC_NewServiceFromUID</b>
<b>MC_FreeServiceList</b>	<b>MC_Get_Association_Info</b>

## MC\_NewSyntaxList

Creates a new syntax list for use in the creation of services for association negotiation.

### Synopsis

```
#include "mergecom.h"
#include "mc3msg.h"

MC_STATUS MC_NewSyntaxList (
    char *SyntaxListName,
    TRANSFER_SYNTAX SyntaxArray[]
)
```

*SyntaxListName*            Application supplied name to associate with this list

*SyntaxArray*              NULL terminated array of TRANSFER\_SYNTAX-es  
to be used in this list

### Remarks

**MC\_NewSyntaxList** establishes a list of syntaxes to be used during the negotiation of an association. The SyntaxList name is supplied by the application and is used as a reference when creating service references

This functionality is used to dynamically create list normally found in the **mergecom.app** configuration file. This method of syntax list generation augments the existing configuration file.

TRANSFER\_SYNTAX-es are an enumerated type found in **mc3msg.h**

Service names are generated using **MC\_NewServiceFromName** or **MC\_NewServiceFromUID**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_DUPLICATE_NAME</b>	The requested syntax list name is already in use.
<b>MC_DUPLICATE_SYNTAX</b>	A syntax id is duplicated in the array supplied.

### See Also

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_NewServiceFromName</b>	<b>MC_NewServiceFromUID</b>
<b>MC_FreeSyntaxList</b>	

## MC\_NewService... Functions

Creates a new service description for use in the creation of service lists.

## Synopsis

```
#include "mergecom.h"
MC_STATUS MC_NewServiceFromName (
    char *ServiceName,
    char *SOPClassName,
    char *SyntaxListName,
    int SCURole,
    int SCPRole
)
MC_STATUS MC_NewServiceFromUID (
    char *ServiceName,
    char *SOPClassUID,
    char *SyntaxListName,
    int SCURole,
    int SCPRole
)
MC_STATUS MC_NewServiceWithExtInfoFromName (
    char *ServiceName,
    char *SOPClassName,
    char *SyntaxListName,
    int SCURole,
    int SCPRole,
    void *ExtInfoBuffer,
    int ExtInfoLength
)
MC_STATUS MC_NewServiceWithExtInfoFromUID (
    char *ServiceName,
    char *SOPClassUID,
    char *SyntaxListName,
    int SCURole,
    int SCPRole,
    void *ExtInfoBuffer,
    int ExtInfoLength
)
```

<i>ServiceName</i>	Application supplied name to associate with this service
<i>SOPClassName</i>	Name as defined in <b>mergecom.srv</b>
<i>SOPClassUID</i>	UID as defined by DICOM and found in <b>mergecom.srv</b>
<i>SyntaxListName</i>	Name of a syntax list as defined by <b>MC_NewSyntaxList</b> or in the <b>mergecom.app</b> . Can be NULL, if so the default syntax lists will be utilized.
<i>SCURole</i>	Sets the scu role negotiation parameters for this service, 0 or 1
<i>SCPRole</i>	Sets the scp role negotiation parameters for this service, 0 or 1
<i>ExtInfoBuffer</i>	A pointer to the buffer containing extended negotiation information.
<i>ExtInfoLength</i>	The number of bytes contained in the <i>ExtInfoBuffer</i> .



## Synopsis

```

#include "mergecom.h"

MC_STATUS MC_Open_Association (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList
)

MC_STATUS MC_Open_Association_With_Connect_Timeout (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SecureFunctions,
    void *SecureContext,
    int Timeout
)

typedef enum {
    NO_USER_IDENTITY = 0,
    USERNAME = 1,
    USERNAME_AND_PASSCODE = 2,
    KERBEROS_SERVICE_TICKET = 3,
    SAML_ASSERTION = 4
} USER_IDENTITY_TYPE;

MC_STATUS MC_Open_Association_With_Identity (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SecureFunctions,
    void *SecureContext,
    USER_IDENTITY_TYPE IdentityType,
    unsigned char ResponseRequested,
    void *PrimaryField,
    unsigned short PrimaryFieldLength,
    void *SecondaryField,
    unsigned short SecondaryFieldLength
)

typedef struct {
    unsigned short Result;
    unsigned short Source;
    unsigned short Reason;
} AssocRejectInfo;

MC_STATUS MC_Open_Association_With_Identity_With_Reject_Info (

```

```

    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SecureFunctions,
    void *SecureContext,
    USER_IDENTITY_TYPE IdentityType,
    unsigned char ResponseRequested,
    void *PrimaryField,
    unsigned short PrimaryFieldLength,
    void *SecondaryField,
    unsigned short SecondaryFieldLength,
    AssocRejectInfo RejectInfo
)
MC_STATUS
MC_Open_Association_With_Identity_With_Reject_Info_With_Connect_Timeout (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SecureFunctions,
    void *SecureContext,
    USER_IDENTITY_TYPE IdentityType,
    unsigned char ResponseRequested,
    void *PrimaryField,
    unsigned short PrimaryFieldLength,
    void *SecondaryField,
    unsigned short SecondaryFieldLength,
    AssocRejectInfo RejectInfo,
    int Timeout
)
MC_STATUS MC_Open_Association_With_Reject_Info (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList
    AssocRejectInfo *RejectInfo
)
MC_STATUS MC_Open_Association_With_Callback (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    MC_STATUS (*YourCallback) ()
)

```

---

```

MC_STATUS MC_Open_Association_With_All_Optional_Parameters (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SecureFunctions,
    void *SecureContext,
    USER_IDENTITY_TYPE IdentityType,
    unsigned char ResponseRequested,
    void *PrimaryField,
    unsigned short PrimaryFieldLength,
    void *SecondaryField,
    unsigned short SecondaryFieldLength,
    AssocRejectInfo RejectInfo,
    int Timeout,
    MC_STATUS (*YourCallback) ()
)

```

<i>ApplicationID</i>	The application ID returned from the MC_Register_Application function.
<i>AssociationID</i>	The identification number of an association object is returned here.
<i>RemoteApplicationTitle</i>	The DICOM Application Title of the remote application.

Each of the following parameters is optional. Use NULL if not used.

<i>RemoteHostPortNumber</i>	The TCP/IP port used by the remote application to “listen” for DICOM associations
<i>RemoteHostTCPIPName</i>	The remote host’s TCP/IP Name. This parameter can be a hostname, an IPv4 address, or an IPv6 address.
<i>ServiceList</i>	Name of a service list in the Merge DICOM Toolkit configuration file.
<i>SecureFunctions</i>	An optional pointer to a structure containing functions that will be called by Merge DICOM Toolkit while processing network I/O over the secure connection. See <b>MC_Open_Secure_Association</b> for details.
<i>SecureContext</i>	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in <i>SecureFunctions</i> . See <b>MC_Open_Secure_Association</b> for details.
<i>IdentityType</i>	The type of User Identity negotiation to perform as specified in DICOM PS3.7, Section D.3.3.7.

---

<i>ResponseRequested</i>	If response from the server is required, this field should be set to <code>POSITIVE_RESPONSE_REQUESTED</code> , if a response is not required, this field should be set to <code>NO_RESPONSE_REQUESTED</code> .
<i>PrimaryField</i>	A buffer pointing to the primary field used in User Identity Negotiation.
<i>PrimaryFieldLength</i>	The length of <i>PrimaryField</i> . Note that when passing a text string in <i>PrimaryField</i> , the NULL terminator should not be included in the length.
<i>SecondaryField</i>	A buffer pointing to the secondary field used in User Identity Negotiation. If the secondary field is not used for the type of User Identity specified by <i>IdentityType</i> , this field can be set to NULL.
<i>SecondaryFieldLength</i>	The length of <i>SecondaryField</i> . Note that when passing a text string in <i>SecondaryField</i> , the NULL terminator should not be included in the length.
<i>RejectInfo</i>	If the association is rejected, this return argument will contain the result/source/reason codes explaining the reason for rejection (See DICOM PS3.8, Section 9.3.4).
<i>Timeout</i>	The number of seconds to wait for the network connect to be accepted.  If greater than zero, the parameter supersedes the application-wide <code>CONNECT_TIMEOUT</code> configuration setting.  If negative or zero, the <code>CONNECT_TIMEOUT</code> configuration setting takes effect.
<i>YourCallback</i>	Name of a user function which will be called with the association ID as a parameter

The callback function must be prototyped as follows:

```
MC_STATUS YourCallback (
    int AssociationID
)
```

<i>AssociationID</i>	The ID assigned to the association object as soon as it is created. This ID can be used to cancel the association request before the connect timeout expires.
----------------------	---

## Remarks

**MC\_Open\_Association** establishes a DICOM association connection with a remote DICOM application.

Each application in a DICOM association has a publicly known name or “application title”. This application’s title was declared in the **MC\_Register\_Application** call. The application to which we are



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intending to connect is specified in *RemoteApplicationTitle*. The remote DICOM system waits for association requests on a given TCP/IP port. That port number is specified by *RemoteHostPortNumber*. The TCP/IP name of the remote host is specified by *RemoteHostTCPIPName*.

Starting a DICOM association is a negotiated process. One application provides one or more services, and the other uses one or more of the services provided. The **MC\_Open\_Association** function lets the remote DICOM process know which services this application wishes to use. This “service list” is defined in the Merge DICOM Toolkit Application Configuration file, and the name of the appropriate service list is specified by the *ServiceList* parameter.

A few DICOM services require the applications to negotiate application-specific information. This is performed by sharing “extended negotiation information” when the association is negotiated. If one or more of the services in *ServiceList* requires such negotiation, **MC\_Set\_Negotiation\_Info** should be called for each such service to supply the negotiation information.

If the remote system accepts the association request (i.e. it can support one or more of the services in the *ServiceList*), **MC\_Open\_Association** creates an association object, puts its ID in *\*AssociationID*, and returns MC\_NORMAL\_COMPLETION.

If the service requires the remote application to return extended negotiation information, **MC\_Get\_Negotiation\_Info** should be called to retrieve such information. If the information is unacceptable, **MC\_Close\_Association** should be called.

**NOTE:** That the information registered with the **MC\_Set\_Negotiation\_Info** call is not changed during the association process. Use **MC\_Clear\_Negotiation\_Info** to prevent the information from being used in subsequent association negotiations for a given service.

**MC\_Open\_Association\_With\_Identity** is used when User Identity information is to be negotiated for the association as defined in DICOM Supplement 99. **MC\_Open\_Association\_With\_Identity** can be used to open both secure and unsecure associations. See **MC\_Open\_Secure\_Association** for details on opening secure associations.

When negotiating user identity information, the *IdentityType* parameter is set to a specific kind of user identity. The *PrimaryField* and *SecondaryField* parameters are set as defined in DICOM Part 8. For instance, when *USERNAME\_AND\_PASSCODE* is specified, the *PrimaryField* has the username and *SecondaryField* has the passcode. Due to the fact that older DICOM applications may not be looking for the user identity information, it is possible to ask for a response from the server so the application can determine if the user identity information was accepted or ignored. The *ResponseRequested* field is used to request this response. After the association has been negotiated, an application can use the **MC\_Get\_Association\_Information** to retrieve the information on if the server has responded to the user identity information in the request. The **MC\_Get\_User\_Identity\_Length** and **MC\_Get\_User\_Identity\_Info** routines can also be used if information was returned from the remote system.

**NOTE:** **MC\_Open\_Association\_With\_Identity** is identical to **MC\_Open\_Association** when *IdentityType* is set to **NO\_USER\_IDENTITY**, and the *SecureFunctions*, *PrimaryField*, and *SecondaryField* parameters are set to NULL.

**MC\_ASSOCIATION\_REJECTED** is returned if the remote system rejects the association request. *\*AssociationID* is NOT valid if the association is rejected or if an error occurs.

**NOTE:** Only the first three parameters (*ApplicationID*, *AssociationID* and *RemoteApplicationTitle*) for **MC\_Open\_Association** are required. Each of the others will be defaulted if they are specified as NULL. The default values are obtained from the *RemoteApplicationTitle*'s section in the Merge DICOM Toolkit Application Configuration file.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally. <i>AssociationID</i> has been set to the association's identification number.
<b>MC_ASSOCIATION_REJECTED</b>	The remote system rejected the open association request.
<b>MC_NEGOTIATION_ABORTED</b>	The association was aborted during negotiation
<b>MC_CONFIG_INFO_MISSING</b>	<i>RemoteApplicationTitle</i> or <i>ServiceList</i> could not be found in the mergecom.app configuration file.
<b>MC_CONFIG_INFO_ERROR</b>	The service list contained too many services. DICOM has a limit of 128 presentation contexts/services when negotiating an association.
<b>MC_CONNECTION_FAILED</b>	The remote system could not be connected to at the TCP/IP level. Check that the remote host name and port number have been configured properly.
<b>MC_NULL_POINTER_PARM</b>	<i>AssociationID</i> and/or <i>RemoteApplicationTitle</i> was NULL.
<b>MC_INVALID_APPLICATION_TITLE</b>	<i>RemoteApplicationTitle</i> was not 1-16 bytes long.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> does not identify a valid Merge DICOM Toolkit application.
<b>MC_INVALID_PORT_NUMBER</b>	<i>RemoteHostPortNumber</i> was not NULL and pointed at a negative number.
<b>MC_INVALID_SERVICE_LIST_NAME</b>	<i>ServiceList</i> was not NULL and pointed at an empty string.
<b>MC_INVALID_HOST_NAME</b>	<i>RemoteHostTCPIPName</i> was not NULL and it was not 1-39 bytes long.
<b>MC_UNKNOWN_HOST_NAME</b>	The <i>RemoteHostTCPIPName</i> is unknown to the system.
<b>MC_TIMEOUT</b>	Timeout attempting the association.

<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The operating system interrupted the network call. Retry the connection.
<b>MC_NO_APPLICATIONS_REGISTERED</b>	An application title for this application has not yet be registered.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Register_Application</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_Get_Association_Info</b>	<b>MC_Set_Negotiation_Info</b>
<b>MC_Get_Negotiation_Info</b>	<b>MC_Get_User_Identity_Length</b>
<b>MC_Get_User_Identity_Info</b>	<b>MC_Clear_Negotiation_Info</b>
<b>MC_Close_Association</b>	<b>MC_Abort_Association</b>

## MC\_Open\_Empty\_Item

Creates a new empty Merge DICOM Toolkit item object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Open_Empty_Item (
    int *ItemIDPtr
)
```

*ItemIDPtr*      Upon successful completion, the item object identifier is returned here.

### Remarks

The **MC\_Open\_Empty\_Item** function creates a empty "item object" which contains no attributes. The resulting item object is given an identification number which is returned in *\*ItemIDPtr*. All functions dealing with this item must provide this item ID number.

If an item is opened using **MC\_Open\_Empty\_Item**, it is not necessary to add attributes to the item object before setting attribute values. If one of the set value functions (e.g.

**MC\_Set\_Value\_From\_String**) is used for an attribute, the attribute will automatically be added to the item object before the value is set. (Note that this is NOT THE CASE if an item object is opened using **MC\_Open\_Item**. In that case the item IS associated with a given item name and attributes other than those associated with that item name must be explicitly added to the item before setting values for the added attributes.)

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>ItemIDPtr</i> was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Open\_Item**

## MC\_Open\_Empty\_Message

Creates a new “empty” Merge DICOM Toolkit message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Open_Empty_Message (
    int *MessageIDPtr
)
```

*MessageIDPtr* Upon successful completion, the message object identifier is returned here.

### Remarks

The **MC\_Open\_Empty\_Message** function creates a “message object” which contains no attributes. The resulting message object is given an identification number which is returned in *\*MessageIDPtr*. All functions dealing with this message must provide this message ID number.

The opened message object is not associated with any particular DICOM service or command. If the message object is to be used to send a message to a network partner, or if **MC\_Validate\_Message** is to be called for the message object, **MC\_Set\_Service\_Command** must be called first to associate the message object with a given DICOM service and command.

If a message is opened using **MC\_Open\_Empty\_Message**, it is not necessary to add attributes to the message object before setting attribute values. If one of the set value functions (e.g. **MC\_Set\_Value\_From\_String**) is used for an attribute, the attribute will automatically be added to the message object before the value is set. (Note that this is NOT THE CASE if a message object is opened using **MC\_Open\_Message**. In that case the message IS associated with a given service/command pair and attributes other than those associated with that service and command must be explicitly added to the message before setting values for the added attributes.)

Reference the “DICOM V3.0 Standard” for more information about these commands.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>MessageIDPtr</i> was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Open_Message</b>	<b>MC_Create_File</b>
<b>MC_Free_Message</b>	<b>MC_Free_Item</b>

**MC\_Open\_File**  
**MC\_Open\_File\_Bypass\_OBOW**  
**MC\_Open\_File\_Upto\_Tag**  
**MC\_Open\_File\_Upto\_Tag\_Bypass\_Value**

Requests that the values of a file object be retrieved from a DICOM file

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Open_File (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC_Open_File_Bypass_OBOW (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC_Open_File_Upto_Tag (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    unsigned long Tag,
    long *Offset,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC_Open_File_Upto_Tag_Bypass_Value (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    unsigned long Tag,
    MTI_BOOLEAN AbypassTagValue,
    long *Offset,
    MC_STATUS (*YourFromMediaFunction())
)
```

<i>ApplicationID</i>	The identifier assigned to this object by the <b>MC_Register_Application</b> function.
<i>FileID</i>	The identifier assigned to this object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourFromMediaFunction</i> each time it is called. This may be NULL.
<i>AbypassTagValue</i>	Bypass an attribute value if TRUE. <b>Note:</b> For <b>MC_Open_File_Upto_Tag_Bypass_Value</b> this argument is unused, as the function will <i>by definition</i> bypass the attribute value. Retained for backward compatibility only.
<i>Tag</i>	The attribute after which to stop reading the file from media.
<i>Offset</i>	Upon successful completion, the offset in bytes from the beginning of the file of: <ul style="list-style-type: none"> <li>- the first attribute greater than <i>Tag</i> (for <b>MC_Open_File_Upto_Tag</b>)</li> <li>- the data of the attribute at <i>Tag</i> (for <b>MC_Open_File_Upto_Tag_Bypass_Value</b>)</li> </ul> is returned here.
<i>YourFromMediaFunction</i>	Name of a function which will be called repeatedly to request blocks of DICOM file data from media.

The function must be prototyped as follows:

```
MC_STATUS YourFromMediaFunction (
    char *CBfilename,
    void *CBUserInfo,
    int *CBdataSizePtr,
    void **CBdataBufferPtr,
    int CBisFirst,
    int *CBisLastPtr
)
```

<i>CBfilename</i>	String filename associated with the file object
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_Open_File...</b> function. This may be NULL.
<i>CBdataSizePtr</i>	Set <i>*CBdataSizePtr</i> to the number of bytes you are providing. This must be an even number.
<i>CBdataBufferPtr</i>	Set <i>*CBdataBufferPtr</i> to the address of the data you are providing.

<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourFromMediaFunction</i> to request data blocks.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (non-zero) when you are returning with the last block of file data.

### Remarks

**MC\_Open\_File**, **MC\_Open\_File\_Bypass\_OBOW**, and **MC\_Open\_File\_Upto\_Tag**, **MC\_Open\_File\_Upto\_Tag\_Bypass\_Value** request that the contents of a DICOM file be converted and placed into the file object *FileID*. The file is passed to Merge DICOM Toolkit by *YourFromMediaFunction*. Merge DICOM Toolkit repeatedly calls *YourFromMediaFunction* until all of the file has been processed.

The **MC\_Open\_File...** functions can pass data to *YourFromMediaFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourFromMediaFunction* in *CBUserInfo* each time it is called. *UserInfo* may be NULL.

When **MC\_Open\_File** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC\_Get\_Value\_To\_Function** to retrieve the attribute values. If a callback is registered for the attribute, the callback is supplied the data as it is read. See the description of **MC\_Register\_Callback\_Function** for more details.

When **MC\_Open\_File\_Bypass\_OBOW** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC\_Get\_Value\_To\_Function** to retrieve the attribute values.

**MC\_Open\_File\_Bypass\_OBOW** can be used to increase performance for handling attributes of type OB, OW, OF or OD. When a callback function is registered with **MC\_Register\_Callback\_Function** for an attribute of type OB, OW, OF or OD, **MC\_Open\_File\_Bypass\_OBOW** will not read in the attribute's value. Instead, the data will be left on media and the offset of the attribute's value from the beginning of the file along with length of the value will be passed to the user's callback function. When the data is needed by the user or Merge DICOM Toolkit, the callback can retrieve it from media. See the description of **MC\_Register\_Callback\_Function** for more details.

When **MC\_Open\_File\_Upto\_Tag** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC\_Get\_Value\_To\_Function** to retrieve the attribute values.

**MC\_Open\_File\_Upto\_Tag** can be used to increase performance for handling attributes of type OB, OW, OF or OD. **MC\_Open\_File\_Upto\_Tag** will stop reading the file from media when it reaches the first attribute greater than *Tag*. As a convenience, the offset in bytes from the beginning of the file of the first attribute greater than *Tag* is returned in *Offset*. If the user wants to use *Offset* to access attributes greater than *Tag* directly from media, the user will have to parse the file directly.

**MC\_Open\_File\_Upto\_Tag\_Bypass\_Value** has the same functionality as **MC\_Open\_File\_Upto\_Tag** except that the attribute values with given *Tag* will not be read, but left on media. It increases performance for handling large size attributes, especially pixel data (7fe0,0010). Instead of reading the attribute values the above described callback mechanism should be used with **MC\_Register\_Callback\_Function** for that attribute to be retrieved from media when needed. If the

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file contains any attributes with a value representation of SQ (i.e. the file contains one or more sequences of items), an item object is automatically opened for each item in the file. The ItemID associated with each opened item object is used as the value for the item in the sequence attribute. Later, the **MC\_Get\_Value...** functions may be used to retrieve the ItemIDs from the SQ attribute. Then, again using the **MC\_Get\_Value...** functions, the attributes of the ItemID object may be retrieved.

The **MC\_Open\_File...** functions will also read in DICOMDIRs. In order for a DICOMDIR to be properly read in, the file object must be associated with the service for a DICOMDIR. This can be accomplished by specifying the service when the object is created, or calling **MC\_Set\_Service\_Command** on the object before one of the **MC\_Open\_File...** functions is called. When one of these conditions is met, the function will resolve the directory record file offset pointers within the DICOMDIR by assigning them the ItemID associated with each opened item object.

The **MC\_Open\_File...** functions read in the DICOM File Meta Information attributes in explicit VR little endian transfer syntax. The remainder of the file is read in with the transfer syntax specified in the attribute (0002,0010). If this attribute is not found, the entire file is read in using the Explicit VR Little Endian transfer syntax.

**NOTE:** A runtime configuration parameter determines what will happen if the input file contains an invalid DICOM file prefix. The default is to change any invalid prefix to “DICM”. If requested, however, an invalid prefix can be left in the file. If an invalid prefix is read in or wrote out a warning message will be logged.

**NOTE:** A runtime configuration parameter determines what will happen if the input file contains an attribute which is not in the service associated with the file. The default is to ignore such attributes (with a warning message logged). If requested, however, such attributes will be added to the file, along with their values. If the Value Representation of the attribute being added cannot be determined, the attribute is given a pseudo Value Representation of “**Unknown\_VR**”. The only way to retrieve the value of such attributes is to use the **MC\_Get\_Value\_To\_Buffer** function. To change the value of such attributes, **MC\_Set\_Value\_Representation** (or **MC\_Set\_pValue\_Representation**) must first be called to assign a valid Value Representation to the attribute. If **MC\_Write\_File** is used, attributes with unknown VRs are simply copied (memcpy) to the stream with no consideration given to byte ordering.

### *YourFileToFunction*

It is the responsibility of *YourFromMediaFunction* to pass blocks of data back to Merge DICOM Toolkit each time it is called. Merge DICOM Toolkit sets *CBFirstCall* to TRUE (non-zero) the first time it calls *YourFromMediaFunction* for this file.

*\*CBdataBufferPtr* must be set to the address of the buffer containing the stream data block, and *\*CBdataSizePtr* must be set to the number of bytes placed at *\*CBdataBufferPtr*.



*YourFromMediaFunction* must set *\*CBisLast* to TRUE (non-zero) when it is providing the last block of the streamed message.

Do not reuse  
data in your buffer

Data in the buffer returned by *\*CBdataBufferPtr* shall not be reused, because with some configurations Merge DICOM Toolkit may do in-place byte swapping to convert data to a native endian format. If your application needs to keep source data unchanged, you must create a copy of your source data chunk and return its address to the caller.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>FileIDPtr</i> , <i>YourFromMediaFunction</i> , or <i>Filename</i> was NULL.
<b>MC_INVALID_APPLICATION_ID</b>	The application ID does not identify a valid Merge DICOM Toolkit application.
<b>MC_INVALID_FILE</b>	An invalid DICOM Prefix was found within the file. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid transfer syntax code was found within the file’s DICOM File Meta Information.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourFromMediaFunction</i> returned with a status other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The <i>CBdataSizePtr</i> parameter returned by <i>YourFromMediaFunction</i> was an uneven number.
<b>MC_CALLBACK_PARM_ERROR</b>	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See <b>MC_Register_Callback_Function</b> for details.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The file contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_UNEXPECTED_EOD</b>	<i>YourFromMediaFunction</i> stopped without passing the entire value for an attribute.

**MC\_INVALID\_LENGTH\_FOR\_VR** The value(s) for one of the file attributes was not legal for its value representation.

Any of the status codes returned by **MC\_Set\_Value** may also be returned.

### See Also

**MC\_Register\_Callback\_Function**      **MC\_Write\_File** **MC\_Write\_File\_By\_Callback**

## MC\_Open\_Item

Creates a new Merge DICOM Toolkit item object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Open_Item (
    int *ItemIDPtr,
    char *ItemName
)
```

*ItemIDPtr*      Upon successful completion, the item object identifier is returned here.

*ItemName*      String name of the item to be associated with this item object.

### Remarks

The **MC\_Open\_Item** function creates a “item object” which contains (or will contain) all of the attributes of a named item which will be used in a sequence of items in a message object or in another item object. The resulting item object is given an identification number which is returned in *\*ItemIDPtr*. All functions dealing with this item must provide this item ID number.

The *ItemName* is used to access configuration information which describes the attributes of the message. If such configuration information is not available, an empty item object is created, and a warning message is logged.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC\_Open\_Empty\_Item****MC\_Open\_Message****MC\_Open\_Message**

Creates a new Merge DICOM Toolkit message object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Open_Message (
    int *MessageIDPtr,
    char *ServiceName,
    MC_COMMAND Command
)
```

- MessageIDPtr* Upon successful completion, the message object identifier is returned here.
- ServiceName* String name of a DICOM service to be associated with this message object.
- Command* The command which is to be associated with this message. The **MC\_COMMAND** enumerated values are defined in "mc3msg.h".

**Remarks**

The **MC\_Open\_Message** function creates a "message object" which contains (or will contain) all of the attributes of a DICOM message which will be used for the given *ServiceName* and *Command*. The resulting message object is given an identification number which is returned in *\*MessageIDPtr*. All functions dealing with this message must provide this message ID number.

The *ServiceName* and *Command* are used to access configuration information which describes the attributes of the message. If such configuration information is not available, an empty message object is created, and a warning message is logged.

**MC\_Open\_Message** generates in each message object created the set of "command type" attributes used by most DICOM services. While Merge DICOM Toolkit sets the values of many of these "command type" attributes automatically, some services require the application to set them. (Refer to the description of **MC\_Send\_Request\_Message** for more information.)

**MC\_Open\_Empty\_Message** should be used if the service and command are not yet known, or if there is no need to validate that values will be set only for attributes assigned to a given service/command pair.

The following commands are supported by the Merge DICOM Toolkit:

<b>Command</b>	<b>Description</b>
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response

C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### ***Return Value***

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_COMMAND</b>	<i>Command</i> is not a supported command.

<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Open_Empty_Message</b>	<b>MC_Free_Message</b>
<b>MC_Free_Item</b>	

## MC\_Open\_Secure\_Association MC\_Open\_Secure\_Association\_With\_Reject\_Info

Establishes a connection with a remote DICOM application over a secure socket connection.

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Open_Secure_Association (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SS_functions,
    void *SS_application_context
)

typedef struct {
    unsigned short Result;
    unsigned short Source;
    unsigned short Reason;
} AssocRejectInfo;

MC_STATUS MC_Open_Secure_Association_With_Reject_Info (
    int ApplicationID,
    int *AssociationID,
    const char *RemoteApplicationTitle,
    int *RemoteHostPortNumber,
    char *RemoteHostTCPIPName,
    char *ServiceList,
    SecureSocketFunctions *SS_functions,
    void *SS_application_context,
    AssocRejectInfo RejectInfo
)

```

<i>ApplicationID</i>	The application ID returned from the MC_Register_Application function.
<i>AssociationID</i>	The identification number of an association object is returned here.

---

<i>RemoteApplicationTitle</i>	The DICOM Application Title of the remote application.
<i>SS_functions</i>	Pointer to a structure containing functions that will be called by Merge DICOM Toolkit while processing network I/O over the secure connection. (see below)

Each of the following is optional. Use NULL if not used

<i>RejectInfo</i>	If the association is rejected, this return argument will contain the result/source/reason codes explaining the reason for rejection (See DICOM PS3.8, Section 9.3.4).
<i>RemoteHostPortNumber</i>	The TCP/IP port used by the remote application to “listen” for DICOM associations
<i>RemoteHostTCPIPName</i>	The remote host’s TCP/IP Name. This parameter can be a hostname, an IPv4 address, or an IPv6 address.
<i>ServiceList</i>	Name of a service list in the Merge DICOM Toolkit configuration file.
<i>SS_context</i>	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in <i>SS_functions</i> .

## Remarks

**MC\_Open\_Secure\_Association** establishes a secure DICOM association connection with a remote DICOM application. Use **MC\_Open\_Association** if a secure network connection is not required.

Each application in a DICOM association has a publicly known name or “application title”. This application’s title was declared in the **MC\_Register\_Application** call. The application to which we are intending to connect is specified in *RemoteApplicationTitle*. The remote DICOM system waits for association requests on a given TCP/IP port. That port number is specified by *RemoteHostPortNumber*. The TCP/IP name of the remote host is specified by *RemoteHostTCPIPName*.

Starting a DICOM association is a negotiated process. One application provides one or more services, and the other uses one or more of the services provided. The **MC\_Open\_Secure\_Association** function lets the remote DICOM process know which services this application wishes to use. This “service list” is defined in the Merge DICOM Toolkit Application Configuration file, and the name of the appropriate service list is specified by the *ServiceList* parameter.

A few DICOM services require the applications to negotiate application-specific information. This is performed by sharing “extended negotiation information” when the association is negotiated. If one or more of the services in *ServiceList* requires such negotiation, **MC\_Set\_Negotiation\_Info** should be called for each such service to supply the negotiation information.

If the remote system accepts the association request (i.e. it can support one or more of the services in the *ServiceList*), **MC\_Open\_Secure\_Association** creates an association object, puts its ID in *\*AssociationID*, and returns MC\_NORMAL\_COMPLETION.

If the service requires the remote application to return extended negotiation information, **MC\_Get\_Negotiation\_Info** should be called to retrieve such information. If the information is unacceptable, **MC\_Close\_Association** should be called.

**NOTE:** That the information registered with the **MC\_Set\_Negotiation\_Info** call is not changed during the association process. Use **MC\_Clear\_Negotiation\_Info** to prevent the information from being used in subsequent association negotiations for a given service.

**MC\_ASSOCIATION\_REJECTED** is returned if the remote system rejects the association request. *\*AssociationID* is NOT valid if the association is rejected or if an error occurs.

**NOTE:** Only four parameters (*ApplicationID*, *AssociationID*, *RemoteApplicationTitle* and *SS\_functions*) are required. *RemoteHostPortNumber*, *RemoteHostTCPIPName* and *ServiceList* will be defaulted if they are specified as NULL. The default values are obtained from the *RemoteApplicationTitle*'s section in the Merge DICOM Toolkit Application Configuration file.

### **SecureSocketFunctions**

When using the **MC\_Open\_Secure\_Association** call, Merge DICOM Toolkit establishes a TCP/IP connection and then calls the functions provided by the *SS\_functions* parameter to establish the secure connection and to pass data through the secure connection. The *SS\_functions* are responsible for sending and receiving all data through the secure connection, thus allowing them to do so using a secure protocol such as Secure Socket Layer(SSL). Merge DICOM Toolkit closes the underlying TCP/IP connection when all association processing has completed and after it calls the **SS\_Session\_Shutdown** callback.

The **SecureSocketFunctions** structure is declared in mergecom.h as follows:

```
typedef struct MC_Secure_Socket_Functions_Struct
{
    SS_STATUS (NOEXP_FUNC *SS_Session_Start) (
        MC_SOCKET      SocketToUse,
        CONN_TYPE     ConnectionType,
        void           *ApplicationContext,
        void           **SecurityContext
    );
    SS_STATUS (NOEXP_FUNC *SS_Read) (
        void           *SScontext,
        void           *ApplicationContext,
        char          *Buffer,
        unsigned int BytesToRead,
        unsigned int *BytesRead,
        int           Timeout
    );
};
```

---

```

SS_STATUS (NOEXP_FUNC *SS_Write) (
    void          *SScontext,
    void          *ApplicationContext,
    char          *Buffer,
    unsigned int  BytesToWrite,
    unsigned int  *BytesWritten,
    int           Timeout
);
void (NOEXP_FUNC *SS_Session_Shutdown) (
    void          *SScontext,
    void          *ApplicationContext
);
} SecureSocketFunctions;

```

You must provide valid function pointers for each of the four fields in the **SecureSocketFunctions** structure.

### **SS\_Session\_Start**

Merge DICOM Toolkit calls the **SS\_Session\_Start** function just after it has established a TCP/IP connection with the remote host. The *SocketToUse* parameter contains the socket assigned to the connection. Please note that the connection is non-blocking. The *ApplicationContext* parameter is the presented by the *SS\_context* parameter of the **MC\_Open\_Secure\_Association** call. *ConnectionType* will be the manifest constant **REQUESTER\_CONNECTION** if the **SS\_Session\_Start** function is called as a result of a **MC\_Open\_Secure\_Association** call. (It will be **ACCEPTOR\_CONNECTION** if it is called as a result of a **MC\_Wait\_For\_Secure\_Association** call.)

The **SS\_Session\_Start** function is responsible for establishing a secure connection using the socket provided. It is assumed, but not required, that the connection will be a Secure Socket Layer (SSL) or Transport Layer Socket (TLS) connection. A pointer to a context block should be returned at *\*SecurityContext* if the secure connection is established. Merge DICOM Toolkit will provide this pointer when it calls the other callback functions.

**SS\_Session\_Start** must return **SS\_NORMAL\_COMPLETION** if the secure connection was successfully established, otherwise **SS\_ERROR** must be returned. If it returns **SS\_ERROR**, the TCP/IP connection will be closed and the **MC\_Open\_Secure\_Association** call will return a status of **MC\_NEGOTIATION\_ABORTED**.

### **SS\_Session\_Shutdown**

Merge DICOM Toolkit calls the **SS\_Session\_Shutdown** function when the association is aborted or closed. It is the responsibility of the **SS\_Session\_Shutdown** function to gracefully close the secure network connection. Merge DICOM Toolkit closes the TCP/IP socket connection after calling **SS\_Session\_Shutdown**. The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Open\_Secure\_Association** call, and the *SScontext* parameter is that previously returned by the **SS\_Session\_Start** function.

### **SS\_Read**

Merge DICOM Toolkit calls the **SS\_Read** function whenever it needs association data from the secure connection. The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Open\_Secure\_Association** call, and the *SScontext* parameter is that previously returned by the



**SS\_Session\_Start** function. It is the responsibility of the **SS\_Read** function to retrieve into *Buffer* the number of unencrypted data bytes specified by *BytesToRead*. The actual number of bytes placed in the *Buffer* is returned at *\*BytesRead*. **SS\_NORMAL\_COMPLETION** must be returned if the read request was satisfied.

If the **SS\_Read** function cannot retrieve *BytesToRead* bytes in *Timeout* seconds, it must return **SS\_TIMEOUT**. Please note that the socket connection passed by Merge DICOM Toolkit to the **SS\_Session\_Start** function is non-blocking. (Note that if **SS\_TIMEOUT** is returned, an outstanding **MC\_Read\_Message** call will return **MC\_TIMEOUT**.)

If it is determined that the secure socket connection has closed, or that the underlying transport has closed, **SS\_SESSION\_CLOSED** must be returned. This should only occur during a DICOM association if the remote host aborted the association. If a fatal error occurs while processing the read request, **SS\_ERROR** must be returned. (Note that if **SS\_SESSION\_CLOSED** or **SS\_ERROR** is returned, an outstanding **MC\_Read\_Message** call will return **MC\_NETWORK\_SHUT\_DOWN**.)

### SS\_Write

Merge DICOM Toolkit calls the **SS\_Write** function whenever it needs to send association data over the secure connection. The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Open\_Secure\_Association** call, and the *SScontext* parameter is that previously returned by the **SS\_Session\_Start** function. It is the responsibility of the **SS\_Write** function to send *BytesToWrite* bytes of the data in *Buffer* over the secure connection, returning the number of bytes actually written at *\*BytesWritten*. **SS\_NORMAL\_COMPLETION** must be returned if the write request was satisfied.

If the **SS\_Write** function cannot send *BytesToWrite* bytes in *Timeout* seconds, it must return **SS\_TIMEOUT**. Please note that the socket connection passed by Merge DICOM Toolkit to the **SS\_Session\_Start** function is non-blocking.

If a fatal error occurs while processing the write request, **SS\_ERROR** must be returned. (Note that if **SS\_ERROR** is returned, an outstanding **MC\_Send\_Request\_Message**, **MC\_Send\_Request**, **MC\_Send\_Response\_Message** or **MC\_Send\_Response** call will return **MC\_SYSTEM\_ERROR**.)

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally. <i>AssociationID</i> has been set to the association’s identification number.
<b>MC_ASSOCIATION_REJECTED</b>	The remote system rejected the open association request.
<b>MC_NEGOTIATION_ABORTED</b>	The association was aborted during negotiation
<b>MC_CONNECTION_FAILED</b>	The remote system could not be connected to at the TCP/IP level. Check that the remote host name and port number have been configured properly.

<b>MC_NULL_POINTER_PARM</b>	<i>AssociationID</i> , <i>SS_functions</i> or <i>RemoteApplicationTitle</i> was NULL.
<b>MC_NULL_VALUE</b>	One or more of the function parameters within <i>SS_functions</i> was NULL.
<b>MC_INVALID_APPLICATION_TITLE</b>	<i>RemoteApplicationTitle</i> was not 1-16 bytes long.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> does not identify a valid Merge DICOM Toolkit application.
<b>MC_INVALID_PORT_NUMBER</b>	<i>RemoteHostPortNumber</i> was not NULL and pointed at a negative number.
<b>MC_INVALID_SERVICE_LIST_NAME</b>	<i>ServiceList</i> was not NULL and pointed at an empty string.
<b>MC_INVALID_HOST_NAME</b>	<i>RemoteHostTCPIPName</i> was not NULL and it was not 1-39 bytes long.
<b>MC_TIMEOUT</b>	Timeout attempting the association.
<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The operating system interrupted the network call. Retry the connection.
<b>MC_NO_APPLICATIONS_REGISTERED</b>	An application title for this application has not yet be registered.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Open_Association</b>	<b>MC_Register_Application</b>
<b>MC_Wait_For_Association</b>	<b>MC_Wait_For_Secure_Association</b>
<b>MC_Set_Negotiation_Info</b>	<b>MC_Get_Negotiation_Info</b>
<b>MC_Clear_Negotiation_Info</b>	<b>MC_Close_Association</b>
<b>MC_Abort_Association</b>	<b>MC_Wait_For_Connection</b>
<b>MC_Wait_For_Connection_On_Port</b>	<b>MC_Process_Association_Request</b>
<b>MC_Process_Secure_Association_Request</b>	

### MC\_Process\_Association\_Request MC\_Process\_Secure\_Association\_Request

Process a standard association request or secure association request that was received by the `MC_Wait_For_Connection` or `MC_Wait_For_Connection_on_Port` functions. It also can be used to process an association received by the internet services daemon (`inetd`) on UNIX systems.

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Process_Association_Request (
    MC_SOCKET Socket,
    const char *ServiceListName,
    int *ApplicationID,
```

```

        int *AssociationID
    )
MC_STATUS MC_Process_Secure_Association_Request (
    MC_SOCKET Socket,
    const char *ServiceListName,
    int *ApplicationID,
    int *AssociationID,
    SecureSocketFunctions *SS_functions,
    void *SS_application_context
)

```

<i>Socket</i>	Socket returned by <code>MC_Wait_For_Connection</code> or <code>MC_Wait_For_Connection_On_Port</code> .
<i>ServiceListName</i>	Name of a service list in the Merge DICOM Toolkit configuration file.
<i>ApplicationID</i>	The identification number of a previously registered application is returned here.
<i>AssociationID</i>	The identification number of an association object is returned here.
<i>SS_functions</i>	Pointer to a structure containing functions that will be called by Merge DICOM Toolkit while processing network I/O over the secure connection.  The <code>SecureSocketFunctions</code> structure is defined in "mergecom.h" (see <b>MC_Open_Secure_Association</b> )
<i>SS_context</i>	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in <i>SS_functions</i> .

### Remarks

**MC\_Process\_Association\_Request** can be used in conjunction with the **MC\_Wait\_For\_Connection** and **MC\_Wait\_For\_Connection\_On\_Port** routines to handle incoming connections.

**MC\_Process\_Secure\_Association\_Request** can also be used in conjunction with **MC\_Wait\_For\_Connection** and **MC\_Wait\_For\_Connection\_On\_Port** to process secure DICOM association requests. See the description to **MC\_Wait\_For\_Secure\_Association** for details on how to use secure callback functions.

**MC\_Process\_Association\_Request** and **MC\_Process\_Secure\_Association\_Request** can also be used on UNIX toolkit platforms in conjunction with a UNIX OS's internet services daemon (inetd). In these situations, inetd is configured to handle the TCP/IP connection request on a specific listen port. Once a connection request is received, inetd performs a fork/exec on a pre-configured user program to handle the connection. inetd supplies the socket to the process by setting stdin to the socket's value. In this scenario, stdin must be used as the *Socket* parameter to **MC\_Process\_Association\_Request**.

Once the user's program is invoked, this function is used in the place of **MC\_Wait\_For\_Association** to complete the association request with one of the previously registered applications.

inetd must be properly configured in order to correctly perform the listen on the correct TCP/IP socket and to invoke the user's application. There are some differences between UNIX versions, so the following is only an example configuration. Please consult the appropriate UNIX man pages or documentation for more information.

The server must be specified in the systems services file (typically in `/etc/inet/` or in `/etc` directory). E.g.

```
dicom_echo 104/tcp
```

The server must also be specified in the inetd configuration file (typically `/etc/inet/inetd.conf` or `/etc/inetd.conf`). E.g.:

```
dicom_echo stream tcp nowait root /usr/bin/inetd_echo_scp inetd_echo_scp /usr/bin/merge.ini
```

Where:

"dicom\_echo" must be defined in services as servicing the DICOM port (e.g. 104)

"stream" - always

"tcp" - always

"nowait" - always

"root" - from `/etc/passwd`: typically root

`/usr/bin/inetd_echo_scp` - full path name to this runtime application

`inetd_echo_scp` - `argv[0]`

`/usr/bin/merge.ini` - `argv[1]` - The application's arguments, if any.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "`mcstatus.h`":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_NEGOTIATION_ABORTED</b>	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the <b>MC_Process_Association_Request</b> call.
<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the <b>MC_Process_Association_Request</b> call.
<b>MC_NULL_POINTER_PARM</b>	<i>AssociationID</i> , <i>ApplicationID</i> or <i>ServiceList</i> parameter was NULL.

**MC\_NO\_APPLICATIONS\_REGISTERED**

No applications have been registered using **MC\_Register\_Application**.

**MC\_INVALID\_SERVICE\_LIST\_NAME**

*ServiceList* points at a null string.

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious problem was detected in the operating environment. A message describing the error had been written to the Merge DICOM Toolkit log file.

**MC\_ASSOCIATION\_REJECTED**

The association was rejected as invalid.

**MC\_ASSOCIATION\_CLOSED**

The association was closed after handling an echo request.

**See Also**

**MC\_Wait\_For\_Association**  
**MC\_Wait\_For\_Connection**

**MC\_Wait\_For\_Secure\_Association**  
**MC\_Wait\_For\_Connection\_On\_Port**

**MC\_Read\_Message**

Reads the next message sent by the remote application.

**Synopsis**

```
#include "mergecom.h"

MC_STATUS MC_Read_Message (
    int AssociationID,
    int Timeout,
    int *MessageID,
    char **ServiceName,
    MC_COMMAND *Command
)
```

*AssociationID* The association object's identification number

*Timeout* The maximum time (in seconds) to wait for a message to start arriving. A value of zero (0) means "check one time" and a value of minus one (-1) means "wait forever".

*MessageID* The ID of a message object containing the attributes of the message is returned here.

*ServiceName* The name of the service associated with *MessageID* is returned here. Note well that this memory is freed when the **MC\_Free\_Message()** function is called for *MessageID*.

*Command* The command which is associated with the message is returned here. The **MC\_COMMAND** enumerated values are defined in "mc3msg.h".

## Remarks

**MC\_Read\_Message** allows the caller to wait for the arrival of a request or response message from the remote application. If a message is not received on the association identified by *AssociationID* within *Timeout* seconds, the function returns a status of MC\_TIMEOUT.

**NOTE:** If *Timeout* is set to less than zero, **MC\_Read\_Message** will wait forever for a message to arrive. If it is set to zero, it will check one time if a message has arrived and then return.

Once a message begins arriving, the **INACTIVITY\_TIMEOUT** configuration value is used. While receiving the message, the association will be aborted if there is no activity on the network for the length of time specified by this configuration value.

If a message arrives, *\*MessageID* is set to the ID of a message object which has been opened to receive the attributes of the message. The message's attribute values have been set by the DICOM message stream received from the remote application. If **MC\_Register\_Callback\_Function** was called for any message attributes, those values were passed on to the registered callback function by the time this function (**MC\_Read\_Message**) returns.

*ServiceName* is set to the name of the service associated with *MessageID* and *Command* is set to the command associated with *MessageID*.

**NOTE:** It is the responsibility of the caller to release the message object. This is done using the MC\_Free\_Message call.

If **MC\_Read\_Message** returns either **MC\_ASSOCIATION\_CLOSED**, **MC\_ASSOCIATION\_ABORTED**, **MC\_NETWORK\_SHUT\_DOWN**, **MC\_INACTIVITY\_TIMEOUT**, **MC\_CONFIG\_INFO\_ERROR** or **MC\_INVALID\_MESSAGE\_RECEIVED** no further calls may be made for the association and no message ID is returned at *\*MessageID*.

The following commands are supported by the Merge DICOM Toolkit:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response

---

C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_MUST_CONTINUE_BEFORE_READING</b>	A previous message was not read completely before making this call.
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> , <i>ServiceName</i> or <i>Command</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Read_Message</b>	<b>MC_Free_Message</b>
<b>MC_Register_Callback_Function</b>	<b>MC_Continue_Read_Message</b>
<b>MC_Continue_Read_Message_To_Tag</b>	

## MC\_Read\_Message\_To\_Tag

Reads the next message sent by the remote applicate up until a specified tag.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Read_Message_To_Tag (
    int AssociationID,
    int Timeout,
    unsigned long StopTag,
    int *MessageID,
    char **ServiceName,
    MC_COMMAND *Command
)
```

<i>AssociationID</i>	The association object's identification number
<i>Timeout</i>	The maximum time (in seconds) to wait for a message to start arriving. A value of zero (0) means "check one time" and a value of minus one (-1) means "wait forever".
<i>StopTag</i>	Read up to and include this tag when reading from the remote application. Must be outside the command section (greater than or equal to (0001,0000))
<i>MessageID</i>	The ID of a message object containing the attributes of the message is returned here.
<i>ServiceName</i>	The name of the service associated with <i>MessageID</i> is returned here. Note well that this memory is freed when the <b>MC_Free_Message()</b> function is called for <i>MessageID</i> .



---

*Command* The command which is associated with the message is returned here. The **MC\_COMMAND** enumerated values are defined in “mc3msg.h”.

### Remarks

**MC\_Read\_Message\_To\_Tag** allows the caller to wait for the arrival of a request or response message from the remote application. If a message is not received on the association identified by *AssociationID* within *Timeout* seconds, the function returns a status of MC\_TIMEOUT. Note that if *Timeout* is set to less than zero, **MC\_Read\_Message\_To\_Tag** will wait forever for a message to arrive. If it is set to zero, it will check one time if a message has arrived and then return.

Once a message begins arriving, the **INACTIVITY\_TIMEOUT** configuration value is used. While receiving the message, the association will be aborted if there is no activity on the network for the length of time specified by this configuration value.

If a message arrives, *\*MessageID* is set to the ID of a message object which has been opened to receive the attributes of the message, up to, and including, the specified *StopTag*. The message's attribute values have been set by the DICOM message stream received from the remote application. If **MC\_Register\_Callback\_Function** was called for any message attributes, those values were passed on to the registered callback function by the time this function (**MC\_Read\_Message\_To\_Tag**) returns.

The message prior to this call must have been read with **MC\_Read\_Message**, or read up to the last tag (FFFF,FFFF) either explicitly with **MC\_Continue\_Read\_Message\_To\_Tag**, or by using **MC\_Continue\_Read\_Message**.

The message returned must be read until the last tag (FFFF,FFFF) either explicitly with **MC\_Continue\_Read\_Message\_To\_Tag**, or by calling **MC\_Continue\_Read\_Message** before using **MC\_Read\_Message** or **MC\_Read\_Message\_To\_Tag** again.

*ServiceName* is set to the name of the service associated with *MessageID* and *Command* is set to the command associated with *MessageID*.

**NOTE:** It is the responsibility of the caller to release the message object. This is done using the MC\_Free\_Message call.

If **MC\_Read\_Message\_To\_Tag** returns either **MC\_ASSOCIATION\_CLOSED**, **MC\_ASSOCIATION\_ABORTED**, **MC\_NETWORK\_SHUT\_DOWN**, **MC\_INACTIVITY\_TIMEOUT**, **MC\_CONFIG\_INFO\_ERROR** or **MC\_INVALID\_MESSAGE\_RECEIVED** no further calls may be made for the association and no message ID is returned at *\*MessageID*.

The following commands are supported by the Merge DICOM Toolkit:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response

C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Response
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_MUST_CONTINUE_BEFORE_READING</b>	A previous message was not read completely before making this call.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> , <i>ServiceName</i> or <i>Command</i> parameter was NULL.

<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	<i>StopTag</i> was within the command set (less than (0001,0000)). <u>The association is dropped if any of the following are returned:</u>
<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Read_Message</b>	<b>MC_Register_Callback_Function</b>
<b>MC_Continue_Read_Message</b>	<b>MC_Free_Message</b>
<b>MC_Continue_Read_Message_To_Tag</b>	

## MC\_Read\_To\_Stream

Reads the message sent by the remote application directly into a streaming function. Especially useful for the transfer of large data which we don't want to load into application memory.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Read_To_Stream (
    int AssociationID,
    int Timeout,
    char **ServiceName,
    MC_COMMAND *Command
    char *FileName,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>Timeout</i>	The maximum time (in seconds) to wait for a message to start arriving. A value of zero (0) means "check one time" and a value of minus one (-1) means "wait forever".
<i>ServiceName</i>	The name of the service is returned here.

---

<i>Command</i>	The command which is associated with the message is returned here. The <b>MC_COMMAND</b> enumerated values are defined in “mc3msg.h”.
<i>Filename</i>	The name of file associated with the receiving message. This may be NULL.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to receive blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void* CUserInfo,
    int CBdataSize,
    void* CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The internal identifier assigned to the receiving message object. It becomes invalid once the message is received.
<i>CUserInfo</i>	Address of data which is being passed from the <b>MC_Message_To_Stream</b> function. This may be NULL.
<i>CBdataSize</i>	The number of bytes of stream data being provided to you in <i>CBdataBuffer</i> .
<i>CBdataBuffer</i>	The buffer containing stream data from the message object.
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

## Remarks

**MC\_Read\_To\_Stream** allows the caller to wait for the arrival of a request or response message from the remote application. If a message is not received on the association identified by *AssociationID* within *Timeout* seconds, the function returns a status of MC\_TIMEOUT.

**NOTE:** If *Timeout* is set to less than zero, **MC\_Read\_To\_Stream** will wait forever for a message to arrive. If it is set to zero, it will check one time if a message has arrived and then return.

Once a message begins arriving, the **INACTIVITY\_TIMEOUT** configuration value is used. While receiving the message, the association will be aborted if there is no activity on the network for the length of time specified by this configuration value.

If a message arrives, *YourReceiveStreamFunction* is called repeatedly providing the blocks of data of a message object. The message's attribute values have been set by the DICOM message stream received from the remote application.

*ServiceName* is set to the name of the service associated with receiving message and *Command* is set to the command associated with *MessageID*.

If **MC\_Read\_To\_Stream** returns either **MC\_ASSOCIATION\_CLOSED**, **MC\_ASSOCIATION\_ABORTED**, **MC\_NETWORK\_SHUT\_DOWN**, **MC\_INACTIVITY\_TIMEOUT**, **MC\_CONFIG\_INFO\_ERROR** or **MC\_INVALID\_MESSAGE\_RECEIVED** no further calls may be made for the association and no message ID is returned at *\*MessageID*.

The following commands are supported by the Merge DICOM Toolkit:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request

N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_MUST_CONTINUE_BEFORE_READING</b>	A previous message was not read completely before making this call.
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> , <i>ServiceName</i> or <i>Command</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message’s service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Read_Message</b>	<b>MC_Continue_Read_Message</b>
<b>MC_Continue_Read_Message_To_Tag</b>	

## MC\_Register\_Application

Registers a Merge DICOM Toolkit application.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Register_Application (
    int *ApplicationID,
    char *AETitle
)
```

*ApplicationID*     A unique application identification number will be returned here

*AETitle*            The DICOM application title used by this application.

### Remarks

**MC\_Register\_Application** registers an application with Merge DICOM Toolkit. This function provides Merge DICOM Toolkit with the information it needs to identify this DICOM application and to maintain information specific to this application.

*AETitle* is the DICOM name of the application. *AETitle* must be made known to any other DICOM application which wishes to communicate with this one.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>ApplicationID</i> or <i>AETitle</i> was NULL.
<b>MC_INVALID_LENGTH_FOR_TITLE</b>	<i>AETitle</i> must be 1 to 16 bytes long.
<b>MC_ALREADY_REGISTERED</b>	An application title with this name has already been registered.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Release\_Application**            **MC\_Register\_Callback\_Function**  
**MC\_Set\_Message\_Callbacks**        **MC\_Set\_Negotiation\_Info**

## MC\_Register\_Callback\_Function MC\_Register\_pCallback\_Function

Registers a callback function to provide or retrieve a standard or private attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file

### Synopsis

```
#include "mc3msg.h"
```

---

```

MC_STATUS MC_Register_Callback_Function (
    int ApplicationID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*CallbackFunction)()
)

MC_STATUS MC_Register_pCallback_Function (
    int ApplicationID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*pCallbackFunction)
)

```

*ApplicationID* The identifier assigned to this application by the **MC\_Register\_Application** function.

*Tag* DICOM tag which identifies the attribute to which this callback function applies. *Tag* must specify an attribute with a value representation of OB, OW, OD, or OF.

*PrivateCode* The code string which dictates which block in the private *Group* "owns" the attribute.

*Group* The number identifying the private group containing the private attribute. It must be an odd number.

*ElementByte* The number identifying the private attribute within the private *Group* for this *PrivateCode*.

*UserInfo* Address of data which will be passed on to *CallbackFunction* each time it is called. This may be NULL.

*CallbackFunction* Name of a function which will be called repeatedly to  
or provide blocks of data or to request blocks of data for  
*pCallbackFunction* the attribute's value.

The functions must be prototyped as follows:

```

MC_STATUS CallbackFunction (
    int CBmessageID,
    unsigned long CBtag,
    void *CBuserInfo,
    CALLBACK_TYPE CBtype,
    unsigned long *CBdataSizePtr,
    void **CBdataBufferPtr,
    int CBisFirst,
    int *CBisLastPtr
)

MC_STATUS pCallbackFunction (
    int CBmessageID,
    char *CBprivateCode,
    unsigned short CBgroup,
    unsigned char CBelementByte,
    void *CBuserInfo,

```



---

```

    CALLBACK_TYPE Cbtype,
    unsigned long *CBdataSizePtr,
    void **CBdataBufferPtr,
    int CBisFirst,
    int *CBisLastPtr
)

```

*CBmessageID* Merge DICOM Toolkit sets this to the identifier assigned to the message, item or file object by the **MC\_Open\_Message** function.

*CBtag* Merge DICOM Toolkit sets this to the DICOM tag which identifies the attribute.

*CBprivateCode* The code string which dictates which block in the private *CBgroup* "owns" the attribute.

*Cbgroup* The number identifying the private group containing the private attribute. It must be an odd number.

*CBelementByte* The number identifying the private attribute within the private *CBgroup* for this *CBprivateCode*.

*CBuserInfo* Merge DICOM Toolkit sets this to the address of data which is being passed from the **MC\_Register\_Callback\_Function** function. This may be NULL.

*CBtype* When the *CallbackFunction* is called, this is set to one of the following enumerated CALLBACK\_TYPE codes as defined in "mergecom.h":

```

REQUEST_FOR_DATA
REQUEST_FOR_DATA_LENGTH
PROVIDING_DATA
PROVIDING_DATA_LENGTH
PROVIDING_MEDIA_DATA_LENGTH
PROVIDING_OFFSET_TABLE
FREE_DATA
REQUEST_FOR_DATA_WITH_OFFSET

```

---

*CbdataSizePtr*

If *CBtype* is REQUEST\_FOR\_DATA, then you must set *\*CbdataSizePtr* to the number of bytes of data you are providing at *\*CBdataBufferPtr*. This must be an even number and its value must be no larger than INT\_MAX.

If *CBtype* is REQUEST\_FOR\_DATA\_WITH\_OFFSET, then *\*CbdataSizePtr* is the pointer to long which contains the offset of required data in the input seekable stream. The stream offset has to be used only when *CBisFirst* to TRUE (not zero), i.e. when you are to provide the first block of data. After the data reading *\*CbdataSizePtr* needs to be set to the number of bytes of provided data at *\*CBdataBufferPtr*. This must be an even number and its value must be no larger than INT\_MAX.

If *CBtype* is PROVIDING\_DATA, then Merge DICOM Toolkit has set *\*CbdataSizePtr* to the number of bytes of data it is providing at *\*CBdataBufferPtr*.

If *CBtype* is REQUEST\_FOR\_DATA\_LENGTH then you must set *\*CbdataSizePtr* to the total size (in bytes) of the attribute's value. This must be an even number.

If *CBtype* is PROVIDING\_DATA\_LENGTH then Merge DICOM Toolkit has set *\*CbdataSizePtr* to the total size (in bytes) of the attribute's value. Merge DICOM Toolkit will call the function with *CBtype* of PROVIDING\_DATA\_LENGTH before it calls the function with *CBtype* of PROVIDING\_DATA.

If *CBtype* is PROVIDING\_MEDIA\_DATA\_LENGTH then Merge DICOM Toolkit has set *\*CbdataSizePtr* to the total size (in bytes) of the attribute's value.

If *CBtype* is PROVIDING\_OFFSET\_TABLE then Merge DICOM Toolkit has set *\*CbdataSizePtr* to the number of bytes of data it is providing at *\*CbdataBufferPtr*.

If *CBtype* is FREE\_DATA then Merge DICOM Toolkit has set *CbdataSizePtr* to NULL.

---

<i>CBdataBufferPtr</i>	<p>If <i>CBtype</i> is REQUEST_FOR_DATA, REQUEST_FOR_DATA_WITH_OFFSET or PROVIDING_DATA this points at the address of the buffer containing a portion of the attribute's value. The value for this field must be even because of alignment problems on some platforms.</p> <p>If <i>CBtype</i> is REQUEST_FOR_DATA_LENGTH or <i>CBtype</i> is PROVIDING_DATA_LENGTH this parameter is not used.</p> <p>If <i>CBtype</i> is PROVIDING_MEDIA_DATA_LENGTH, <i>*CBdataBufferPtr</i> is a pointer to long that contains the offset of the attribute's value from the beginning of the DICOM file.</p> <p>If <i>CBtype</i> is FREE_DATA then Merge DICOM Toolkit has set <i>CBdataBufferPtr</i> to NULL.</p>
<i>CBisFirst</i>	<p>If <i>CBtype</i> is REQUEST_FOR_DATA, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is requesting data for this attribute's value (i.e. when you are to provide the first block of data).</p> <p>If <i>CBtype</i> is PROVIDING_DATA, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is providing data for this attribute's value (i.e. when it is providing the first block of data).</p> <p>If <i>CBtype</i> is PROVIDING_OFFSET_TABLE, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is providing data for the basic offset table.</p> <p>If <i>CBtype</i> is REQUEST_FOR_DATA_LENGTH, <i>CBtype</i> is PROVIDING_DATA_LENGTH, or <i>CBtype</i> is PROVIDING_MEDIA_DATA_LENGTH this parameter is not used.</p>
<i>CBisLastPtr</i>	<p>If <i>CBtype</i> is REQUEST_FOR_DATA or REQUEST_FOR_DATA_WITH_OFFSET, then you must set <i>*CBisLastPtr</i> to TRUE (not zero) the last time you are providing data for this attribute's value (i.e. when you are providing the last block of data).</p> <p>If <i>CBtype</i> is PROVIDING_DATA, then Merge DICOM Toolkit has set <i>*CBisLastPtr</i> to TRUE (not zero) because this is the last time it will be providing data for this attribute's value (i.e. when it is providing the last block of data).</p>

---

If *CBtype* is REQUEST\_FOR\_DATA\_LENGTH, *CBtype* is PROVIDING\_DATA\_LENGTH or *CBtype* is PROVIDING\_MEDIA\_DATA\_LENGTH this parameter is not used.

## Remarks

**MC\_Register\_Callback\_Function** registers *CallbackFunction* to provide or retrieve an attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file. The callback will also be called if the user calls **MC\_Get\_Value\_To\_Function** or **MC\_Set\_Value\_From\_Function** although this should not happen because the user already is storing the OB, OW, or OF data. **MC\_Register\_Callback\_Function** may only be used for attributes with a value representation of OB, OW, or OF.

**MC\_Register\_pCallback\_Function** registers *pCallbackFunction* to provide or retrieve a private attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file. The callback will also be called if the user calls **MC\_Get\_pValue\_To\_Function** or **MC\_Set\_pValue\_From\_Function** although this should not happen because the user already is storing the OB, OW, or OF data. **MC\_Register\_Callback\_Function** may only be used for attributes with a value representation of OB, OW, or OF. Subsequent descriptions in this section are applicable for both standard and private registered callback functions.

**NOTE:** If a value has already been set for *Tag*, *CallbackFunction* will not be called to set or get its value.

**NOTE:** The **CALLBACK\_MIN\_DATA\_SIZE** configuration value specifies the minimum sized value for which a callback function is used. This configuration option can be used so that only messages or files with very large attribute values use a callback function.

**NOTE:** Some message definitions contain OB, OW, or OF data but a value does not have to be set for these attributes (such as C-FIND-RQ and C-FIND-RSP messages). To have the registered callback function ignored, the attribute should be deleted from the message with the **MC\_Delete\_Attribute** function.

If a callback function was already registered, *CallbackFunction* replaces the function previously registered. A callback function may be "de-registered" by calling **MC\_Release\_Callback\_Function** for the same attribute.

The **MC\_Register\_Callback\_Function** caller may provide the *CallbackFunction* with a pointer to agreed upon data in its *UserInfo* parameter. This is optional and *UserInfo* may be NULL.

### Network Communications:

When the Merge DICOM Toolkit communications software receives a message on a DICOM association, it uses **MC\_Open\_Message** to acquire a message compatible with the message being

received. It then populates the message with the values it receives over the association. When it receives attributes of type OB, OW, or OF (or any other large values) the message library stores the values in a configurable location (normally in temporary files). Then, the receiving application could use any of the “Get” functions (including **MC\_Get\_Value\_To\_Function**) to retrieve attribute values from the message object.

Some applications may wish to bypass the storing of these large values in the message object. To do so, the **MC\_Register\_Callback\_Function** is used to register a function which will be called as the attribute’s value arrives on the association; blocks of the value are then passed to this “*CallbackFunction*” instead of storing the value in the message.

Similarly, a client application may use `MC_Register_Callback_Function` to register a callback function to provide Merge DICOM Toolkit with an attribute’s value as Merge DICOM Toolkit needs the value for transmission on the network. “*CallbackFunction*” will be called when *Tag* is encountered in any message being transferred between this *ApplicationID* and a remote application.

#### Media Applications:

When the Merge DICOM Toolkit media software reads a file with **MC\_Open\_File**, it populates the file object with the values it receives from media. When it receives attributes of type OB, OW, or OF (or any other large values) the file library stores the values in a configurable location (normally in temporary files). Then, the reading application could use any of the “Get” functions (including **MC\_Get\_Value\_To\_Function**) to retrieve attribute values from the file object.

Some applications may wish to bypass the storing of these large values in the file object. To do so, the **MC\_Register\_Callback\_Function** is used to register a function which will be called as the attribute’s value is read from media. The user has two options when the attribute’s value is read from media. If the file is being read with the function **MC\_Open\_File** or **MC\_Open\_File\_Upto\_Tag** it behaves in the same manner as with associations. The OB, OW, or OF data is passed to *CallbackFunction* instead of storing it in the file object. However, when **MC\_Open\_File\_Bypass\_OBOW** or **MC\_Open\_File\_Upto\_Tag\_Bypass\_Value** are used, the OB, OW, or OF data is left on media. The location and length of the data within the file is passed to *CallbackFunction*. The actual data is not passed. Whenever *Tag* is encountered in any file being read within *ApplicationID*, *CallbackFunction* will be called.

In some cases, *CallbackFunction* must also supply Merge DICOM Toolkit with the OB, OW, or OF data. If the file object is converted to a message object with **MC\_File\_To\_Message** and sent over the network, Merge DICOM Toolkit will request the attribute’s value from *CallbackFunction* when it needs the value for transmission. Similarly, if the file object is re-written to media, *CallbackFunction* will also be requested for the attribute’s value.

#### The *CallbackFunction*:

Merge DICOM Toolkit passes the *CallbackFunction* both *CBmessageID* and *CBtag* to identify which attribute is involved. **MC\_Get\_Message\_Service** may be called to identify which service and command this *CBmessageID* relates to. The *CBuserInfo* parameter is optional data from the **MC\_Register\_Callback\_Function** caller.

*CallbackFunction* must return a status of **MC\_NORMAL\_COMPLETION** if it could accommodate the callback request, or **MC\_CANNOT\_COMPLY**, if not. These status codes are defined in “mcstatus.h.”

---

CBtype is set to `REQUEST_FOR_DATA_LENGTH` if Merge DICOM Toolkit is requesting the size (in bytes) of the attribute's value. In this case *CallbackFunction* must set *\*CBdataSizePtr* to the attribute's value size. Merge DICOM Toolkit will call the *CallbackFunction* with *CBtype* set to `REQUEST_FOR_DATA_LENGTH` before it begins calling *CallbackFunction* with *CBtype* set to `REQUEST_FOR_DATA`.

CBtype is set to `PROVIDING_DATA_LENGTH` if Merge DICOM Toolkit is providing *CallbackFunction* with the total size of the attribute's value. The value size (in bytes) is placed at *\*CBdataSizePtr*. Merge DICOM Toolkit will call the *CallbackFunction* with *CBtype* set to `PROVIDING_DATA_LENGTH` before it begins calling *CallbackFunction* with *CBtype* set to `PROVIDING_DATA`.

CBtype is set to `REQUEST_FOR_DATA` if Merge DICOM Toolkit is requesting data from the *CallbackFunction*. In this case *CallbackFunction* sets *\*CBdataBufferPtr* to the address of a block of the attribute's value, and *\*CBdataSizePtr* to the number of bytes at *\*CBdataBufferPtr*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this attribute's data *CBisFirst* will be TRUE (non-zero). If *CallbackFunction* is returning the last block of data to be provided for this attribute, it must set *\*CBisLastPtr* to TRUE (non-zero). Merge DICOM Toolkit will repeatedly call *CallbackFunction* until *\*CBisLastPtr* is set to TRUE or *CallbackFunction* returns with a status other than **MC\_NORMAL\_COMPLETION**.

CBtype is set to `PROVIDING_DATA` if Merge DICOM Toolkit is providing data to the *CallbackFunction*. In this case Merge DICOM Toolkit has set *\*CBdataBufferPtr* to the address of a block of the attribute's value, and *\*CBdataSizePtr* to the number of bytes at *\*CBdataBufferPtr*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this attribute's data *CBisFirst* will be TRUE (non-zero). If this is the last block of data to be provided for this attribute, Merge DICOM Toolkit has set *\*CBisLastPtr* to TRUE (non-zero). Merge DICOM Toolkit will repeatedly call *CallbackFunction* until all of the value has been provided. At that time, it sets *\*CBisLastPtr* to TRUE.

CBtype is set to `PROVIDING_OFFSET_TABLE` if Merge DICOM Toolkit is providing basic offset table to the *CallbackFunction*. In this case Merge DICOM Toolkit has set *\*CBdataBufferPtr* to the address of the offset table, and *\*CBdataSizePtr* to the number of bytes at *\*CBdataBufferPtr*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this offset table's data *CBisFirst* will be TRUE (non-zero).

**NOTE:** *\*CBdataBufferPtr* may be NULL when *\*CBisLastPtr* is returned TRUE.

**NOTE:** The *CBtype* `PROVIDING_OFFSET_TABLE` is given to the callback function when the pixel data is encapsulated.

**NOTE:** *CallbackFunction* is not called with this value when a file is opened with **MC\_Open\_File\_Bypass\_OBOW** because the OB, OW, or OF data is left on media.

CBtype is set to `PROVIDING_MEDIA_DATA_LENGTH` if Merge DICOM Toolkit is reading a file from media by use of the **MC\_Open\_File\_Bypass\_OBOW** function. *CallbackFunction* is provided with the total size of the attribute's value and the byte offset from the beginning of the media file of the

attribute's value. The value size (in bytes) is placed at *\*CBdataSizePtr*. *\*\*CBdataBufferPtr* is a long int that contains the byte offset of the attribute's value from the beginning of the media file. Merge DICOM Toolkit will not call the *CallbackFunction* with *CBtype* set to PROVIDING\_DATA when it calls *CallbackFunction* with *CBtype* set to PROVIDING\_MEDIA\_DATA\_LENGTH.

*CBtype* is set to FREE\_DATA if the memory associated with the enclosing message, item, or file is being freed by Merge DICOM Toolkit, and the USE\_FREE\_DATA\_CALLBACK configuration option has been set to Yes. When this configuration option is set to No, registered callback functions will not be called with the FREE\_DATA type.

If *CallbackFunction* returns with a status other than MC\_NORMAL\_COMPLETION, Merge DICOM Toolkit will stop calling it.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>CallbackFunction</i> , <i>pCallbackFunction</i> or <i>PrivateCode</i> were NULL.
<b>MC_INVALID_APPLICATION_ID</b>	ApplicationID does not identify a valid application object.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

<b>MC_Set_Value_From_Function</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Set_pValue_From_Function</b>	<b>MC_Get_pValue_To_Function</b>
<b>MC_Open_File</b>	<b>MC_Get_Message_Service</b>
<b>MC_Open_File_Bypass_OBOW</b>	<b>MC_Open_File_Upto_Tag</b>
<b>MC_Open_File_Upto_Tag_Bypass_Value</b>	
<b>MC_Release_Callback_Function</b>	<b>MC_Register_Application</b>
<b>MC_Set_Message_Callbacks</b>	

## MC\_Register\_Compression\_Callbacks

Registers compression/decompression callback functions to compress or decompress a standard or private attribute's values. The callbacks are automatically used when **MC\_Set\_Encapsulated\_Value**, **MC\_Set\_Next\_Encapsulated\_Value**, **MC\_Get\_Encapsulated\_Value**, **MC\_Get\_Next\_Encapsulated\_Value**, **MC\_Get\_Frame\_To\_Function** and **MC\_Duplicate\_Message** are called.

## Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Register_Compression_Callbacks (
    int MsgFileItemID,
    MC_STATUS (*CompressionCallbackFunction) ()
```



---

```

    MC_STATUS (*DecompressionCallbackFunction) ()
)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*CompressionCallbackFunction* Name of a function which will be called repeatedly with blocks of uncompressed data, and will return compressed data.

*DecompressionCallbackFunction* Name of a function which will be called repeatedly with compressed blocks of data, and will return decompressed data

The functions must be prototyped as follows:

```

MC_STATUS YourDestMsg(De)CompressionCallback (
    int CBmsgID,
    void **CBcontext,
    unsigned long CBdataLength,
    void *CBdataValue,
    unsigned long *CBoutdataLength,
    void **CBoutdataValue,
    int CBisFirst,
    int CBisLast
    int CBrelease
)

```

*CBmsgID* The identifier assigned to this message object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message** functions.

*CBcontext* A data structure that contains user data and has to be preserved between compression calls. The first call to the callback function should initialize this structure.

*CBdataLength* The length of the incoming data pointed to by *CBdataValue*.

*CBdataValue* Pointer to incoming data.

*CBoutdataLength* The length of the outgoing data pointed to by *CBoutdataValue*.

*CBoutdataValue* Pointer to the outgoing data.

*CBisFirst* This is TRUE (not zero) the first time **YourDestMsg(De)CompressionCallback** is being called.

*CBisLast* This is TRUE (not zero) the last time **YourDestMsg(De)CompressionCallback** is being called.

*CBrelease* This is TRUE (not zero) if the callback should release all the context memory and return.



## Remarks

**MC\_Register\_Compression\_Callbacks** may only be used for attributes with a value representation of OB or OW. The built-in callbacks can be used, or the user may implement their own (Please see Users Manual, "Using Compression/Decompression Callback Functions")

The toolkit has a built in compressor/decompressor, represented by functions

**MC\_Standard\_Compressor** and **MC\_Standard\_Decompressor**, which are capable of handling the following types of pixel data:

Grayscale:

JPEG\_BASELINE (8 bit)

JPEG\_EXTENDED\_2\_4 (8,10,12 bit)

JPEG\_LOSSLESS\_HIER\_14 (any from 2 to 16 bit)

JPEG\_2000 (8,10,12,16 bit)

JPEG\_2000\_LOSSLESS\_ONLY (8,10,12,16 bit)

Other possible inputs/outputs:

8 bits/pixel, 3 samples/pixel RGB

8 bits/pixel, 3 samples/pixel YBR\_FULL\_422

If a callback function was already registered, the passed in callback replaces the function previously registered. A callback function may be "de-registered" by calling

**MC\_Register\_Compression\_Callbacks** with NULL as the parameter.

The **MC\_Register\_Callback\_Function** caller may provide the *CallbackFunction* with a pointer to agreed upon data in its *UserInfo* parameter. This is optional and *UserInfo* may be NULL.

**NOTE:** *\*CBdataBufferPtr* may be NULL when *\*CBisLastPtr* is returned TRUE.

**NOTE:** **FOR MC\_Standard\_(De)compressor:**

JPEG\_2000/JPEG\_2000\_LOSSLESS\_ONLY will cause an irreversible, respective reversible color transformation when compressing RGB data. The Photometric Interpretation MUST be changed from RGB to:

1. YBR\_ICT if JPEG\_2000 is used with  
COMPRESSION\_WHEN\_J2K\_USE\_LOSSY = Yes (lossy color transform for lossy compression)
2. YBR\_RCT if JPEG\_2000\_LOSSLESS\_ONLY, or JPEG\_2000 with  
COMPRESSION\_WHEN\_J2K\_USE\_LOSSY = No (lossless color transform for lossless compression).

Similarly, on the decompression end, the Photometric Interpretation should be changed back to RGB, but the Lossy Image Compression attribute should indicate if it had been compressed lossy.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	MsgFileItemID's transfer syntax is not one of the encapsulated transfer syntaxes.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

**MC\_Set\_Encapsulated\_Value\_From\_Function**  
**MC\_Set\_Next\_Encapsulated\_Value\_From\_Function**  
**MC\_Get\_Encapsulated\_Value\_To\_Function**  
**MC\_Get\_Next\_Encapsulated\_Value\_To\_Function**  
**MC\_Get\_Frame\_To\_Function**  
**MC\_Get\_Offset\_Table\_To\_Function**  
**MC\_Duplicate\_Message**

## MC\_Register\_Enhanced\_MemoryLog\_Function

Registers a callback function that will be notified as each log message is written

### Synopsis

```
#include "mc3msg.h"
```

```
void MC_Register_Enhanced_MemoryLog_Function (
    void (*MemLogFunction) ()
)
```

*MemLogFunction* The name of a function that will be called each time Merge DICOM Toolkit emits a log message.

*MemLogFunction* must be prototyped as follows:

```
void (*MemLogFunction) (LogInfo *logInfo),
```

*logInfo* A structure containing information about the message that is being logged.

The **LogInfo** structure is defined as follows:

```
typedef struct LogInfo_struct
{
    MsgLogType typeCode;
    LogTime timeValues;
    char *type;
    char *prefix;
```

---

<b>char</b>	<i>*processID;</i>
<b>char</b>	<i>*timeStamp;</i>
<b>char</b>	<i>*function;</i>
<b>char</b>	<i>*message;</i>
<b>} LogInfo;</b>	
<i>typeCode</i>	The type of message being logged. It will be one of the following constants defined by the <b>MsgLogType</b> enumeration: MC_ERROR_MESSAGE MC_WARNING_MESSAGE MC_INFO_MESSAGE MC_T1_MESSAGE MC_T2_MESSAGE MC_T3_MESSAGE MC_T4_MESSAGE MC_T5_MESSAGE MC_T6_MESSAGE MC_T7_MESSAGE MC_T8_MESSAGE MC_T9_MESSAGE
<i>timeValues</i>	A <b>LogTime</b> structure containing the exact time the message was being logged. (See structure definition below.)
<i>type</i>	The string representation of the message type. For example, “E”, “W”, “I”, “T1” etc.
<i>prefix</i>	An option prefix string. Normally this will be an empty string. The <b>MC_Set_Log_Prefix</b> function is used to provide a string that will be prefixed to all log messages.
<i>processID</i>	A string that represents the ID of the process that generated the message. In some operating environments this may be an empty string.
<i>timeStamp</i>	A string representation of the time the message was logged. This string may or may not be included in the actual log <i>message</i> .
<i>function</i>	A string representation of the Merge DICOM Toolkit function that generated the message. This may be an empty string.
<i>message</i>	The log message. This is the string normally logged to screen or to file.

The **LogTime** structure that is included in the returned *logInfo* is defined as follows:

```

typedef struct LogTime_struct {
    int hour;
    int min;
    int sec;
    int hun;
    int day;
    int mon;
    int year;
} LogTime;

hour          hours since midnight - [0,23]
min           minutes after the hour - [0,59]
sec           seconds after the minute - [0,59]
hun           hundredths of a sec after the sec [0,99]
day           day of the month - [1,31]
mon           months since January - [0,11]
year          years since 1900

```

### Remarks

This function registers an enhanced message log handler to process system log messages. (See **MC\_Register\_MemoryLog\_Function** for information about registering a standard log handler.)

Once registered, all system log messages are passed to the *MemLogFunction*. Information about the logged message is passed by the *logInfo* parameter. Refer to the above description of the **LogInfo** structure for detailed information about the data that is made available.

Only one enhanced message log handler may exist at any one time. If this function is called again, any existing enhanced log handler will no longer be called. The *MemLogFunction* parameter may be null to de-register the last enhanced handler.

Log messages can be directed to one or more of four destinations by settings in the merge.ini file, or by setting the destinations at runtime using the **MC\_Set\_Log\_Destination** function. Different types of log messages may be directed to the screen, to a file, to memory, or to the “bit bucket”. Messages directed to the “bit bucket” are those that have no destination set for them.

Note that all messages with a screen or file destination are also passed on to the *MemLogFunction*. If you wish to capture log messages without sending messages to a file or screen destination, set the memory destination in the merge.ini file.

### See Also

**MC\_Set\_Log\_Destination**                      **MC\_Set\_Log\_Prefix**  
**MC\_Register\_MemoryLog\_Function**

## MC\_Register\_MemoryLog\_Function

Registers a callback function that will be notified as each log message is written

### Synopsis

```
#include "mc3msg.h"
```

---

```
void MC_Register_MemoryLog_Function (
    void (*MemLogFunction) ()
)
```

*MemLogFunction* The name of a function that will be called each time Merge DICOM Toolkit emits a log message.

*MemLogFunction* must be prototyped as follows:

```
void (*MemLogFunction) (
    MsgLogType MsgType,
    char *Msg
)
```

*MsgType* The type of message being logged. It will be one of the following constants defined by the **MsgLogType** enumeration:

```
MC_ERROR_MESSAGE
MC_WARNING_MESSAGE
MC_INFO_MESSAGE
MC_TRACE_MESSAGE
```

*Msg* The message string that is being logged

### Remarks

This function registers a standard message log handler to process system log messages. (See **MC\_Register\_Enhanced\_MemoryLog\_Function** for information about registering an enhanced log handler.)

Once registered, all system log messages are passed to the *MemLogFunction*. The type of message being logged is provided by the *MsgType* parameter and the message string itself is passed by the *Msg* parameter.

Only one standard message log handler may exist at any one time. If this function is called again, any existing standard log handler will no longer be called. The *MemLogFunction* parameter may be null to de-register the last standard handler.

Log messages can be directed to one or more of four destinations by settings in the merge.ini file, or by setting the destinations at runtime using the **MC\_Set\_Log\_Destination** function. Different types of log messages may be directed to the screen, to a file, to memory, or to the “bit bucket”. Messages directed to the “bit bucket” are those that have no destination set for them.

Note that all messages with a screen or file destination are also passed on to the *MemLogFunction*. If you wish to capture log messages without sending messages to a file or screen destination, set the memory destination in the merge.ini file.

### See Also

**MC\_Set\_Log\_Destination**  
**MC\_Register\_Enhanced\_MemoryLog\_Function**

## MC\_Register\_Network\_Capture\_Callbacks (deprecated)

Registers a set of callback functions that will be used to capture network data, overriding the default network capture handler.

**NOTE:** Use of this call is deprecated.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Register_Network_Capture_Callbacks (
    MC_NetworkCaptureInfo *AcallbackInfo
)
```

*AcallbackInfo* Pointer to an MC\_NetworkCaptureInfo structure that provides an optional application context, plus various callback functions. If NULL, the default Merge DICOM Toolkit handler functions will be used.

*AcallbackInfo* is a pointer to an MC\_NetworkCaptureInfo type prototyped as follows:

```
typedef struct MC_NetworkCaptureInfo_Struct {
    void *CAP_applicationContext;

    int (NOEXP_FUNC *CAP_initialization) (
        void *AppContext,
        long MaxFileSize,
        char *FileName,
        int NumFiles,
        int RewriteFiles
    );

    void (NOEXP_FUNC *CAP_shutdown) (
        void *AppContext
    );

    void *(NOEXP_FUNC *CAP_getConnectionContext) (
        void *AppContext,
        struct sockaddr *SourceIPAddr,
        struct sockaddr *DestIPAddr
    );

    void (NOEXP_FUNC *CAP_freeConnectionContext) (
        void *AppContext,
        void *ConnContext
    );

    int (NOEXP_FUNC *CAP_conectionOpened) (
        void *AppContext,
        void *ConnContext,
        struct sockaddr *SourceIPAddr,
        struct sockaddr *DestIPAddr
    );

    int (NOEXP_FUNC *CAP_conectionClosed) (
```

```

        void *AppContext,
        void *ConnContext,
        struct sockaddr *SourceIPAddr,
        struct sockaddr *DestIPAddr
    );

    int (NOEXP_FUNC *CAP_dataSent) (
        void *AppContext,
        void *ConnContext,
        struct sockaddr *SourceIPAddr,
        struct sockaddr *DestIPAddr,
        char *Data,
        long DataLength
    );
} MC_NetworkCaptureInfo;

```

The functions provided in the MC\_NetworkCaptureInfo structure will override the default network capture handler provided by Merge DICOM Toolkit. (Please refer to the *Merge DICOM Toolkit Users Manual* for more information about the default handler.)

**CAP\_applicationContext** - An optional pointer to application context data. Merge DICOM Toolkit passes this pointer when it calls the callback functions. It may be NULL.

**CAP\_initialization** - Merge DICOM Toolkit calls this function at startup time (if the NETWORK\_CAPTURE configuration parameter is Yes), whenever a network capture configuration value is changed at runtime, and whenever new capture functions are registered. Five configuration parameters may be set in the [TRANSPORT\_PARMS] section of the mergecom.pro file:

**NETWORK\_CAPTURE = Yes/No** - Determines whether or not Merge DICOM Toolkit should call the capture handler functions.

**CAPTURE\_FILE\_SIZE = n** - Sets the maximum size in kilobytes of capture files, with zero meaning unlimited size.

**CAPTURE\_FILE = <filename>** - Provides the base name to use for capture files.

**NUMBER\_OF\_CAP\_FILES = n** - Provides the maximum number of capture files to create.

**REWRITE\_CAPTURE\_FILES = Yes/No** - Determines whether capture files will be reused or not.

Each of the above values may also be set at runtime using the appropriate MC\_Set\_XXX\_Config\_Value function.

**CAP\_initialization** is called with these parameters:

<i>AppContext</i>	The application context provided by <b>CAP_applicationContext</b> .
<i>MaxFileSize</i>	the current value of the <b>CAPTURE_FILE_SIZE</b> configuration parameter
<i>FileName</i>	the current value of the <b>CAPTURE_FILE</b> configuration parameter
<i>NumFiles</i>	the current value of the <b>NUMBER_OF_CAP_FILES</b> configuration parameter

---

<i>RewriteFiles</i>	the current value of the <b>REWRITE_CAPTURE_FILES</b> configuration parameter
---------------------	---

**CAP\_shutdown** - Merge DICOM Toolkit calls this function when the library is released, or when NETWORK\_CAPTURE is turned off after it was on. The function is called with one parameter:

<i>AppContext</i>	The application context provided by CAP_applicationContext.
-------------------	---

**CAP\_getConnectionContext** - Merge DICOM Toolkit calls this function when it has opened a new association connection. The function is expected to return a pointer to a context area that will be used to process the connection's capture information. Merge DICOM Toolkit will pass this pointer (as the *ConnContext* parameter) to other callbacks (see below). Merge DICOM Toolkit provides the TCP/IP addresses used on the connection. The IP addresses are presented in network order (i.e. big endian).

<i>AppContext</i>	The application context provided by CAP_applicationContext.
<i>SourceIPAddr</i>	The first Internet Protocol address used on the connection.
<i>DestIPAddr</i>	The second Internet Protocol address used on the connection.

**CAP\_freeConnectionContext** - Merge DICOM Toolkit calls this function when it closes a network connection. Merge DICOM Toolkit will never use the *ConnContext* pointer again.

<i>AppContext</i>	The application context provided by CAP_applicationContext.
<i>ConnContext</i>	The connection context provided by the CAP_getConnectionContext callback.

**CAP\_conectionOpened** - Merge DICOM Toolkit calls this function when it has opened a new association connection after calling CAP\_getConnectionContext. The source and destination addresses are provided. The function is called with these parameters:

<i>AppContext</i>	The application context provided by CAP_applicationContext.
<i>ConnContext</i>	The connection context provided by the CAP_getConnectionContext callback.
<i>SourceIPAddr</i>	The Internet Protocol address of the node that opened the connection.
<i>DestIPAddr</i>	The Internet Protocol address of the node that accepted the connection.

**CAP\_conectionClosed** - Merge DICOM Toolkit calls this function

<i>AppContext</i>	The application context provided by CAP_applicationContext.
<i>ConnContext</i>	The connection context provided by the CAP_getConnectionContext callback.
<i>SourceIPAddr</i>	The Internet Protocol address of the node that opened the connection.
<i>DestIPAddr</i>	The Internet Protocol address of the node that accepted the connection.

**CAP\_dataSent** - Merge DICOM Toolkit calls this function



<i>AppContext</i>	The application context provided by <code>CAP_applicationContext</code> .
<i>ConnContext</i>	The connection context provided by the <code>CAP_getConnectionContext</code> callback.
<i>SourceIPAddr</i>	The Internet Protocol address of the node that sent the data.
<i>DestIPAddr</i>	The Internet Protocol address of the node that received the data.

### Remarks

Merge DICOM Toolkit provides a facility to capture raw data that is transmitted over a network connection. The data is captured in files that can be read by the MergeDPM utility to analyze the network activity. The network capture facility is controlled by the configuration parameters discussed in the above section.

In rare cases you may wish to replace the default Merge DICOM Toolkit network capture facility with one of your own. The **MC\_Register\_Network\_Capture\_Callbacks** function is used to register the functions that you will provide to capture network data, overriding the default handler functions.

Refer to the above description of the individual callback functions for details of the network capture interface.

Note that received network data is provided by Merge DICOM Toolkit after it has been optionally decrypted by any secure socket functions (see **MC\_Open\_Secure\_Association** and **MC\_Wait\_For\_Secure\_Association**). Likewise, the data is provided to the callbacks before it sends the data to secure socket functions for possible encryption.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “`mcstatus.h`”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the functions provided in the <code>MC_NetworkCaptureInfo</code> structure was NULL.

### See Also

**MC\_Open\_Secure\_Association**      **MC\_Wait\_For\_Secure\_Association**

## MC\_Reject\_Association MC\_Reject\_Association\_With\_Reason\_Codes

Reject a remote application's request for a DICOM association

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Reject_Association (
    int AssociationID,
    REJECT_REASON Reason
)
```

```

MC_STATUS MC_Reject_Association_With_Reason_Codes (
    int AssociationID,
    unsigned short ResultCode,
    unsigned short SourceCode,
    unsigned short ReasonCode
)

```

*AssociationID* The association object's identification number

*Reason* The reason the DICOM association is being rejected. Use one of the enumerated **REJECT\_REASON** types defined in "mergecom.h":

**PERMANENT\_NO\_REASON\_GIVEN,**  
**PERMANENT\_NO\_REASON\_GIVEN\_SERV\_USER** (same as PERMANENT\_NO\_REASON\_GIVEN),  
**PERMANENT\_NO\_REASON\_GIVEN\_SERV\_PROV\_ACSE,**  
**TRANSIENT\_NO\_REASON\_GIVEN,**  
**TRANSIENT\_NO\_REASON\_GIVEN\_SERV\_USER** (same as TRANSIENT\_NO\_REASON\_GIVEN),  
**TRANSIENT\_NO\_REASON\_GIVEN\_SERV\_PROV\_ACSE,**  
**PERMANENT\_APPLICATION\_CONTEXT\_NAME\_NOT\_SUPPORTED,**  
**PERMANENT\_CALLING\_AE\_TITLE\_NOT\_RECOGNIZED,**  
**PERMANENT\_CALLED\_AE\_TITLE\_NOT\_RECOGNIZED,**  
**PERMANENT\_ACSE\_PROTOCOL\_VERSION\_NOT\_SUPPORTED,** **TRANSIENT\_TEMPORARY\_CONGESTION,**  
**TRANSIENT\_LOCAL\_LIMIT\_EXCEEDED**

*ReasonCode* The reason field (byte 10 in A-ASSOCIATE-RJ PDU as per DICOM PS3.8, Section 9.3.4)

*ResultCode* The result field (byte 8 in A-ASSOCIATE-RJ PDU as per DICOM PS3.8, Section 9.3.4)

*SourceCode* The source field (byte 9 in A-ASSOCIATE-RJ PDU as per DICOM PS3.8, Section 9.3.4)

### Remarks

If a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function completes normally, one of two functions must be called. **MC\_Accept\_Association** informs the remote application that the association can proceed. Use **MC\_Reject\_Association** to reject the association request.

Upon successful return from the **MC\_Reject\_Association** call, no further calls may be made for the association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NO_REQUEST_PENDING</b>	There is no pending association request for this <i>AssociationID</i> .

---

**MC\_INVALID\_ASSOC\_ID**                      *AssociationID* is not a valid association object ID.

### See Also

**MC\_Wait\_For\_Association**                      **MC\_Wait\_For\_Secure\_Association**  
**MC\_Accept\_Association**

## MC\_Release\_Application

De-register an application.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Release_Application (
    int *ApplicationID
)
```

*ApplicationID*      Address of the application object's identification number

### Remarks

**MC\_Release\_Application** releases the system resources used by the application. If the application has one or more associations open, they are aborted. Applications should always close or abort associations before calling **MC\_Release\_Application**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	The <i>ApplicationID</i> parameter was NULL.
<b>MC_INVALID_APPLICATION_ID</b>	<i>*ApplicationID</i> is not a valid application ID.

### See Also

**MC\_Register\_Application**

## MC\_Release\_Callback\_Function MC\_Release\_pCallback\_Function

De-register a callback function for a given attribute.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Release_Callback_Function (
    int ApplicationID,
    unsigned long Tag
)
```

```
MC_STATUS MC_Release_pCallback_Function (
    int ApplicationID,
    char *PrivateCode,
```

```

    unsigned short Group,
    unsigned char ElementByte,
)

ApplicationID    The application object's identification number
Tag             The identifying tag of an attribute which had a callback
                function registered for it.
PrivateCode     The code string which dictates which block in the private
                Group "owns" the attribute.
Group           The number identifying the private group containing the
                private attribute. It must be an odd number.
ElementByte     The number identifying the private attribute within the
                private Group for this PrivateCode.

```

### Remarks

**MC\_Release\_Callback\_Function** releases the callback function which was registered for the attribute identified by *Tag*. The callback function will no longer be called when the attribute's value is being received or when the attribute's value is required.

**MC\_pRelease\_Callback\_Function** releases the callback function which was registered for the private attribute. The callback function will no longer be called when the private attribute's value is being received or when the private attribute's value is required.

The callback function will, however, still be used for messages that were opened before this function call was made.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> does not identify a valid Merge DICOM Toolkit application.
<b>MC_INVALID_TAG</b>	There was no callback function registered for <i>Tag</i> .

### See Also

**MC\_Register\_Callback\_Function**      **MC\_Register\_pCallback\_Function**

## MC\_Release\_Library\_Exception\_Handler

Disables the internal system exception handler and releases the user-defined exception handler.

### Synopsis

```

#include "mc3msg.h"

MC_STATUS MC_Release_Library_Exception_Handler (
    void
)

```

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

**See Also**

**MC\_Set\_Library\_Exception\_Handler**

**MC\_Release\_Parent\_Association (UNIX Only)**

Releases parent’s copy of an association object.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Release_Parent_Association (
    int AssociationID
)
```

*AssociationID* The ID of an association object returned by a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function.

**Remarks**

**MC\_Release\_Parent\_Association** is used by a parent process to free its copy of an association object after spawning a child process (and passing the association object to the child). This is often done in UNIX environments in which a server process loops, calling the **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** function. As each association request arrives, the process spawns a child process to handle the association, then uses this function to free its copy of the association object. IT IS VERY IMPORTANT that **MC\_Release\_Parent\_Association** be called in this situation to avoid memory leaks.

Note that this routine is only needed in the parent process when `fork()` is called to create a child process to handle the association. It is not required when a thread is created to handle the connection.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> does not identify a valid Merge DICOM Toolkit association.

**See Also****MC\_Wait\_For\_Association****MC\_Wait\_For\_Secure\_Association****MC\_Release\_Parent\_Connection (UNIX Only)**

Releases parent's copy of a socket for a connection.

**Synopsis**

```
#include "mergecom.h"
```

```
void MC_Release_Parent_Connection (
    MC_SOCKET Socket
)
```

*Socket*            A socket returned by a **MC\_Wait\_For\_Connection** or **MC\_Wait\_For\_Connection\_On\_Port** function.

**Remarks**

**MC\_Release\_Parent\_Connection** is used by a parent process to free its copy of a socket after spawning a child process (and passing the socket to the child). This is often done in UNIX environments in which a server process loops, calling the **MC\_Wait\_For\_Connection** or **MC\_Wait\_For\_Connection\_On\_Port** function. As each connection arrives, the process spawns a child process to handle the connection, then uses this function to free its copy of the connection. IT IS VERY IMPORTANT that **MC\_Release\_Parent\_Connection** be called in this situation to avoid memory leaks.

Note that this routine is only needed in the parent process when `fork()` is called to create a child process to handle the connection. It is not required when a thread is created to handle the connection.

**Return Value**

There is no return value.

**See Also****MC\_Wait\_For\_Connection****MC\_Wait\_For\_Connection\_On\_Port****MC\_Process\_Association\_Request****MC\_Process\_Secure\_Association\_Request****MC\_Report\_Memory**

Reports information on the memory used by the toolkit's internal memory management.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Report_Memory (
    MC_ul_size_t *bytesAllocated,
    MC_ul_size_t *bytesInUse
)
```

<i>bytesAllocated</i>	The number of bytes that the toolkit has allocated. This parameter is type <code>size_t</code> on 64-bit Windows and unsigned long on other platforms.
<i>bytesInUse</i>	The number of bytes of non-freeable memory. This parameter is type <code>size_t</code> on 64-bit Windows and unsigned long on other platforms.

### Remarks

This function steps through the toolkits internal memory structures to determine how much memory has been allocated, and how much of that is actually in use. This function is helpful in determining if a `MC_Cleanup_Memory` call should be made.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "`mcstatus.h`":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_NULL_POINTER_PARM</b>	One or both of the parameters were non-initialized pointers.

### See Also

**MC\_Cleanup\_Memory**

## MC\_Reset\_Filename

Resets the filename associated with a file object

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Reset_Filename (
    int FileID,
    char *NewFilename
)
```

<i>FileID</i>	The identifier assigned to this object by the <b>MC_Create_Empty_File</b> or <b>MC_Create_File</b> function.
<i>NewFilename</i>	A pointer to a string containing the filename to be associated with the new file object.

### Remarks

The **MC\_Reset\_Filename** function changes the filename associated with a file object.

The filename is passed to the user's callback function when the **MC\_Write\_File** function is called.

This function is useful when reusing file objects or saving a copy of a file.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>NewFilename</i> was NULL.

**See Also**

**MC\_Write\_File**                      **MC\_Empty\_File**

**MC\_Reset\_Message\_Transfer\_Syntax**

Resets the transfer syntax over which a message will be sent on the network.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Reset_Message_Transfer_Syntax (  
    int MessageID  
)
```

*MessageID*      The identifier assigned to this object by the **MC\_Read\_Message**, **MC\_Open\_Message** or **MC\_Open\_Empty\_Message** function.

**Remarks**

**MC\_Reset\_Message\_Transfer\_Syntax** resets the DICOM transfer syntax associated with a message. When a message is read off the network, **MC\_Read\_Message** stores the transfer syntax in which the message was received over the network, similarly to how **MC\_Set\_Message\_Transfer\_Syntax** can be used to set the transfer syntax for a message. If the same message is sent again over the network, it must be transferred with the transfer syntax that it was received in.

If the transfer syntax of the message is reset with **MC\_Reset\_Message\_Transfer\_Syntax**, Merge DICOM Toolkit will pick any uncompressed transfer syntax to send over the network.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.

**See Also**

**MC\_Send\_Request\_Message**              **MC\_Get\_Message\_Transfer\_Syntax**  
**MC\_Set\_Message\_Transfer\_Syntax**



## MC\_Send\_Request\_Message

Sends a request message to the remote application.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Send_Request_Message (
    int AssociationID,
    int MessageID
)
```

*AssociationID*    The association object's identification number

*MessageID*        A message object's identification number

### Remarks

**MC\_Send\_Request\_Message** sends a request message to the remote application. The message is identified by *MessageID* and must have been created using the **MC\_Open\_Message** function. The values of the message attributes must have been set with the "Set..." message functions and/or the **MC\_Stream\_To\_Message** function. The message is sent across an open DICOM association identified by *AssociationID*.

**NOTE:** If the message being sent was opened with **MC\_Open\_Empty\_Message** and the pixel data is being supplied to the message with a registered callback function, the pixel data attribute should be explicitly added to the message with the function **MC\_Add\_Standard\_Attribute** before **MC\_Send\_Request\_Message** is called.

If **MC\_Register\_Callback\_Function** was called to register a callback function for any attributes in the message, **MC\_Send\_Request\_Message** calls that function to retrieve the attribute values as it sends the message.

**NOTE:** Some DICOM services require that values for certain "command level" message attributes (i.e. group 0 attributes) be set. (Merge DICOM Toolkit automatically adds command level attributes to the message when **MC\_Open\_Message** is called. With the exceptions listed below, the caller must set any command level attribute values before sending the message. **MC\_Send\_Request\_Message** does, however, set the following attribute values for you - **if you have not set them**:

- The group length attribute (0000,0000) value is always set by Merge DICOM Toolkit.
- If the message command requires it, the Affected SOP Class UID attribute (0000,0002) value is set to the service's abstract syntax UID.
- The command attribute (0000,0100) value is always set by Merge DICOM Toolkit.

- The Message ID attribute (0000,0110) value is set to a unique number for this association.
- If the message command requires it, the Priority attribute (0000,0700) value is set “medium” priority (i.e. zero).
- The Data Set Type attribute (0000,0800) value is always set by Merge DICOM Toolkit.

If **MC\_Send\_Request\_Message** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
-------------------------------	--

### See Also

<b>MC_Register_Callback_Function</b>	<b>MC_Open_Message</b>
<b>MC_Read_Message</b>	<b>MC_Read_To_Stream</b>
<b>MC_Send_Response_Message</b>	<b>MC_Send_Response</b>
<b>MC_Send_Request_Message_For_Service</b>	
<b>MC_Send_Request_For_Service</b>	

## MC\_Send\_Request\_Message\_For\_Service

Sends a request message to the remote application.

### Synopsis

```
#include "mergecom.h"
    MC_STATUS MC_Send_Request_Message_For_Service (
        int AssociationID,
        int MessageID,
        char *AServiceName
    )
    AssociationID    The association object's identification number
    MessageID       A message object's identification number
    AserviceName    Name of the service negotiated to utilize for the presentation
                    context.
```

### Remarks

**MC\_Send\_Request\_Message\_For\_Service** sends a request message to the remote application. The presentation context used in the transfer is looked up based on the service specified in the call. This call is used to select the proper presentation context when the object is common to multiple services negotiated. An example is the FilmBox when both BASIC\_GRAYSCALE\_PRINT\_MANAGEMENT and BASIC\_COLOR\_PRINT\_MANAGEMENT are negotiated. The message is identified by *MessageID* and must have been created using the **MC\_Open\_Message** function. The values of the message attributes must have been set with the "Set..." message functions and/or the **MC\_Stream\_To\_Message** function. The message is sent across an open DICOM association identified by *AssociationID*.

**NOTE:** If the message being sent was opened with **MC\_Open\_Empty\_Message** and the pixel data is being supplied to the message with a registered callback function, the pixel data attribute should be explicitly added to the message with the function **MC\_Add\_Standard\_Attribute** before **MC\_Send\_Request\_Message\_For\_Service** is called.

If **MC\_Register\_Callback\_Function** was called to register a callback function for any attributes in the message, **MC\_Send\_Request\_Message\_For\_Service** calls that function to retrieve the attribute values as it sends the message.

**NOTE:** Some DICOM services require that values for certain "command level" message attributes (i.e. group 0 attributes) be set. (Merge DICOM Toolkit automatically adds command level attributes to the message when **MC\_Open\_Message** is called. With the exceptions listed below, the caller must set any command level attribute values before sending the message. **MC\_Send\_Request\_Message\_For\_Service** does, however, set the following attribute values for you - **if you have not set them:**

- The group length attribute (0000,0000) value is always set by Merge DICOM Toolkit.
- If the message command requires it, the Affected SOP Class UID attribute (0000,0002) value is set to the service's abstract syntax UID.
- The command attribute (0000,0100) value is always set by Merge DICOM Toolkit.
- The Message ID attribute (0000,0110) value is set to a unique number for this association.
- If the message command requires it, the Priority attribute (0000,0700) value is set "medium" priority (i.e. zero).
- The Data Set Type attribute (0000,0800) value is always set by Merge DICOM Toolkit.

If **MC\_Send\_Request\_Message\_For\_Service** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
-------------------------------	--

**See Also**

<b>MC_Register_Callback_Function</b>	<b>MC_Open_Message</b>
<b>MC_Send_Request_Message</b>	<b>MC_Send_Request</b>
<b>MC_Send_Response_Message</b>	<b>MC_Send_Response</b>
<b>MC_Read_Message</b>	<b>MC_Read_To_Stream</b>
<b>MC_Get_Meta_ServiceName</b>	

**MC\_Send\_Request**

Sends a request message to the remote application directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Send_Request (
    int AssociationID,
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>Filename</i>	This parameter is unused (legacy). It may be anything, including NULL.
<i>UserInfo</i>	Address of user data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.
<i>CallbackFunction</i>	Name of a function which will be called repeatedly to provide blocks of request data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
    unsigned long CBtag,
    void* CBUserInfo,
    CALLBACK_TYPE CBtype,
    unsigned long* CBdataSizePtr,
    void** CBdataBufferPtr,
    int CBisFirst,
    int* CBisLastPtr
)
```

where:

<i>CBAssociationID</i>	The association object's identification number
<i>CBtag</i>	Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC\_Register\_Callback\_Function* section.

## Remarks

**MC\_Send\_Request** sends a request to the remote application using user's *CallbackFunction* as the message data provider. The request message might be associated with DICOM file identified by *Filename* parameter.

The using of *CallbackFunction* mechanism facilitates the sending of large messages, decreases the application memory footprint and in many cases increases the overall performance. The data blocks of the request message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*.

**NOTE:** Some DICOM services require that values for certain “command level” message attributes (i.e. group 0 attributes) be present. Merge DICOM Toolkit automatically adds command level attributes to the sent message when **MC\_Send\_Request** is called (see details in **MC\_Send\_Request\_Message** section).

If **MC\_Send\_Request** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

**MC\_ASSOCIATION\_ABORTED** The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

**MC\_Register\_Callback\_Function**      **MC\_Open\_Message**  
**MC\_Read\_Message**                    **MC\_Read\_To\_Stream**  
**MC\_Send\_Response\_Message**        **MC\_Send\_Response**  
**MC\_Send\_Request\_Message\_For\_Service**  
**MC\_Send\_Request\_For\_Service**

**MC\_Send\_Request\_For\_Service**

Sends a request message to the remote application directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Send_Request_For_Service (
    int AssociationID,
    char *AServiceName
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>AServiceName</i>	Name of the service negotiated to utilize for the presentation context.
<i>Filename</i>	This parameter is unused (legacy). It may be anything, including NULL.
<i>UserInfo</i>	Address of user data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.
<i>CallbackFunction</i>	Name of a function which will be called repeatedly to provide blocks of request data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
    unsigned long CBtag,
    void* CUserInfo,
    CALLBACK_TYPE CBtype,
    unsigned long* CBdataSizePtr,
    void** CBdataBufferPtr,
    int CBisFirst,
    int* CBisLastPtr
)
```

where:

<i>CBAssociationID</i>	The association object's identification number
<i>CBtag</i>	Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC\_Register\_Callback\_Function* section.

### Remarks

**MC\_Send\_Request\_For\_Service** sends a request message to the remote application using user's *CallbackFunction* as the message data provider. The request message might be associated with DICOM file identified by *Filename* parameter.

The presentation context used in the transfer is looked up based on the service specified in the call. This call is used to select the proper presentation context when the object is common to multiple services negotiated. An example is the FilmBox when both BASIC\_GRAYSCALE\_PRINT\_MANAGEMENT and BASIC\_COLOR\_PRINT\_MANAGEMENT are negotiated.

The data blocks of the message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*

**NOTE:** Some DICOM services require that values for certain “command level” message attributes (i.e. group 0 attributes) be present. Merge DICOM Toolkit automatically adds command level attributes to the sent message when **MC\_Send\_Request\_For\_Service** is called (see details in **MC\_Send\_Request\_Message** section).

If **MC\_Send\_Request\_For\_Service** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.



**MC\_SYSTEM\_ERROR** An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

**MC\_ASSOCIATION\_ABORTED** The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Register_Callback_Function</b>	<b>MC_Open_Message</b>
<b>MC_Send_Request_Message</b>	<b>MC_Send_Request</b>
<b>MC_Send_Response_Message</b>	<b>MC_Send_Response</b>
<b>MC_Read_Message</b>	<b>MC_Read_To_Stream</b>
<b>MC_Get_Meta_ServiceName</b>	

## MC\_Send\_Response\_Message

Sends a response to a message received from the remote application.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Send_Response_Message (
    int AssociationID,
    RESP_STATUS ResponseStatus,
    int ResponseMessageID
)
```

<i>AssociationID</i>	The association object's identification number
<i>ResponseStatus</i>	This is the status code to be returned. It must be one of the enumerated <b>RESP_STATUS</b> codes defined in "mergecom.h".
<i>ResponseMessageID</i>	This is the ID of a message object containing the response message.

### Remarks

**MC\_Send\_Response\_Message** allows the caller to respond to a message received from the remote application. **MC\_Send\_Response\_Message** is called after receiving a request message using **MC\_Read\_Message** or **MC\_Read\_To\_Stream**.

*ResponseStatus* must be set to a valid response code for the service involved. Response codes for standard DICOM services are defined in the "mergecom.h" file.

*ResponseMessageID* must be set to an identifier returned by **MC\_Open\_Message**. Many DICOM services do not require a response of more than just a status. Others, however, (e.g. C\_FIND\_RSP) require the setting of several message attributes.

**NOTE:** Some DICOM services require that values for certain “command level” message attributes (i.e. group 0 attributes) be set. (Merge DICOM Toolkit automatically adds command level attributes to the message when **MC\_Open\_Message** is called. With the exceptions listed below, the caller must set any command level attribute values before sending the message. **MC\_Send\_Response\_Message** does, however, set the following attribute values for you - **if you have not set them**:

- The group length attribute (0000,0000) value is always set by Merge DICOM Toolkit.
- If the message command requires it, the Affected SOP Class UID attribute (0000,0002) value is set to the service’s abstract syntax UID.
- The command attribute (0000,0100) value is always set by Merge DICOM Toolkit.
- The Response Message ID attribute (0000,0120) value is set to the Message ID value of the last received Request message.
- The Data Set Type attribute (0000,0800) value is always set by Merge DICOM Toolkit.

If **MC\_Send\_Response\_Message** returns **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for that association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

---

The association is dropped if any of the following are returned:

**MC\_ASSOCIATION\_ABORTED**      The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Send\_Request\_Message**      **MC\_Read\_Message**

## MC\_Send\_Response

Sends a response to a message received from the remote application. The response is sent directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Send_Response (
    int AssociationID,
    RESP_STATUS ResponseStatus,
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

*AssociationID*      The association object's identification number

*ResponseStatus*      This is the status code to be returned. It must be one of the enumerated **RESP\_STATUS** codes defined in "mergecom.h".

*Filename*      This parameter is unused (legacy). It may be anything, including NULL.

*UserInfo*      Address of user data which will be passed on to *CallbackFunction* each time it is called. This may be NULL.

*CallbackFunction*      Name of a function which will be called repeatedly to provide blocks of the response message data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
    unsigned long CBtag,
    void *CBUserInfo,
    CALLBACK_TYPE CBtype,
    unsigned long *CBdataSizePtr,
    void **CBdataBufferPtr,
    int CBisFirst,
    int *CBisLastPtr
)
```

where:

<i>CBAssociationID</i>	The association object's identification number
<i>CBtag</i>	Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC\_Register\_Callback\_Function* section.

### Remarks

**MC\_Send\_Response** allows the caller to respond to a message received from the remote application using the callback mechanism. The response data should be provided in the form of a DICOM object. The data blocks of the response message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*

**MC\_Send\_Response** is called after receiving a request message using **MC\_Read\_Message** or **MC\_Read\_To\_Stream**.

*ResponseStatus* must be set to a valid response code for the service involved. Response codes for standard DICOM services are defined in the "mergecom.h" file.

Many DICOM services do not require a response of more than just a status. Others, however, (e.g. C\_FIND\_RSP) require the setting of several message attributes.

**NOTE:** See **MC\_Send\_Response\_Message** section for the details regarding the handling of the required message attributes for DICOM services.

If **MC\_Send\_Response** returns **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for that association.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

**MC\_ASSOCIATION\_ABORTED** The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Send\_Request\_Message**      **MC\_Send\_Request**  
**MC\_Read\_Message**            **MC\_Read\_To\_Stream**

## MC\_Set\_Bool\_Config\_Value

Used to set the value of a boolean toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Bool_Config_Value (
    BoolParm Aparm,
    int Avalue
)
```

*Aparm* An enumerated constant identifying the boolean configuration parameter to be (re)set. *Aparm* can have any of the following values:

```
ACCEPT_ANY_APPLICATION_TITLE
ACCEPT_ANY_CONTEXT_NAME
ACCEPT_ANY_HOSTNAME
ACCEPT_ANY_PRESENTATION_CONTEXT
ACCEPT_DIFFERENT_IC_UID
ACCEPT_DIFFERENT_VERSION
ACCEPT_MULTIPLE_PRES_CONTEXTS
ACCEPT_RELATED_GENERAL_SERVICES
ACCEPT_STORAGE_SERVICE_CONTEXTS
ALLOW_COMMA_IN_DS_FL_FD_STRINGS
ALLOW_EMPTY_PDV_LENGTH
ALLOW_INVALID_PRIVATE_ATTRIBUTES
ALLOW_INVALID_PRIVATE_CREATOR_CODES
ALLOW_LIBRARY_EXCEPTION_HANDLER
ALLOW_OUT_OF_RANGE_BITS_JPEG_LOSSLESS
ATT_00081190_USE_UT_VR
ATT_00287FE0_USE_UT_VR
ATT_0040E010_USE_UT_VR
ATT_0074100A_USE_ST_VR
AUTO_ECHO_SUPPORT
BLANK_FILL_LOG_FILE
CALCULATE_DEFINED_LENGTH_FOR_CB
COMPRESSION_ALLOW_FRAGS
COMPRESSION_J2K_LOSSY_USE_QUALITY
COMPRESSION_USE_HEADER_QUERY
COMPRESSION_WHEN_J2K_USE_LOSSY
CREATE_OFFSET_TABLE
DEFLATE_ALLOW_FLUSH
DICOMDIR_STREAM_STORAGE
```

---

DUPLICATE\_ENCAPSULATED\_ICON  
 ELIMINATE\_ITEM\_REFERENCES  
 EMPTY\_PRIVATE\_CREATOR\_CODES  
 EXPLICIT\_VR\_TO\_UN\_FOR\_LENGTH\_GT\_64K  
 EXPORT\_EMPTY\_PRIVATE\_CREATOR\_CODES  
 EXPORT\_GROUP\_LENGTHS\_TO\_MEDIA  
 EXPORT\_GROUP\_LENGTHS\_TO\_NETWORK  
 EXPORT\_PRIVATE\_ATTRIBUTES\_TO\_MEDIA  
 EXPORT\_PRIVATE\_ATTRIBUTES\_TO\_NETWORK  
 EXPORT\_UN\_VR\_TO\_MEDIA  
 EXPORT\_UN\_VR\_TO\_NETWORK  
 EXPORT\_UNDEFINED\_LENGTH\_SQ  
 EXPORT\_UNDEFINED\_LENGTH\_SQ\_IN\_DICOMDIR  
 FORCE\_OPEN\_EMPTY\_ITEM  
 HARD\_CLOSE\_TCP\_IP\_CONNECTION  
 INSURE\_EVEN\_UID\_LENGTH  
 LIST\_UN\_ATTRIBUTES  
 LOG\_FILE\_BACKUP  
 MSG\_FILE\_ITEM\_OBJ\_TRACE  
 NETWORK\_CAPTURE  
 PRIVATE\_SYNTAX\_1\_ENCAPSULATED  
 PRIVATE\_SYNTAX\_1\_EXPLICIT\_VR  
 PRIVATE\_SYNTAX\_1\_LITTLE\_ENDIAN  
 PRIVATE\_SYNTAX\_2\_ENCAPSULATED  
 PRIVATE\_SYNTAX\_2\_EXPLICIT\_VR  
 PRIVATE\_SYNTAX\_2\_LITTLE\_ENDIAN  
 REJECT\_INVALID\_VR  
 RELEASE\_SQ\_ITEMS  
 REMOVE\_PADDING\_CHARS  
 REMOVE\_SINGLE\_TRAILING\_SPACE  
 RETURN\_COMMA\_IN\_DS\_FL\_FD\_STRINGS  
 REWRITE\_CAPTURE\_FILES  
 SEND\_ECHO\_PRIORITY  
 SEND\_LENGTH\_TO\_END  
 SEND\_MSG\_ID\_RESPONSE  
 SEND\_RECOGNITION\_CODE  
 SEND\_RESPONSE\_PRIORITY  
 SEND\_SOP\_CLASS\_UID  
 SEND\_SOP\_INSTANCE\_UID  
 TCPIP\_DISABLE\_NAGLE  
 TOLERATE\_INVALID\_IN\_DEFAULT\_CHARSET  
 UPDATE\_GROUP\_0028\_ON\_DUPLICATE  
 USE\_FREE\_DATA\_CALLBACK

These names are the same as those given to the parameters in the toolkit configuration files.

*Avalue*

The boolean value to which Aparm is to be set.

**Remarks**

The Merge DICOM Library accesses several configuration files at startup. This call allows your application to (re)set boolean configurable parameters specified in these files at runtime. This call should be made immediately after calling **MC\_Library\_Initialization** to avoid using these parameters before they are set. Please see the detailed description of toolkit configuration elsewhere in this manual.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

**See Also**

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
<b>MC_Get_Long_Config_Value</b>	<b>MC_Set_Long_Config_Value</b>
<b>MC_Get_String_Config_Value</b>	<b>MC_Set_String_Config_Value</b>

**MC\_Set\_Encapsulated\_Value\_From\_Function**

Encapsulates a single frame and stores the encapsulated value into the message object for the given attribute. The value representation of the attribute must be OB or OW. If a compressor is registered, the data will be compressed in the message.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Encapsulated_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>UserInfo</i>	Address of user data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.

*YourSetFunction* Name of a function which will be called repeatedly for blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    int CBisFirst,
    void *CBUserInfo,
    int *CBdataSizePtr,
    void **CBdataBufferPtr,
    int *CBisLastPtr
)
```

*CBMsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*CBtag* DICOM tag which identifies the attribute.

*CBisFirst* This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourSetFunction* to request data blocks.

*CBUserInfo* Address of data which is being passed from the **MC\_Set\_Value\_From\_Function** function. This may be NULL.

*CBdataSizePtr* Set *\*CBdataSizePtr* to the number of bytes you are providing.

*CBdataBufferPtr* Set *\*CBdataBufferPtr* to the address of the data you are providing.

*CBisLastPtr* Set *\*CBisLastPtr* to TRUE (not zero) when you are returning with the last block of OBOW data.

## Remarks

The **MC\_Set\_Encapsulated\_Value\_From\_Function** function is used to encapsulate, and then set the value of an attribute which has a value representation of OB or OW. If a compressor is registered with **MC\_Register\_Compression\_Callbacks**, the data will be compressed using the registered compressor. Such attributes tend to have values of great length. To accommodate this, one uses the **MC\_Set\_Encapsulated\_Value\_From\_Function** function to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls repeatedly requesting blocks of the attribute's data value.

**MC\_Close\_Encapsulated\_Value** must be called when the user is through encapsulating data within this message. If more frames will be encapsulated, use

**MC\_Set\_Next\_Encapsulated\_Value\_From\_Function** until all frames have been encapsulated, followed by **MC\_Close\_Encapsulated\_Value**.



An optional *UserInfo* parameter may be used to pass information between the **MC\_Set\_Encapsulated\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### *YourSetFunction*

*YourSetFunction* must set *\*CBdataBufferPtr* to the address of a block of data which is a portion of the attribute's value. It also must set *\*CBdataSizePtr* to the number of bytes in the block.

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB or OW.
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was not an even number.
<b>MC_CALLBACK_PARM_ERROR</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was an odd number.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourSetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### **See Also**

**MC\_Set\_Next\_Encapsulated\_Value\_From\_Function**

**MC\_Close\_Encapsulated\_Value**

**MC\_Register\_Compression\_Callbacks**

## MC\_Set\_File\_Preamble

Sets the preamble for a file object

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Set_File_Preamble (
    int FileID,
    char *Preamble
)
```

*FileID* The identifier assigned to this object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*Preamble* A pointer to the 128 byte preamble to be associated with the file object *FileID*.

### Remarks

**MC\_Set\_File\_Preamble** changes the preamble associated with a file object. The function copies the 128 byte DICOM file preamble pointed to by *Preamble* into the file object *FileID*. This preamble is written to media when the **MC\_Write\_File** function is called.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_NULL_POINTER_PARM</b>	<i>Preamble</i> was NULL.

### See Also

**MC\_Get\_File\_Preamble**

## MC\_Set\_Int\_Config\_Value

Used to set the value of a integer toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Int_Config_Value (
    IntParm Aparam,
    int Avalue
)
```

*Aparam* An enumerated constant identifying the integer configuration parameter to be (re)set. *Aparam* can have any of the following values:

ARTIM\_TIMEOUT  
ASSOC\_REPLY\_TIMEOUT

---

```

COMPRESSION_CHROM_FACTOR
COMPRESSION_J2K_LOSSY_QUALITY
COMPRESSION_J2K_LOSSY_RATIO
COMPRESSION_LUM_FACTOR
CONNECT_TIMEOUT
DEFLATE_COMPRESSION_LEVEL
DESIRED_LAST_PDU_SIZE
FLATE_GROW_OUTPUT_BUF_SIZE
IGNORE_JPEG_BAD_SUFFIX
INACTIVITY_TIMEOUT
LARGE_DATA_SIZE
LIST_SQ_DEPTH_LIMIT
LIST_VALUE_LIMIT
LOG_FILE_LINE_LENGTH
LOG_FILE_SIZE
LOG_MEMORY_SIZE
MAX_PENDING_CONNECTIONS
NUM_HISTORICAL_LOG_FILES
NUMBER_OF_CAP_FILES
OBOW_BUFFER_SIZE
PEGASUS_NUMBER_OF_THREADS
RELEASE_TIMEOUT
TCPIP_KEEP_ALIVE_INTERVAL
TCPIP_KEEP_ALIVE_TIME
TCPIP_LISTEN_PORT
TCPIP_RECEIVE_BUFFER_SIZE
TCPIP_SEND_BUFFER_SIZE
WORK_BUFFER_SIZE
WRITE_TIMEOUT

```

These names are the same as those given to the parameters in the toolkit configuration files. A description of the options can be found in Appendix B.

*Avalue*            The integer value to which Aparam is to be set.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to (re)set integer configurable parameters specified in these files at runtime. This call should be made immediately after calling **MC\_Library\_Initialization** to avoid using these parameters before they are set. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_MUST_BE_POSITIVE</b>	Parameter value cannot be negative.

---

**MC\_LIBRARY\_NOT\_INITIALIZED**      The library has not been properly initialized.

### See Also

**MC\_Get\_Int\_Config\_Value**

**MC\_Get\_Log\_Destination**

**MC\_Get\_Long\_Config\_Value**

**MC\_Get\_String\_Config\_Value**

**MC\_Set\_Log\_Destination**

**MC\_Set\_Long\_Config\_Value**

**MC\_Set\_String\_Config\_Value**

## MC\_Set\_Library\_Exception\_Handler

Initializes the internal system exception handler and registers the user-defined exception handler which will be called if System exception or System signal are raised.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Library_Exception_Handler (
    MCLibraryExceptionHandler handler
)
```

*handler*              A user-defined exception handler which is called if System exception or System signal is raised

The handler must be prototyped as follows:

```
void UserExceptionHandler (
    int ExceptionId
)
```

### Remarks

This call allows you to initialize the internal exception handler and to register a user-defined exception handler callback, which will be called in case System exception or System signal are raised. This allows for the (limited) recovery of the user program by at least giving it a chance to cleanup and exit gracefully and avoid a straight crash.

### Note

To enable the system exception handlers, ALLOW\_LIBRARY\_EXCEPTION\_HANDLER configuration parameter should be set to 'Yes'.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

### See Also

**MC\_Release\_Library\_Exception\_Handler**

## MC\_Set\_Log\_Destination

Determines where log messages will be written.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Log_Destination (
    LogParm Aparm,
    int Avalue
)
```

<i>Aparm</i>	An enumerated constant identifying the class of logging that is to be redirected. <i>Aparm</i> can have any of the following values: ERROR_DESTINATIONS, WARNING_DESTINATIONS, INFO_DESTINATIONS, T1_DESTINATIONS, T2_DESTINATIONS, T3_DESTINATIONS, T4_DESTINATIONS, T5_DESTINATIONS, T6_DESTINATIONS, T7_DESTINATIONS, T8_DESTINATIONS, T9_DESTINATIONS
<i>Avalue</i>	A defined term identifying where the logging is to be directed. <i>Avalue</i> can have any of the following values: File_Destination, Memory_Destination, Screen_Destination, Bitbucket_Destination These values can also be OR'ed together to indicate multiple destinations.

### Remarks

This call allows you to redirect the logging of error, warning, and info messages at runtime. The [DEFAULT\_LIBRARY] section of the Merge DICOM Toolkit initialization file contains the setting used at startup. This call should be made immediately after calling **MC\_Library\_Initialization** to avoid using these parameters before they are set. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Get_Long_Config_Value</b> <b>MC_Set_Long_Config_Value</b>
	<b>MC_Get_String_Config_Value</b> <b>MC_Set_String_Config_Value</b>

## MC\_Set\_Log\_Prefix

Sets the string to be placed at the beginning of log statements.

### Synopsis

```
#include "mc3msg.h"
```

```
void MC_Set_Log_Prefix (
    char *Prefix
)
```

*Prefix*            A prefix to place in front of all logs

### Remarks

This call allows you to place a string in front of all log statements generated by the toolkit.

### Return Value

None

### See Also

<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
-------------------------------	-------------------------------

## MC\_Set\_Long\_Config\_Value

Sets the value of a long integer toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Long_Config_Value (
    LongParm Aparm,
    long int Avalue
)
```

*Aparm*            An enumerated constant identifying the long integer configuration parameter to be (re)set. *Aparm* can have only the following values:  
                   CAPTURE\_FILE\_SIZE,  
                   PDU\_MAXIMUM\_LENGTH,  
                   CALLBACK\_MIN\_DATA\_SIZE,  
                   PIXEL\_BUFFER\_SIZE

This name is the same as those given to the parameters in the toolkit configuration files.

*Avalue* The long integer value to which *Aparam* is to be set.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to (re)set long integer configurable parameters specified in these files at runtime. This call should be made immediately after calling **MC\_Library\_Initialization** to avoid using this parameter before it is set. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_MUST_BE_POSITIVE</b>	Parameter value cannot be negative.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Long_Config_Value</b>	<b>MC_Set_Long_Config_Value</b>
<b>MC_Get_String_Config_Value</b>	<b>MC_Set_String_Config_Value</b>
<b>MC_Get_Log_Destination</b>	

## MC\_Set\_MergeINI MC\_Set\_MergeINI\_Unicode

Set the path of the merge.ini file so that the MERGE\_INI environment variable is not used.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_MergeINI (
    char *Filename
)

MC_STATUS MC_Set_MergeINI_Unicode (
    void *Filename,
)
```

*Filename* An absolute or relative path containing the location of the merge.ini file. For **MC\_Set\_MergeINI\_Unicode**, it must be specified as a null terminated Unicode string: UTF-16 (wchar\_t) for Windows platforms and UTF-8 for non Windows.

## Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. The `MERGE_INI` environment variable is used to point to the main configuration file (`merge.ini`). **MC\_Set\_MergeINI** and **MC\_Set\_Merge\_INI\_Unicode** can be used to override the use of this environment variable. *Filename* contains an absolute or relative filename where the `merge.ini` file is located. This call should be made immediately before calling **MC\_Library\_Initialization**.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “`mcstatus.h`”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_ALREADY_INITIALIZED</b>	The library has already been initialized.

## See Also

<b>MC_Library_Initialization</b>	<b>MC_Library_Release</b>
<b>MC_Library_Reset</b>	

## MC\_Set\_Message\_Callbacks

Associates registered callback functions with a message or file

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Message_Callbacks (
    int ApplicationID,
    int MessageFileID,
)
```

*ApplicationID* The identifier assigned to this application by the **MC\_Register\_Application** function.

*MessageFileID* The identifier assigned to this object by the **MC\_Open\_Message** or **MC\_Create\_File** functions.

### Remarks

**MC\_Set\_Message\_Callbacks** associates the callback functions registered for an application with a message or file object. When this function is not used, the callback function is first associated with a message or file when it is transmitted or received on a DICOM association or read or written to a DICOM file.

When **MC\_Set\_Message\_Callbacks** is used, subsequent calls to **MC\_Get\_Value\_To\_Function** or **MC\_Set\_Value\_From\_Function** will also call the callback function to store an attribute's values.



See **MC\_Register\_Callback\_Function** for further details on using callback functions to manage OB, OW, or OF data.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> does not identify a valid application object.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageFileID</i> is not a valid message or file object ID.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Set_Value_From_Function</b>	<b>MC_Get_Value_To_Function</b>
<b>MC_Register_Callback_Function</b>	<b>MC_Release_Callback_Function</b>

## MC\_Set\_Message\_Transfer\_Syntax

Sets the transfer syntax over which a message will be sent through the network.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Set_Message_Transfer_Syntax (
    int MessageID,
    TRANSFER_SYNTAX TransferSyntax
)
```

<i>MessageID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> or <b>MC_Open_Empty_Message</b> function.
<i>TransferSyntax</i>	The name of the transfer syntax to associate with the message. Use one of the enumerated TRANSFER_SYNTAX types defined in “ <b>mc3msg.h</b> ” (see <b>MC_Get_Transfer_Syntax_From_Enum</b> ).

### Remarks

**MC\_Set\_Message\_Transfer\_Syntax** associates a DICOM transfer syntax with a message. This function is only of use for SCU applications that negotiate more than one transfer syntax for a service. This call is used in conjunction with **MC\_Send\_Request\_Message** to specify the transfer syntax to use when sending the message.

Reference the *Merge DICOM Toolkit User's Manual* for a discussion on negotiating multiple transfer syntaxes for a service.

**MC\_Set\_Message\_Transfer\_Syntax** can also be used to set the transfer syntax of a DICOM file object. When used with a DICOM file object, the tag (0002,0010) Transfer Syntax UID will be set with the proper UID for the transfer syntax specified.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID.

## See Also

**MC\_Send\_Request\_Message**      **MC\_Get\_Message\_Transfer\_Syntax**  
**MC\_Reset\_Message\_Transfer\_Syntax**

## MC\_Set\_Negotiation\_Info

Registers extended negotiation information.

**MC\_Set\_Negotiation\_Info\_For\_Association** and setting of negotiation information through service lists should be used in place of this call and **MC\_Clear\_Negotiation\_Info**.

**NOTE:** Use of this call is deprecated.

## Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Set_Negotiation_Info (
    int ApplicationID,
    char *ServiceName,
    void *ExtInfoBuffer,
    int ExtInfoLength
)
```

*ApplicationID*      The identification number for the registered application.

*ServiceName*      The name given to a valid DICOM service.

*ExtInfoBuffer*      A pointer to the buffer containing extended negotiation information.

*ExtInfoLength*      The number of bytes contained in the *ExtInfoBuffer*. This must be an even number.

## Remarks

The DICOM standard allows application entities to exchange “extended negotiation information” when establishing an association. The contents of the negotiation information must be known to both the association requestor application and the association acceptor application. Such extended negotiation is not often used for DICOM services, but some services may require it.

**MC\_Set\_Negotiation\_Info** allows the caller to supply Merge DICOM Toolkit with extended negotiation information which it will use when establishing associations.

When a **MC\_Open\_Association** or **MC\_Open\_Secure\_Association** call is made, Merge DICOM Toolkit sends any registered extended negotiation information to the association acceptor. The

acceptor normally returns an updated version of the negotiation information which can be accessed using the **MC\_Get\_Negotiation\_Info** call.

When a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call is made, Merge DICOM Toolkit stores any received extended negotiation information. This information may be accessed using the **MC\_Get\_Negotiation\_Info** call. **MC\_Set\_Negotiation\_Info** may be used to “update” the extended negotiation information before calling **MC\_Accept\_Association** to accept the association. Merge DICOM Toolkit will return any registered negotiation information to the remote application.

Use **MC\_Clear\_Negotiation\_Info** to remove extended information registered for a service.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_APPLICATION_ID</b>	<i>ApplicationID</i> is not a valid application identifier.
<b>MC_NULL_POINTER_PARM</b>	Either <i>ServiceName</i> or <i>ExtInfoBuffer</i> was NULL.
<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Get\_Negotiation\_Info**                      **MC\_Clear\_Negotiation\_Info**  
**MC\_Set\_Negotiation\_Info\_For\_Association**

## MC\_Set\_Negotiation\_Info\_For\_Association

Sets extended negotiation information before acceptance of an association.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC_Set_Negotiation_Info_For_Association (
    int AssociationID,
    char *ServiceName,
    void *ExtInfoBuffer,
    int ExtInfoLength
)
```

*AssociationID*    An association identification number returned by an  
**MC\_Wait\_For\_Association** or  
**MC\_Wait\_For\_Secure\_Association** call.

---

<i>ServiceName</i>	The name given to a valid DICOM service.
<i>ExtInfoBuffer</i>	A pointer to the buffer containing extended negotiation information.
<i>ExtInfoLength</i>	The number of bytes contained in the <i>ExtInfoBuffer</i> .

### Remarks

The DICOM standard allows application entities to exchange “extended negotiation information” when establishing an association. The contents of the negotiation information must be known to both the association requestor application and the association acceptor application. Such extended negotiation is not often used for DICOM services, but some services may require it.

**MC\_Set\_Negotiation\_Info\_For\_Association** allows the caller to supply Merge DICOM Toolkit with extended negotiation information which it will use when establishing associations. When a **MC\_Wait\_For\_Association** or **MC\_Wait\_For\_Secure\_Association** call is made, Merge DICOM Toolkit stores any received extended negotiation information. This information may be accessed using the **MC\_Get\_Negotiation\_Info** call. **MC\_Set\_Negotiation\_Info\_For\_Association** may then be used to set extended negotiation information in the association response. After setting the extended negotiation information to return, **MC\_Accept\_Association** would be called to accept the association. If **MC\_Set\_Negotiation\_Info\_For\_Association** is not used, no extended negotiation information will be returned by **MC\_Accept\_Association** in the response.

Note that if no negotiation information was included in the association request, **MC\_Set\_Negotiation\_Info\_For\_Association** will not set the negotiation information in the association response.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association identifier.
<b>MC_NO_REQUEST_PENDING</b>	<i>AssociationID</i> references to an association that has already been accepted.
<b>MC_NULL_POINTER_PARM</b>	Either <i>ServiceName</i> or <i>ExtInfoBuffer</i> was NULL.
<b>MC_UNKNOWN_SERVICE</b>	<i>ServiceName</i> was not registered in the Merge DICOM Toolkit configuration files or was not negotiated for the association.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Get_Negotiation_Info</b>	<b>MC_Clear_Negotiation_Info</b>
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## MC\_Set\_Next\_Encapsulated\_Value\_From\_Function

Encapsulates the next frame and stores the encapsulated value into the message object for the given attribute. The value representation of the attribute must be OB or OW. If a compressor is registered, the data will be compressed in the message.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Next_Encapsulated_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>UserInfo</i>	Address of user data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.
<i>YourSetFunction</i>	Name of a function which will be called repeatedly for blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    int CBisFirst,
    void *CBUserInfo,
    int *CBdataSizePtr,
    void **CBdataBufferPtr,
    int *CBisLastPtr
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourSetFunction</i> to request data blocks.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_Set_Value_From_Function</b> function. This may be NULL.
<i>CBdataSizePtr</i>	Set <i>*CBdataSizePtr</i> to the number of bytes you are providing.

---

<i>CBdataBufferPtr</i>	Set <i>*CBdataBufferPtr</i> to the address of the data you are providing.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (not zero) when you are returning with the last block of OBOW data.

### Remarks

The **MC\_Set\_Next\_Encapsulated\_Value\_From\_Function** function is used to encapsulate the next frame, and then set the value of an attribute which has a value representation of OB or OW. If a compressor is registered with **MC\_Register\_Compression\_Callbacks**, the data will be compressed using the registered compressor. Such attributes tend to have values of great length. To accommodate this, one uses the **MC\_Set\_Next\_Encapsulated\_Value\_From\_Function** function to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls repeatedly requesting blocks of the attribute's data value.

**MC\_Close\_Encapsulated\_Value** must be called when the user is through encapsulating data within this message. If more frames will be encapsulated, use **MC\_Set\_Next\_Encapsulated\_Value\_From\_Function** until all frames have been encapsulated, followed by **MC\_Close\_Encapsulated\_Value**.

An optional *UserInfo* parameter may be used to pass information between the **MC\_Set\_Next\_Encapsulated\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CBuserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourSetFunction

*YourSetFunction* must set *\*CBdataBufferPtr* to the address of a block of data which is a portion of the attribute's value. It also must set *\*CBdataSizePtr* to the number of bytes in the block.

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . This status will not be returned if setting the value of a message object which was opened

	using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB or OW.
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was not an even number.
<b>MC_CALLBACK_PARM_ERROR</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was an odd number
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourSetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

**MC\_Set\_Encapsulated\_Value\_From\_Function**  
**MC\_Close\_Encapsulated\_Value**  
**MC\_Register\_Compression\_Callbacks**

## MC\_Set\_Next\_pValue... Functions

Appends another value to a private attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_Next_pValue (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_DT DataType, void* Value
)
MC_STATUS MC_Set_Next_pValue_From_Float (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    float Value
)
MC_STATUS MC_Set_Next_pValue_From_Double (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    double Value
)
MC_STATUS MC_Set_Next_pValue_From_ShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
```

```

        unsigned char ElementByte,
        short int Value
    )
MC_STATUS MC_Set_Next_pValue_From_UShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned short Value
)
MC_STATUS MC_Set_Next_pValue_From_Int (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    int Value
)
MC_STATUS MC_Set_Next_pValue_From_UInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned int Value
)
MC_STATUS MC_Set_Next_pValue_From_LongInt (
    int MsgFileItemID,
    char*PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    long int Value
)
MC_STATUS MC_Set_Next_pValue_From_ULongInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long Value
)
MC_STATUS MC_Set_Next_pValue_From_LongLong (
    int MsgFileItemID,
    char*PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    long long Value
)
MC_STATUS MC_Set_Next_pValue_From_ULongLong (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long Value
)
MC_STATUS MC_Set_Next_pValue_From_String (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,

```



```

    unsigned char ElementByte,
    char *Value
)
MC_STATUS MC_Set_Next_pValue_From_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    int ValueLength,
    const MC_Uchar *Value
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>PrivateCode</i>	The code string which identifies which block in the private Group “owns” the attribute.																								
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.																								
<i>ElementByte</i>	The number identifying the private attribute within the private Group for this PrivateCode.																								
<i>DataType</i>	One of the enumerated codes identifying the data type of the value in Value. The <b>MC_DT</b> enumerated type is defined in “mc3msg.h”. They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
<b>String_Type</b>	Null-terminated character string																								
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<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute should be set to this value.																								

### Remarks

These functions add another value for an attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. If no values exist yet for the attribute, *Value* is stored as the attribute’s first value. If **MC\_Set\_Next\_pValue** is used, the data type of the *Value* is specified by the *DataType* parameter. The other function names imply the data type. For example, **MC\_Set\_Next\_pValue\_From\_Int** is the same as calling **MC\_Set\_Next\_pValue** with *DataType*

specified as **Int\_Type**. Each function will assign the value at *Value*, which must be prototyped as the appropriate type.

**NOTE:** String values are NULL-terminated character arrays.

For **MC\_Set\_Next\_pValue\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from *Value*'s data type to the attribute's value representation. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) *Value* must represent an integer which is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to set values to attributes with these Value Representations
MC_Set_Next_pValue_From_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_ULongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_pValue_From_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Set_Next_pValue_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT

The same rules apply to the **MC\_Set\_Next\_pValue** function, based on the value used in the *DataType* parameter.

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

**INFORMATIONAL MESSAGES:**

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
-----------------------------	----------------------------------

**WARNINGS:**

(VALUE WAS STILL ENCODED)

<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.

**ERRORS:**

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table above.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_Set_Value... Functions</b>	<b>MC_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC_Set_pValue... Functions</b>	<b>MC_Set_pValue_From_Function</b>
<b>MC_Set_pValue_To_NULL</b>	<b>MC_Set_pValue_To_Empty</b>
<b>MC_Set_Next_Value... Functions</b>	<b>MC_Stream_To_Message</b>

## MC\_Set\_Next\_pValue\_To\_NULL

Sets the next value of a private attribute in a message object to NULL.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_pValue_To_NULL (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte
)
```

- MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message** function or the **MC\_Open\_Item** function.
- PrivateCode* The code string which identifies which block in the private *Group* "owns" the attribute.
- Group* The number identifying the private group containing the private attribute. It must be an odd number.
- ElementByte* The number identifying the private attribute within the private *Group* for this *PrivateCode*.

### Remarks

**MC\_Set\_Next\_pValue\_To\_NULL** adds a NULL to the next value of a private multi-valued text type attribute identified by *PrivateCode*, *Group* and *ElementByte* in the message identified by *MsgFileItemID*. Any existing values remain in the attribute. Note that the function can only be used on attributes which 1) allow the backslash (\) character as a field delimiter and 2) are of a text type. It can not be used on numerical attributes.

If a callback function was registered for the attribute, it is "de-registered."

**NOTE:** if the attribute has a value representation of SQ (sequence of items), setting the value to null does NOT free the item object identified by the value.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INCOMPATIBLE_VR</b>	The attribute identified by <i>Tag</i> can not be set to NULL.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .

<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>Tag</i> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value to NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Set\_Next\_Value\_To\_NULL**

## MC\_Set\_Next\_Value... Functions

Appends a value to an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_Next_Value (
    int MsgFileItemID,
    unsigned long Tag,
    MC_DT DataType,
    void *Value
)
MC_STATUS MC_Set_Next_Value_From_Float (
    int MsgFileItemID,
    unsigned long Tag,
    float Value
)
MC_STATUS MC_Set_Next_Value_From_Double (
    int MsgFileItemID,
    unsigned long Tag,
    double Value
)
MC_STATUS MC_Set_Next_Value_From_ShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    short int Value
)
MC_STATUS MC_Set_Next_Value_From_UShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned short Value
)
MC_STATUS MC_Set_Next_Value_From_Int (
    int MsgFileItemID,
```

```

        unsigned long Tag,
        int Value
    )
    MC_STATUS MC_Set_Next_Value_From_UInt (
        int MsgFileItemID,
        unsigned long Tag,
        unsigned int Value
    )
    MC_STATUS MC_Set_Next_Value_From_LongInt (
        int MsgFileItemID,
        unsigned long Tag,
        long int Value
    )
    MC_STATUS MC_Set_Next_Value_From_ULongInt (
        int MsgFileItemID,
        unsigned long Tag,
        unsigned long Value
    )
    MC_STATUS MC_Set_Next_Value_From_LongLong (
        int MsgFileItemID,
        unsigned long Tag,
        long long Value
    )
    MC_STATUS MC_Set_Next_Value_From_ULongLong (
        int MsgFileItemID,
        unsigned long Tag,
        unsigned long long Value
    )
    MC_STATUS MC_Set_Next_Value_From_String (
        int MsgFileItemID,
        unsigned long Tag,
        char *Value
    )
    MC_STATUS MC_Set_Next_Value_From_UnicodeString (
        int MsgFileItemID,
        unsigned long Tag,
        int ValueLength,
        const MC_Uchar *Value)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*DataType* One of the enumerated codes identifying the data type of the value in *Value*. The MC\_DT enumerated type is defined in "mc3msg.h". They are:

<b>String_Type</b>	Null-terminated character string
<b>Int_Type</b>	Binary integer number
<b>UInt_Type</b>	Binary unsigned integer number
<b>ShortInt_Type</b>	Binary short integer number
<b>UShortInt_Type</b>	Binary unsigned short integer number
<b>LongInt_Type</b>	Binary long integer number
<b>ULongInt_Type</b>	Binary unsigned long integer number
<b>LongLong_Type</b>	Binary 64-bit integer number
<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number
<b>Float_Type</b>	Binary Floating point number
<b>Double_Type</b>	Binary Floating point number
<b>Buffer_Type</b>	Binary byte value
<i>Value</i>	The attribute will be set to this value.

### Remarks

These functions add another value for the attribute with the given *Tag*. If no values exist yet for the attribute, *Value* is stored as the attribute's first value. If **MC\_Set\_Next\_Value** is used, the data type of the *Value* is specified by the *DataType* parameter. The other function names imply the data type. For example, **MC\_Set\_Next\_Value\_From\_Int** is the same as calling **MC\_Set\_Next\_Value** with *DataType* specified as **Int\_Type**. Each function will set the value at *Value*, which must be prototyped as the appropriate type. Note that string values are NULL-terminated character arrays.

For **MC\_Set\_Next\_Value\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from *Value's* data type to the attribute's value representation. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** For attributes with a value representation of **SQ** (sequence of items) *Value* must represent an integer which is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Functions	May be used to set values to attributes with these Value Representations
MC_Set_Next_Value_From_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ

Functions	May be used to set values to attributes with these Value Representations
MC_Set_Next_Value_From_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_ULongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Next_Value_From_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Set_Next_Value_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT

The same rules apply to the **MC\_Set\_Next\_Value** function, based on the value used in the *DataType* parameter.



**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

**INFORMATIONAL MESSAGES:**

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
-----------------------------	----------------------------------

**WARNINGS:****(VALUE WAS STILL ENCODED)**

<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.

**ERRORS:**

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Check Merge DICOM Toolkit log for detail.</b>

**See Also**

<b>MC_Set_Value... Functions</b>	<b>MC_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC_Set_pValue... Functions</b>	<b>MC_Set_pValue_From_Function</b>
<b>MC_Set_pValue_To_NULL</b>	<b>MC_Set_pValue_To_Empty</b>
<b>MC_Set_Next_pValue... Functions</b>	<b>MC_Stream_To_Message</b>
<b>MC_Enable_Unicode_Conversion</b>	

**MC\_Set\_Next\_Value\_To\_NULL**

Sets the next value of an attribute in a message object to NULL.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Next_Value_To_NULL (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

**Remarks**

This function adds a NULL to the next value of a multi-valued text type attribute with the given *Tag*. Any existing values remain in the attribute. Note that the function can only be used on attributes which 1) allow the backslash (\) character as a field delimiter and 2) are of a text type. It can not be used on numerical attributes.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INCOMPATIBLE_VR</b>	The attribute identified by <i>Tag</i> can not be set to NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value to NULL.

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Set\_Next\_pValue\_To\_NULL**

## MC\_Set\_pValue... Functions

Sets the value of a private attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_pValue (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_DT DataType,
    void* Value
)
MC_STATUS MC_Set_pValue_From_Float (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    float Value
)
MC_STATUS MC_Set_pValue_From_Double (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    double Value
)
MC_STATUS MC_Set_pValue_From_ShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    short int Value
)
MC_STATUS MC_Set_pValue_From_UShortInt (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned short Value
)
```

```
)  
MC_STATUS MC_Set_pValue_From_Int (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    int Value  
)  
MC_STATUS MC_Set_pValue_From_UInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned int Value  
)  
MC_STATUS MC_Set_pValue_From_LongInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    long int Value  
)  
MC_STATUS MC_Set_pValue_From_ULongInt (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned long Value  
)  
MC_STATUS MC_Set_pValue_From_LongLong (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    long long Value  
)  
MC_STATUS MC_Set_pValue_From_ULongLong (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    unsigned long long Value  
)  
MC_STATUS MC_Set_pValue_From_String (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    char *Value  
)  
MC_STATUS MC_Set_pValue_From_UnicodeString (  
    int MsgFileItemID,  
    char *PrivateCode,  
    unsigned short Group,  
    unsigned char ElementByte,  
    int ValueLength,
```

```

    const MC_Uhar* Value
)
MC_STATUS MC_Set_pValue_From_Buffer (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *Value
    unsigned long ValueLength
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.																								
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.																								
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .																								
<i>DataType</i>	One of the enumerated codes identifying the data type of the value in <i>Value</i> . The <b>MC_DT</b> enumerated type is defined in “mc3msg.h”. They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
<b>String_Type</b>	Null-terminated character string																								
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<b>ULongInt_Type</b>	Binary unsigned long integer number																								
<b>LongLong_Type</b>	Binary 64-bit integer number																								
<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number																								
<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute should be set to this value.																								
<i>ValueLength</i>	Length of provided <i>Value</i> .																								

## Remarks

These functions store a new value for a private attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. If one or more values already exist for the attribute, they are first removed. Use **MC\_Set\_Next\_pValue** to append attribute values. If **MC\_Set\_pValue** is used, the data type of the *Value* is specified by the *Data Type* parameter. The other function names imply the data type. For example, **MC\_Set\_pValue\_From\_Int** is the same as calling **MC\_Set\_pValue** with *Data Type* specified

as **Int\_Type**. Each function will assign the value at *Value*, which must be prototyped as the appropriate type.

**NOTE:** String values are NULL-terminated character arrays.

For **MC\_Set\_pValue\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC\_Set\_pValue\_From\_Buffer** is intended mainly for setting the value of an attribute whose value representation is unknown. This may occur if **MC\_Message\_To\_Stream** is to be used and one or more of the stream attributes is unknown. The attribute's value is simply copied (memcpy) from the *Value* buffer according to the length provided in *ValueLength*. The function supports other value representations as well – see table below.

Any reasonable conversion will be made from *Value's* data type to the attribute's value representation. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** For attributes with a value representation of **SQ** (sequence of items) *Value* must represent an integer which is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to set values to attributes with these Value Representations
MC_Set_pValue_From_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_Int	DS, FD, FL, IS, SL, SS, UL, US, SQ
MC_Set_pValue_From_UInt	DS, FD, FL, IS, SL, SS, UL, US, SQ
MC_Set_pValue_From_LongInt	AT, DS, FD, FL, IS, SL, SS, UL, US, SQ
MC_Set_pValue_From_UlongInt	AT, DS, FD, FL, IS, SL, SS, UL, US, SQ
MC_Set_pValue_From_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_pValue_From_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Set_pValue_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT

Function	May be used to set values to attributes with these Value Representations
MC_Set_pValue_From_Buffer	UNKNOWN_VR , OB, OW, OV, OL, OD, OF, UR, UT
MC_Set_pValue_From_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT

The same rules apply to the **MC\_Set\_pValue** function, based on the value used in the *Data Type* parameter. The **MC\_Set\_pValue\_From\_Function** call is described in its own section.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>INFORMATIONAL MESSAGES:</b>	
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>WARNINGS:</b> (VALUE WAS STILL ENCODED)	
<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.
<b>ERRORS:</b>	
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table above.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g., setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).

<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Set_Value... Functions</b>	<b>MC_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC_Set_pValue_From_Function</b>	<b>MC_Set_pValue_To_NULL</b>
<b>MC_Set_pValue_To_Empty</b>	<b>MC_Set_Next_Value... Functions</b>
<b>MC_Set_Next_pValue... Functions</b>	<b>MC_Stream_To_Message</b>

## MC\_Set\_pValue\_From\_Function

Sets the value of a message object private attribute which has the binary value representation of OB, OW, OV, OL, OD or OF, or the numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or the text value representation of UR or UT.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_pValue_From_Function (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.



---

*YourSetFunction* Name of a function which will be called repeatedly to request  
*n* blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long Cbtag,
    int CBisFirst,
    void *CBUserInfo,
    int *CBdataSizePtr,
    void **CBdataBufferPtr,
    int *CBisLastPtr
)
```

*CBMsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Cbtag* DICOM tag which identifies the attribute.

*CBisFirst* This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourSetFunction* to request data blocks.

*CBUserInfo* Address of data which is being passed from the **MC\_Set\_pValue\_From\_Function** function. This may be NULL.

*CBdataSizePtr* Set *\*CBdataSizePtr* to the number of bytes you are providing.

*CBdataBufferPtr* Set *\*CBdataBufferPtr* to the address of the data you are providing.

*CBisLastPtr* Set *\*CBisLastPtr* to TRUE (not zero) when you are returning with the last block of OB, OW, or OF data.

### Remarks

The **MC\_Set\_pValue\_From\_Function** function is used to set the value of a private attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses **MC\_Set\_pValue\_From\_Function** to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to request blocks of the attribute's data value.

An optional *UserInfo* parameter may be used to pass information between the **MC\_Set\_pValue\_From\_Function** caller and *YourSetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourSetFunction

*YourSetFunction* must set *\*CBdataBufferPtr* to the address of a block of data which is a portion of the attribute's value. It also must set *\*CBdataSizePtr* to the number of bytes in the block.

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mcstatus.h".

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> or <i>YourSetFunction</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not one of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT.
<b>MC_CALLBACK_PARM_ERROR</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataBufferPtr</i> parameter was NULL and <i>*CBisLastPtr</i> was not set to true(non-zero).
<b>MC_CALLBACK_DATA_SIZE_NEGATIVE</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was a negative number
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> parameter was an odd number
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourSetFunction</i> returned a status other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_VALUE_TOO_LARGE</b>	The value set by <i>YourSetFunction</i> in its <i>*CBdataSizePtr</i> was too large. It may not be larger than the largest unsigned int on your machine.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

**MC\_Set\_pValue... Functions**  
**MC\_Set\_pValue\_To\_Empty**  
**MC\_Set\_Next\_Value... Functions**

**MC\_Set\_pValue\_To\_NULL**  
**MC\_Set\_Value... Functions** **MC\_Set\_Value\_To\_NULL**  
**MC\_Set\_Value\_To\_Empty**  
**MC\_Set\_Next\_pValue... Functions**

**MC\_Set\_pValue\_Representation**

Sets a private attribute's value representation code.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_pValue_Representation (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_VR ValueRep
)
```

- MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.
- PrivateCode* The code string which identifies which block in the private *Group* "owns" the attribute.
- Group* The number identifying the private group containing the private attribute. It must be an odd number.
- ElementByte* The number identifying the private attribute within the private *Group* for this *PrivateCode*.
- ValueRep* A valid value representation code as defined by the **MC\_VR** type in "mc3msg.h":  
**AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ**

**Remarks**

**MC\_Set\_pValue\_Representation** is used to change a private attribute's value representation. The attribute is identified by *ElementByte* for the *PrivateCode* within the given *Group*. A message attribute may have an unknown value representation if it is obtained from a message stream (**MC\_Stream\_To\_Message**) and the attribute is unknown. This method can be used to facilitate reading of the values for such attributes. This function can also be used to manage the attributes that have more than one possible VR.

The valid VR conversions are:

Original VR	New VR
US	US
	SS
	OW
	SS
	US
	SS
	OW
	US
	SS
UV	SV
	OV
	OV
	UV
	SV
	OB
	OW
	OB
	OV
	OB
	OV
UN	Any VR

Any other conversion will result in an error return status.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_VR_CODE</b>	<i>ValueRep</i> is invalid.
<b>MC_ATTRIBUTE_HAS_VALUES</b>	When <i>ValueRep</i> is SQ, the attribute may not already have a value.
<b>MC_VR_ALREADY_VALID</b>	The attribute already has a valid Value Representation.

### See Also

**MC\_Set\_Value\_Representation**

### MC\_Set\_pValue\_To\_Empty

Removes all values from a private attribute in a message object.

## Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_pValue_To_Empty (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .

## Remarks

**MC\_Set\_pValue\_To\_Empty** removes any existing values for the attribute identified by *PrivateCode*, *Group* and *ElementByte* in the message identified by *MsgFileItemID*. If a callback function was registered for the attribute, it is "de-registered."

**NOTE:** This is not the same as setting a NULL value. Use **MC\_Set\_pValue\_To\_NULL** to give the attribute a value length of zero (i.e. a NULL value).

## Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.

## See Also

<b>MC_Set_Value_To_Empty</b>	<b>MC_Set_Value_To_NULL</b>
<b>MC_Set_pValue_To_NULL</b>	

## MC\_Set\_pValue\_To\_NULL

Sets the value of a private attribute in a message object to NULL.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_pValue_To_NULL (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte
)
```

- MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.
- PrivateCode* The code string which identifies which block in the private *Group* "owns" the attribute.
- Group* The number identifying the private group containing the private attribute. It must be an odd number.
- ElementByte* The number identifying the private attribute within the private *Group* for this *PrivateCode*.

### Remarks

**MC\_Set\_pValue\_To\_NULL** sets the value of the attribute identified by *PrivateCode*, *Group* and *ElementByte* in the message identified by *MsgFileItemID* to NULL. That is, it sets the attribute's value length to zero. NULL is a valid value in DICOM. Use **MC\_Set\_pValue\_To\_Empty** if the intent is to remove the attribute's value altogether. If a callback function was registered for the attribute, it is "de-registered."

**NOTE:** If the attribute has a value representation of SQ (sequence of items), setting the value to null does NOT free the item object identified by the value.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .

**MC\_INVALID\_MESSAGE\_ID** *MsgFileItemID* is not a valid message object ID, file object ID or item object ID.

### See Also

**MC\_Set\_pValue\_To\_Empty**                      **MC\_Set\_Value\_To\_Empty**  
**MC\_Set\_Value\_To\_NULL**

## MC\_Set\_Service\_Command

Associates a Merge DICOM Toolkit message or file object with a given DICOM service/command pair.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Service_Command (
    int MessageID,
    char *ServiceName,
    MC_COMMAND Command
)
```

*MessageID*            The identifier assigned to the message object by the **MC\_Open\_Empty\_Message**, **MC\_Open\_Message**, **MC\_Create\_Empty\_File**, or **MC\_Create\_File** function.

*ServiceName*        String name of a DICOM service to be associated with this message object.

*Command*            The command which is to be associated with this message. The **MC\_COMMAND** enumerated values are defined in "mc3msg.h".

### Remarks

The **MC\_Set\_Service\_Command** function associates a message object with a given DICOM service/command pair. This is necessary if the message object was opened using **MC\_Open\_Empty\_Message** and the message object is to be sent to a network partner, or is to be validated using the **MC\_Validate\_Message** function.

The *ServiceName* must be a valid service name defined in the Merge DICOM Toolkit service profile file, and *Command* must be a valid DICOM command.

If the service "DICOMDIR" and command "C\_STORE\_RQ" is specified and the object identified by *MessageID* is a file object, the object will be converted to a DICOMDIR object. The object can then be manipulated with the **MC\_Dir\_...** functions. **MC\_Set\_Service\_Command** should only be used on empty file objects, because the **MC\_Dir\_...** functions will not work correctly if any directory records are already contained in the object.

The following commands are supported by the Merge DICOM Toolkit:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request

---

C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>ServiceName</i> was NULL.



<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message or file object ID.
<b>MC_INVALID_COMMAND</b>	<i>Command</i> is not a supported command.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Create_Empty_File</b>	<b>MC_Create_File</b> <b>MC_Open_Empty_Message</b>
	<b>MC_Open_Message</b> <b>MC_Get_MergeCOM_Service</b>
	<b>MC_Get_UID_From_MergeCOM_Service</b>

## MC\_Set\_String\_Config\_Value

Used to set the value of a character string toolkit configuration parameter at runtime.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_String_Config_Value (
    StringParm Aparm,
    char *Avalue
)
```

---

*Aparm* An enumerated constant identifying the character string configuration parameter to be (re)set. Aparm can have any of the following values:

- MERGECOM\_3\_PROFILE
- MERGECOM\_3\_SERVICES
- MERGECOM\_3\_APPLICATIONS
- CAPTURE\_FILE
- COMPRESSION\_RGB\_TRANSFORM\_FORMAT
- DECODER\_TAG\_FILTER
- DECODER\_PRIVATE\_TAG\_WHITELIST
- DEFLATED\_EXPLICIT\_LITTLE\_ENDIAN\_SYNTAX
- DICTIONARY\_ACCESS
- DICTIONARY\_FILE
- ENCAPSULATED\_UNCOMPRESSED\_ELE\_SYNTAX
- EXPLICIT\_BIG\_ENDIAN\_SYNTAX
- EXPLICIT\_LITTLE\_ENDIAN\_SYNTAX
- HEVC\_H265\_M10P\_LEVEL\_5\_1\_SYNTAX
- HEVC\_H265\_MP\_LEVEL\_5\_1\_SYNTAX
- IMPLEMENTATION\_CLASS\_UID
- IMPLEMENTATION\_VERSION
- IMPLICIT\_BIG\_ENDIAN\_SYNTAX
- IMPLICIT\_LITTLE\_ENDIAN\_SYNTAX
- INITIATOR\_NAME
- IP\_TYPE
- JPEG\_2000\_LOSSLESS\_ONLY\_SYNTAX
- JPEG\_2000\_MC\_LOSSLESS\_ONLY\_SYNTAX
- JPEG\_2000\_MC\_SYNTAX
- JPEG\_2000\_SYNTAX
- JPEG\_BASELINE\_SYNTAX
- JPEG\_EXTENDED\_2\_4\_SYNTAX
- JPEG\_EXTENDED\_3\_5\_SYNTAX
- JPEG\_EXTENDED\_HIER\_16\_18\_SYNTAX
- JPEG\_EXTENDED\_HIER\_17\_19\_SYNTAX
- JPEG\_FULL\_PROG\_HIER\_24\_26\_SYNTAX
- JPEG\_FULL\_PROG\_HIER\_25\_27\_SYNTAX
- JPEG\_FULL\_PROG\_NON\_HIER\_10\_12\_SYNTAX
- JPEG\_FULL\_PROG\_NON\_HIER\_11\_13\_SYNTAX
- JPEG\_LOSSLESS\_HIER\_14\_SYNTAX
- JPEG\_LOSSLESS\_HIER\_28\_SYNTAX
- JPEG\_LOSSLESS\_HIER\_29\_SYNTAX
- JPEG\_LOSSLESS\_NON\_HIER\_14\_SYNTAX
- JPEG\_LOSSLESS\_NON\_HIER\_15\_SYNTAX
- JPEG\_LS\_LOSSLESS\_SYNTAX
- JPEG\_LS\_LOSSY\_SYNTAX
- JPEG\_SPEC\_HIER\_20\_22\_SYNTAX
- JPEG\_SPEC\_HIER\_21\_23\_SYNTAX
- JPEG\_SPEC\_NON\_HIER\_6\_8\_SYNTAX
- JPEG\_SPEC\_NON\_HIER\_7\_9\_SYNTAX
- JPIP\_REFERENCED\_DEFLATE\_SYNTAX
- JPIP\_REFERENCED\_SYNTAX
- LARGE\_DATA\_STORE
- LICENSE
- LOCAL\_APPL\_CONTEXT\_NAME
- LOG\_FILE

MPEG2\_MPHL\_SYNTAX  
 MPEG2\_MPML\_SYNTAX  
 MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1\_SYNTAX  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1\_SYNTAX  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D\_SYNTAX  
 MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D\_SYNTAX  
 MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2\_SYNTAX  
 MSG\_INFO\_FILE  
 NULL\_TYPE3\_VALIDATION  
 PEGASUS\_DISP\_REG\_NAME  
 PEGASUS\_DISP\_REGISTRATION  
 PEGASUS\_OP\_D2SEPLUS\_NAME  
 PEGASUS\_OP\_D2SEPLUS\_REGISTRATION  
 PEGASUS\_OP\_J2KE\_NAME  
 PEGASUS\_OP\_J2KE\_REGISTRATION  
 PEGASUS\_OP\_J2KP\_NAME  
 PEGASUS\_OP\_J2KP\_REGISTRATION  
 PEGASUS\_OP\_JLSE\_NAME  
 PEGASUS\_OP\_JLSE\_REGISTRATION  
 PEGASUS\_OP\_JLSP\_NAME  
 PEGASUS\_OP\_JLSP\_REGISTRATION  
 PEGASUS\_OP\_LIE3PLUS\_NAME  
 PEGASUS\_OP\_LIE3PLUS\_REGISTRATION  
 PEGASUS\_OP\_LIP3PLUS\_NAME  
 PEGASUS\_OP\_LIP3PLUS\_REGISTRATION  
 PEGASUS\_OP\_SE2DPLUS\_NAME  
 PEGASUS\_OP\_SE2DPLUS\_REGISTRATION  
 PEGASUS\_OPCODE\_PATH  
 PRIVATE\_SYNTAX\_1\_SYNTAX  
 PRIVATE\_SYNTAX\_2\_SYNTAX  
 RECEIVER\_NAME  
 RLE\_SYNTAX  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTIVE\_VIDEO\_SYNTAX  
 SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIVE\_VIDEO\_SYNTAX  
 SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO\_SYNTAX  
 TEMP\_FILE\_DIRECTORY  
 UNKNOWN\_VR\_CODE

These names are the same as those given to the parameters in the toolkit configuration files.

*Avalue* The character string value to which Aparam is to be set.

### Remarks

The Merge DICOM Toolkit Library accesses several configuration files at startup. This call allows your application to (re)set character string configurable parameters specified in these files at runtime. This call should be made immediately after calling **MC\_Library\_Initialization** to avoid using these parameters before they are set. Please see the detailed description of toolkit configuration elsewhere in this manual.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_PARAMETER_NAME</b>	Parameter specified is not one of the above listed parameters.
<b>MC_NULL_POINTER_PARM</b>	A value was a null pointer.
<b>MC_SYSTEM_ERROR</b>	Out of memory condition occurred.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_Get_Int_Config_Value</b>	<b>MC_Set_Int_Config_Value</b>
<b>MC_Get_Log_Destination</b>	<b>MC_Set_Log_Destination</b>
<b>MC_Get_Long_Config_Value</b>	<b>MC_Set_Long_Config_Value</b>
<b>MC_Get_String_Config_Value</b>	<b>MC_Set_String_Config_Value</b>

## MC\_Set\_Value... Functions

Sets the value of an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_Value (
    int MsgFileItemID,
    unsigned long Tag,
    MC_DT DataType,
    void *Value
)
MC_STATUS MC_Set_Value_From_Float (
    int MsgFileItemID,
    unsigned long Tag,
    float Value
)
MC_STATUS MC_Set_Value_From_Double (
    int MsgFileItemID,
    unsigned long Tag,
    double Value
)
MC_STATUS MC_Set_Value_From_ShortInt
    (int MsgFileItemID,
    unsigned long Tag,
    short int Value
)
MC_STATUS MC_Set_Value_From_UShortInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned short Value
)
MC_STATUS MC_Set_Value_From_Int (
    int MsgFileItemID,
    unsigned long Tag,
    int Value
)
)
```

---

```

MC_STATUS MC_Set_Value_From_UInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned int Value
)
MC_STATUS MC_Set_Value_From_LongInt (
    int MsgFileItemID,
    unsigned long Tag,
    long int Value
)
MC_STATUS MC_Set_Value_From_ULongInt (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long Value
)
MC_STATUS MC_Set_Value_From_LongLong (
    int MsgFileItemID,
    unsigned long Tag,
    long long Value
)
MC_STATUS MC_Set_Value_From_ULongLong (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long Value
)
MC_STATUS MC_Set_Value_From_String (
    int MsgFileItemID,
    unsigned long Tag,
    char* Value
)
MC_STATUS MC_Set_Value_From_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    int ValueLength,
    const MC_Uhar* Value
)
MC_STATUS MC_Set_Value_From_Buffer (
    int MsgFileItemID,
    unsigned long Tag,
    void *Value,
    unsigned long ValueLength
)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*Data Type* One of the enumerated codes identifying the data type of the value in *Value*. The MC\_DT enumerated type is defined in “mc3msg.h”. They are:

<b>String_Type</b>	Null-terminated character string
<b>Int_Type</b>	Binary integer number
<b>UInt_Type</b>	Binary unsigned integer number
<b>ShortInt_Type</b>	Binary short integer number
<b>UshortInt_Type</b>	Binary unsigned short integer number
<b>LongInt_Type</b>	Binary long integer number
<b>UlongInt_Type</b>	Binary unsigned long integer number
<b>LongLong_Type</b>	Binary 64-bit integer number
<b>UlongLong_Type</b>	Binary 64-bit unsigned integer number
<b>Float_Type</b>	Binary Floating point number
<b>Double_Type</b>	Binary Floating point number
<b>Buffer_Type</b>	Binary byte value
<i>Value</i>	The value to be used as the attribute's value.
<i>ValueLength</i>	Length of provided <i>Value</i> .

### Remarks

These functions store a new value for the attribute with the given *Tag*. If one or more values already exist for the attribute, they are first removed. Use **MC\_Set\_Next\_Value** to append attribute values. If **MC\_Set\_Value** is used, the data type of the *Value* is specified by the *DataType* parameter. The other function names imply the data type. For example, **MC\_Set\_Value\_From\_Int** is the same as calling **MC\_Set\_Value** with *DataType* specified as **Int\_Type**. Each function will set the value at *Value*, which must be prototyped as the appropriate type. Note that string values are NULL-terminated character arrays.

For **MC\_Set\_Value\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC\_Set\_Value\_From\_Buffer** is intended mainly for setting the value of an attribute whose value representation is unknown. This may occur if **MC\_Message\_To\_Stream** is to be used and one or more of the stream attributes is unknown. The attribute's value is simply copied (memcpy) from the *Value* buffer according to the length provided in *ValueLength*. The function supports other value representations as well – see table below.

Any reasonable conversion will be made from *Value*'s data type to the attribute's value representation. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** for attributes with a value representation of **SQ** (sequence of items) *Value* must represent an integer which is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to set values to attributes with these Value Representations
MC_Set_Value_From_Float	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_Double	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_ShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_UShortInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_Int	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_UInt	DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_LongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_ULongInt	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_LongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_ULongLong	AT, DS, FD, FL, IS, SL, SS, SV, UL, US, UV, SQ
MC_Set_Value_From_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC_Set_Value_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC_Set_Value_From_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT
MC_Set_Value_From_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT

The same rules apply to the **MC\_Set\_Value** function, based on the value used in the *DataType* parameter. The **MC\_Set\_Value\_From\_Function** call is described in its own section.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

#### INFORMATIONAL MESSAGES:

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
-----------------------------	----------------------------------

#### WARNINGS: (VALUE WAS STILL ENCODED)

<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
----------------------------------	--

---

<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.
--------------------------------	--

---

**ERROR MESSAGES:**

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Check Merge DICOM Toolkit log for detail.</b>

**See Also**

<b>MC_Set_Value_From_Function</b>	<b>MC_Set_Value_To_NULL</b>
<b>MC_Set_Value_To_Empty</b>	<b>MC_Set_pValue... Functions</b>
<b>MC_Set_pValue_From_Function</b>	<b>MC_Set_pValue_To_NULL</b>
<b>MC_Set_pValue_To_Empty</b>	<b>MC_Set_Next_Value... Functions</b>
<b>Functions</b>	<b>MC_Set_Next_pValue...</b>
	<b>MC_Enable_Unicode_Conversion</b>



## MC\_Set\_Value\_From\_Function

Sets the value of a message object attribute which has the binary value representation of OB, OW, OV, OL, OD or OF, or the numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or the text value representation of UR or UT.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.
<i>YourSetFunction</i>	Name of a function which will be called repeatedly to request blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long Cbtag,
    int CbisFirst,
    void *CbuserInfo,
    int *CbdataSizePtr,
    void **CbdataBufferPtr,
    int *CbisLastPtr
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Cbtag</i>	DICOM tag which identifies the attribute.
<i>CbisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourSetFunction</i> to request data blocks.
<i>CbuserInfo</i>	Address of data which is being passed from the <b>MC_Set_Value_From_Function</b> function. This may be NULL.

---

<i>CbdataSizePtr</i>	Set <i>*CbdataSizePtr</i> to the number of bytes you are providing.
<i>CbdataBufferPtr</i>	Set <i>*CbdataBufferPtr</i> to the address of the data you are providing.
<i>CbisLastPtr</i>	Set <i>*CbisLastPtr</i> to TRUE (not zero) when you are returning with the last block of OB, OW, OV, OD or OF data.

### Remarks

The **MC\_Set\_Value\_From\_Function** function is used to set the value of an attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses the **MC\_Set\_Value\_From\_Function** function to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to request blocks of the attribute’s data value.

An optional *UserInfo* parameter may be used to pass information between the **MC\_Set\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CbuserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourSetFunction

*YourSetFunction* must set *\*CbdataBufferPtr* to the address of a block of data which is a portion of the attribute’s value. It also must set *\*CbdataSizePtr* to the number of bytes in the block.

Merge DICOM Toolkit sets *CbisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute’s value. *YourSetFunction* must set *\*CbisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute’s value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not one of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT.
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The value set by <i>YourSetFunction</i> in its <i>*CbdataSizePtr</i> parameter was not an even number.
<b>MC_CALLBACK_PARM_ERROR</b>	The value set by <i>YourSetFunction</i> in its <i>*CbdataSizePtr</i> parameter was an odd number
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourSetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

**MC\_Set\_Value... Functions**

**MC\_Set\_Next\_Value... Functions**

## MC\_Set\_Value\_Representation

Sets the value representation code of an attribute.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Value_Representation (
    int MsgFileItemID,
    unsigned long Tag,
    MC_VR ValueRep
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying the attribute.
<i>ValueRep</i>	A valid value representation code as defined by the <b>MC_VR</b> type in "mc3msg.h": <b>AE, AS, CS, DA, DS, DT, IS, LO, LT, PN, SH, ST, TM, UC, UR, UT, UI, SS, US, AT, SL, UL, SV, UV, FL, FD, OB, OW, OV, OL, OD, OF, SQ</b>

### Remarks

**MC\_Set\_Value\_Representation** is used to change an attribute's value representation.

A message attribute may have an unknown value representation if it is obtained from a message stream (**MC\_Stream\_To\_Message**) and the attribute is unknown. This method can be used to facilitate reading of the values for such attributes.

This function can also be used to manage the attributes that have more than one possible VR.

The valid VR conversions are:

Original VR	New VR
US	US
	SS
	OW
	SS
	US
	SS
	OW
	US
	SS
UV	SV
	OV
	OV
	UV
	SV
	OB
	OB
	OW
	OB
	OV
	OB
	OV
UN	Any VR

Any other conversion will result in an error return status.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_VR_CODE</b>	<i>ValueRep</i> is invalid.
<b>MC_ATTRIBUTE_HAS_VALUES</b>	When <i>ValueRep</i> is SQ, the attribute may not already have a value.
<b>MC_VR_ALREADY_VALID</b>	The attribute already has a valid Value Representation.

### See Also

**MC\_Set\_pValue\_Representation**

### MC\_Set\_Value\_To\_Empty

Removes all values from an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"
```

---

```
MC_STATUS MC_Set_Value_To_Empty (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

### Remarks

**MC\_Set\_Value\_To\_Empty** removes any existing values for the attribute identified by *Tag* in the message identified by *MsgFileItemID*. If a callback function was registered for the attribute, it is “de-registered.”

**NOTE:** This is not the same as setting a NULL value. Use **MC\_Set\_Value\_To\_NULL** to give the attribute a value length of zero (i.e. a NULL value).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.

### See Also

<b>MC_Set_pValue_To_Empty</b>	<b>MC_Set_Value_To_NULL</b>
<b>MC_Set_pValue_To_NULL</b>	

## MC\_Set\_Value\_To\_NULL

Sets the value of an attribute in a message object to NULL.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Set_Value_To_NULL (
    int MsgFileItemID,
    unsigned long Tag
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

### Remarks

**MC\_Set\_Value\_To\_NULL** sets the value of the attribute identified by *Tag* in the message identified by *MsgFileItemID* to NULL. That is, it sets the attribute's value length to zero. NULL is a valid value in DICOM. Use **MC\_Set\_Value\_To\_Empty** if the intent is to remove the attribute's value altogether.

If a callback function was registered for the attribute, it is "de-registered."

**NOTE:** If the attribute has a value representation of SQ (sequence of items), setting the value to null does NOT free the item object identified by the value.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value to NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.

### See Also

**MC\_Set\_Value\_To\_Empty**      **MC\_Set\_pValue\_To\_Empty**  
**MC\_Set\_pValue\_To\_NULL**

## MC\_SR\_Add\_Child

Adds a lower level SR node to a specified SR tree management.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Add_Child (
    int SRID,
    int ItemID
)
```

*SRID*            The identifier assigned to the given SR object to which the child is to be added.

*ItemID*          The identifier assigned to the child SR object which is to be added to the parent.

### Remarks

**MC\_SR\_Add\_Child** adds a new lower level SR tree management node referenced by the item object *SRID*, and places it in the SR tree management object identified by *ItemID*.

The child SR tree management record node is placed at the end of *SRID*'s SR record list and all internal links to the new entity are adjusted by Merge DICOM Toolkit.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_INVALID_ITEM_ID</b>	The <i>ItemID</i> value is not a valid SR tree management record object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_Delete_Child</b>	

## MC\_SR\_Add\_Root

Adds the root node to the SR tree management structure.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Add_Root (
    int MsgID,
    int *SRID
)
```

*MsgID*            The identifier assigned to the message.

*SRID*             Upon successful completion, the root SR item object identifier is returned here.

### Remarks

**MC\_SR\_Add\_Root** adds an node as the root node of an SR tree management object. A valid identifier of a message object must be passed into this function. This returned item identifier can then be used to set and retrieve SR values.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>SRID</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

## MC\_SR\_Delete\_Child

Deletes a given SR child node.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Delete_Child (
    int SRID
)
```

*SRID*            The identifier of the SR item which is to be deleted is passed into this function here.

### Remarks

**MC\_SR\_Delete\_Child** removes the specified child SR object and all of its associated child objects from the SR tree management structures. It also frees the system resources used by the specified child object and all of its child SR object(s).



**MC\_SR\_Delete\_Child** updates all of the location values for affected SR objects within the SR tree.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

## MC\_SR\_Get\_Child\_Count

Returns the number of children of an SR tree management node.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_First_Child (
    int SRID,
    int *Count
)
```

*SRID*            The identifier assigned to this SR tree management node.

*Count*           Upon successful completion, this parameter returns the number of children for *SRID*

### Remarks

**MC\_SR\_Get\_Child\_Count** returns the number of children of the SR tree management item *ItemID*.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>Count</i> parameter was NULL.
<b>MC_UNABLE_TO_GET_SR_ID</b>	An internal error was encountered, Merge DICOM Toolkit was unable to retrieve the ID of an SR object.

**See Also**

**MC\_SR\_Add\_Child**  
**MC\_SR\_Get\_Next\_Child**  
**MC\_SR\_Delete\_Child**

**MC\_SR\_Get\_First\_Child**  
**MC\_SR\_Get\_Root**

**MC\_SR\_Get\_First\_Child**

Returns a pointer to the first child node at a given parent node of the SR tree management structure.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_First_Child (
    int SRID,
    int *ItemID,
    int *IsLast
)
```

*SRID*            The identifier assigned to this SR tree management node.

*ItemID*          Upon successful completion, the item object identifier of the first SR tree management child record of the given *SRID* object is returned here.

*IsLast*          Upon successful completion, this parameter is set to true (non-zero) if the first record is also the last record in the SR tree management entity (i.e., it is the only element)

**Remarks**

**MC\_SR\_Get\_First\_Child** retrieves the identifier of the first SR tree management child record of the SR tree management item *ItemID*. If *ItemID* is an empty root SR tree management entity, *\*IsLast* is set to non-zero, and *ItemID* is set to -1.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_INVALID_SR_ITEM_ID</b>	The <i>ItemID</i> value is not a valid SR tree management record object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>ItemID</i> , or <i>IsLast</i> parameter was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred attempting to access the configuration data file for the directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

**MC\_SR\_Get\_Location**

Returns the location within the current SR tree management structure.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Get_Location (
    int SRID,
    int sizeOfLocation,
    char *Location
)
```

*SRID*            The identifier assigned to this SR tree management object.

*sizeOfLocation*    The size of the character array that the toolkit is to place the value for *Location* into.

*Location*            String name of the location is returned here upon successful completion.

**Remarks**

**MC\_SR\_Get\_Location** is used to obtain a string value which represents the location of a given item within the SR tree management structure. The string that is returned will contain a dot-separated list of numbers. These numbers represent the numerical "position" of the item within the tree structure. For example, if the number returned by this function is "1.2.1.3", then the item referenced by *SRID* is the third item, under the first item, under the second item, under the root entity.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>Location</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_SR_Add_Child</b>	<b>MC_SR_First_Child</b>
<b>MC_SR_Next_Child</b>	<b>MC_SR_Root</b>
<b>MC_Delete_Child</b>	

## MC\_SR\_Get\_Next\_Child

Retrieves a pointer to the next child SR tree management node linked to a specified SR tree management record

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Get_Next_Child (
    int SRID,
    int *NextChildID,
    int *IsLast
)
```

*SRID*                    The identifier assigned to this SR tree management object.

*NextChildID*           Upon successful completion, the item object identifier of the next SR tree management node in the SR tree management entity *NextChildID* is returned here. At a given parent *SRID* a pointer to the next record is maintained.

*IsLast*                    Upon successful completion, this parameter is set to true (non-zero) if the next record in the SR tree management entity *NextChildID* is also the last record.

### Remarks

**MC\_SR\_Get\_Next\_Child** returns *NextChildID*, the entity object identifier of the next child SR tree management node linked to *SRID*. The value *IsLast* is set if the given *NextChildID* is the last in the SR tree management structure.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>NextChildID</i> or <i>IsLast</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_Delete_Child</b>	

## MC\_SR\_Get\_Root

Returns a pointer to the root node of an SR tree management structure.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_Root (
    int MsgID,
    int *SRID
)
```

*MsgID*            The identifier assigned to this SR tree management object by the **MC\_Message\_To\_SR** function.

*SRID*            Upon successful completion, the root SR item object identifier is returned here.

**Remarks**

**MC\_SR\_Get\_Root** returns an identifier to the root node of an SR tree management object. A valid identifier of a message containing an SR tree object must be passed into this function. This item identifier can then be used to set and retrieve SR values.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>MsgID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	The <i>SRID</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

**MC\_SR\_To\_Message**

Converts a toolkit-managed SR tree object into a toolkit-managed message object.

**Synopsis**

```
#include "mc3media.h"
```

```
MC_STATUS MC_SR_To_Message (
    int SRID
)
```

*SRID*            The identifier assigned to an existing toolkit message that has an SR tree management structure associated with it.

**Remarks**

**MC\_SR\_To\_Message** converts an SR tree management object into a normal toolkit message object by deleting the SR tree management structures from the toolkit's memory

Since the SR API calls are used to alter a toolkit DICOM message, this function is used to remove the SR tree management structures from the toolkit's memory. This call can be used as a last step, after modifications are completed to the normal toolkit message.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

<b>MC_SR_Add_Child</b>	<b>MC_SR_Get_First_Child</b>
<b>MC_SR_Get_Next_Child</b>	<b>MC_SR_Get_Root</b>
<b>MC_SR_Delete_Child</b>	

## MC\_Stream\_To\_Message

### MC\_Stream\_To\_Message\_With\_Offset

Request that the values of a message object be retrieved from a DICOM stream.

**Synopsis**

```
#include "mc3msg.h"

MC_STATUS MC_Stream_To_Message (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    unsigned long *ErrorTagPtr,
    void *UserInfo,
    MC_STATUS (*YourStreamToFunction) ()
)

MC_STATUS MC_Stream_To_Message_With_Offset (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    unsigned long *ErrorTagPtr,
    unsigned long Offset,
    void *UserInfo,
```

---

```

MC_STATUS (*YourStreamToFunction) ()
)

```

<i>MessageID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , or the <b>MC_Open_Item</b> functions.
<i>StartTag</i>	The DICOM tag identifying the first attribute which should be added to the message.
<i>StopTag</i>	The DICOM tag identifying the last attribute which should be added to the message.
<i>SyntaxType</i>	Specify which DICOM transfer syntax was used to encode the stream data you will be providing. Use one of the enumerated TRANSFER_SYNTAX types defined in "mc3msg.h": IMPLICIT_LITTLE_ENDIAN IMPLICIT_BIG_ENDIAN EXPLICIT_LITTLE_ENDIAN EXPLICIT_BIG_ENDIAN DEFLATED_EXPLICIT_LITTLE_ENDIAN ENCAPSULATED_UNCOMPRESSED_ELEMENT RLE JPEG_BASELINE JPEG_EXTENDED_2_4 JPEG_EXTENDED_3_5 JPEG_SPEC_NON_HIER_6_8 JPEG_SPEC_NON_HIER_7_9 JPEG_FULL_PROG_NON_HIER_10_12 JPEG_FULL_PROG_NON_HIER_11_13 JPEG_LOSSLESS_NON_HIER_14 JPEG_LOSSLESS_NON_HIER_15 JPEG_EXTENDED_HIER_16_18 JPEG_EXTENDED_HIER_17_19 JPEG_SPEC_HIER_20_22 JPEG_SPEC_HIER_21_23 JPEG_FULL_PROG_HIER_24_26 JPEG_FULL_PROG_HIER_25_27 JPEG_LOSSLESS_HIER_28 JPEG_LOSSLESS_HIER_29 JPEG_LOSSLESS_HIER_14 JPEG_2000_LOSSLESS_ONLY JPEG_2000 JPEG_LS_LOSSLESS JPEG_LS_LOSSY HEVC_H265_M10P_LEVEL_5_1 HEVC_H265_MP_LEVEL_5_1 JPIP_REFERENCED

	JPIP_REFERENCED_DEFLATE
	MPEG2_MPML
	MPEG2_MPHL
	MPEG4_AVC_H264_HP_LEVEL_4_1
	MPEG4_AVC_H264_BDC_HP_LEVEL_4_1
	MPEG4_AVC_H264_HP_LEVEL_4_2_2D
	MPEG4_AVC_H264_HP_LEVEL_4_2_3D
	MPEG4_AVC_H264_STEREO_HP_LEVEL_4_2
	JPEG_2000_MC_LOSSLESS_ONLY
	JPEG_2000_MC
	SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_ACTIVE_VIDEO
	SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_ACTIVE_VIDEO
	SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO
	PRIVATE_SYNTAX_1
	PRIVATE_SYNTAX_2
<i>ErrorTagPtr</i>	If an error occurs, <i>*ErrorTagPtr</i> will be set to the tag which caused the error.
<i>Offset</i>	The offset from the beginning of the stream to the attribute after <i>StopTag</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourStreamToFunction</i> each time it is called. This may be NULL.
<i>YourStreamToFunction</i>	Name of a function which will be called repeatedly to request blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourStreamToFunction (
    int CbmessageID,
    void *CbuserInfo,
    int CBFIRSTCall,
    int *CbdataSizePtr,
    void **CbdataBuffer,
    int *CbisLastPtr
)
```

<i>CbmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CbuserInfo</i>	Address of data which is being passed from the <b>MC_Stream_To_Message</b> function. This may be NULL.
<i>CBFIRSTCall</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourStreamToFunction</i> to request data blocks.
<i>CbdataSizePtr</i>	Set <i>*CbdataSizePtr</i> to the number of bytes you are providing. This must be an even number.



---

<i>CbdataBuffer</i>	Set <i>*CbdataBuffer</i> to the address of the data you are providing.
<i>CbisLastPtr</i>	Set <i>*CbisLastPtr</i> to TRUE (not zero) when you are returning with the last block of stream data.

### Remarks

**MC\_Stream\_To\_Message** requests that the contents of a “streamed message” (i.e. a message in the form defined by the DICOM standard) be converted and placed in the message object or item object identified by *MessageID*. The streamed message is passed to Merge DICOM Toolkit by *YourStreamToFunction*. Merge DICOM Toolkit repeatedly calls *YourStreamToFunction* until all of the streamed message has been processed.

**MC\_Stream\_To\_Message** can pass data to *YourStreamToFunction* by specifying the data’s address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourStreamToFunction* in *CbuserInfo* each time it is called. *UserInfo* may be NULL.

If an error occurs while processing the stream, Merge DICOM Toolkit will put the tag of the attribute in error in *\*ErrorTagPtr*.

**MC\_Stream\_To\_Message\_With\_Offset** is identical to **MC\_Stream\_To\_Message** except that it returns the byte offset from the beginning of the stream to the next attribute after *StopTag*. If there is not a tag after *StopTag*, the length of the file will be returned.

*StartTag* and *StopTag* specify which attributes in the stream are to be placed in the message object. Any attributes in the stream with tags less than *StartTag* or greater than *StopTag* will be ignored. Neither *StartTag* nor *StopTag* need be in the stream.

*SyntaxType* must be set to **one of the values listed above**. The transfer syntax specifies the byte order used in the streamed message, whether or not each attribute’s value representation is explicitly encoded in the stream, and how the pixel data is encoded in the message.

If the stream contains any attributes with a value representation of SQ (i.e. the stream contains one or more sequence of items), an item object is automatically opened for each item in the stream. The *ItemID* associated with each opened item object is used as the value for each item in the sequence attribute. Later, the **MC\_Get\_Value...** functions may be used to retrieve the *ItemID*’s from the SQ attribute. Then, again using the **MC\_Get\_Value...** functions, the attributes of the *ItemID* object may be retrieved.

**NOTE:** A runtime configuration parameter determines what happens if the input stream contains an attribute which is not in the message. The default is to ignore such attributes (with a warning message logged). If requested, however, such attributes and their values are added to the message. If the Value Representation of the attribute being added cannot be determined, the attribute is given a pseudo Value Representation of “**Unknown\_VR**”. Only the **MC\_Get\_Value\_To\_Buffer** function retrieves the value of such attributes. To change the value of such attributes, **MC\_Set\_Value\_Representation** or **MC\_Set\_pValue\_Representation** must first be called to assign a valid Value Representation to the attribute. If **MC\_Message\_To\_Stream** is used, attributes with unknown VRs are simply copied (memcpy) to the stream with no consideration given to byte ordering.

### *YourStreamToFunction*

It is the responsibility of *YourStreamToFunction* to pass blocks of data back to Merge DICOM Toolkit each time it is called. As a convenience, Merge DICOM Toolkit sets *CBFirstCall* to TRUE (non-zero) the first time it calls *YourStreamToFunction* for this attribute.

*\*CbdataBufferPtr* must be set to the address of the buffer containing the stream data block, and *\*CbdataSizePtr* must be set to the number of bytes placed at *\*CbdataBufferPtr*.

*YourStreamToFunction* must set *\*CbisLast* to TRUE (non-zero) when it is providing the last block of the streamed message.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>YourStreamToFunction</i> or <i>ErrorTagPtr</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid code was used for the <i>SyntaxType</i> parameter.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourStreamToFunction</i> returned with a status other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The <i>CbdataSizePtr</i> parameter returned by the <i>YourStreamToFunction</i> was an uneven number.
<b>MC_CALLBACK_PARM_ERROR</b>	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See <b>MC_Register_Callback_Function</b> .

<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The message contains an invalid tag. The tag is placed at <i>*ErrorTagPtr</i> .
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the stream message (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_UNEXPECTED_EOD</b>	<i>YourStreamToFunction</i> stopped without passing the entire value for an attribute.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value(s) for one of the stream attributes was not legal for its value representation.

Any of the status codes returned by **MC\_Set\_Value** may also be returned.

### See Also

**MC\_Register\_Callback\_Function**      **MC\_Message\_To\_Stream**

## MC\_Thread\_Release

Releases thread specific resources used by the Merge DICOM Toolkit library.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Thread_Release (
    void
)
```

### Remarks

**MC\_Thread\_Release** releases resources allocated for the calling thread.

**MC\_Thread\_Release** should be called before the end of each thread that uses either **MC\_Standard\_Compressor** or **MC\_Standard-Decompressor** to avoid memory leaks in Pegasus libraries from Accusoft.

This call has no effect on platforms that do not support threads.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been initialized by a call to <b>MC_Library_Initialization</b> .

### See Also

**MC\_Library\_Initialization**

## MC\_Unicode\_Get\_Substitution\_Characters

A utility function to retrieve the replacement characters for a DICOM character set encoder.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Unicode_Get_Substitution_Characters (
    char *Charset,
    char *SubChars,
    int *Length
)
```

*Charset*            The DICOM specific character set name  
*SubChars*           The substitution characters  
*Length*             On input the capacity of *SubChars*, on output the number of bytes copied to it

### Remarks

**MC\_Unicode\_Get\_Substitution\_Characters** requires **MC\_Enable\_Unicode\_Conversion** being called first.

*Charset* should be set to a value corresponding to one of the DICOM defined terms for the Specific Character Set (0008,0005).

When returns status is MC\_NORMAL\_COMPLETION, *SubChars* contains the substitution characters as a byte array. *Length* contains how many bytes are in the *SubChars* buffer.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_CANNOT_COMPLY</b>	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
<b>MC_BUFFER_TOO_SMALL</b>	The output buffer doesn't have enough space to hold the output.
<b>MC_NULL_POINTER_PARM</b>	Any of the arguments is null. An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Byte\_To\_Unicode**  
**MC\_Enable\_Unicode\_Conversion**  
**MC\_Get\_Value\_To\_UnicodeString**  
**MC\_Get\_Next\_Value\_To\_UnicodeString** **MC\_Set\_Value\_From\_UnicodeString**  
**MC\_Set\_Next\_Value\_From\_UnicodeString**  
**MC\_Unicode\_To\_Byte**

## MC\_Unicode\_To\_Byte

A utility function to convert Unicode to DICOM character set.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Unicode_To_Byte (
    char **Charsets,
    int NumCharsets,
    const MC_UChar *Val,
    int InLen,
    int BufferSize,
    int *OutLen,
    char *OutVal
)
```

<i>Charsets</i>	An array of character strings from the DICOM specific character set attribute.
<i>NumCharsets</i>	Number of character set strings in the <i>Charsets</i> array
<i>Val</i>	Input Unicode array
<i>InLen</i>	Input Unicode character count
<i>BufferSize</i>	Output buffer size
<i>OutLen</i>	Output length (returned by this call)
<i>OutVal</i>	Output buffer to hold the byte

### Remarks

**MC\_Unicode\_To\_Byte** requires **MC\_Enable\_Unicode\_Conversion** being called first.

*Charsets* should be set to the value of (0008,0005) as an array of character strings. If *NumCharsets* is 0, *Charsets* is NULL or an empty string, the default ISO\_IR 6 (ASCII) character set will be used.

*InLen* can be set to -1 and the toolkit will calculate length if the input Unicode buffer is U+0000 terminated.

When the return status is MC\_NORMAL\_COMPLETION, *OutVal* contains the output multi-byte characters with a NULL terminator. *OutLen* contains the number of bytes present in the *OutVal*/buffer (excluding the terminator).

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_CANNOT_COMPLY</b>	Fail to process the input. Check the Merge DICOM Toolkit log file for details of failure.
<b>MC_BUFFER_TOO_SMALL</b>	The output buffer doesn't have enough space to hold the output.

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC\_Byte\_To\_Unicode****MC\_Byte\_To\_Long\_Unicode****MC\_Long\_Unicode\_To\_Byte****MC\_Enable\_Unicode\_Conversion****MC\_Get\_Value\_To\_UnicodeString****MC\_Get\_Next\_Value\_To\_UnicodeString** **MC\_Set\_Value\_From\_UnicodeString****MC\_Set\_Next\_Value\_From\_UnicodeString****MC\_Validate\_Attribute**

Ensures that an attribute meets DICOM validation criteria.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Validate_Attribute (
    int MessageFileID,
    unsigned long Tag
    VAL_ERR **ErrorInfo,
    VAL_LEVEL ErrorLevel
)
```

*MessageFileID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*Tag* Tag value of the attribute to validate.

*ErrorInfo* The address of a validation error block describing the first violation encountered is returned here if a validation violation occurs. Otherwise NULL is returned here. The block is the **VAL\_ERR** type defined in "mc3msg.h":

```
typedef struct ValErr_struct
{
    unsigned long Tag; /* Tag of attribute with validation
                       violation */
    int MsgItemID; /* ID of message or item object
                   containing the attribute */
    int ValueNumber; /* Value number involved - zero if no
                     value involved */
    MC_STATUS Status; /* Validation violation status code */
    int ParentMsgID; /* ID of parent of message or item
                     object containing the attribute */
    int MsgLevel; /* Nesting level in data set hierarchy
                  of the message or item object
                  containing the attribute; */
} VAL_ERR;
```

<i>ErrorLevel</i>	The level of validation checking is specified here. Use one of the enumerated <b>VAL_LEVEL</b> types defined in “mc3msg.h”:
<i>Validation_Level1:</i>	Report only <u>Errors</u> .
<i>Validation_Level2:</i>	Report <u>Errors</u> and <u>Warnings</u> .
<i>Validation_Level3:</i>	Report <u>Errors</u> , <u>Warnings</u> and <u>Info messages</u> .

## Remarks

The **MC\_Validate\_Attribute** function validates an attribute contained in the object identified by *MessageFileID* to determine if its values are valid. The attribute is validated to ensure that it meets the requirements of the service and command specified when the object was opened by **MC\_Open\_Message** or **MC\_Create\_File**, or when **MC\_Set\_Service\_Command** was called for the object.

**MC\_Validate\_Attribute** has a lower overhead than the **MC\_Validate\_Message** and **MC\_Validate\_File** functions. When validation is only required for a select group of attributes, this function should be called.

While the validation is quite comprehensive there are limitations in validation:

- If the attribute was specified by DICOM Part 3 as being in either a user optional module, or a conditional module, it will always be treated as a Type 3 attribute (optional attribute) by **MC\_Validate\_Attribute**.
- The Ultrasound Image Object used in storage services has mutually exclusive Image, Overlay, and Curve information entities. The attributes defined in these entities are all treated as Type 3 (optional attributes) by **MC\_Validate\_Attribute**.

In any case, **MC\_Validate\_Attribute** is a powerful tool that can catch most all problems with an attribute. The DICOM Standard should always be the final word on whether or not an attribute satisfies the DICOM protocol.

*ErrorLevel* specifies the type of validation violation which will cause the **MC\_Validate\_Attribute** function to return a status of **MC\_DOES\_NOT\_VALIDATE**.

**NOTE:** All validation violations encountered will be logged to the Merge DICOM Toolkit log file, regardless of the level specified in *ErrorLevel*.

A list of validation violations is created and the validation error block describing the first violation is returned at *\*ErrorInfo*. Subsequent violations may be accessed by using the **MC\_Get\_Next\_Validate\_Error** function. If the file validates, the status of **MC\_MESSAGE\_VALIDATES** is returned and NULL is returned at *\*ErrorInfo*. Also, the results of the validation are logged into the message log (usually merge.log) at the T5\_MESSAGE level.

**WARNINGS:****Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_MESSAGE_VALIDATES</b>	The attribute contained no validation violations of the type specified in <i>ErrorLevel</i> .
<b>MC_DOES_NOT_VALIDATE</b>	The attribute contained at least one validation violation of the type specified in <i>ErrorLevel</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageFileID</i> does not identify a valid message or file object.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	<i>Tag</i> was not in the message.
<b>MC_MSGFILE_ERROR</b>	An error occurred involving the message info file for the file object. The exact error is logged in the Merge DICOM Toolkit log file.
<b>MC_INVALID_ITEM_ID</b>	The message or file object contains a sequence of items attribute with an invalid item ID value.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**Validation Violations**

If a status of **MC\_DOES\_NOT\_VALIDATE** is returned, the status of the first validation violation is returned at *ErrorInfo->Status*. The violation status codes are defined in “**mcstatus.h**”. They are arranged by violation type below:

**INFO MESSAGES:**

<b>MC_NO_CONDITION_FUNCTION</b>	The attribute’s DICOM type is “1C” or “2C” and no function was available to check the condition. A user-defined condition function was not correctly linked with the program.
<b>MC_UNABLE_TO_CHECK_CONDITION</b>	Not enough information is available to check whether or not a DICOM type “1C” or “2C” attribute is required.
<b>MC_NOT_ONE_OF_DEFINED_TERMS</b>	A value set for this attribute is not one of the valid defined terms assigned to this attribute.
<b>MC_NON_SERVICE_ATTRIBUTE</b>	The attribute is not one of those defined for the file’s service. Note that private attributes will not cause this violation

**ERRORS:**

<b>MC_INVALID_VR_CODE</b>	The attribute’s value representation is unknown.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	An attribute which is required for the message service has been deleted from the file object.
<b>MC_REQUIRED_VALUE_MISSING</b>	The attribute is required to have a value and does not.
<b>MC_VALUE_MAY_NOT_BE_NULL</b>	The attribute is DICOM type “1” or type “1C” and it has been encoded with a NULL value.



<b>MC_VALUE_NOT_ALLOWED</b>	This DICOM type “1C” or type “2C” attribute may not have a value under current conditions.
<b>MC_TOO_FEW_VALUES</b>	The attribute is required to have more values set.
<b>MC_TOO_MANY_VALUES</b>	The attribute has more values set than are allowed.
<b>MC_INVALID_ITEM_ID</b>	This sequence of items (SQ) attribute has an invalid value assigned to it.
<b>MC_NOT_ONE_OF_ENUMERATED_VALUES</b>	A value set for this attribute is not one of the valid enumerated values assigned to this attribute.
<b>MC_INVALID_VALUE_FOR_VR</b>	A value for this attribute does not conform to the requirements of its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for this attribute does not contain valid characters for its value representation.

### See Also

**MC\_Get\_Next\_Validate\_Error**      **MC\_Validate\_Message** **MC\_Validate\_File**

## MC\_Validate\_File

Ensures that a file meets DICOM validation criteria.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_Validate_File (
    int FileID,
    VAL_ERR **ErrorInfo,
    VAL_LEVEL ErrorLevel
)
```

*FileID*            The identifier assigned to this object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*ErrorInfo*        The address of a validation error block describing the first violation encountered is returned here if a validation violation occurs. Otherwise NULL is returned here. The block is the **VAL\_ERR** type defined in “mc3msg.h”:

```
typedef struct ValErr_struct
{
    unsigned long Tag;    /* Tag of attribute with validation
                           violation */
    int MsgItemID;        /* ID of message or item object
                           containing the attribute */
    int ValueNumber;     /* Value number involved - zero if no
                           value involved */
    MC_STATUS Status;    /* Validation violation status code */
    int ParentMsgID;     /* ID of parent of message or item
                           object containing the attribute */
    int MsgLevel;        /* Nesting level in data set hierarchy
                           of the message or item object
                           containing the attribute; */
}
```

---

```
} VAL_ERR;
```

*ErrorLevel* The level of validation checking is specified here. Use one of the enumerated **VAL\_LEVEL** types defined in “mc3msg.h”:

*Validation\_Level1:* Report only Errors.

*Validation\_Level2:* Report Errors and Warnings.

*Validation\_Level3:* Report Errors, Warnings and Info messages.

### Remarks

The **MC\_Validate\_File** function validates the file identified by *FileID* to determine that required attributes are present and that all attribute values are valid. The file is validated to ensure that it meets the requirements of the service and command specified when the message was opened with **MC\_Create\_File** or when **MC\_Set\_Service\_Command** was called for the file object. If the file was opened with **MC\_Create\_Empty\_File**, the **MC\_Set\_Service\_Command** function must be called to specify the service and command to validate against.

While the validation is quite comprehensive there are limitations in validating files:

- If the attribute was specified by DICOM Part 3 as being in either a user optional module, or a conditional module, it will always be treated as a Type 3 attribute (optional attribute) by **MC\_Validate\_File**.
- The Ultrasound Image Object used in storage services has mutually exclusive Image, Overlay, and Curve information entities. The attributes defined in these entities are all treated as Type 3 (optional attributes) by **MC\_Validate\_File**.
- **MC\_Validate\_File** does not validate properly for application profiles that modify the standard content of a message.

In any case, **MC\_Validate\_File** is a powerful tool that can catch most all problems with a file. The DICOM Standard should always be the final word on whether or not a file satisfies the DICOM protocol.

*ErrorLevel* specifies the type of validation violation which will cause the **MC\_Validate\_File** function to return a status of **MC\_DOES\_NOT\_VALIDATE**.

**NOTE:** All validation violations encountered will be logged to the Merge DICOM Toolkit log file, regardless of the level specified in *ErrorLevel*.

A list of validation violations is created and the validation error block describing the first violation is returned at *\*ErrorInfo*. Subsequent violations may be accessed by using the **MC\_Get\_Next\_Validate\_Error** function. If the file validates, the status of **MC\_MESSAGE\_VALIDATES** is returned, and NULL is returned at *\*ErrorInfo*. Also, the results of the validation are logged into the message log (usually merge.log) at the T5\_MESSAGE level.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
-------	---------

---

<b>MC_MESSAGE_VALIDATES</b>	The file object contained no validation violations of the type specified in <i>ErrorLevel</i> .
<b>MC_DOES_NOT_VALIDATE</b>	The file object contained at least one validation violation of the type specified in <i>ErrorLevel</i> .
<b>MC_INVALID_FILE_ID</b>	<i>FileID</i> does not identify a valid file object.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred involving the message info file for the file object. The exact error is logged in the Merge DICOM Toolkit log file.
<b>MC_INVALID_ITEM_ID</b>	The file object contains a sequence of items attribute with an invalid item ID value.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### Validation Violations

If a status of **MC\_DOES\_NOT\_VALIDATE** is returned, the status of the first validation violation is returned at *ErrorInfo->Status*. The violation status codes are defined in "**mcstatus.h**". They are arranged by violation type below:

### INFO MESSAGES:

---

<b>MC_NO_CONDITION_FUNCTION</b>	The attribute's DICOM type is "1C" or "2C" and no function was available to check the condition. A user-defined condition function was not correctly linked with the program.
<b>MC_UNABLE_TO_CHECK_CONDITION</b>	Not enough information is available to check whether or not a DICOM type "1C" or "2C" attribute is required.

### WARNINGS:

---

<b>MC_NOT_ONE_OF_DEFINED_TERMS</b>	A value set for this attribute is not one of the valid defined terms assigned to this attribute.
<b>MC_NON_SERVICE_ATTRIBUTE</b>	The attribute is not one of those defined for the file's service. Note that private attributes will not cause this violation

### ERRORS:

---

<b>MC_INVALID_VR_CODE</b>	The attribute's value representation is unknown.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	An attribute which is required for the message service has been deleted from the file object.
<b>MC_REQUIRED_VALUE_MISSING</b>	The attribute is required to have a value and does not.
<b>MC_VALUE_MAY_NOT_BE_NULL</b>	The attribute is DICOM type "1" or type "1C" and it has been encoded with a NULL value.

<b>MC_VALUE_NOT_ALLOWED</b>	This DICOM type “1C” or type “2C” attribute may not have a value under current conditions.
<b>MC_TOO_FEW_VALUES</b>	The attribute is required to have more values set.
<b>MC_TOO_MANY_VALUES</b>	The attribute has more values set than are allowed.
<b>MC_INVALID_ITEM_ID</b>	This sequence of items (SQ) attribute has an invalid value assigned to it.
<b>MC_NOT_ONE_OF_ENUMERATED_VALUES</b>	A value set for this attribute is not one of the valid enumerated values assigned to this attribute.
<b>MC_INVALID_VALUE_FOR_VR</b>	A value for this attribute does not conform to the requirements of its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for this attribute does not contain valid characters for its value representation.

### See Also

**MC\_Get\_Next\_Validate\_Error**      **MC\_Validate\_Message** **MC\_Validate\_Attribute**

## MC\_Validate\_Message

Ensures that a message meets DICOM validation criteria.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_Validate_Message (
    int MessageID,
    VAL_ERR **ErrorInfo,
    VAL_LEVEL ErrorLevel
)
```

*MessageID*

The message object’s identification number

*ErrorInfo*

The address of a validation error block describing the first violation encountered is returned here if a validation violation occurs. Otherwise NULL is returned here. The block is the **VAL\_ERR** type defined in “mc3msg.h”:

```
typedef struct ValErr_struct
{
    unsigned long Tag; /* Tag of attribute with validation
                       violation */
    int MsgItemID; /* ID of message or item object
                  containing the attribute */
    int ValueNumber; /* Value number involved - zero if no
                    value involved */
    MC_STATUS Status; /* Validation violation status code */
    int ParentMsgID; /* ID of parent of message or item
                    */
};
```

```

    object containing the attribute */
    int MsgLevel;          /* Nesting level in data set hierarchy
                           of the message or item object
                           containing the attribute; */
} VAL_ERR;

ErrorLevel    The level of validation checking is specified here. Use one of
               the enumerated VAL_LEVEL types defined in "mc3msg.h":
               Validation_Level1:    Report only Errors.
               Validation_Level2:    Report Errors and Warnings.
               Validation_Level3:    Report Errors, Warnings and Info
                                   messages.

```

## Remarks

**MC\_Validate\_Message** validates the message identified by *MessageID* to determine that required attributes are present and that all attribute values are valid. The message is validated to ensure that it meets the requirements of the service and command specified when the message was opened by **MC\_Open\_Message**. If the message was opened with **MC\_Open\_Empty\_Message**, the **MC\_Set\_Service\_Command** function must be called to specify the service and command to validate against.

While the validation is quite comprehensive there are limitations in validating messages opened for composite services:

- If the attribute was specified by DICOM Part 3 as being in either a user optional module, or a conditional module, it will always be treated as a Type 3 attribute (optional attribute) by **MC\_Validate\_Message**.
- The Nuclear Medicine and Ultrasound Image Objects used in storage services have mutually exclusive Image, Overlay, and Curve information entities. The attributes defined in these entities are all treated as Type 3 (optional attributes) by **MC\_Validate\_Message**.
- For normalized services using the N-EVENT-REPORT command, the actual contents of a message specified in DICOM Part 4 are dependent on the Event Type ID being communicated. All attributes used for all Event Type ID's are treated as Type 3 by **MC\_Validate\_Message**.
- Unique keys used within C-FIND-RQ messages for each of the Query/Retrieve service classes are not validated properly because the differences in what is required for request and response messages. The C-FIND-RSP messages are validated properly. An error is also reported when a unique key is set to NULL. This is an invalid error for the unique keys at the level that is being queried.

In any case, **MC\_Validate\_Message** is a powerful tool that can catch most all problems with a message. The DICOM Standard should always be the final word on whether or not a message satisfies the DICOM protocol.

*ErrorLevel* specifies the type of validation violation which will cause the **MC\_Validate\_Message** function to return a status of **MC\_DOES\_NOT\_VALIDATE**. Note, however, that all validation violations encountered will be logged to the Merge DICOM Toolkit log file, regardless of the level specified in *ErrorLevel*.

A list of validation violations is created and the validation error block describing the first violation is returned at *\*ErrorInfo*. Subsequent violations may be accessed by using the **MC\_Get\_Next\_Validate\_Error** function. If the message validates, the status of **MC\_MESSAGE\_VALIDATES** is returned and NULL is returned at *\*ErrorInfo*. Also, the results of the validation are logged into the message log (usually merge.log) at the T5\_MESSAGE level.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_MESSAGE_VALIDATES</b>	The message contained no validation violations of the type specified in <i>ErrorLevel</i> .
<b>MC_DOES_NOT_VALIDATE</b>	The message contained at least one validation violation of the type specified in <i>ErrorLevel</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> does not identify a valid message object.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_MSGFILE_ERROR</b>	An error occurred involving the message info file for the message. The exact error is logged in the Merge DICOM Toolkit log file.
<b>MC_INVALID_ITEM_ID</b>	The message contains a sequence of items attribute with an invalid item ID value.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### Validation Violations

If a status of **MC\_DOES\_NOT\_VALIDATE** is returned, the status of the first validation violation is returned at *ErrorInfo->Status*. The violation status codes are defined in “**mcstatus.h**”. They are arranged by violation type below:

#### INFO MESSAGES:

<b>MC_NO_CONDITION_FUNCTION</b>	The attribute’s DICOM type is “1C” or “2C” and no function was available to check the condition. A user-defined condition function was not correctly linked with the program.
<b>MC_UNABLE_TO_CHECK_CONDITION</b>	Not enough information is available to check whether or not a DICOM type “1C” or “2C” attribute is required.

#### WARNINGS:

<b>MC_NOT_ONE_OF_DEFINED_TERMS</b>	A value set for this attribute is not one of the valid defined terms assigned to this attribute.
<b>MC_NON_SERVICE_ATTRIBUTE</b>	The attribute is not one of those defined for the message’s service. Note that private attributes will not cause this violation

#### ERRORS:

<b>MC_INVALID_VR_CODE</b>	The attribute’s value representation is unknown.
---------------------------	--

**MC\_REQUIRED\_ATTRIBUTE\_MISSING**

An attribute which is required for the message service has been deleted from the message object.

**MC\_REQUIRED\_VALUE\_MISSING**

The attribute is required to have a value and does not.

**MC\_VALUE\_MAY\_NOT\_BE\_NULL**

The attribute is DICOM type “1” or type “1C” and it has been encoded with a NULL value.

**MC\_VALUE\_NOT\_ALLOWED**

This DICOM type “1C” or type “2C” attribute may not have a value under current conditions.

**MC\_TOO\_FEW\_VALUES**

The attribute is required to have more values set.

**MC\_TOO\_MANY\_VALUES**

The attribute has more values set than are allowed.

**MC\_INVALID\_ITEM\_ID**

This sequence of items (SQ) attribute has an invalid value assigned to it.

**MC\_NOT\_ONE\_OF\_ENUMERATED\_VALUES**

A value set for this attribute is not one of the valid enumerated values assigned to this attribute.

**MC\_INVALID\_VALUE\_FOR\_VR**

A value for this attribute does not conform to the requirements of its value representation.

**MC\_INVALID\_CHARS\_IN\_VALUE**

A value for this attribute does not contain valid characters for its value representation.

**See Also****MC\_Get\_Next\_Validate\_Error****MC\_Validate\_Attribute****MC\_Wait\_For\_Association****MC\_Wait\_For\_Association\_On\_Port****MC\_Wait\_For\_Association\_On\_Address**

Waits for an association request from a remote DICOM application

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC_Wait_For_Association (
    char *ServiceList,
    int Timeout,
    int *ApplicationID,
    int *AssociationID
)
```

```
MC_STATUS MC_Wait_For_Association_On_Port (
    char *ServiceList,
    int Timeout,
    int ApplicationID,
    int Port,
    int *AssociationID
)
```

```

MC_STATUS MC_Wait_For_Association_On_Address (
    char *ServiceList,
    int Timeout,
    int ApplicationID,
    int Port,
    const char *Address,
    int *AssociationID
)

```

<i>ServiceList</i>	Name of a service list in the Merge DICOM Toolkit configuration file.
<i>Timeout</i>	The maximum time (in seconds) to wait for an association request to arrive. A value of zero (0) means “check one time” and a value of minus one (-1) means “wait forever”.
<i>ApplicationID</i>	The identification number of a previously registered application is returned here, or the application ID to negotiate is supplied here.
<i>AssociationID</i>	The identification number of an association object is returned here.
<i>Port</i>	Port number to listen on.
<i>Address</i>	The network name or IP address of the network interface to listen on. If this argument is NULL the toolkit will accept connections on all available network interfaces.

### Remarks

**MC\_Wait\_For\_Association**, **MC\_Wait\_For\_Association\_On\_Port** and **MC\_Wait\_For\_Association\_On\_Address** are used to wait for a remote DICOM application to make a request for an association with one of the applications previously registered using the **MC\_Register\_Application** function. **MC\_Wait\_For\_Association** will negotiate for all applications registered with **MC\_Register\_Application**, while **MC\_Wait\_For\_Association\_On\_Port** and **MC\_Wait\_For\_Association\_On\_Address** will only negotiate associations for the specific Application passed to the call.

If *Timeout* is a positive number Merge DICOM Toolkit will wait no longer than *Timeout* seconds for an association request. If *Timeout* is negative, Merge DICOM Toolkit will not return until an association request has arrived or an error occurs. If *Timeout* is zero, Merge DICOM Toolkit will check one time for the arrival of an association request and return. A status of MC\_TIMEOUT is returned if no valid association request is received in the specified time period.

*ServiceList* is the name of a section in the Merge DICOM Toolkit configuration file which specifies which DICOM services the registered applications are willing to provide. If a request for any one of these services is received, this function returns MC\_NORMAL\_COMPLETION and sets *\*AssociationID* to the identification number of an association object. *AssociationID* is then used in other association function calls to identify this negotiated connection.

Normally, if an association request is received for an application whose title is not registered or is not specified on a call to **MC\_Wait\_For\_Association\_On\_Port** or **MC\_Wait\_For\_Association\_On\_Address**, Merge DICOM Toolkit rejects the association request and



continues to wait for a valid association request. Optionally, “ACCEPT\_ANY\_APPLICATION\_TITLE = YES” may be specified in the Merge DICOM Toolkit system profile. In that case, requests for associations with an unregistered application will be given to the first registered application entity title which has been registered with **MC\_Register\_Application**.

Merge DICOM Toolkit validates each received association request based on the protocol rules of DICOM and on configurable specifications contained in the Merge DICOM Toolkit system profile. An association request is rejected if it does not validate.

Upon successful completion (MC\_NORMAL\_COMPLETION returned) of **MC\_Wait\_For\_Association**, *\*ApplicationID* is set to the identification number of a registered application. In all other cases, both *\*ApplicationID* and *\*AssociationID* are not valid.

Upon successful completion, the caller may examine any expected extended negotiation information by using the **MC\_Get\_Negotiation\_Info** function. The caller must respond to the association requestor by using either **MC\_Accept\_Association** or **MC\_Reject\_Association** before any message exchange can occur over the association.

The listen port can be changed!

The port that **MC\_Wait\_For\_Association** listens on can be changed while an application is running by calling **MC\_Set\_Int\_Config\_Value** to set the TCPIP\_LISTEN\_PORT configuration option. The next call to **MC\_Wait\_For\_Association** after this configuration option has changed will stop listening on the previous listen port and start listening on the newly configured listen port.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_NEGOTIATION_ABORTED</b>	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the <b>MC_Wait_For_Association</b> call.
<b>MC_ASSOCIATION_REJECTED</b>	An incoming association was aborted because no services were acceptable.
<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the <b>MC_Wait_For_Association</b> call.
<b>MC_NULL_POINTER_PARM</b>	<i>AssociationID</i> , <i>ApplicationID</i> or <i>ServiceList</i> parameter was NULL.
<b>MC_NO_APPLICATIONS_REGISTERED</b>	No applications have been registered using <b>MC_Register_Application</b> .
<b>MC_INVALID_SERVICE_LIST_NAME</b>	<i>ServiceList</i> points at a null string.
<b>MC_CONFIG_INFO_MISSING</b>	Could not access <i>ServiceList</i> configuration parameters.
<b>MC_CONFIG_INFO_ERROR</b>	The <i>ServiceList</i> contained too many services.

**MC\_SYSTEM\_ERROR** An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Open\_Association**                      **MC\_Open\_Secure\_Association** **MC\_Get\_Negotiation\_Info**  
**MC\_Accept\_Association**  
**MC\_Reject\_Association**                      **MC\_Wait\_For\_Secure\_Association**  
**MC\_Close\_Listen\_Port**                      **MC\_Wait\_For\_Connection**  
**MC\_Close\_Listen\_Port\_On\_Address** **MC\_Wait\_For\_Connection\_On\_Port**  
**MC\_Process\_Association\_Request** **MC\_Wait\_For\_Connection\_On\_Address**  
**MC\_Process\_Secure\_Association\_Request**  
**MC\_Wait\_For\_Secure\_Association\_On\_Address**

## MC\_Wait\_For\_Connection

### MC\_Wait\_For\_Connection\_On\_Port

### MC\_Wait\_For\_Connection\_On\_Address

Waits for an incoming network connection from a remote DICOM application

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Wait_For_Connection (
    int Timeout,
    MC_SOCKET *Socket
)

MC_STATUS MC_Wait_For_Connection_On_Port (
    int Timeout,
    int Port,
    MC_SOCKET *Socket
)

MC_STATUS MC_Wait_For_Connection_On_Address (
    int Timeout,
    int Port,
    const char *Address,
    MC_SOCKET *Socket
)
```

*Timeout*                      The maximum time (in seconds) to wait for an association request to arrive. A value of zero (0) means “check one time” and a value of minus one (-1) means “wait forever”.

*Socket*                      The socket for which the incoming connection has been accepted is returned here.

*Port*                      Port number to listen on.

---

*Address* Address of the network interface to listen on. This can be the IP address or the network name of the interface. If this argument is NULL, the listener will be set up on all available network interfaces.

### Remarks

**MC\_Wait\_For\_Connection**, **MC\_Wait\_For\_Connection\_On\_Port** and **MC\_Wait\_For\_Connection\_On\_Address** are used to wait for a remote DICOM application to make a request for an association to this application. These routines work in conjunction with the **MC\_Process\_Association\_Request** and **MC\_Process\_Secure\_Association\_Request** functions which actually process the incoming association request.

If *Timeout* is a positive number Merge DICOM Toolkit will wait no longer than *Timeout* seconds for an association request. If *Timeout* is negative, Merge DICOM Toolkit will not return until an association request has arrived or an error occurs. If *Timeout* is zero, Merge DICOM Toolkit will check one time for the arrival of an association request and return. A status of MC\_TIMEOUT is returned if no valid association request is received in the specified time period.

These functions were introduced to address a problem with the **MC\_Wait\_For\_Association** function where a poorly performing DICOM application connecting to Merge DICOM Toolkit could cause delays in processing DICOM associations. With **MC\_Wait\_For\_Association**, when Merge DICOM Toolkit receives an association, it will not process other new incoming connections until it has read the initial association request from the network. The **MC\_Wait\_For\_Connection**, **MC\_Wait\_For\_Connection\_On\_Port** and **MC\_Wait\_For\_Connection\_On\_Address** routines allow an application to create a thread or process to handle a new network connection as soon as it is received to eliminate this problem. The routines do not read any data from the network connection after it has been accepted.

After a **MC\_Wait\_For\_Connection** returns, the socket returned must be passed to **MC\_Process\_Association\_Request** or **MC\_Process\_Secure\_Association\_Request** for the association to be negotiated.

The listen port can be changed!

The port that **MC\_Wait\_For\_Connection** listens on can be changed while an application is running by calling **MC\_Set\_Int\_Config\_Value** to set the TCPIP\_LISTEN\_PORT configuration option. The next call to **MC\_Wait\_For\_Connection** after this configuration option has changed will stop listening on the previous listen port and start listening on the newly configured listen port.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the <b>MC_Wait_For_Connection</b> call.

<b>MC_UNKNOWN_HOST_CONNECTED</b>	A host whose remote hostname could be resolved has attempted to connect and the connection has been dropped.
<b>MC_NEGOTIATION_ABORTED</b>	An unexpected network error occurred when attempting to accept the connection.
<b>MC_NULL_POINTER_PARM</b>	The <i>Socket</i> parameter was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b>
<b>MC_Wait_For_Secure_Association</b>	<b>MC_Close_Listen_Port</b>
<b>MC_Close_Listen_Port_On_Address</b>	<b>MC_Wait_For_Association</b>
<b>MC_Wait_For_Association_On_Port</b>	<b>MC_Process_Association_Request</b>
<b>MC_Wait_For_Association_On_Address</b>	
<b>MC_Wait_For_Secure_Association_On_Address</b>	
<b>MC_Process_Secure_Association_Request</b>	
<b>MC_Release_Parent_Connection</b>	

### MC\_Wait\_For\_Secure\_Association MC\_Wait\_For\_Secure\_Association\_On\_Port MC\_Wait\_For\_Secure\_Association\_On\_Address

Waits for an association request from a remote DICOM application using a secure socket connection.

### Synopsis

```
#include "mergecom.h"

MC_STATUS MC_Wait_For_Secure_Association (
    char *ServiceList,
    int Timeout,
    int *ApplicationID,
    int *AssociationID,
    SecureSocketFunctions *SS_functions,
    void *SS_context
)

MC_STATUS MC_Wait_For_Secure_Association_On_Port (
    char *ServiceList,
    int Timeout,
    int ApplicationID,
    int Port,
    int *AssociationID,
    SecureSocketFunctions *SS_functions,
    void *SS_context
)

MC_STATUS MC_Wait_For_Secure_Association_On_Address (
    char *ServiceList,
    int Timeout,
    int ApplicationID,
```

```

    int Port,
    const char *Address,
    int *AssociationID,
    SecureSocketFunctions *SS_functions,
    void *SS_context
)

```

<i>ServiceList</i>	Name of a service list in the Merge DICOM Toolkit configuration file.
<i>Timeout</i>	The maximum time (in seconds) to wait for an association request to arrive. A value of zero (0) means “check one time” and a value of minus one (-1) means “wait forever”.
<i>ApplicationID</i>	The identification number of a previously registered application is returned here, or the application ID to negotiate is supplied here.
<i>AssociationID</i>	The identification number of an association object is returned here.
<i>Port</i>	Port number to listen on.
<i>Address</i>	The network name or IP address of the network interface to listen on. If this argument is NULL the toolkit will accept connections on all available network interfaces.
<i>SS_functions</i>	Pointer to a structure containing functions that will be called by Merge DICOM Toolkit while processing network I/O over the secure connection. (see below)
<i>SS_context</i>	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in <i>SS_functions</i> .

### Remarks

Use **MC\_Wait\_For\_Secure\_Association**, **MC\_Wait\_For\_Secure\_Association\_On\_Port** and **MC\_Wait\_For\_Secure\_Association\_On\_Address** to wait for a remote DICOM application to make a request for an association with one of the applications previously registered using the **MC\_Register\_Application** function. **MC\_Wait\_For\_Secure\_Association** will negotiate for all applications registered with **MC\_Register\_Application**, while **MC\_Wait\_For\_Secure\_Association\_On\_Port** and **MC\_Wait\_For\_Secure\_Association\_On\_Address** will only negotiate associations for the specific Application passed to the call.

If *Timeout* is a positive number Merge DICOM Toolkit will wait no longer than *Timeout* seconds for an association request to arrive. If *Timeout* is negative, Merge DICOM Toolkit will not return until an association request has arrived or an error occurs. If *Timeout* is zero, Merge DICOM Toolkit will check one time for the arrival of an association request and return. A status of MC\_TIMEOUT is returned if no valid association request is received in the specified time period.

*ServiceList* is the name of a section in the Merge DICOM Toolkit configuration file which specifies which DICOM services the registered applications are willing to provide. If a request for any one of these services is received, this function returns MC\_NORMAL\_COMPLETION and sets *\*AssociationID* to the identification number of an association object. *AssociationID* is then used in other association function calls to identify this negotiated connection.

Normally, if an association request is received for an application whose title is not registered or is not specified on a call to **MC\_Wait\_For\_Secure\_Association\_On\_Port** or **MC\_Wait\_For\_Secure\_Association\_On\_Address**, Merge DICOM Toolkit rejects the association request and continues to wait for a valid association request. Optionally, “ACCEPT\_ANY\_APPLICATION\_TITLE = YES” may be specified in the Merge DICOM Toolkit system profile. In that case, requests for associations with an unregistered application will be given to the first registered application entity title which has been registered with **MC\_Register\_Application**.

Merge DICOM Toolkit validates each received association request based on the protocol rules of DICOM and on configurable specifications contained in the Merge DICOM Toolkit system profile. An association request is rejected if it does not validate.

Upon successful completion (MC\_NORMAL\_COMPLETION returned) of **MC\_Wait\_For\_Secure\_Association**, *\*ApplicationID* is set to the identification number of a registered application. In all other cases, both *\*ApplicationID* and *\*AssociationID* are not valid.

Upon successful completion, the caller may examine any expected extended negotiation information by using the **MC\_Get\_Negotiation\_Info** function. The caller must respond to the association requestor by using either **MC\_Accept\_Association** or **MC\_Reject\_Association** before any message exchange can occur over the association.

The listen port can be changed!

The port that **MC\_Wait\_For\_Secure\_Association** listens on can be changed while an application is running by calling **MC\_Set\_Int\_Config\_Value** to set the TCPIP\_LISTEN\_PORT configuration option. The next call to **MC\_Wait\_For\_Secure\_Association** after this configuration option has changed will stop listening on the previous listen port and start listening on the newly configured listen port.

### **SecureSocketFunctions**

When using the **MC\_Wait\_For\_Secure\_Association**, **MC\_Wait\_For\_Secure\_Association\_On\_Port** or **MC\_Wait\_For\_Secure\_Association\_On\_Address** calls, Merge DICOM Toolkit establishes a TCP/IP connection and then calls the functions provided by the *SS\_functions* parameter to establish the secure connection and to pass data through the secure connection. The *SS\_functions* are responsible for sending and receiving all data through the secure connection, thus allowing them to do so using a secure protocol such as Secure Socket Layer (SSL). Merge DICOM Toolkit closes the underlying TCP/IP connection when all association processing has completed and after it calls the **SS\_Session\_Shutdown** callback.

The **SecureSocketFunctions** structure is declared in mergecom.h as follows:

```
typedef struct MC_Secure_Socket_Functions_Struct
{
    SS_STATUS (NOEXP_FUNC *SS_Session_Start) (
        MC_SOCKET      SocketToUse,
        CONN_TYPE     ConnectionType,
        void           *ApplicationContext,
```

---

```

        void          **SecurityContext
    );
    SS_STATUS (NOEXP_FUNC *SS_Read) (
        void          *SScontext,
        void          *ApplicationContext,
        char          *Buffer,
        unsigned int  BytesToRead,
        unsigned int  *BytesRead,
        int           Timeout
    );
    SS_STATUS (NOEXP_FUNC *SS_Write) (
        void          *SScontext,
        void          *ApplicationContext,
        char          *Buffer,
        unsigned int  BytesToWrite,
        unsigned int  *BytesWritten,
        int           Timeout
    );
    void (NOEXP_FUNC *SS_Session_Shutdown) (
        void          *SScontext,
        void          *ApplicationContext
    );
} SecureSocketFunctions;

```

You must provide valid function pointers for each of the four fields in the **SecureSocketFunctions** structure.

### SS\_Session\_Start

Merge DICOM Toolkit calls the **SS\_Session\_Start** function just after it has accepted the TCP/IP connect request made by the remote host. The *SocketToUse* parameter contains the socket assigned to the connection. Please note that the connection is non-blocking. The *ApplicationContext* parameter is the presented by the *SS\_context* parameter of the **MC\_Wait\_For\_Secure\_Association** call. *ConnectionType* will be the manifest constant ACCEPTOR\_CONNECTION if the **SS\_Session\_Start** function is called as a result of a **MC\_Wait\_For\_Secure\_Association** call. (It will be REQUESTER\_CONNECTION if it is called as a result of a **MC\_Open\_Secure\_Association** call.)

The **SS\_Session\_Start** function is responsible for establishing a secure connection using the socket provided. It is assumed, but not required, that the connection will be a Secure Socket Layer (SSL) or Transport Layer Socket (TLS) connection. A pointer to a context block should be returned at *\*SecurityContext* if the secure connection is established. Merge DICOM Toolkit will provide this pointer when it calls the other callback functions.

**SS\_Session\_Start** must return SS\_NORMAL\_COMPLETION if the secure connection was successfully established, otherwise SS\_ERROR must be returned. If it returns SS\_ERROR, the TCP/IP connection will be closed and the **MC\_Wait\_For\_Secure\_Association** call will return a status of **MC\_NEGOTIATION\_ABORTED**.

### SS\_Session\_Shutdown

Merge DICOM Toolkit calls the **SS\_Session\_Shutdown** function when the association is aborted or closed. It is the responsibility of the **SS\_Session\_Shutdown** function to gracefully close the secure network connection. Merge DICOM Toolkit closes the TCP/IP socket connection after calling



**SS\_Session\_Shutdown.** The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Wait\_For\_Secure\_Association** call, and the *Sscontext* parameter is that previously returned by the **SS\_Session\_Start** function.

### SS\_Read

Merge DICOM Toolkit calls the **SS\_Read** function whenever it needs association data from the secure connection. The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Wait\_For\_Secure\_Association** call, and the *Sscontext* parameter is that previously returned by the **SS\_Session\_Start** function. It is the responsibility of the **SS\_Read** function to retrieve into *Buffer* the number of unencrypted data bytes specified by *BytesToRead*. The actual number of bytes placed in the *Buffer* is returned at *\*BytesRead*. SS\_NORMAL\_COMPLETION must be returned if the read request was satisfied.

If the **SS\_Read** function cannot retrieve *BytesToRead* bytes in *Timeout* seconds, it must return SS\_TIMEOUT. Please note that the socket connection passed by Merge DICOM Toolkit to the **SS\_Session\_Start** function is non-blocking. (Note that if SS\_TIMEOUT is returned, an outstanding MC\_Read\_Message call will return MC\_TIMEOUT.)

If it is determined that the secure socket connection has closed, or that the underlying transport has closed, SS\_SESSION\_CLOSED must be returned. This should only occur during a DICOM association if the remote host aborted the association. If a fatal error occurs while processing the read request, SS\_ERROR must be returned. (Note that if SS\_SESSION\_CLOSED or SS\_ERROR is returned, an outstanding MC\_Read\_Message call will return MC\_NETWORK\_SHUT\_DOWN.)

### SS\_Write

Merge DICOM Toolkit calls the **SS\_Write** function whenever it needs to send association data over the secure connection. The *ApplicationContext* parameter is that presented by the *SS\_context* parameter of the **MC\_Wait\_For\_Secure\_Association** call, and the *Sscontext* parameter is that previously returned by the **SS\_Session\_Start** function. It is the responsibility of the **SS\_Write** function to send *BytesToWrite* bytes of the data in *Buffer* over the secure connection, returning the number of bytes actually written at *\*BytesWritten*. SS\_NORMAL\_COMPLETION must be returned if the write request was satisfied.

If the **SS\_Write** function cannot send *BytesToWrite* bytes in *Timeout* seconds, it must return SS\_TIMEOUT. Please note that the socket connection passed by Merge DICOM Toolkit to the **SS\_Session\_Start** function is non-blocking.

If a fatal error occurs while processing the write request, SS\_ERROR must be returned.

**NOTE:** If SS\_ERROR is returned, an outstanding MC\_Send\_Request\_Message, MC\_Send\_Response\_Message or MC\_Send\_Response call will return MC\_SYSTEM\_ERROR.)

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------



<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_NEGOTIATION_ABORTED</b>	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the <b>MC_Wait_For_Secure_Association</b> call. This will also be returned if the <b>SS_Session_Start</b> callback function returned an SS_ERROR status.
<b>MC_ASSOCIATION_REJECTED</b>	An incoming association was aborted because no services were acceptable.
<b>MC_SYSTEM_CALL_INTERRUPTED</b>	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the <b>MC_Wait_For_Secure_Association</b> call.
<b>MC_NULL_POINTER_PARM</b>	<i>AssociationID</i> , <i>ApplicationID</i> , <i>SS_functions</i> or <i>ServiceList</i> parameter was NULL.
<b>MC_NULL_VALUE</b>	One or more of the function parameters within <i>SS_functions</i> was NULL.
<b>MC_NO_APPLICATIONS_REGISTERED</b>	No applications have been registered using <b>MC_Register_Application</b> .
<b>MC_INVALID_SERVICE_LIST_NAME</b>	<i>ServiceList</i> points at a null string.
<b>MC_CONFIG_INFO_MISSING</b>	Could not access <i>ServiceList</i> configuration parameters.
<b>MC_CONFIG_INFO_ERROR</b>	The <i>ServiceList</i> contained too many services.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC_Open_Association</b>	<b>MC_Open_Secure_Association</b> <b>MC_Get_Negotiation_Info</b> <b>MC_Accept_Association</b>
<b>MC_Reject_Association</b>	<b>MC_Wait_For_Association</b> <b>MC_Close_Listen_Port</b> <b>MC_Close_Listen_Port_On_Address</b>

## MC\_Write\_File

### MC\_Write\_File\_By\_Callback

Writes a file object to media.

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_Write_File (
    int FileID,
    int NumBytes,
    void *UserInfo,
```

---

```

    MC_STATUS (*YourToMediaFunction()
)
MC_STATUS MC_Write_File_By_Callback (
    int ApplicationID,
    int FileID,
    int NumBytes,
    void *UserInfo,
    MC_STATUS (*YourToMediaFunction()
)

```

*ApplicationID* The identifier for an application object assigned by the **MC\_Register\_Application** function.

*FileID* The identifier assigned to this object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*NumBytes* The attribute (FFFC,FFFC) will be added to the file object and given a length such that the total length of the file being written is a multiple of *NumBytes*. If *NumBytes* is set to 0, there will be no padding of the file. *NumBytes* must be an even number.

*UserInfo* Address of data which will be passed on to *YourToMediaFunction* each time it is called. This may be NULL.

*YourToMediaFunction* Name of a function which will be called repeatedly to provide blocks of DICOM file data.

The function must be prototyped as follows:

```

MC_STATUS YourToMediaFunction (
    char *Cbfilename,
    void *Cbuserinfo,
    int CbdataSize,
    void *CbdataBuffer,
    int CbisFirst,
    int CbisLast
)

```

*Cbfilename* The filename associated with the file object by the **MC\_Create\_Empty\_File** or **MC\_Create\_File** function.

*Cbuserinfo* Address of data which is being passed from the **MC\_Write\_File** function. This may be NULL.

*CbdataSize* The number of bytes of file data being provided to you in *CbdataBuffer*.

*CbdataBuffer* The buffer containing file data from the file object.

*CbisFirst* Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of file data.

*CbisLast* Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of file data.

## Remarks

**MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** request that the contents of the file object identified by *FileID* be put in a form specified by the DICOM standard for files. The file is passed to the user in blocks by calling *YourToMediaFunction* repeatedly until the entire file has been transferred.

**MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** can pass data to *YourToMediaFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourToMediaFunction* in *CbuserInfo* each time it is called. *UserInfo* may be NULL.

**MC\_Write\_File\_By\_Callback** is identical to **MC\_Write\_File** except that it can be used in conjunction with **MC\_Register\_Callback\_Function** to have pixel data supplied to the function as it is being streamed out.

**NOTE:** If the file object is a DICOMDIR, **MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** will resolve the directory record offsets within the object before passing the user the file data.

**NOTE:** If the file contains “group length” attributes (i.e. attributes with tags of the form gggg0000: any group, element zero), **MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** will automatically calculate the group length value when supplying it to *YourToMediaFunction*.

**NOTE:** **MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** will format the byte stream passed to *YourToMediaFunction* in the attribute transfer syntax UID (0002, 0010).

**NOTE:** **MC\_Write\_File** and **MC\_Write\_File\_By\_Callback** will automatically fill in two group 2 attributes within the file meta information – **if you have not set them:**

- The Implementation Class UID (0002,0012) will be filled in with the value set for the **IMPLEMENTATION\_CLASS\_UID** configuration value in the mergecom.pro file.
- The Implementation Version Name (0002,0013) will be filled in with the value set for the **IMPLEMENTATION\_VERSION** configuration value in the mergecom.pro file.

## YourToMediaFunction

*YourToMediaFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *CbisFirst* to TRUE (non-zero) the first time it calls *YourToMediaFunction* for this attribute and it sets *CbisLast* to TRUE (non-zero) when it calls *YourToMediaFunction* with the final block of file data.

*CbdataBuffer* is set to the address of a buffer containing the file data block, and *CbdataSize* is set to the number of bytes placed at *CbdataBuffer*.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_APPLICATION_ID</b>	The <i>ApplicationID</i> value is not a valid application object ID.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_INVALID_PAD</b>	The <i>NumBytes</i> parameter contained too large of a number or an odd number.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The file has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourToMediaFunction</i> returned a value other than MC_NORMAL_COMPLETION.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The transfer syntax is improperly specified or is not specified in the DICOM File Meta Information attributes.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.

### See Also

**MC\_Open\_File**

**MC\_Create\_File**

**MC\_Create\_Empty\_File**

## MC\_XML\_To\_Message

Reads attribute values from a Merge DICOM Model XML string into a message, file or item object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC_XML_To_Message (
    int MessageID,
    void *UserInfo,
    MC_STATUS (*YourGetXMLFunction) ()
)
```

*MessageID*                      The identifier of a message, file or item object.

*UserInfo*                        Address of data which will be passed on to *YourGetXMLFunction* each time it is called. This may be NULL.

*YourGetXMLFunction*            Name of a function which will be called repeatedly to get the XML string.

The function must be prototyped as follows:

```
MC_STATUS YourGetXMLFunction (
    int CBmessageID,
```

```

    void *CBUserInfo,
    int *CBdataSize,
    void **CBdataBuffer,
    int CBisFirst,
    int *CBisLast
)

```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_XML_To_Message</b> function. This may be NULL.
<i>CBdataSize</i>	Set *CBdataSize to the number of bytes you are providing.
<i>CBdataBuffer</i>	Set *CBdataBuffer to the address of the data you are providing.
<i>CBisFirst</i>	Set to TRUE (not zero) by the toolkit on the first call.
<i>CBisLast</i>	Set *CBisLast to TRUE (not zero) when you are returning with the last block of XML data.

### Remarks

**MC\_XML\_To\_Message** requests that the XML buffer be converted into a DICOM message. The XML data is requested from the user in blocks by calling *YourGetXMLFunction* repeatedly until the entire XML content has been received by the Merge DICOM Toolkit.

### YourGetXMLFunction

*YourGetXMLFunction* will be called repeatedly to get blocks of data from it. Merge DICOM Toolkit sets *CBisFirst* to TRUE(non-zero) the first time it calls *YourGetXMLFunction* for this message and *YourGetXMLFunction* should set \**CBisLast* to TRUE(non-zero) when it gives Merge DICOM Toolkit the final block of data to be converted.

\**CBdataBuffer* is set to the address of a buffer containing the data block to be converted, and *CBdataSize* is set to the number of bytes to be placed at \**CBdataBuffer*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	YourGetXMLFunction parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetXMLFunction</i> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

**See Also****MC\_Message\_To\_XML****MC\_XML\_Native\_To\_Message**

Reads attribute values from a Native DICOM Model XML string into a message, file or item object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC_XML_Native_To_Message (
    int MessageID,
    void *UserInfo,
    MC_STATUS (*YourGetXMLFunction) ()
)
```

<i>MessageID</i>	The identifier of a message, file or item object.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetXMLFunction</i> each time it is called. This may be NULL.
<i>YourGetXMLFunction</i>	Name of a function which will be called repeatedly to get the XML string.

The function must be prototyped as follows:

```
MC_STATUS YourGetXMLFunction (
    int CBmessageID,
    void *CBUserInfo,
    int *CBdataSize,
    void **CBdataBuffer,
    int CBisFirst,
    int *CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC_XML_Native_To_Message</b> function. This may be NULL.
<i>CBdataSize</i>	Set *CBdataSize to the number of bytes you are providing.
<i>CBdataBuffer</i>	Set *CBdataBuffer to the address of the data you are providing.
<i>CBisFirst</i>	Set to TRUE (not zero) by the toolkit on the first call.
<i>CBisLast</i>	Set *CBisLast to TRUE (not zero) when you are returning with the last block of XML data.

**Remarks**

**MC\_XML\_Native\_To\_Message** requests that the Native DICOM Model XML buffer be converted into a DICOM message. The XML data is requested from the user in blocks by calling

*YourGetXMLFunction* repeatedly until the entire XML content has been received by the Merge DICOM Toolkit.

### *YourGetXMLFunction*

*YourGetXMLFunction* will be called repeatedly to get blocks of data from it. Merge DICOM Toolkit sets *CBisFirst* to TRUE(non-zero) the first time it calls *YourGetXMLFunction* for this message and *YourGetXMLFunction* should set *\*CBisLast* to TRUE(non-zero) when it gives Merge DICOM Toolkit the final block of data to be converted.

*\*\*CBdataBuffer* is set to the address of a buffer containing the data block to be converted, and *CBdataSize* is set to the number of bytes to be placed at *\*\*CBdataBuffer*.

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetXMLFunction</i> parameter was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message, file or item object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetXMLFunction</i> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	This call was made prior to the initialization of the library.

### **See Also**

**MC\_Message\_To\_XML\_Native**

## **64-bit API Reference**

Merge DICOM C/C++ New Edition Toolkits offer a set of 64-bit API functions which allows to access and process the data exceeding 4GB size. The next section of this manual contains an alphabetically arranged 64-bit function reference section. Each function reference provides:

- A brief description of the 64-bit API function
- A synopsis of the 64-bit API function which contains a list of include files required to use the function, the function prototype and a description of each function parameter
- Remarks outlining the use of the function
- A list of status codes returned by the function
- A “See also” cross reference to other functions.

## Note

The set of 64-API functions is supported by Merge DICOM Toolkit C/C++ New Edition Toolkits:

- 64-Bit Windows (New Edition) – VS 2019
- 64-Bit Linux on Intel x86\_64 (New Edition) – GCC 9.4.0
- 64-Bit macOS on Intel and M1 (New Edition)

## MC64\_Continue\_Read\_Message\_To\_Stream

Continues the reading of the current message that arrived from the remote application to a callback function. Continuing requires that a previous **MC\_Read\_Message\_To\_Tag** or **MC\_Continue\_Read\_Message\_To\_Tag** function was called.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC64_Continue_Read_Message_To_Stream (
    int AssociationID,
    int *MessageID,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number.
<i>MessageID</i>	The ID of the message to be continued.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to provide blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void* CUserInfo,
    void* CBdataBufferStart,
    void* CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CUserInfo</i>	Address of data which is being passed from the <b>MC64_Continue_Read_Message_To_Stream</b> function. This may be NULL.



<i>CBdataBufferStart</i>	The address of the buffer containing stream data from the message object.
<i>CBdataBufferEnd</i>	The address next to the end of the buffer containing stream data from the message object, that is, <i>CBdataBufferStart</i> + the number of bytes of stream data being provided to you in <i>CBdataBufferStart</i> .
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

### Remarks

**MC64\_Continue\_Read\_Message\_To\_Stream** reads from after previous stop tag until the end of the message. The message passed in must have been read with **MC\_Read\_Message\_To\_Tag**, or **MC\_Continue\_Read\_Message\_To\_Tag**.

**MC64\_Continue\_Read\_Message\_To\_Stream** can be used to increase performance by not having Merge DICOM Toolkit process a message and pass it directly to disk as it is being read off of the network. The **MC\_Read\_Message\_To\_Tag** can be used to get basic information about the message such as the SOP Instance UID of the message from the Affected SOP Instance UID tag or the SOP Class UID of the message from the Affected SOP Class UID tag. The transfer syntax that the message is encoded in can be determined from the **MC\_Get\_Message\_Transfer\_Syntax** function after the message has been initially read with **MC\_Read\_Message\_To\_Tag**.

### YourReceiveStreamFunction

*YourReceiveStreamFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *\*CBisFirst* to TRUE (non-zero) the first time it calls *YourReceiveStreamFunction* for this attribute and it sets *\*CBisLast* to TRUE (non-zero) when it calls *YourReceiveStreamFunction* with the final block of streamed data.

*\*CBdataBufferStart* is set to the address of a buffer containing the stream data block, and *\*CBdataBufferEnd* is set to the address next to the end of the buffer containing stream data block, that is, *CBdataBufferStart* + the number of bytes of stream data block being provided in *CBdataBufferStart*.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MessageID</i> is not a valid message object ID or <b>MC_Read_Message_To_Tag</b> was not called for <i>MessageID</i> .
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.

<b>MC_STATE_VIOLATION</b>	<i>AssociationID</i> is not a valid association that has been accepted.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<u>The association is dropped if any of the following are returned:</u>	
<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourReceiveStreamFunction</i> returned an error.

### See Also

<b>MC_Read_Message</b>	<b>MC_Read_Message_To_Tag</b>
<b>MC_Continue_Read_Message</b>	<b>MC_Get_Message_Transfer_Syntax</b>

## MC64\_Get\_Encapsulated\_Value\_To\_Function

Retrieves the first frame of encapsulated pixel data from a message. If a decompressor is registered, then the data will be decompressed.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Encapsulated_Value_To_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    void *YourGetFunction,
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying a message attribute containing pixel data.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.

*YourGetFunction* Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void *CUserInfo,
    void *CBdataBufferStart,
    void *CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)
```

*CBMsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*CBtag* DICOM tag which identifies the attribute.

*CUserInfo* Address of user data which is being passed from the **MC64\_Get\_Encapsulated\_Value\_To\_Function** function. This may be NULL.

*CBdataBufferStart* Address of the buffer containing a portion of the attribute's value.

*CBdataBufferEnd* Address next to the end of the buffer containing a portion of the attribute's value, that is, *\*CBdataBufferStart* + the number of bytes in the buffer at *\*CBdataBufferStart*.

*CBisFirst* This is TRUE (not zero) the first time *YourGetFunction* is being called for this attribute.

*CBisLast* This is TRUE (not zero) the last time *YourGetFunction* is being called for this attribute.

## Remarks

The **MC64\_Get\_Encapsulated\_Value\_To\_Function** function is used to fetch the value of the first frame of an attribute which has a value representation of OB or OW and is encapsulated. If a decompressor is registered, the data will be decompressed. Such attributes tend to have values of great length. To accommodate this, one passes the **MC64\_Get\_Encapsulated\_Value\_To\_Function** function the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This "callback" function is called repeatedly to provide blocks of the attribute's data value. If a decompressor is registered for this message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC64\_Get\_Encapsulated\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

**MC64\_Get\_Encapsulated\_Value\_To\_Function** sets an internal frame pointer such that **MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** will retrieve the next frame following this one.

## YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart* + the number of bytes in the block at *CBdataBufferStart*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

## **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned MC_CANNOT_COMPLY.
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.
<b>MC_MISSING_DELIMITER</b>	The expected delimiter cannot be detected

## **See Also**

**MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function**  
**MC64\_Get\_Frame\_To\_Function**  
**MC64\_Get\_Offset\_Table\_To\_Function**  
**MC\_Register\_Compression\_Callbacks**

## MC64\_Get\_File\_Length

Gets the length in bytes of a file object.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC64_Get_File_Length (
    int FileID,
    unsigned long long *FileLength
)
```

*FileID* The identifier assigned to this object by the **MC\_Create\_File** or **MC\_Create\_Empty\_File** function.

*FileLength* The file object size is returned here.

### Remarks

**MC64\_Get\_File\_Length** returns the number of bytes it would take to write a file object in DICOM Part 10 format. This function assumes the transfer syntax UID is contained in the group 2 elements. Note that a possible value for *FileLength* is undefined length (i.e., 0xffffffff), when the file object is encoded in an encapsulated transfer syntax. Also note that the file length may change. The padding is specified when calling **MC64\_Write\_File**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The transfer syntax UID contained in the file objects group 2 elements was incorrect.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_NULL_POINTER_PARM</b>	<i>FileLength</i> was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment.

## MC64\_Get\_Frame\_To\_Function

Retrieves the requested frame of encapsulated or non-encapsulated pixel data from a message. For encapsulated data, if a decompressor is registered, then the data will be returned decompressed.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Frame_To_Function (
    int MsgFileItemID,
    int Frame,
    void *UserInfo,
```

---

```

    void *YourGetFunction(),
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Frame</i>	An integer identifying a frame number of encapsulated pixel data (starting from 0).
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```

MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void *CBUserInfo,
    void *CBdataBufferStart,
    void *CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)

```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC_Get_Frame_To_Function</b> function. This may be NULL.
<i>CBdataBufferStart</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBdataBufferEnd</i>	Address next to the end of the buffer containing a portion of the attribute's value, that is, <i>*CBdataBufferStart</i> + the number of bytes in the buffer at <i>*CBdataBufferStart</i> .
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC64\_Get\_Frame\_To\_Function** function is used to fetch an encapsulated or non-encapsulated frame of a pixel data attribute. In the encapsulated case, the functionality is similar to **MC64\_Get\_Encapsulated\_Value\_To\_Function** and **MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** except that the user can retrieve the encapsulated frame by its number (starting from 0).

As pixel data attributes usually have values of great length the most effective way to handle it is to use **MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value** and the callback mechanism with **MC\_Register\_Callback\_Function** to retrieve the attribute values from media.

The (*YourGetFunction*) function is used to provide repeatedly the blocks of the attribute's data value. If a decompressor is registered for this message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC64\_Get\_Frame\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

Each block of data is returned in *CBdataBuffer* and the number of bytes in the block is specified by *CBdataSize*.

### YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart + the number of bytes in the block at CBdataBufferStart*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

## Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL

<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned MC_CANNOT_COMPLY.
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.
<b>MC_MISSING_DELIMITER</b>	The expected delimiter can not be detected

### See Also

**MC64\_Get\_Encapsulated\_Value\_To\_Function**

**MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function**

**MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value MC\_Register\_Compression\_Callbacks**

## MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function

Retrieves the next frame of encapsulated pixel data from a message. If a decompressor is registered, then the data will be decompressed.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Next_Encapsulated_Value_To_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    void *YourGetFunction,
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	A tag identifying a message attribute containing pixel data.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide blocks of data of the attribute's value

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
```



```

    unsigned long CBtag,
    void *CBUserInfo,
    void *CBdataBufferStart,
    void *CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)

```

<i>CBMsgFileItemID</i>	The message identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC64_Get_Next_Encapsulated_Value_To_Function</b> function. This may be NULL.
<i>CBdataBufferStart</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBdataBufferEnd</i>	Address next to the end of the buffer containing a portion of the attribute's value, that is, <i>*CBdataBufferStart</i> + the number of bytes in the buffer at <i>*CBdataBufferStart</i> .
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** function is used to fetch the value of the next frame of an attribute which has a value representation of OB or OW and is encapsulated. If a decompressor is registered, the data will be decompressed. Such attributes tend to have values of great length. To accommodate this, one passes the **MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** function the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This "callback" function is called repeatedly to provide blocks of the attribute's data value. If a decompressor is registered for this message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

**MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function** sets an internal frame pointer such that subsequent calls will retrieve the next frame following this one.

### YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart* + the number of bytes in the block at *CBdataBufferStart*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and this was the last frame in the message.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_END_OF_FRAME</b>	The function completed normally, and there are more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute does not contain OB or OW data
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_NULL_VALUE</b>	The attribute has a value of NULL.
<b>MC_NO_MORE_VALUES</b>	The attribute has no more values.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned <b>MC_CANNOT_COMPLY</b> .
<b>MC_COMPRESSION_FAILURE</b>	There was an error while trying to decompress the data.

### See Also

**MC64\_Get\_Encapsulated\_Value\_To\_Function**  
**MC64\_Get\_Frame\_To\_Function**  
**MC64\_Get\_Offset\_Table\_To\_Function**  
**MC\_Register\_Compression\_Callbacks**

## MC64\_Get\_Next\_pValue... Functions

Retrieves the next value of a private attribute in a message object

### Synopsis

```
#include "mc3msg.h"
```

---

```

MC_STATUS MC64_Get_Next_pValue (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_DT DataType,
    unsigned long long BufferSize,
    void *Value,
    unsigned long long *ValueSize
)
MC_STATUS MC64_Get_Next_pValue_To_String (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long BufferSize,
    char *Value
)
MC_STATUS MC64_Get_Next_pValue_To_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long BufferSize,
    unsigned long long *ValueSize,
    MC_Uchar *Value)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*PrivateCode* The code string which identifies which block in the private *Group* “owns” the attribute.

*Group* The number identifying the private group containing the private attribute. It must be an odd number.

*ElementByte* The number identifying the private attribute within the private *Group* for this *PrivateCode*.

*DataType* One of the enumerated codes identifying the data type of the value in *Value*. The MC\_DT enumerated type is defined in “mc3msg.h”. They are:

<b>String_Type</b>	Null-terminated character string
<b>Int_Type</b>	Binary integer number
<b>UInt_Type</b>	Binary unsigned integer number
<b>ShortInt_Type</b>	Binary short integer number
<b>UShortInt_Type</b>	Binary unsigned short integer number
<b>LongInt_Type</b>	Binary long integer number
<b>ULongInt_Type</b>	Binary unsigned long integer number
<b>LongLong_Type</b>	Binary 64-bit integer number
<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number
<b>Float_Type</b>	Binary Floating point number
<b>Double_Type</b>	Binary Floating point number
<b>Buffer_Type</b>	Binary byte value
<i>Value</i>	The attribute's value will be returned here.
<i>ValueSize</i>	The size of the returned value is returned here.
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes.

### Remarks

These functions fetch the next value of a multi-valued private attribute. If no value has yet been fetched from this attribute, these functions behave identically to the functions of similar names, with “\_Next” removed from the name. If one or more values have already been fetched from this attribute, the next value will be returned.

If **MC64\_Get\_Next\_pValue** is used, the data type of the fetched value is specified by the *Data Type* parameter. In the case of **MC64\_Get\_Next\_pValue\_To\_String** and **MC64\_Get\_Next\_pValue\_To\_UnicodeString**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC64\_Get\_Next\_pValue**, *BufferSize* must be large enough to contain the data type requested.

For **MC64\_Get\_Next\_pValue\_To\_UnicodeString**, it is required to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

Function	May be used to retrieve values from attributes with these Value Representations
MC64_Get_Next_pValue_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC64_Get_Next_pValue_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

The same rules apply to the **MC64\_Get\_Next\_pValue** function, based on the value used in the *DataType* parameter.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_NO_MORE_VALUES</b>	There are no more values for this attribute.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC64_Get_Next_pValue</b> and <b>MC64_Get_Next_pValue_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using <b>MC64_Get_pValue_To_Int</b> when the value is 123.45; or instances where the value's sign (+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.

### See Also

**MC64\_Get\_pValue... Functions**      **MC64\_Get\_Value... Functions**  
**MC64\_Get\_Next\_Value... Functions**

## MC64\_Get\_Next\_Value... Functions

Retrieves the next value of an attribute in a message object

### Synopsis

```
#include "mc3msg.h"
```

```

MC_STATUS MC64_Get_Next_Value (
    int MsgFileItemID,
    unsigned long Tag,
    MC_DT DataType,
    unsigned long long BufferSize,
    void *Value,
    unsigned long long *ValueSize
)
MC_STATUS MC64_Get_Next_Value_To_String (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long BufferSize,
    char *Value
)
MC_STATUS MC64_Get_Next_Value_To_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long BufferSize,
    unsigned long long *ValueSize,
    MC_Uchar *Value
)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*DataType* One of the enumerated codes identifying the data type of the value in *Value*. The MC\_DT enumerated type is defined in "mc3msg.h". They are:

<b>String_Type</b>	Null-terminated character string
<b>Int_Type</b>	Binary integer number
<b>UInt_Type</b>	Binary unsigned integer number
<b>ShortInt_Type</b>	Binary short integer number
<b>UShortInt_Type</b>	Binary unsigned short integer number
<b>LongInt_Type</b>	Binary long integer number
<b>ULongInt_Type</b>	Binary unsigned long integer number
<b>LongLong_Type</b>	Binary 64-bit integer number
<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number
<b>Float_Type</b>	Binary Floating point number
<b>Double_Type</b>	Binary Floating point number
<b>Buffer_Type</b>	Binary byte value

*Value* The attribute's value will be returned here.

*ValueSize* The size of the returned value is returned here.

*BufferSize* The size of *Value* buffer in bytes.

## Remarks

These functions fetch the next value of a multi-valued attribute. If no value has yet been fetched from this attribute, these functions behave identically to the functions of similar names, with "\_Next"

removed from the name. If one or more values have already been fetched from this attribute, the next value will be returned.

If **MC64\_Get\_Next\_Value** is used, the data type of the fetched value is specified by the *DataType* parameter. In the case of **MC64\_Get\_Next\_Value\_To\_String** and **MC64\_Get\_Next\_Value\_To\_UnicodeString**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC64\_Get\_Next\_Value**, *BufferSize* must be large enough to contain the data type requested.

For **MC64\_Get\_Next\_Value\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC64_Get_Next_Value_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC64_Get_Next_Value_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT

The same rules apply to the **MC64\_Get\_Next\_Value** function, based on the value used in the *DataType* parameter.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_NO_MORE_VALUES</b>	There are no more values for this attribute.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFile/ItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC_Get_Next_Value</b> and <b>MC_Get_Next_Value_To_String</b> only)

<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using <b>MC_Get_Value_To_Int</b> when the value is 123.45; or instances where the value's sign (+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.</b>

### See Also

**MC64\_Get\_pValue... Functions**      **MC64\_Get\_Next\_pValue... Functions**  
**MC64\_Get\_Next\_Value... Functions**    **MC64\_Get\_Value\_To\_Function**  
**MC\_Enable\_Unicode\_Conversion**

## MC64\_Get\_Offset\_Table\_To\_Function

Retrieves the basic offset table of encapsulated pixel data from a message.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Offset_Table_To_Function (
    int    MsgFileItemID,
    void*  *UserInfo,
    void*  *YourGetFunction,
)
```

*MsgFileItemID*      The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*UserInfo*            Address of data which will be passed on to *YourGetFunction* each time it is called. This may be NULL.

*YourGetFunction*    Name of a function which will be called repeatedly to provide blocks of data of the offset table

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
    int    CBMsgFileItemID,
    unsigned long CBtag,
    void*  CBUserInfo,
    void*  CBdataBufferStart,
    void*  CBdataBufferEnd,
```



```

    int CBisFirst,
    int CBisLast
)

```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBUserInfo</i>	Address of user data which is being passed from the <b>MC64_Get_Offset_Table_To_Function</b> function. This may be NULL.
<i>CBdataBufferStart</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBdataBufferEnd</i>	Address next to the end of the buffer containing a portion of the attribute's value, that is, <i>*CBdataBufferStart</i> + the number of bytes in the buffer at <i>*CBdataBufferStart</i> .
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC64\_Get\_Offset\_Table\_To\_Function** function is used to fetch a basic offset table of an encapsulated pixel data attribute.

The (*YourGetFunction*) function is used to provide a byte array which contains an offset table data. This byte array needs to be converted to array of integers, where every integer consists of four bytes. The first integer is the offset table length and all subsequential integer values are the corresponding frame offsets.

### YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart* + the number of bytes in the block at *CBdataBufferStart*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally, and there are no more frames in the message.
<b>MC_NULL_POINTER_PARM</b>	<i>YourGetFunction</i> is NULL
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned MC_CANNOT_COMPLY.

## See Also

**MC64\_Get\_Encapsulated\_Value\_To\_Function**  
**MC64\_Get\_Next\_Encapsulated\_Value\_To\_Function**  
**MC64\_Get\_Frame\_To\_Function**  
**MC\_Register\_Compression\_Callbacks**

## MC64\_Get\_pValue... Functions

Retrieves the first or only value of a private attribute in a message object.

## Synopsis

```
#include "mc3msg.h"

MC_STATUS MC64_Get_pValue (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    MC_DT DataType,
    unsigned long long BufferSize,
    void *Value,
    unsigned long long *ValueSize
)
MC_STATUS MC64_Get_pValue_To_String (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long BufferSize,
    char *Value
)
MC_STATUS MC64_Get_pValue_To_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
```

```

        unsigned long long BufferSize,
        unsigned long long *ValueSize,
        MC_Uhar *Value
    )
MC_STATUS MC64_Get_pValue_To_Buffer (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long BufferSize,
    void *Value,
    unsigned long long *ValueSize
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.																								
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.																								
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .																								
<i>DataType</i>	One of the enumerated codes identifying the data type which should be used for the returned value in <i>Value</i> . The MC_DT enumerated type is defined in “mc3msg.h”. They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
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<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number																								
<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute’s value will be returned here.																								
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes.																								
<i>ValueSize</i>	The size (in bytes) of the value returned in the <i>Value</i> buffer.																								

## Remarks

These functions fetch the first (or only) value of a private attribute identified by *ElementByte* for the *PrivateCode* within the given private *Group*. If more than one value exists for this attribute, the first one will be returned. If **MC64\_Get\_pValue** is used, the data type of the fetched value is specified by the *DataType* parameter. For **MC64\_Get\_pValue\_To\_String**, **MC64\_Get\_pValue\_To\_UnicodeString** and **MC64\_Get\_pValue\_To\_Buffer**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC64\_Get\_pValue**, *BufferSize* must be large enough to contain the data type requested.

For **MC64\_Get\_pValue\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC64\_Get\_pValue\_To\_Buffer** is used to retrieve the value of a private attribute of a binary value representation of UN, OB, OW, OV, OL, OD or OF, or a text value representation of UR or UT, or an attribute whose value representation is unknown. This may occur if **MC64\_Stream\_To\_Message** is used and one or more of the stream attributes is unknown. Using **MC64\_Get\_pValue\_To\_Buffer** for attributes whose Value Representation is known will result in an error. The attribute's value is simply copied (memcpy) to the *Value* buffer and its length is placed at *ValueSize*.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC64_Get_pValue_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC64_Get_pValue_To_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT
MC64_Get_pValue_To_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT

The same rules apply to the **MC64\_Get\_pValue** function, based on the value used in the *DataType* parameter. The **MC64\_Get\_pValue\_To\_Function** call is described in its own section.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC64_Get_pValue</b> , <b>MC64_Get_pValue_To_Buffer</b> and <b>MC64_Get_pValue_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using <b>MC64_Get_pValue_To_Int</b> when the value is 123.45; or instances where the value's sign(+ -) would be affected)
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.

## See Also

**MC64\_Get\_pValue\_To\_Function**      **MC64\_Get\_Value\_To\_Function**  
**MC64\_Get\_Next\_pValue... Functions**      **MC64\_Get\_Value... Functions**  
**MC64\_Get\_Next\_Value... Functions**

## MC64\_Get\_pValue\_Length

Returns the length of a private attribute value.

## Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_pValue_Length (
    int MsgFileItemID,
    char *PrivateCode,
```

```

    unsigned short Group,
    unsigned char ElementByte,
    int ValueNumber,
    unsigned long long *Length
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>ValueNumber</i>	Retrieve the length of this attribute value.
<i>Length</i>	The value’s length is returned here.

### Remarks

**MC64\_Get\_pValue\_Length** returns the length of a given value of an attribute in a message object. The size, in bytes, is returned at *\*Length*.

The function returns the length of value *ValueNumber*. The first value is number 1. Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_NULL_POINTER_PARM</b>	<i>Length</i> or <i>PrivateCode</i> was NULL.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.

<b>MC_INVALID_VALUE_NUMBER</b>	<i>ValueNumber</i> was negative or the attribute does not have that many values.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_TEMP_FILE_ERROR</b>	File I/O error accessing value information in temporary files.

### See Also

**MC64\_Get\_Value\_Length**

## MC64\_Get\_pValue\_To\_Function

Retrieves the value of a private attribute which has a binary value representation of OB, OW, OV, OL, OD or OF, or a numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or a text value representation of UR or UT, from a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_pValue_To_Function (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*YourGetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourGetFunction</i> each time it is called. This may be NULL.
<i>YourGetFunction</i>	Name of a function which will be called repeatedly to provide the function with blocks of the attribute's value.

The function must be prototyped as follows:

```

MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void* CUserInfo,
    void* CBdataBufferStart,
    void* CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)

```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CUserInfo</i>	Address of user data which is being passed from the <b>MC64_Get_pValue_To_Function</b> function. This may be NULL.
<i>CBdataBufferStart</i>	Address of the buffer containing a portion of the attribute's value.
<i>CBdataBufferEnd</i>	Address next to the end of the buffer containing a portion of the attribute's value, that is, <i>*CBdataBufferStart</i> + the number of bytes in the buffer at <i>*CBdataBufferStart</i> .
<i>CBisFirst</i>	This is TRUE (not zero) the first time <i>YourGetFunction</i> is being called for this attribute.
<i>CBisLast</i>	This is TRUE (not zero) the last time <i>YourGetFunction</i> is being called for this attribute.

## Remarks

The **MC64\_Get\_pValue\_To\_Function** function is used to fetch the value of a private attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses the **MC64\_Get\_pValue\_To\_Function** function to specify the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, calls. This "callback" function is called repeatedly to provide blocks of the attribute's data value.

An optional *UserInfo* parameter may be used to pass information between the **MC64\_Get\_pValue\_To\_Function** caller and *YourGetFunction* which receives the data in its *CUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

## YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart* + the number of bytes in the block at *CBdataBufferStart*.



*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB, OW, or OF.
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

<b>MC64_Get_Value</b>	<b>MC64_Get_Value_To_Function</b>
<b>MC64_Get_pValue</b>	<b>MC64_Get_Next_Value</b>
<b>MC64_Get_Next_pValue</b>	

## MC64\_Get\_Stream\_Length

Returns the size of a DICOM stream which would result from using the **MC\_Message\_To\_Stream** function.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Stream_Length (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    unsigned long long *LengthPtr,
    TRANSFER_SYNTAX SyntaxType
)
```

<i>MessageID</i>	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
<i>StartTag</i>	The DICOM tag identifying the first attribute which would be streamed.
<i>StopTag</i>	The DICOM tag identifying the last attribute which would be streamed
<i>LengthPtr</i>	Location where Merge DICOM Toolkit will return the stream length.
<i>SyntaxType</i>	Specify which DICOM transfer syntax is to be assumed for the stream data. Use one of the enumerated TRANSFER_SYNTAX types defined in "mc3msg.h":

---

IMPLICIT\_LITTLE\_ENDIAN  
IMPLICIT\_BIG\_ENDIAN  
EXPLICIT\_LITTLE\_ENDIAN  
EXPLICIT\_BIG\_ENDIAN  
DEFLATED\_EXPLICIT\_LITTLE\_ENDIAN  
ENCAPSULATED\_UNCOMPRESSED\_ELEMENT  
RLE  
JPEG\_BASELINE  
JPEG\_EXTENDED\_2\_4  
JPEG\_EXTENDED\_3\_5  
JPEG\_SPEC\_NON\_HIER\_6\_8  
JPEG\_SPEC\_NON\_HIER\_7\_9  
JPEG\_FULL\_PROG\_NON\_HIER\_10\_12  
JPEG\_FULL\_PROG\_NON\_HIER\_11\_13  
JPEG\_LOSSLESS\_NON\_HIER\_14  
JPEG\_LOSSLESS\_NON\_HIER\_15  
JPEG\_EXTENDED\_HIER\_16\_18  
JPEG\_EXTENDED\_HIER\_17\_19  
JPEG\_SPEC\_HIER\_20\_22  
JPEG\_SPEC\_HIER\_21\_23  
JPEG\_FULL\_PROG\_HIER\_24\_26  
JPEG\_FULL\_PROG\_HIER\_25\_27  
JPEG\_LOSSLESS\_HIER\_28  
JPEG\_LOSSLESS\_HIER\_29  
JPEG\_LOSSLESS\_HIER\_14  
JPEG\_2000\_LOSSLESS\_ONLY  
JPEG\_2000  
JPEG\_LS\_LOSSLESS  
JPEG\_LS\_LOSSY  
HEVC\_H265\_M10P\_LEVEL\_5\_1  
HEVC\_H265\_MP\_LEVEL\_5\_1  
JPIP\_REFERENCED  
JPIP\_REFERENCED\_DEFLATE  
MPEG2\_MPML  
MPEG2\_MPHL  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D  
MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2  
JPEG\_2000\_MC\_LOSSLESS\_ONLY  
JPEG\_2000\_MC  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTIVE\_VIDEO  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIVE\_VIDEO

SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO  
PRIVATE\_SYNTAX\_1  
PRIVATE\_SYNTAX\_2

### Remarks

**MC64\_Get\_Stream\_Length** returns the size of a DICOM stream which would result from using the **MC64\_Message\_To\_Stream** function for the message identified by *MessageID*. The calculation is based on the assumption that the stream would be encoded using *SyntaxType* DICOM transfer syntax. It is also assumed that the stream would contain attributes with tags greater than or equal to *StartTag* and less than or equal to *StopTag*. The length is returned to the unsigned long long at *\*LengthPtr*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	<i>SyntaxType</i> is not one of the <b>TRANSFER_SYNTAX</b> codes defined in “ <b>mc3msg.h</b> ”.
<b>MC_NULL_POINTER_PARM</b>	<i>LengthPtr</i> was NULL.

### See Also

**MC64\_Message\_To\_Stream**

## MC64\_Get\_Value... Functions

Retrieves the first or only value of an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC64_Get_Value (
    int MsgFileItemID,
    unsigned long Tag,
    MC_DT DataType,
    unsigned long long BufferSize,
    void *Value,
    unsigned long long *ValueSize
)
MC_STATUS MC64_Get_Value_To_String (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long BufferSize,
    char *Value
)
MC_STATUS MC64_Get_Value_To_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long BufferSize,
```

```

        unsigned long long *ValueSize,
        MC_Uchar *Value
    )
MC_STATUS MC64_Get_Value_To_Buffer (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long BufferSize,
    char *Value,
    unsigned long long *ValueSize
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.																								
<i>Tag</i>	DICOM tag which identifies the attribute.																								
<i>Data Type</i>	One of the enumerated codes identifying the data type which should be used for the returned value in <i>Value</i> . The MC_DT enumerated type is defined in "mc3msg.h". They are: <table> <tr> <td><b>String_Type</b></td> <td>Null-terminated character string</td> </tr> <tr> <td><b>Int_Type</b></td> <td>Binary integer number</td> </tr> <tr> <td><b>UInt_Type</b></td> <td>Binary unsigned integer number</td> </tr> <tr> <td><b>ShortInt_Type</b></td> <td>Binary short integer number</td> </tr> <tr> <td><b>UShortInt_Type</b></td> <td>Binary unsigned short integer number</td> </tr> <tr> <td><b>LongInt_Type</b></td> <td>Binary long integer number</td> </tr> <tr> <td><b>ULongInt_Type</b></td> <td>Binary unsigned long integer number</td> </tr> <tr> <td><b>LongLong_Type</b></td> <td>Binary 64-bit integer number</td> </tr> <tr> <td><b>ULongLong_Type</b></td> <td>Binary 64-bit unsigned integer number</td> </tr> <tr> <td><b>Float_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Double_Type</b></td> <td>Binary Floating point number</td> </tr> <tr> <td><b>Buffer_Type</b></td> <td>Binary byte value</td> </tr> </table>	<b>String_Type</b>	Null-terminated character string	<b>Int_Type</b>	Binary integer number	<b>UInt_Type</b>	Binary unsigned integer number	<b>ShortInt_Type</b>	Binary short integer number	<b>UShortInt_Type</b>	Binary unsigned short integer number	<b>LongInt_Type</b>	Binary long integer number	<b>ULongInt_Type</b>	Binary unsigned long integer number	<b>LongLong_Type</b>	Binary 64-bit integer number	<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number	<b>Float_Type</b>	Binary Floating point number	<b>Double_Type</b>	Binary Floating point number	<b>Buffer_Type</b>	Binary byte value
<b>String_Type</b>	Null-terminated character string																								
<b>Int_Type</b>	Binary integer number																								
<b>UInt_Type</b>	Binary unsigned integer number																								
<b>ShortInt_Type</b>	Binary short integer number																								
<b>UShortInt_Type</b>	Binary unsigned short integer number																								
<b>LongInt_Type</b>	Binary long integer number																								
<b>ULongInt_Type</b>	Binary unsigned long integer number																								
<b>LongLong_Type</b>	Binary 64-bit integer number																								
<b>ULongLong_Type</b>	Binary 64-bit unsigned integer number																								
<b>Float_Type</b>	Binary Floating point number																								
<b>Double_Type</b>	Binary Floating point number																								
<b>Buffer_Type</b>	Binary byte value																								
<i>Value</i>	The attribute's value will be returned here.																								
<i>BufferSize</i>	The size of the <i>Value</i> buffer in bytes.																								
<i>ValueSize</i>	The size (in bytes) of the value returned in the <i>Value</i> buffer. If <i>Data Type</i> is <b>String_Type</b> , the length of the string (not including the trailing null) is returned.																								

### Remarks

These functions fetch the first (or only) value of an attribute with the given *Tag*. If more than one value exists for this attribute, the first one will be returned. If **MC64\_Get\_Value** is used, the data type of the fetched value is specified by the *Data Type* parameter. For **MC64\_Get\_Value\_To\_String**, **MC64\_Get\_Value\_To\_UnicodeString** and **MC64\_Get\_Value\_To\_Buffer**, an additional parameter (*BufferSize*) is required to specify the size of the buffer to receive the string value. For **MC64\_Get\_Value**, *BufferSize* must be large enough to contain the data type requested.

For **MC64\_Get\_Value\_To\_UnicodeString**, it requires to call **MC\_Enable\_Unicode\_Conversion** first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC64\_Get\_Value\_To\_Buffer** is used to retrieve the value of a standard attribute of a binary value representation of UN, OB, OW, OV, OL, OD or OF, or a text value representation of UR or UT, or an attribute whose value representation is unknown. Using **MC64\_Get\_Value\_To\_Buffer** for attributes with other Value Representations will result in an error. The attribute's value is simply copied (memcpy) to the *Value* buffer and its length is placed at *ValueSize*.

Any reasonable conversion will be made from the attribute's value representation to the data type requested. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** Attributes with a value representation of **SQ** (sequence of items) have values stored internally as integers - each value is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to retrieve values from attributes with these Value Representations
MC64_Get_Value_To_String	AE, AS, AT, CS, DA, DS, DT, FD, FL, IS, LO, LT, PN, SH, SL, SS, SV, ST, TM, UC, UI, UL, UR, US, UV, UT, SQ
MC64_Get_Value_To_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC64_Get_Value_To_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT
MC64_Get_Value_To_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT

The same rules apply to the **MC64\_Get\_Value** function, based on the value used in the *DataType* parameter. The **MC64\_Get\_Value\_To\_Function** call is described in its own section.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).

<b>MC_BUFFER_TOO_SMALL</b>	Buffer is not large enough to contain the value. ( <b>MC64_Get_Value</b> , <b>MC64_Get_Value_To_Buffer</b> and <b>MC64_Get_Value_To_String</b> only)
<b>MC_INCOMPATIBLE_VR</b>	The function was called to retrieve an attribute value whose value representation (VR) is not one of those listed for the function in the table above.
<b>MC_INCOMPATIBLE_VALUE</b>	The attribute's value is not consistent with its VR. (This should never happen.)
<b>MC_VALUE_OUT_OF_RANGE</b>	The attribute numeric value is too large to be accommodated by the receiving data type.
<b>MC_INVALID_DATA_TYPE</b>	The <i>DataType</i> parameter is invalid.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.</b>

### See Also

<b>MC64_Get_pValue... Functions</b>	<b>MC64_Get_pValue_To_Function</b>
<b>MC64_Get_Next_pValue... Functions</b>	<b>MC64_Get_Value_To_Function</b>
<b>MC64_Get_Next_Value... Functions</b>	<b>MC_Enable_Unicode_Conversion</b>

## MC64\_Get\_Value\_Length

Returns the length of an attribute value.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Get_Value_Length (
    int MsgFileItemID,
    unsigned long Tag,
    int ValueNumber,
    unsigned long long *Length
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*ValueNumber* Retrieve the length of this attribute value.

*Length* The value's length is returned here.

### Remarks

**MC64\_Get\_Value\_Length** returns the length of a given value of an attribute in a message object. The size, in bytes, is returned at *\*Length*.

The function returns the length of value *ValueNumber*. The first value is number 1. Only certain attributes are allowed to contain multiple values and be conformant to the DICOM standard. The

developer usually knows ahead of time which attributes will contain multiple values and which will not. Some attributes, such as those with value representations of OB or OW, may never contain more than one value.

For pixel data tag which has a default value representation of OW, the returned length can be odd or even depending on the actual size of pixel data and the effective VR. For example, if pixel data is generated by uncompressing encapsulated data with 8 bits allocation per pixel, the effective VR is set to OB. If actual uncompressed data size is odd, the function returns an odd size length (No padding has been applied). See **MC\_Get\_Attribute\_Info** for retrieving the effective VR of an attribute. However, if pixel data is retrieved from a file or stream, the length is always even size due to padding.

If the attribute has a value representation of SQ, the number of items in the sequence is returned in *\*Length*.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>Length</i> was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_NULL_VALUE</b>	The attribute contains a NULL value (i.e. its value is of length zero).
<b>MC_EMPTY_VALUE</b>	No value has been assigned to the attribute.
<b>MC_INVALID_VALUE_NUMBER</b>	<i>ValueNumber</i> was negative, or the attribute does not have that many values.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_TEMP_FILE_ERROR</b>	File I/O error accessing value information in temporary files.

### See Also

**MC64\_Get\_pValue\_Length**

## MC64\_Get\_Value\_To\_Function

Retrieves the value of an attribute which has a binary value representation of OB, OW, OV, OL, OD or OF, or a numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or a text value representation of UR or UT, from a message object.

### Synopsis

```
#include "mc3msg.h"
```



---

```

MC_STATUS MC64_Get_Value_To_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourGetFunction) ()
)

```

*MsgFileItemID*      The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag*                      DICOM tag which identifies the attribute.

*UserInfo*                Address of data which will be passed on to *YourGetFunction* each time it is called. This may be NULL.

*YourGetFunction*      Name of a function which will be called repeatedly to provide the function with blocks of the attribute's value.

The function must be prototyped as follows:

```

MC_STATUS YourGetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    void* CBUserInfo,
    void* CBdataBufferStart,
    void* CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)

```

*CBMsgFileItemID*      The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*CBtag*                      DICOM tag which identifies the attribute.

*CBUserInfo*                Address of user data which is being passed from the **MC64\_Get\_Value\_To\_Function** function. This may be NULL.

*CBdataBufferStart*      Address of the buffer containing a portion of the attribute's value.

*CBdataBufferEnd*      Address next to the end of the buffer containing a portion of the attribute's value, that is, *\*CBdataBufferStart* + the number of bytes in the buffer at *\*CBdataBufferStart*.

*CBisFirst*                This is TRUE (not zero) the first time *YourGetFunction* is being called for this attribute.

*CBisLast*                This is TRUE (not zero) the last time *YourGetFunction* is being called for this attribute.

## Remarks

The **MC64\_Get\_Value\_To\_Function** function is used to fetch the value of an attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. This function can also be used to fetch the value of an attribute which has a numeric value representation (SL, SS, SV, UL, US, UV, AT, FL, FD).

To accommodate this, one uses the **MC64\_Get\_Value\_To\_Function** function to specify the name of a function (*YourGetFunction*) which Merge DICOM Toolkit, in turn, will call. This “callback” function is called repeatedly to provide blocks of the attribute’s data value. An optional *UserInfo* parameter may be used to pass information between the **MC64\_Get\_Value\_To\_Function** caller and *YourGetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourGetFunction

Each block of data is returned in *CBdataBufferStart*, *CBdataBufferEnd* is set to the address next to the end of block data, that is, *\*CBdataBufferStart* + the number of bytes in the block at *CBdataBufferStart*.

*CBisFirst* is set to TRUE the first time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the first time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often open a file at this time.

*CBisLast* is set to TRUE the last time *YourGetFunction* is called. This provides a clear mechanism for the function to know it is being called the last time for the attribute identified by *CBtag* in the message identified by *CBMsgFileItemID*. Users often close a file at this time.

*YourGetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute’s value representation was not OB, OW, OF, SL, SS, UL, US, AT, FL or FD.
<b>MC_EMPTY_VALUE</b>	No value has been assigned to this attribute yet.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourGetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

**See Also****MC64\_Get\_Value... Functions****MC64\_Get\_pValue... Functions****MC64\_Get\_pValue\_To\_Function****MC64\_Get\_Next\_Value... Functions****MC64\_Get\_Next\_pValue... Functions****MC64\_Message\_To\_Stream**

Request that the values of a message object be returned as a DICOM stream.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Message_To_Stream (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>MessageID</i>	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
<i>StartTag</i>	The DICOM tag identifying the first attribute which should be streamed.
<i>StopTag</i>	The DICOM tag identifying the last attribute which should be streamed
<i>SyntaxType</i>	Specify which DICOM transfer syntax is to be used to encode the stream data. Use one of the enumerated TRANSFER_SYNTAX types defined in "mc3msg.h": IMPLICIT_LITTLE_ENDIAN IMPLICIT_BIG_ENDIAN EXPLICIT_LITTLE_ENDIAN EXPLICIT_BIG_ENDIAN DEFLATED_EXPLICIT_LITTLE_ENDIAN ENCAPSULATED_UNCOMPRESSED_ELE

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RLE  
JPEG\_BASELINE  
JPEG\_EXTENDED\_2\_4  
JPEG\_EXTENDED\_3\_5  
JPEG\_SPEC\_NON\_HIER\_6\_8  
JPEG\_SPEC\_NON\_HIER\_7\_9  
JPEG\_FULL\_PROG\_NON\_HIER\_10\_12  
JPEG\_FULL\_PROG\_NON\_HIER\_11\_13  
JPEG\_LOSSLESS\_NON\_HIER\_14  
JPEG\_LOSSLESS\_NON\_HIER\_15  
JPEG\_EXTENDED\_HIER\_16\_18  
JPEG\_EXTENDED\_HIER\_17\_19  
JPEG\_SPEC\_HIER\_20\_22  
JPEG\_SPEC\_HIER\_21\_23  
JPEG\_FULL\_PROG\_HIER\_24\_26  
JPEG\_FULL\_PROG\_HIER\_25\_27  
JPEG\_LOSSLESS\_HIER\_28  
JPEG\_LOSSLESS\_HIER\_29  
JPEG\_LOSSLESS\_HIER\_14  
JPEG\_2000\_LOSSLESS\_ONLY  
JPEG\_2000  
JPEG\_LS\_LOSSLESS  
JPEG\_LS\_LOSSY  
HEVC\_H265\_M10P\_LEVEL\_5\_1  
HEVC\_H265\_MP\_LEVEL\_5\_1  
JPIP\_REFERENCED  
JPIP\_REFERENCED\_DEFLATE  
MPEG2\_MPML  
MPEG2\_MPHL  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_BDC\_HP\_LEVEL\_4\_1  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_2D  
MPEG4\_AVC\_H264\_HP\_LEVEL\_4\_2\_3D  
MPEG4\_AVC\_H264\_STEREO\_HP\_LEVEL\_4\_2  
JPEG\_2000\_MC\_LOSSLESS\_ONLY  
JPEG\_2000\_MC  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_PROGRESSIVE\_ACTIVE\_VIDEO  
SMPTE\_ST\_2110\_20\_UNCOMPRESSED\_INTERLACED\_ACTIVE\_VIDEO  
SMPTE\_ST\_2110\_30\_PCM\_DIGITAL\_AUDIO  
PRIVATE\_SYNTAX\_1  
PRIVATE\_SYNTAX\_2

---

<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to provide blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void *CBuserInfo,
    void* CBdataBufferStart,
    void* CBdataBufferEnd,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CBuserInfo</i>	Address of data which is being passed from the <b>MC64_Message_To_Stream</b> function. This may be NULL.
<i>CBdataBufferStart</i>	The address of the buffer containing stream data from the message object.
<i>CBdataBufferEnd</i>	The address next to the end of the buffer containing stream data from the message object, that is, <i>CBdataBufferStart</i> + the number of bytes of stream data being provided to you in <i>CBdataBufferStart</i> .
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

### Remarks

**MC64\_Message\_To\_Stream** requests that the contents of the message identified by *MessageID* be “streamed” (i.e. put in the form defined by the DICOM standard). The streamed message is passed to the user in blocks by calling *YourReceiveStreamFunction* repeatedly until the entire streamed message has been transferred.

**MC64\_Message\_To\_Stream** can pass data to *YourReceiveStreamFunction* by specifying the data’s address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourReceiveStreamFunction* in *CBuserInfo* each time it is called. *UserInfo* may be NULL.

*StartTag* and *StopTag* specify which attributes in the message are to be placed in the stream. Any attributes in the message with tags less than *StartTag* or greater than *StopTag* will be ignored. Neither *StartTag* nor *StopTag* need be in the message.

*SyntaxType* must be set to **one of the values listed above**. The transfer syntax specifies the byte order used in the streamed message, whether or not each attribute's value representation is explicitly encoded in the stream, and how the pixel data is encoded in the message.

**NOTE:** If the message contains “group length” attributes (i.e. attributes with tags of the form gggg0000: any group, element zero), **MC64\_Message\_To\_Stream** will automatically calculate the group length value when the message is streamed.

### *YourReceiveStreamFunction*

*YourReceiveStreamFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *\*CBisFirst* to TRUE (non-zero) the first time it calls *YourReceiveStreamFunction* for this attribute and it sets *\*CBisLast* to TRUE (non-zero) when it calls *YourReceiveStreamFunction* with the final block of streamed data.

*\*CBdataBufferStart* is set to the address of a buffer containing the stream data block, and *\*CBdataBufferEnd* is set to the address next to the end of the buffer containing stream data block, that is, *CBdataBufferStart* + the number of bytes of stream data block being provided in *CBdataBufferStart*.

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The message has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourReceiveStreamFunction</i> returned a value other than MC_NORMAL_COMPLETION.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid code was used for the <i>SyntaxType</i> parameter.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.

### **See Also**

**MC64\_Stream\_To\_Message**                      **MC64\_Get\_Stream\_Length**

**MC64\_Open\_File**  
**MC64\_Open\_File\_Bypass\_OBOW**

## MC64\_Open\_File\_Upto\_Tag

### MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value

Requests that the values of a file object be retrieved from a DICOM file

#### Synopsis

```
#include "mc3media.h"

MC_STATUS MC64_Open_File (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC64_Open_File_Bypass_OBOW (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC64_Open_File_Upto_Tag (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    unsigned long Tag,
    long *Offset,
    MC_STATUS (*YourFromMediaFunction())
)

MC_STATUS MC64_Open_File_Upto_Tag_Bypass_Value (
    int ApplicationID,
    int FileID,
    void *UserInfo,
    unsigned long Tag,
    MTI_BOOLEAN AbypassTagValue,
    unsigned long long *Offset,
    MC_STATUS (*YourFromMediaFunction())
)
```

<i>ApplicationID</i>	The identifier assigned to this object by the <b>MC_Register_Application</b> function.
<i>FileID</i>	The identifier assigned to this object by the <b>MC_Create_File</b> or <b>MC_Create_Empty_File</b> functions.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourFromMediaFunction</i> each time it is called. This may be NULL.
<i>AbypassTagValue</i>	Bypass an attribute value if TRUE.

#### **Note:**

	For <b>MC64_Open_File_Upto_Tag_Bypass_Value</b> this argument is unused, as the function will <i>by definition</i> bypass the attribute value. Retained for backward compatibility only.
<i>Tag</i>	The attribute after which to stop reading the file from media.
<i>Offset</i>	Upon successful completion, the offset in bytes from the beginning of the file of: <ul style="list-style-type: none"> <li>- the first attribute greater than <i>Tag</i> (for <b>MC64_Open_File_Upto_Tag</b>)</li> <li>- the data of the attribute at <i>Tag</i> (for <b>MC64_Open_File_Upto_Tag_Bypass_Value</b>)</li> </ul> is returned here.
<i>YourFromMediaFunction</i>	Name of a function which will be called repeatedly to request blocks of DICOM file data from media.

The function must be prototyped as follows:

```
MC_STATUS YourFromMediaFunction (
    char *CBfilename,
    void *CBuserInfo,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int *CBisLastPtr
)
```

<i>CBfilename</i>	String filename associated with the file object
<i>CBuserInfo</i>	Address of data which is being passed from the <b>MC64_Open_File...</b> function. This may be NULL.
<i>CBdataBufferStart</i>	Set <i>*CBdataBufferStart</i> to the address of the data you are providing.
<i>CBdataBufferEnd</i>	Set <i>*CBdataBufferEnd</i> to the address next after the address of the end of the data, that is <i>CBdataBufferStart + the number of bytes of the data</i>
<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourFromMediaFunction</i> to request data blocks.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (non-zero) when you are returning with the last block of file data.

### Remarks

**MC64\_Open\_File**, **MC64\_Open\_File\_Bypass\_OBOW**, and **MC64\_Open\_File\_Upto\_Tag**, **MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value** request that the contents of a DICOM file be converted and placed into the file object *FileID*. The file is passed to Merge DICOM Toolkit by *YourFromMediaFunction*. Merge DICOM Toolkit repeatedly calls *YourFromMediaFunction* until all of the file has been processed.



The **MC64\_Open\_File...** functions can pass data to *YourFromMediaFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourFromMediaFunction* in *CUserInfo* each time it is called. *UserInfo* may be NULL.

When **MC64\_Open\_File** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC64\_Get\_Value\_To\_Function** to retrieve the attribute values. If a callback is registered for the attribute, the callback is supplied the data as it is read. See the description of **MC64\_Register\_Callback\_Function** for more details.

When **MC64\_Open\_File\_Bypass\_OBOW** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC64\_Get\_Value\_To\_Function** to retrieve the attribute values.

#### Performance Tuning

**MC64\_Open\_File\_Bypass\_OBOW** can be used to increase performance for handling attributes of type OB, OW, OF or OD. When a callback function is registered with **MC64\_Register\_Callback\_Function** for an attribute of type OB, OW, OF or OD, **MC64\_Open\_File\_Bypass\_OBOW** will not read in the attribute's value. Instead, the data will be left on media and the offset of the attribute's value from the beginning of the file along with length of the value will be passed to the user's callback function. When the data is needed by the user or Merge DICOM Toolkit, the callback can retrieve it from media. See the description of **MC64\_Register\_Callback\_Function** for more details.

#### Performance Tuning

When **MC64\_Open\_File\_Upto\_Tag** retrieves attributes of type OB, OW, OF or OD and a callback is not registered for the attribute, the library stores the values in a configurable location (normally in temporary files). Then the user can use **MC64\_Get\_Value\_To\_Function** to retrieve the attribute values.

**MC64\_Open\_File\_Upto\_Tag** can be used to increase performance for handling attributes of type OB, OW, OF or OD. **MC64\_Open\_File\_Upto\_Tag** will stop reading the file from media when it reaches the first attribute greater than *Tag*. As a convenience, the offset in bytes from the beginning of the file of the first attribute greater than *Tag* is returned in *Offset*. If the user wants to use *Offset* to access attributes greater than *Tag* directly from media, the user will have to parse the file directly.

**MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value** has the same functionality as **MC64\_Open\_File\_Upto\_Tag** except that the attribute values with given *Tag* will not be read, but left on media. It increases performance for handling large size attributes, especially pixel data (7fe0,0010). Instead of reading the attribute values the above-described callback mechanism should be used with **MC64\_Register\_Callback\_Function** for that attribute to be retrieved from media when needed. If the file contains any attributes with a value representation of SQ (i.e. the file contains one or more sequences of items), an item object is automatically opened for each item in the file. The ItemID associated with each opened item object is used as the value for the item in the sequence attribute. Later, the **MC64\_Get\_Value...** functions may be used to retrieve the ItemIDs from the SQ attribute. Then, again using the **MC64\_Get\_Value...** functions, the attributes of the ItemID object may be retrieved.

The **MC64\_Open\_File...** functions will also read in DICOMDIRs. In order for a DICOMDIR to be properly read in, the file object must be associated with the service for a DICOMDIR. This can be

accomplished by specifying the service when the object is created or calling **MC\_Set\_Service\_Command** on the object before one of the **MC64\_Open\_File...** functions is called. When one of these conditions is met, the function will resolve the directory record file offset pointers within the DICOMDIR by assigning them the ItemID associated with each opened item object.

The **MC64\_Open\_File...** functions read in the DICOM File Meta Information attributes in explicit VR little endian transfer syntax. The remainder of the file is read in with the transfer syntax specified in the attribute (0002,0010). If this attribute is not found, the entire file is read in using the Explicit VR Little Endian transfer syntax.

**NOTE:** A runtime configuration parameter determines what will happen if the input file contains an invalid DICOM file prefix. The default is to change any invalid prefix to “DICM”. If requested, however, an invalid prefix can be left in the file. If an invalid prefix is read in or wrote out a warning message will be logged.

**NOTE:** A runtime configuration parameter determines what will happen if the input file contains an attribute which is not in the service associated with the file. The default is to ignore such attributes (with a warning message logged). If requested, however, such attributes will be added to the file, along with their values. If the Value Representation of the attribute being added cannot be determined, the attribute is given a pseudo Value Representation of “**Unknown\_VR**”. The only way to retrieve the value of such attributes is to use the **MC64\_Get\_Value\_To\_Buffer** function. To change the value of such attributes, **MC\_Set\_Value\_Representation** (or **MC\_Set\_pValue\_Representation**) must first be called to assign a valid Value Representation to the attribute. If **MC64\_Write\_File** is used, attributes with unknown VRs are simply copied (memcpy) to the stream with no consideration given to byte ordering.

### *YourFileToFunction*

It is the responsibility of *YourFromMediaFunction* to pass blocks of data back to Merge DICOM Toolkit each time it is called. Merge DICOM Toolkit sets *CBFirstCall* to TRUE (non-zero) the first time it calls *YourFromMediaFunction* for this file.

*\*CBdataBufferStart* must be set to the address of the buffer containing the stream data block, and *\*CBdataBufferEnd* must be set to the address next after the address of the data end, that is, *\*CBdataBufferStart + the number of bytes placed at \*CBdataBufferStart*.

*YourFromMediaFunction* must set *\*CBisLast* to TRUE (non-zero) when it is providing the last block of the streamed message.

Data in the buffer returned by *\*CBdataBufferStart* shall not be reused, because with some configurations Merge DICOM Toolkit may do in-place byte swapping to convert data to a native endian format. If your application needs to keep source data unchanged, you must create a copy of your source data chunk and return its address to the caller.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>FileIDPtr</i> , <i>YourFromMediaFunction</i> , or <i>Filename</i> was NULL.
<b>MC_INVALID_APPLICATION_ID</b>	The application ID does not identify a valid Merge DICOM Toolkit application.
<b>MC_INVALID_FILE</b>	An invalid DICOM Prefix was found within the file. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid transfer syntax code was found within the file’s DICOM File Meta Information.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourFromMediaFunction</i> returned with a status other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The size parameter returned by <i>YourFromMediaFunction</i> was an uneven number.
<b>MC_CALLBACK_PARM_ERROR</b>	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See <b>MC64_Register_Callback_Function</b> for details.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The file contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_UNEXPECTED_EOD</b>	<i>YourFromMediaFunction</i> stopped without passing the entire value for an attribute.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value(s) for one of the file attributes was not legal for its value representation.

Any of the status codes returned by **MC\_Set\_Value** may also be returned.

## See Also

**MC64\_Register\_Callback\_Function** **MC64\_Write\_File** **MC64\_Write\_File\_By\_Callback**

## MC64\_Read\_To\_Stream

Reads the message sent by the remote application directly into a streaming function. Especially useful for the transfer of large data which we don't want to load into application memory.

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC64_Read_To_Stream (
    int AssociationID,
    int Timeout,
    char **ServiceName,
    MC_COMMAND *Command,
    char *FileName,
    void *UserInfo,
    MC_STATUS (*YourReceiveStreamFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>Timeout</i>	The maximum time (in seconds) to wait for a message to start arriving. A value of zero (0) means "check one time" and a value of minus one (-1) means "wait forever".
<i>ServiceName</i>	The name of the service is returned here.
<i>Command</i>	The command which is associated with the message is returned here. The <b>MC_COMMAND</b> enumerated values are defined in "mc3msg.h".
<i>Filename</i>	The name of file associated with the receiving message. This may be NULL.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourReceiveStreamFunction</i> each time it is called. This may be NULL.
<i>YourReceiveStreamFunction</i>	Name of a function which will be called repeatedly to receive blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourReceiveStreamFunction (
    int CBmessageID,
    void* CBuserInfo,
    int CBdataSize,
    void* CBdataBuffer,
    int CBisFirst,
    int CBisLast
)
```

<i>CBmessageID</i>	The internal identifier assigned to the receiving message object. It becomes invalid once the message is received.
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<i>CBuserInfo</i>	Address of data which is being passed from the <b>MC64_Message_To_Stream</b> function. This may be NULL.
<i>CBdataBufferStart</i>	The address of the buffer containing stream data from the message object.
<i>CBdataBufferEnd</i>	The address next to the end of the buffer containing stream data from the message object, that is, <i>CBdataBufferStart</i> + the number of bytes of stream data being provided to you in <i>CBdataBufferStart</i> .
<i>CBisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
<i>CBisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of stream data.

### Remarks

**MC64\_Read\_To\_Stream** allows the caller to wait for the arrival of a request or response message from the remote application. If a message is not received on the association identified by *AssociationID* within *Timeout* seconds, the function returns a status of MC\_TIMEOUT.

**NOTE:** If *Timeout* is set to less than zero, **MC\_Read\_To\_Stream** will wait forever for a message to arrive. If it is set to zero, it will check one time if a message has arrived and then return.

Once a message begins arriving, the **INACTIVITY\_TIMEOUT** configuration value is used. While receiving the message, the association will be aborted if there is no activity on the network for the length of time specified by this configuration value.

*ServiceName* is set to the name of the service associated with receiving message and *Command* is set to the command associated with *MessageID*.

### YourReceiveStreamFunction

If a message arrives, *YourReceiveStreamFunction* is called repeatedly providing the blocks of data of a message object. The message's attribute values have been set by the DICOM message stream received from the remote application.

\**CBdataBufferStart* is set to the address of a buffer containing the stream data block, and \**CBdataBufferEnd* is set to the address next to the end of the buffer containing stream data block, that is, *CBdataBufferStart* + the number of bytes of stream data block being provided in *CBdataBufferStart*.

If **MC64\_Read\_To\_Stream** returns either **MC\_ASSOCIATION\_CLOSED**, **MC\_ASSOCIATION\_ABORTED**, **MC\_NETWORK\_SHUT\_DOWN**, **MC\_INACTIVITY\_TIMEOUT**, **MC\_CONFIG\_INFO\_ERROR** or **MC\_INVALID\_MESSAGE\_RECEIVED** no further calls may be made for the association and no message ID is returned at *\*MessageID*.

---

The following commands are supported by the Merge DICOM Toolkit:

<b>Command</b>	<b>Description</b>
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response
C_ECHO_RQ	DICOM Verification Service Request
C_ECHO_RSP	DICOM Verification Service Response
C_FIND_RQ	DICOM Composite Find Service Request
C_FIND_RSP	DICOM Composite Find Service Response
C_CANCEL_FIND_RQ	Cancel DICOM Composite Find Service Request
C_GET_RQ	DICOM Composite Get Service Request
C_GET_RSP	DICOM Composite Get Service Response
C_CANCEL_GET_RQ	Cancel DICOM Composite Get Service Request
C_MOVE_RQ	DICOM Composite Move Service Request
C_MOVE_RSP	DICOM Composite Move Service Response
C_CANCEL_MOVE_RQ	Cancel DICOM Composite Move Service Request
N_EVENT_REPORT_RQ	DICOM Normalized Report Service Request
N_EVENT_REPORT_RSP	DICOM Normalized Report Service Response
N_GET_RQ	DICOM Normalized Get Service Request
N_GET_RSP	DICOM Normalized Get Service Request
N_SET_RQ	DICOM Normalized Set Service Request
N_SET_RSP	DICOM Normalized Set Service Response
N_ACTION_RQ	DICOM Normalized Action Service Request
N_ACTION_RSP	DICOM Normalized Action Service Response
N_CREATE_RQ	DICOM Normalized Create Service Request
N_CREATE_RSP	DICOM Normalized Create Service Response
N_DELETE_RQ	DICOM Normalized Delete Service Request
N_DELETE_RSP	DICOM Normalized Delete Service Response

Reference the “DICOM V3.0 Standard, Final Text - October 29, 1993” for more information about these commands.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_TIMEOUT</b>	The <i>Timeout</i> period expired.
<b>MC_MUST_CONTINUE_BEFORE_READING</b>	A previous message was not read completely before making this call.
<b>MC_NULL_POINTER_PARM</b>	The <i>MessageID</i> , <i>ServiceName</i> or <i>Command</i> parameter was NULL.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_NETWORK_SHUT_DOWN</b>	The network connect unexpectedly dropped.
<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_ASSOCIATION_CLOSED</b>	The association has been closed.
<b>MC_INACTIVITY_TIMEOUT</b>	A timeout occurred in the middle of receiving a message.
<b>MC_CONFIG_INFO_ERROR</b>	The message information file describing the message's service/command pair could not be accessed.
<b>MC_INVALID_MESSAGE_RECEIVED</b>	An improperly formatted DICOM message was received. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

**MC\_Read\_Message**                      **MC\_Continue\_Read\_Message**  
**MC\_Continue\_Read\_Message\_To\_Tag**

## MC64\_Register\_Callback\_Function MC64\_Register\_pCallback\_Function

Registers a callback function to provide or retrieve a standard or private attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC64_Register_Callback_Function (
    int ApplicationID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)

MC_STATUS MC64_Register_pCallback_Function (
    int ApplicationID,
    char *PrivateCode,
    unsigned short Group,
```

```

    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*pCallbackFunction)
)

```

<i>ApplicationID</i>	The identifier assigned to this application by the <b>MC_Register_Application</b> function.
<i>Tag</i>	DICOM tag which identifies the attribute to which this callback function applies. <i>Tag</i> must specify an attribute with a value representation of OB, OW, OD, or OF.
<i>PrivateCode</i>	The code string which dictates which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.
<i>CallbackFunction</i> or <i>pCallbackFunction</i>	Name of a function which will be called repeatedly to provide blocks of data or to request blocks of data for the attribute's value.

The functions must be prototyped as follows:

```

MC_STATUS CallbackFunction (
    int CBmessageID,
    unsigned long CBtag,
    void *CBuserInfo,
    CALLBACK_TYPE CBtype,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int *CBisLastPtr
)

MC_STATUS pCallbackFunction (
    int CBmessageID,
    char *CBprivateCode,
    unsigned short CBgroup,
    unsigned char CBelementByte,
    void *CBuserInfo,
    CALLBACK_TYPE CBtype,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int *CBisLastPtr
)

```

<i>CBmessageID</i>	Merge DICOM Toolkit sets this to the identifier assigned to the message, item or file object by the <b>MC_Open_Message</b> function.
--------------------	--



---

<i>CBtag</i>	Merge DICOM Toolkit sets this to the DICOM tag which identifies the attribute.
<i>CBprivateCode</i>	The code string which dictates which block in the private <i>CBgroup</i> "owns" the attribute.
<i>Cbgroup</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>CBelementByte</i>	The number identifying the private attribute within the private <i>CBgroup</i> for this <i>CBprivateCode</i> .
<i>CBuserInfo</i>	Merge DICOM Toolkit sets this to the address of data which is being passed from the <b>MC64_Register_Callback_Function</b> function. This may be NULL.
<i>CBtype</i>	When the <i>CallbackFunction</i> is called, this is set to one of the following enumerated CALLBACK_TYPE codes as defined in "mergecom.h": REQUEST_FOR_DATA REQUEST_FOR_DATA_LENGTH PROVIDING_DATA PROVIDING_DATA_LENGTH PROVIDING_MEDIA_DATA_LENGTH PROVIDING_OFFSET_TABLE FREE_DATA REQUEST_FOR_DATA_WITH_OFFSET

---

*CBdataBufferStart* If *CBtype* is REQUEST\_FOR\_DATA, REQUEST\_FOR\_DATA\_WITH\_OFFSET or PROVIDING\_DATA this points at the address of the buffer containing a portion of the attribute's value. The value for this field must be even because of alignment problems on some platforms.

If *CBtype* is REQUEST\_FOR\_DATA\_WITH\_OFFSET, then *\*CBdataBufferStart* is the pointer to *unsigned long long* which contains the offset of required data in the input seekable stream. The stream offset must be used only when *CBisFirst* to TRUE (not zero), i.e. when you are to provide the first block of data. After the data reading *\*CBdataBufferEnd* needs to be set to the address next to the data end provided at *\*CBdataBufferStart*, that is, *\*CBdataBufferEnd + the number of bytes of provided data*. This must be an even number.

If *CBtype* is REQUEST\_FOR\_DATA\_LENGTH, you must set *\*CBdataBufferStart* and *\*CBdataBufferEnd* so their difference would provide the total size (in bytes) of the attribute's value. This must be an even number.

If *CBtype* is PROVIDING\_DATA\_LENGTH or PROVIDING\_MEDIA\_DATA\_LENGTH, *\*CbdataBufferStart* is a pointer to *unsigned long long* that contains the offset of the attribute's value from the beginning of the DICOM file, *\*CbdataBufferEnd* is set to *unsigned long long* that contains the total size (in bytes) of the attribute's value.

If *CBtype* is FREE\_DATA then Merge DICOM Toolkit has set *CBdataBufferStart* and *CBdataBufferEnd* to NULL.

---

*CBdataBufferEnd*

If *CBtype* is REQUEST\_FOR\_DATA, then you must set *\*CbdataBufferEnd* to the address next to the data end, that is, *CbdataBufferStart* + the number of bytes of data you are providing at *\*CBdataBufferStart*. This must be an even number.

If *CBtype* is REQUEST\_FOR\_DATA\_WITH\_OFFSET, then *\*CBdataBufferStart* is the pointer to *unsigned long long* which contains the offset of required data in the input seekable stream. The stream offset must be used only when *CBisFirst* to TRUE (not zero), i.e. when you are to provide the first block of data. After the data reading *\*CBdataBufferEnd* needs to be set to the address next to the data end provided at *\*CBdataBufferStart*, that is, *\*CbdataBufferEnd* + the number of bytes of provided data. This must be an even number.

If *CBtype* is PROVIDING\_DATA, then Merge DICOM Toolkit has set *\*CBdataBufferEnd* to the address next to the data end providing at *\*CBdataBufferStart*, that is, *\*CBdataBufferStart* + the number of bytes of data it is providing.

If *CBtype* is REQUEST\_FOR\_DATA\_LENGTH, you must set *\*CBdataBufferStart* and *\*CBdataBufferEnd* so their difference would provide the total size (in bytes) of the attribute's value. This must be an even number.

If *CBtype* is PROVIDING\_DATA\_LENGTH or PROVIDING\_MEDIA\_DATA\_LENGTH then Merge DICOM Toolkit has set *\*CBdataBufferEnd* to *unsigned long long* that contains the total size (in bytes) of the attribute's value. Merge DICOM Toolkit will call the function with *CBtype* of PROVIDING\_DATA\_LENGTH before it calls the function with *CBtype* of PROVIDING\_DATA.

If *CBtype* is PROVIDING\_OFFSET\_TABLE then Merge DICOM Toolkit has set *\*CBdataBufferEnd*, so the difference of *\*CBdataBufferStart* and *\*CBdataBufferEnd* is the number of bytes of data providing at *\*CbdataBufferStart*.

If *CBtype* is FREE\_DATA then Merge DICOM Toolkit has set *CBdataBufferEnd* to NULL.

<i>CBisFirst</i>	<p>If <i>CBtype</i> is REQUEST_FOR_DATA, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is requesting data for this attribute's value (i.e. when you are to provide the first block of data).</p> <p>If <i>CBtype</i> is PROVIDING_DATA, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is providing data for this attribute's value (i.e. when it is providing the first block of data).</p> <p>If <i>CBtype</i> is PROVIDING_OFFSET_TABLE, then Merge DICOM Toolkit will set <i>CBisFirst</i> to TRUE (not zero) the first time it is providing data for the basic offset table.</p> <p>If <i>CBtype</i> is REQUEST_FOR_DATA_LENGTH, <i>CBtype</i> is PROVIDING_DATA_LENGTH, or <i>CBtype</i> is PROVIDING_MEDIA_DATA_LENGTH this parameter is not used.</p>
<i>CBisLastPtr</i>	<p>If <i>CBtype</i> is REQUEST_FOR_DATA or REQUEST_FOR_DATA_WITH_OFFSET, then you must set <i>*CBisLastPtr</i> to TRUE (not zero) the last time you are providing data for this attribute's value (i.e. when you are providing the last block of data).</p> <p>If <i>CBtype</i> is PROVIDING_DATA, then Merge DICOM Toolkit has set <i>*CBisLastPtr</i> to TRUE (not zero) because this is the last time it will be providing data for this attribute's value (i.e. when it is providing the last block of data).</p> <p>If <i>CBtype</i> is REQUEST_FOR_DATA_LENGTH, <i>CBtype</i> is PROVIDING_DATA_LENGTH or <i>CBtype</i> is PROVIDING_MEDIA_DATA_LENGTH this parameter is not used.</p>

## Remarks

**MC64\_Register\_Callback\_Function** registers *CallbackFunction* to provide or retrieve an attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file. The callback will also be called if the user calls **MC64\_Get\_Value\_To\_Function** or **MC64\_Set\_Value\_From\_Function** although this should not happen because the user already is storing the OB, OW, or OF data. **MC64\_Register\_Callback\_Function** may only be used for attributes with a value representation of OB, OW, or OF.

**MC64\_Register\_pCallback\_Function** registers *pCallbackFunction* to provide or retrieve a private attribute's values as they are transmitted or received on a DICOM association or read or written to a DICOM file. The callback will also be called if the user calls **MC64\_Get\_pValue\_To\_Function** or **MC64\_Set\_pValue\_From\_Function** although this should not happen because the user already is storing the OB, OW, or OF data. **MC64\_Register\_Callback\_Function** may only be used for attributes

with a value representation of OB, OW, or OF. Subsequent descriptions in this section are applicable for both standard and private registered callback functions.

**NOTE:** If a value has already been set for *Tag*, *CallbackFunction* will not be called to set or get its value.

**NOTE:** The **CALLBACK\_MIN\_DATA\_SIZE** configuration value specifies the minimum sized value for which a callback function is used. This configuration option can be used so that only messages or files with very large attribute values use a callback function.

**NOTE:** Some message definitions contain OB, OW, or OF data but a value does not have to be set for these attributes (such as C-FIND-RQ and C-FIND-RSP messages). To have the registered callback function ignored, the attribute should be deleted from the message with the **MC\_Delete\_Attribute** function.

If a callback function was already registered, *CallbackFunction* replaces the function previously registered. A callback function may be “de-registered” by calling **MC\_Release\_Callback\_Function** for the same attribute.

The **MC64\_Register\_Callback\_Function** caller may provide the *CallbackFunction* with a pointer to agreed upon data in its *UserInfo* parameter. This is optional and *UserInfo* may be NULL.

#### Network Communications:

When the Merge DICOM Toolkit communications software receives a message on a DICOM association, it uses **MC\_Open\_Message** to acquire a message compatible with the message being received. It then populates the message with the values it receives over the association. When it receives attributes of type OB, OW, or OF (or any other large values) the message library stores the values in a configurable location (normally in temporary files). Then, the receiving application could use any of the “Get” functions (including **MC64\_Get\_Value\_To\_Function**) to retrieve attribute values from the message object.

Some applications may wish to bypass the storing of these large values in the message object. To do so, the **MC64\_Register\_Callback\_Function** is used to register a function which will be called as the attribute’s value arrives on the association; blocks of the value are then passed to this “*CallbackFunction*” instead of storing the value in the message.

Similarly, a client application may use **MC64\_Register\_Callback\_Function** to register a callback function to provide Merge DICOM Toolkit with an attribute’s value as Merge DICOM Toolkit needs the value for transmission on the network. “*CallbackFunction*” will be called when *Tag* is encountered in any message being transferred between this *ApplicationID* and a remote application.

#### Media Applications:

When the Merge DICOM Toolkit media software reads a file with **MC64\_Open\_File**, it populates the file object with the values it receives from media. When it receives attributes of type OB, OW, or OF (or any other large values) the file library stores the values in a configurable location (normally in temporary files). Then, the reading application could use any of the “Get” functions (including **MC64\_Get\_Value\_To\_Function**) to retrieve attribute values from the file object.

Some applications may wish to bypass the storing of these large values in the file object. To do so, the **MC64\_Register\_Callback\_Function** is used to register a function which will be called as the attribute’s value is read from media. The user has two options when the attribute’s value is read from media. If the file is being read with the function **MC64\_Open\_File** or **MC64\_Open\_File\_Upto\_Tag** it behaves in the same manner as with associations. The OB, OW, or OF data is passed to *CallbackFunction* instead of storing it in the file object. However, when **MC64\_Open\_File\_Bypass\_OBOW** or **MC64\_Open\_File\_Upto\_Tag\_Bypass\_Value** is used, the OB, OW, or OF data is left on media. The location and length of the data within the file is passed to *CallbackFunction*. The actual data is not passed. Whenever *Tag* is encountered in any file being read within *ApplicationID*, *CallbackFunction* will be called.

In some cases, *CallbackFunction* must also supply Merge DICOM Toolkit with the OB, OW, or OF data. If the file object is converted to a message object with **MC\_File\_To\_Message** and sent over the network, Merge DICOM Toolkit will request the attribute’s value from *CallbackFunction* when it needs the value for transmission. Similarly, if the file object is re-written to media, *CallbackFunction* will also be requested for the attribute’s value.

#### The CallbackFunction:

Merge DICOM Toolkit passes the *CallbackFunction* both *CBmessageID* and *CBtag* to identify which attribute is involved. **MC\_Get\_Message\_Service** may be called to identify which service and command this *CBmessageID* relates to. The *CBuserInfo* parameter is optional data from the **MC64\_Register\_Callback\_Function** caller.

*CallbackFunction* must return a status of **MC\_NORMAL\_COMPLETION** if it could accommodate the callback request, or **MC\_CANNOT\_COMPLY**, if not. These status codes are defined in “mcstatus.h.”

*CBtype* is set to **REQUEST\_FOR\_DATA\_LENGTH** if Merge DICOM Toolkit is requesting the size (in bytes) of the attribute’s value. Merge DICOM Toolkit will call the *CallbackFunction* with *CBtype* set to **REQUEST\_FOR\_DATA\_LENGTH** before it begins calling *CallbackFunction* with *CBtype* set to **REQUEST\_FOR\_DATA**.

*CBtype* is set to **PROVIDING\_DATA\_LENGTH** if Merge DICOM Toolkit is providing *CallbackFunction* with the total size of the attribute’s value. Merge DICOM Toolkit will call the *CallbackFunction* with *CBtype* set to **PROVIDING\_DATA\_LENGTH** before it begins calling *CallbackFunction* with *CBtype* set to **PROVIDING\_DATA**.

*CBtype* is set to **REQUEST\_FOR\_DATA** if Merge DICOM Toolkit is requesting data from the *CallbackFunction*. In this case *CallbackFunction* sets *\*CBdataBufferStart* to the address of a block of the attribute’s value, and *\*CBdataBufferEnd* to the address next to the data end, that is, *CBdataBufferEnd* + the number of bytes at *\*CBdataBufferStart*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this attribute’s data *CBisFirst* will be TRUE (non-zero). If *CallbackFunction* is returning the last block of data to be provided for this attribute, it must set

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*\*CBisLastPtr* to TRUE (non-zero). Merge DICOM Toolkit will repeatedly call *CallbackFunction* until *\*CBisLastPtr* is set to TRUE or *CallbackFunction* returns with a status other than **MC\_NORMAL\_COMPLETION**.

*CBtype* is set to **PROVIDING\_DATA** if Merge DICOM Toolkit is providing data to the *CallbackFunction*. In this case Merge DICOM Toolkit has set *\*CBdataBufferStart* to the address of a block of the attribute's value, and *\*CBdataBufferEnd* to the address next to the data end, that is, *\*CBdataBufferEnd* + the number of bytes at *\*CBdataBufferStart*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this attribute's data *CBisFirst* will be TRUE (non-zero). If this is the last block of data to be provided for this attribute, Merge DICOM Toolkit has set *\*CBisLastPtr* to TRUE (non-zero). Merge DICOM Toolkit will repeatedly call *CallbackFunction* until all of the value has been provided. At that time, it sets *\*CBisLastPtr* to TRUE.

*CBtype* is set to **PROVIDING\_OFFSET\_TABLE** if Merge DICOM Toolkit is providing offset table to the *CallbackFunction*. In this case Merge DICOM Toolkit has set *\*CBdataBufferStart* to the address of the offset table, and *\*CBdataBufferEnd* is set to the address next to the data end, *\*CBdataBufferStart* + the number of bytes at *\*CBdataBufferStart*. If this is the first time Merge DICOM Toolkit is calling *CallbackFunction* for this offset table's data *CBisFirst* will be TRUE (non-zero).

**NOTE:** *\*CBdataBufferStart* may be NULL when *\*CBisLastPtr* is returned TRUE.

**NOTE:** The *CBtype* **PROVIDING\_OFFSET\_TABLE** is given to the callback function when the pixel data is encapsulated.

**NOTE:** *CallbackFunction* is not called with this value when a file is opened with **MC64\_Open\_File\_Bypass\_OBOW** because the OB, OW, or OF data is left on media.

*CBtype* is set to **PROVIDING\_MEDIA\_DATA\_LENGTH** if Merge DICOM Toolkit is reading a file from media by use of the **MC64\_Open\_File\_Bypass\_OBOW** function. *CallbackFunction* is provided with the total size of the attribute's value and the byte offset from the beginning of the media file of the attribute's value. *\*\*CBdataBufferStart* is the pointer to unsigned long long that contains the byte offset of the attribute's value from the beginning of the media file. The value size (in bytes) is placed at *\*CBdataBufferEnd*. Merge DICOM Toolkit will not call the *CallbackFunction* with *CBtype* set to **PROVIDING\_DATA** when it calls *CallbackFunction* with *CBtype* set to **PROVIDING\_MEDIA\_DATA\_LENGTH**.

*CBtype* is set to **FREE\_DATA** if the memory associated with the enclosing message, item, or file is being freed by Merge DICOM Toolkit, and the **USE\_FREE\_DATA\_CALLBACK** configuration option has been set to Yes. When this configuration option is set to No, registered callback functions will not be called with the **FREE\_DATA** type.

If *CallbackFunction* returns with a status other than **MC\_NORMAL\_COMPLETION**, Merge DICOM Toolkit will stop calling it.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>CallbackFunction</i> , <i>pCallbackFunction</i> or <i>PrivateCode</i> were NULL.
<b>MC_INVALID_APPLICATION_ID</b>	ApplicationID does not identify a valid application object.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## See Also

<b>MC64_Set_Value_From_Function</b>	<b>MC64_Get_Value_To_Function</b>
<b>MC64_Set_pValue_From_Function</b>	<b>MC64_Get_pValue_To_Function</b> <b>MC_Get_Message_Service</b>
<b>MC64_Open_File</b>	
<b>MC64_Open_File_Bypass_OBOW</b>	<b>MC64_Open_File_Upto_Tag</b>
<b>MC64_Open_File_Upto_Tag_Bypass_Value</b>	
<b>MC64_Release_Callback_Function</b>	<b>MC_Register_Application</b>
<b>MC_Set_Message_Callbacks</b>	

## MC64\_Send\_Response

Sends a response to a message received from the remote application. The response is sent directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory.

## Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC64_Send_Response (
    int AssociationID,
    RESP_STATUS ResponseStatus,
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>ResponseStatus</i>	This is the status code to be returned. It must be one of the enumerated <b>RESP_STATUS</b> codes defined in “mergecom.h”.
<i>Filename</i>	This parameter is unused (legacy). It may be anything, including NULL.
<i>UserInfo</i>	Address of user data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.



*CallbackFunction* Name of a function which will be called repeatedly to provide blocks of the response message data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
    unsigned long CBtag,
    void *CBUserInfo,
    CALLBACK_TYPE CBtype,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int *CBisLastPtr
)
```

where:

*CBAssociationID* The association object's identification number  
*CBtag* Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC64\_Register\_Callback\_Function* section.

## Remarks

**MC64\_Send\_Response** allows the caller to respond to a message received from the remote application using the callback mechanism. The response data should be provided in the form of a DICOM object. The data blocks of the response message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*

**MC64\_Send\_Response** is called after receiving a request message using **MC\_Read\_Message** or **MC\_Read\_To\_Stream** or **MC64\_Read\_To\_Stream**.

*ResponseStatus* must be set to a valid response code for the service involved. Response codes for standard DICOM services are defined in the "mergecom.h" file.

Many DICOM services do not require a response of more than just a status. Others, however, (e.g. C\_FIND\_RSP) require the setting of several message attributes.

**NOTE:** See **MC\_Send\_Response\_Message** section for the details regarding the handling of the required message attributes for DICOM services.

If **MC64\_Send\_Response** returns **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for that association.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
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### See Also

**MC\_Send\_Request\_Message** **MC64\_Send\_Request**  
**MC\_Read\_Message** **MC64\_Read\_To\_Stream**

## MC64\_Send\_Request

Sends a request message to the remote application directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory

### Synopsis

```
#include "mergecom.h"
```

```
MC_STATUS MC64_Send_Request (
    int AssociationID,
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>Filename</i>	This parameter is unused (legacy). It may be anything, including NULL.
<i>UserInfo</i>	Address of user data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.
<i>CallbackFunction</i>	Name of a function which will be called repeatedly to provide blocks of request data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
```

```

    unsigned long Chtag,
    void* CUserInfo,
    CALLBACK_TYPE Cbtype,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int* CBisLastPtr
)

```

where:

*CBAssociationID*            The association object's identification number  
*Chtag*                        Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC64\_Register\_Callback\_Function* section.

## Remarks

**MC64\_Send\_Request** sends a request to the remote application using user's *CallbackFunction* as the message data provider. The request message might be associated with DICOM file identified by *Filename* parameter.

The using of *CallbackFunction* mechanism facilitates the sending of large messages, decreases the application memory footprint and in many cases increases the overall performance. The data blocks of the request message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*.

**NOTE:** Some DICOM services require that values for certain “command level” message attributes (i.e. group 0 attributes) be present. Merge DICOM Toolkit automatically adds command level attributes to the sent message when **MC64\_Send\_Request** is called (see details in **MC\_Send\_Request\_Message** section).

If **MC64\_Send\_Request** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “*mcstatus.h*”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.

**MC\_REQUIRED\_ATTRIBUTE\_MISSING**

Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to *MessageID* has not been set.

**MC\_UNACCEPTABLE\_SERVICE**

The service related to *MessageID* has not been successfully negotiated for this association.

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

**MC\_ASSOCIATION\_ABORTED**

The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also**

**MC64\_Register\_Callback\_Function**    **MC\_Open\_Message**  
**MC\_Read\_Message**                    **MC64\_Read\_To\_Stream**  
**MC\_Send\_Response\_Message**        **MC64\_Send\_Response**  
**MC\_Send\_Request\_Message\_For\_Service**  
**MC64\_Send\_Request\_For\_Service**

**MC64\_Send\_Request\_For\_Service**

Sends a request message to the remote application directly from a callback function. Especially useful for large data transfers which we don't want to load into application memory.

**Synopsis**

```
#include "mergecom.h"
```

```
MC_STATUS MC64_Send_Request_For_Service (
    int AssociationID,
    char *AServiceName
    char *Filename,
    void *UserInfo,
    MC_STATUS (*CallbackFunction) ()
)
```

<i>AssociationID</i>	The association object's identification number
<i>AserviceName</i>	Name of the service negotiated to utilize for the presentation context.
<i>Filename</i>	This parameter is unused (legacy). It may be anything, including NULL.
<i>UserInfo</i>	Address of user data which will be passed on to <i>CallbackFunction</i> each time it is called. This may be NULL.

---

*CallbackFunction* Name of a function which will be called repeatedly to provide blocks of request data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
    int CBAssociationID,
    unsigned long CBtag,
    void* CUserInfo,
    CALLBACK_TYPE CBtype,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int CBisFirst,
    int* CBisLastPtr
)
```

where:

*CBAssociationID* The association object's identification number  
*CBtag* Not used and has undefined value (0xFFFFFFFF)

and all other *CallbackFunction* parameters as described in *MC64\_Register\_Callback\_Function* section.

## Remarks

**MC64\_Send\_Request\_For\_Service** sends a request message to the remote application using user's *CallbackFunction* as the message data provider. The request message might be associated with DICOM file identified by *Filename* parameter.

The presentation context used in the transfer is looked up based on the service specified in the call. This call is used to select the proper presentation context when the object is common to multiple services negotiated. An example is the FilmBox when both BASIC\_GRAYSCALE\_PRINT\_MANAGEMENT and BASIC\_COLOR\_PRINT\_MANAGEMENT are negotiated.

The data blocks of the message will be repeatedly requested through *CallbackFunction* and sent to the remote application across an open DICOM association identified by *AssociationID*

**NOTE:** Some DICOM services require that values for certain “command level” message attributes (i.e. group 0 attributes) be present. Merge DICOM Toolkit automatically adds command level attributes to the sent message when **MC64\_Send\_Request\_For\_Service** is called (see details in **MC\_Send\_Request\_Message** section).

If **MC64\_Send\_Request\_For\_Service** returns a status code of **MC\_ASSOCIATION\_ABORTED**, no further calls may be made for the association.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_ASSOC_ID</b>	<i>AssociationID</i> is not a valid association object ID.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_MAX_OPERATIONS_EXCEEDED</b>	Sending of the message would cause the Maximum Number of Operations Invoked that was negotiated to be exceeded. A response message must be read before this message can be sent.
<b>MC_REQUIRED_ATTRIBUTE_MISSING</b>	Some DICOM services require certain command level attributes (group 0) to have values set. This status indicates that a required attribute value for the service related to <i>MessageID</i> has not been set.
<b>MC_UNACCEPTABLE_SERVICE</b>	The service related to <i>MessageID</i> has not been successfully negotiated for this association.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

The association is dropped if any of the following are returned:

<b>MC_ASSOCIATION_ABORTED</b>	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
-------------------------------	--

### See Also

**MC64\_Register\_Callback\_Function**   **MC\_Open\_Message**  
**MC\_Send\_Request\_Message**   **MC64\_Send\_Request**  
**MC\_Send\_Response\_Message**   **MC64\_Send\_Response**  
**MC\_Read\_Message**   **MC64\_Read\_To\_Stream**  
**MC\_Get\_Meta\_ServiceName**

## MC64\_Set\_Encapsulated\_Value\_From\_Function

Encapsulates a single frame and stores the encapsulated value into the message object for the given attribute. The value representation of the attribute must be OB or OW. If a compressor is registered, the data will be compressed in the message.

### Synopsis

```
#include "mc3msg.h"

MC_STATUS MC64_Set_Encapsulated_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

---

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Tag</i>	DICOM tag which identifies the attribute.
<i>UserInfo</i>	Address of user data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.
<i>YourSetFunction</i>	Name of a function which will be called repeatedly for blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    int CBisFirst,
    void *CBUserInfo,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int *CBisLastPtr
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourSetFunction</i> to request data blocks.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC64_Set_Encapsulated_Value_From_Function</b> function. This may be NULL.
<i>CbdataBufferStart</i>	Set <i>*CbdataBufferStart</i> to the address of the data you are providing.
<i>CbdataBufferEnd</i>	Set <i>*CbdataBufferEnd</i> to the address next to the end of the data you are providing, that is, <i>CbdataBufferStart</i> + the number of bytes you are providing.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (not zero) when you are returning with the last block of OBOW data.

## Remarks

The **MC64\_Set\_Encapsulated\_Value\_From\_Function** function is used to encapsulate, and then set the value of an attribute which has a value representation of OB or OW. If a compressor is registered with **MC\_Register\_Compression\_Callbacks**, the data will be compressed using the registered compressor. Such attributes tend to have values of great length. To accommodate this, one uses the **MC64\_Set\_Encapsulated\_Value\_From\_Function** function to specify the name of a function

(*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls repeatedly requesting blocks of the attribute's data value.

**MC\_Close\_Encapsulated\_Value** must be called when the user is through encapsulating data within this message. If more frames will be encapsulated, use

**MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function** until all frames have been encapsulated, followed by **MC\_Close\_Encapsulated\_Value**.

An optional *UserInfo* parameter may be used to pass information between the

**MC64\_Set\_Encapsulated\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### *YourSetFunction*

*YourSetFunction* must set *\*CbdataBufferStart* to the address of a block data which is a portion of the attribute's value. It also must set *\*CbdataBufferEnd* to the address next to the end of a block data which is a portion of the attribute's value, that is, *\*CbdataBufferStart + the number of bytes in the block*

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mc3msg.h".

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB or OW.



**MC\_CALLBACK\_DATA\_SIZE\_UNEVEN**

The number of bytes of the value set by *YourSetFunction* was not an even number.

**MC\_CALLBACK\_PARM\_ERROR**

The number of bytes of the value set by *YourSetFunction* was an odd number

**MC\_CALLBACK\_CANNOT\_COMPLY** *YourSetFunction* returned with **MC\_CANNOT\_COMPLY**.

**See Also**

**MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function**

**MC\_Close\_Encapsulated\_Value**

**MC\_Register\_Compression\_Callbacks**

**MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function**

Encapsulates the next frame and stores the encapsulated value into the message object for the given attribute. The value representation of the attribute must be OB or OW. If a compressor is registered, the data will be compressed in the message.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Set_Next_Encapsulated_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*UserInfo* Address of user data which will be passed on to *YourSetFunction* each time it is called. This may be NULL.

*YourSetFunction* Name of a function which will be called repeatedly for blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long CBtag,
    int CBisFirst,
    void *CBUserInfo,
    void **CBdataBufferStart,
    void **CBdataBufferEnd,
    int *CBisLastPtr
)
```

---

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>CBtag</i>	DICOM tag which identifies the attribute.
<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourSetFunction</i> to request data blocks.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC64_Set_Next_Encapsulated_Value_From_Function</b> function. This may be NULL.
<i>CbdataBufferStart</i>	Set <i>*CbdataBufferStart</i> to the address of the data you are providing.
<i>CbdataBufferEnd</i>	Set <i>*CbdataBufferEnd</i> to the address next to the end of the data you are providing, that is, <i>CbdataBufferStart +</i> the number of bytes you are providing.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (not zero) when you are returning with the last block of OBOW data.

### Remarks

The **MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function** function is used to encapsulate the next frame, and then set the value of an attribute which has a value representation of OB or OW. If a compressor is registered with **MC\_Register\_Compression\_Callbacks**, the data will be compressed using the registered compressor. Such attributes tend to have values of great length. To accommodate this, one uses the **MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function** function to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls repeatedly requesting blocks of the attribute's data value.

**MC\_Close\_Encapsulated\_Value** must be called when the user is through encapsulating data within this message. If more frames will be encapsulated, use **MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function** until all frames have been encapsulated, followed by **MC\_Close\_Encapsulated\_Value**.

An optional *UserInfo* parameter may be used to pass information between the **MC64\_Set\_Next\_Encapsulated\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourSetFunction

*YourSetFunction* must set *\*CbdataBufferStart* to the address of a block data which is a portion of the attribute's value. It also must set *\*CbdataBufferEnd* to the address next to the end of a block data which is a portion of the attribute's value, that is, *\*CbdataBufferStart +* the number of bytes in the block

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The message's transfer syntax is non-encapsulated.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not OB or OW.
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The number of bytes of the value set by <i>YourSetFunction</i> was not an even number.
<b>MC_CALLBACK_PARM_ERROR</b>	The number of bytes of the value set by <i>YourSetFunction</i> was an odd number
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourSetFunction</i> returned with <b>MC_CANNOT_COMPLY</b> .

### See Also

**MC64\_Set\_Encapsulated\_Value\_From\_Function**  
**MC\_Close\_Encapsulated\_Value**  
**MC\_Register\_Compression\_Callbacks**

## MC64\_Set\_Next\_pValue... Functions

Appends another value to a private attribute in a message object.

### Synopsis

```
#include "mc3msg.h"

)
MC_STATUS MC64_Set_Next_pValue_From_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long ValueLength,
```

```

    const MC_Uchar *Value
)

```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private Group “owns” the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private Group for this PrivateCode.
<i>Value</i>	The attribute should be set to this value.
<i>ValueLength</i>	Length of provided <i>Value</i> .

### Remarks

These functions add another value for an attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. If no values exist yet for the attribute, *Value* is stored as the attribute’s first value.

For **MC64\_Set\_Next\_pValue\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Function	May be used to set values to attributes with these Value Representations
MC64_Set_Next_pValue_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .

<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table above.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC64_Set_Value... Functions</b>	<b>MC64_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC64_Set_pValue... Functions</b>	<b>MC64_Set_pValue_From_Function</b>
<b>MC_Set_pValue_To_NULL</b>	<b>MC_Set_pValue_To_Empty</b>
<b>MC64_Set_Next_Value... Functions</b>	<b>MC64_Stream_To_Message</b>

## MC64\_Set\_Next\_Value... Functions

Appends a value to an attribute in a message object.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Set_Next_Value_From_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long ValueLength,
    const MC_Uchar *Value)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*ValueLength* The number of Unicode characters in the input *Value*.

---

*Value*                    The attribute will be set to this value.

### Remarks

For **MC64\_Set\_Next\_Value\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

Functions	May be used to set values to attributes with these Value Representations
MC64_Set_Next_Value_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT

**Return Value**

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.

**ERRORS:**

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>Data Type</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Check Merge DICOM Toolkit log for detail.</b>

**See Also**

<b>MC64_Set_Value... Functions</b>	<b>MC64_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC64_Set_pValue... Functions</b>	<b>MC64_Set_pValue_From_Function</b>
<b>MC_Set_pValue_To_NULL</b>	<b>MC_Set_pValue_To_Empty</b>

## MC64\_Set\_Next\_pValue... Functions MC64\_Stream\_To\_Message MC\_Enable\_Unicode\_Conversion

### MC64\_Set\_pValue... Functions

Sets the value of a private attribute in a message object.

#### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Set_pValue_From_UnicodeString (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    unsigned long long ValueLength,
    const MC_Uhar* Value
)
MC_STATUS MC64_Set_pValue_From_Buffer (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *Value
    unsigned long long ValueLength
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.
<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>Value</i>	The attribute should be set to this value.
<i>ValueLength</i>	Length of provided <i>Value</i> .

#### Remarks

These functions store a new value for a private attribute identified by *ElementByte* for the *PrivateCode* within the given *Group*. If one or more values already exist for the attribute, they are first removed.

For **MC64\_Set\_pValue\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.



**MC64\_Set\_pValue\_From\_Buffer** is intended mainly for setting the value of an attribute whose value representation is unknown. This may occur if **MC64\_Message\_To\_Stream** is to be used and one or more of the stream attributes is unknown. The attribute's value is simply copied (memcpy) from the *Value* buffer according to the length provided in *ValueLength*. The function supports other value representations as well – see table below.

Function	May be used to set values to attributes with these Value Representations
MC64_Set_pValue_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC64_Set_pValue_From_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT
MC64_Set_pValue_From_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT

The **MC64\_Set\_pValue\_From\_Function** call is described in its own section.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.
<b>ERRORS:</b>	
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table above.

<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g., setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### See Also

<b>MC64_Set_Value... Functions</b>	<b>MC64_Set_Value_From_Function</b>
<b>MC_Set_Value_To_NULL</b>	<b>MC_Set_Value_To_Empty</b>
<b>MC64_Set_pValue_From_Function</b>	<b>MC_Set_pValue_To_NULL</b>
<b>MC_Set_pValue_To_Empty</b>	<b>MC64_Set_Next_Value... Functions</b>
<b>MC64_Set_Next_pValue... Functions</b>	<b>MC64_Stream_To_Message</b>

## MC64\_Set\_pValue\_From\_Function

Sets the value of a message object private attribute which has the binary value representation of OB, OW, OV, OL, OD or OF, or the numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or the text value representation of UR or UT.

### Synopsis

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Set_pValue_From_Function (
    int MsgFileItemID,
    char *PrivateCode,
    unsigned short Group,
    unsigned char ElementByte,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)
```

<i>MsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>PrivateCode</i>	The code string which identifies which block in the private <i>Group</i> "owns" the attribute.
<i>Group</i>	The number identifying the private group containing the private attribute. It must be an odd number.

---

<i>ElementByte</i>	The number identifying the private attribute within the private <i>Group</i> for this <i>PrivateCode</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourSetFunction</i> each time it is called. This may be NULL.
<i>YourSetFunction</i> <i>n</i>	Name of a function which will be called repeatedly to request blocks of data for the attribute's value.

The function must be prototyped as follows:

```
MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long Cbtag,
    int CBisFirst,
    void *CBUserInfo,
    void **CbdataBufferStart,
    void **CbdataBufferEnd,
    int *CBisLastPtr
)
```

<i>CBMsgFileItemID</i>	The identifier assigned to this object by the <b>MC_Open_Message</b> , <b>MC_Open_Empty_Message</b> , <b>MC_Create_File</b> , <b>MC_Create_Empty_File</b> , or <b>MC_Open_Item</b> functions.
<i>Cbtag</i>	DICOM tag which identifies the attribute.
<i>CBisFirst</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourSetFunction</i> to request data blocks.
<i>CBUserInfo</i>	Address of data which is being passed from the <b>MC64_Set_pValue_From_Function</b> function. This may be NULL.
<i>CbdataBufferStart</i>	Set <i>*CbdataBufferStart</i> to the address of the data you are providing.
<i>CbdataBufferEnd</i>	Set <i>*CbdataBufferEnd</i> to the address next to the end of the data you are providing, that is, <i>CbdataBufferStart +</i> the number of bytes you are providing.
<i>CBisLastPtr</i>	Set <i>*CBisLastPtr</i> to TRUE (not zero) when you are returning with the last block of OB, OW, or OF data.

### Remarks

The **MC64\_Set\_pValue\_From\_Function** function is used to set the value of a private attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses **MC64\_Set\_pValue\_From\_Function** to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls. This "callback" function is called repeatedly to request blocks of the attribute's data value.

An optional *UserInfo* parameter may be used to pass information between the **MC64\_Set\_pValue\_From\_Function** caller and *YourSetFunction* which receives the data in its *CBUserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### *YourSetFunction*

*YourSetFunction* must set *\*CbdataBufferStart* to the address of a block data which is a portion of the attribute's value. It also must set *\*CbdataBufferEnd* to the address next to the end of a block data which is a portion of the attribute's value, that is, *\*CbdataBufferStart* + the number of bytes in the block.

Merge DICOM Toolkit sets *CBisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute's value. *YourSetFunction* must set *\*CBisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute's value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in "mcstatus.h".

### **Return Value**

One of these enumerated **MC\_STATUS** codes defined in "mcstatus.h":

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>PrivateCode</i> or <i>YourSetFunction</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute identified by <i>ElementByte</i> in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INVALID_GROUP</b>	<i>Group</i> was not an odd number.
<b>MC_INVALID_PRIVATE_CODE</b>	The message does not contain any attributes in <i>Group</i> for <i>PrivateCode</i> .
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation was not one of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT.
<b>MC_CALLBACK_PARM_ERROR</b>	The value set by <i>YourSetFunction</i> in its <i>*CbdataBufferStart</i> parameter was NULL and <i>*CBisLastPtr</i> was not set to true(non-zero).
<b>MC_CALLBACK_DATA_SIZE_NEGATIVE</b>	The number of bytes of the value set by <i>YourSetFunction</i> was a negative number
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The number of bytes of the value set by <i>YourSetFunction</i> was an odd number

**MC\_CALLBACK\_CANNOT\_COMPLY**

*YourSetFunction* returned a status other than **MC\_NORMAL\_COMPLETION**.

**MC\_VALUE\_TOO\_LARGE**

The value set by *YourSetFunction* was too large.

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**See Also****MC64\_Set\_pValue... Functions****MC\_Set\_pValue\_To\_Empty****MC64\_Set\_Next\_Value... Functions****MC\_Set\_pValue\_To\_NULL****MC64\_Set\_Value... Functions****MC\_Set\_Value\_To\_NULL****MC\_Set\_Value\_To\_Empty****MC64\_Set\_Next\_pValue... Functions****MC64\_Set\_Value... Functions**

Sets the value of an attribute in a message object.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Set_Value_From_UnicodeString (
    int MsgFileItemID,
    unsigned long Tag,
    unsigned long long ValueLength,
    const MC_Uhar* Value
)
```

```
MC_STATUS MC64_Set_Value_From_Buffer (
    int MsgFileItemID,
    unsigned long Tag,
    void *Value,
    unsigned long long ValueLength
)
```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*Value* The value to be used as the attribute's value.

*ValueLength* Length of provided *Value*.

**Remarks**

These functions store a new value for the attribute with the given *Tag*. If one or more values already exist for the attribute, they are first removed. Use **MC64\_Set\_Next\_...** to append attribute values.

For **MC64\_Set\_Value\_From\_UnicodeString**, the *ValueLength* parameter is for specifying the number of Unicode characters in the input *Value*. This function requires **MC\_Enable\_Unicode\_Conversion** being called first. See documentation for **MC\_Enable\_Unicode\_Conversion**.

**MC64\_Set\_Value\_From\_Buffer** is intended mainly for setting the value of an attribute whose value representation is unknown. This may occur if **MC64\_Message\_To\_Stream** is to be used and one or more of the stream attributes is unknown. The attribute's value is simply copied (memcpy) from the *Value* buffer according to the length provided in *ValueLength*. The function supports other value representations as well – see table below.

Any reasonable conversion will be made from *Value's* data type to the attribute's value representation. However, some conversions are illogical (see the table below). An appropriate error code will be returned if the conversion attempt failed.

**NOTE:** for attributes with a value representation of **SQ** (sequence of items) *Value* must represent an integer which is the *ItemID* of an item object opened previously using **MC\_Open\_Item**.

Function	May be used to set values to attributes with these Value Representations
MC64_Set_Value_From_UnicodeString	LO, LT, PN, SH, ST, UC, UT
MC64_Set_Value_From_Buffer	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, UR, UT
MC64_Set_Value_From_Function	UNKNOWN_VR, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR, UT

The **MC64\_Set\_Value\_From\_Function** call is described in its own section.

### Return Value

One of these enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A string-type <i>Value</i> had invalid characters for the value representation of <i>Tag</i> .
<b>MC_INVALID_VALUE_FOR_VR</b>	<i>Value</i> does not conform to the requirements of its value representation.

### ERROR MESSAGES:

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_INVALID_DATA_TYPE</b>	<i>DataType</i> is not valid.
<b>MC_TOO_MANY_VALUES</b>	This attribute contains the most values that a standard attribute can contain (65535).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CANNOT_COMPLY</b>	<b>The function fails to process the request. Check Merge DICOM Toolkit log for detail.</b>

### See Also

<b>MC64_Set_Value_From_Function</b>	<b>MC_Set_Value_To_NULL</b>
<b>MC_Set_Value_To_Empty</b>	<b>MC64_Set_pValue... Functions</b>
<b>MC64_Set_pValue_From_Function</b>	<b>MC_Set_pValue_To_NULL</b>
<b>MC_Set_pValue_To_Empty</b>	<b>MC64_Set_Next_Value... Functions</b>
<b>Functions</b>	<b>MC64_Set_Next_pValue...</b>
	<b>MC_Enable_Unicode_Conversion</b>

## MC64\_Set\_Value\_From\_Function

Sets the value of a message object attribute which has the binary value representation of OB, OW, OV, OL, OD or OF, or the numeric value representation of AT, SS, US, SL, UL, SV, UV, FL or FD, or the text value representation of UR or UT.

### Synopsis

```
#include "mc3msg.h"
```

---

```

MC_STATUS MC64_Set_Value_From_Function (
    int MsgFileItemID,
    unsigned long Tag,
    void *UserInfo,
    MC_STATUS (*YourSetFunction) ()
)

```

*MsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Tag* DICOM tag which identifies the attribute.

*UserInfo* Address of data which will be passed on to *YourSetFunction* each time it is called. This may be NULL.

*YourSetFunction* Name of a function which will be called repeatedly to request blocks of data for the attribute's value.

The function must be prototyped as follows:

```

MC_STATUS YourSetFunction (
    int CBMsgFileItemID,
    unsigned long Cbtag,
    int CbisFirst,
    void *CbuserInfo,
    void **CbdataBufferStart,
    void **CbdataBufferEnd,
    int *CbisLastPtr
)

```

*CBMsgFileItemID* The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, **MC\_Create\_File**, **MC\_Create\_Empty\_File**, or **MC\_Open\_Item** functions.

*Cbtag* DICOM tag which identifies the attribute.

*CbisFirst* This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourSetFunction* to request data blocks.

*CbuserInfo* Address of data which is being passed from the **MC64\_Set\_Value\_From\_Function** function. This may be NULL.

*CbdataBufferStart* Set *\*CbdataBufferStart* to the address of the data you are providing.

*CbdataBufferEnd* Set *\*CbdataBufferEnd* to the address next to the end of the data you are providing, that is, *CbdataBufferStart* + the number of bytes you are providing.

*CbisLastPtr* Set *\*CbisLastPtr* to TRUE (not zero) when you are returning with the last block of OB, OW, OV, OD or OF data.



## Remarks

The **MC64\_Set\_Value\_From\_Function** function is used to set the value of an attribute which has a value representation of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT. Such attributes tend to have values of great length. To accommodate this, one uses the **MC64\_Set\_Value\_From\_Function** function to specify the name of a function (*YourSetFunction*) which Merge DICOM Toolkit, in turn, calls. This “callback” function is called repeatedly to request blocks of the attribute’s data value.

An optional *UserInfo* parameter may be used to pass information between the **MC64\_Set\_Value\_From\_Function** caller and *YourSetFunction* which receives the data in its *CbuserInfo* parameter. If no such exchange of data is necessary, you may use NULL for *UserInfo*.

### YourSetFunction

*YourSetFunction* must set *\*CbdataBufferStart* to the address of a block data which is a portion of the attribute’s value. It also must set *\*CbdataBufferEnd* to the address next to the end of a block data which is a portion of the attribute’s value, that is, *\*CbdataBufferStart* + the number of bytes in the block.

Merge DICOM Toolkit sets *CbisFirst* to TRUE (non-zero) if it is requesting the first block of the attribute’s value. *YourSetFunction* must set *\*CbisLastPtr* to TRUE (non-zero) if it is supplying the last block of the attribute’s value.

*YourSetFunction* must return **MC\_NORMAL\_COMPLETION** if all went well. If not, it must return **MC\_CANNOT\_COMPLY**. Both of these are defined in “mc3msg.h”.

## Return Value

One of these enumerated **MC\_STATUS** codes defined in “mcstatus.h”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_TAG</b>	The message does not contain an attribute with an ID of <i>Tag</i> . The attribute can be added with <b>MC_Add_Standard_Attribute</b> . Note: This status will not be returned if setting the value of a message object which was opened using <b>MC_Open_Empty_Message</b> or <b>MC_Create_Empty_File</b> . In that case, the attribute is automatically added to the object before setting the value.
<b>MC_INVALID_MESSAGE_ID</b>	<i>MsgFileItemID</i> is not a valid message object ID, file object ID or item object ID.
<b>MC_INCOMPATIBLE_VR</b>	The attribute’s value representation was not one of UN, OB, OW, OV, OL, OD, OF, AT, SS, US, SL, UL, SV, UV, FL, FD, UR or UT.

**MC\_CALLBACK\_DATA\_SIZE\_UNEVEN**

The number of bytes of the value set by *YourSetFunction* was not an even number.

**MC\_CALLBACK\_PARM\_ERROR**

The number of bytes of the value set by *YourSetFunction* was an odd number

**MC\_CALLBACK\_CANNOT\_COMPLY**

*YourSetFunction* returned with **MC\_CANNOT\_COMPLY**.

**See Also****MC64\_Set\_Value... Functions****MC64\_Set\_Next\_Value... Functions****MC64\_Stream\_To\_Message****MC64\_Stream\_To\_Message\_With\_Offset**

Request that the values of a message object be retrieved from a DICOM stream.

**Synopsis**

```
#include "mc3msg.h"
```

```
MC_STATUS MC64_Stream_To_Message (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    unsigned long *ErrorTagPtr,
    void *UserInfo,
    MC_STATUS (*YourStreamToFunction) ()
)
```

```
MC_STATUS MC64_Stream_To_Message_With_Offset (
    int MessageID,
    unsigned long StartTag,
    unsigned long StopTag,
    TRANSFER_SYNTAX SyntaxType,
    unsigned long *ErrorTagPtr,
    unsigned long long *Offset,
    void *UserInfo,
    MC_STATUS (*YourStreamToFunction) ()
)
```

*MessageID*            The identifier assigned to this object by the **MC\_Open\_Message**, **MC\_Open\_Empty\_Message**, or the **MC\_Open\_Item** functions.

*StartTag*            The DICOM tag identifying the first attribute which should be added to the message.

*StopTag*            The DICOM tag identifying the last attribute which should be added to the message.

---

<i>SyntaxType</i>	<p>Specify which DICOM transfer syntax was used to encode the stream data you will be providing. Use one of the enumerated TRANSFER_SYNTAX types defined in "mc3msg.h":</p> <p> IMPLICIT_LITTLE_ENDIAN  IMPLICIT_BIG_ENDIAN  EXPLICIT_LITTLE_ENDIAN  EXPLICIT_BIG_ENDIAN  DEFLATED_EXPLICIT_LITTLE_ENDIAN  ENCAPSULATED_UNCOMPRESSED_ELEMENTARY_STREAM  RLE  JPEG_BASELINE  JPEG_EXTENDED_2_4  JPEG_EXTENDED_3_5  JPEG_SPEC_NON_HIER_6_8  JPEG_SPEC_NON_HIER_7_9  JPEG_FULL_PROG_NON_HIER_10_12  JPEG_FULL_PROG_NON_HIER_11_13  JPEG_LOSSLESS_NON_HIER_14  JPEG_LOSSLESS_NON_HIER_15  JPEG_EXTENDED_HIER_16_18  JPEG_EXTENDED_HIER_17_19  JPEG_SPEC_HIER_20_22  JPEG_SPEC_HIER_21_23  JPEG_FULL_PROG_HIER_24_26  JPEG_FULL_PROG_HIER_25_27  JPEG_LOSSLESS_HIER_28  JPEG_LOSSLESS_HIER_29  JPEG_LOSSLESS_HIER_14  JPEG_2000_LOSSLESS_ONLY  JPEG_2000  JPEG_LS_LOSSLESS  JPEG_LS_LOSSY  HEVC_H265_M10P_LEVEL_5_1  HEVC_H265_MP_LEVEL_5_1  JPIP_REFERENCED  JPIP_REFERENCED_DEFLATE  MPEG2_MPML  MPEG2_MPHL  MPEG4_AVC_H264_HP_LEVEL_4_1  MPEG4_AVC_H264_BDC_HP_LEVEL_4_1  MPEG4_AVC_H264_HP_LEVEL_4_2_2D  MPEG4_AVC_H264_HP_LEVEL_4_2_3D  MPEG4_AVC_H264_STEREO_HP_LEVEL_4_2  JPEG_2000_MC_LOSSLESS_ONLY  JPEG_2000_MC </p>
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	SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_ACTIVE_VIDEO
	SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_ACTIVE_VIDEO
	SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO
	PRIVATE_SYNTAX_1
	PRIVATE_SYNTAX_2
<i>ErrorTagPtr</i>	If an error occurs, <i>ErrorTagPtr</i> will be set to the tag which caused the error.
<i>Offset</i>	The offset from the beginning of the stream to the attribute after <i>StopTag</i> .
<i>UserInfo</i>	Address of data which will be passed on to <i>YourStreamToFunction</i> each time it is called. This may be NULL.
<i>YourStreamToFunction</i>	Name of a function which will be called repeatedly to request blocks of streamed DICOM message data.

The function must be prototyped as follows:

```
MC_STATUS YourStreamToFunction (
    int CbmessageID,
    void *CbuserInfo,
    int CBFIRSTCALL,
    void **CbdataBufferStart,
    void **CbdataBufferEnd,
    int *CbisLastPtr
)
```

<i>CbmessageID</i>	The identifier assigned to the message object by the <b>MC_Open_Message</b> function.
<i>CbuserInfo</i>	Address of data which is being passed from the <b>MC64_Stream_To_Message</b> function. This may be NULL.
<i>CBFIRSTCALL</i>	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls <i>YourStreamToFunction</i> to request data blocks.
<i>CbdataBufferStart</i>	Set <i>*CbdataBufferStart</i> to the address of the data you are providing.
<i>CbdataBufferEnd</i>	Set <i>*CbdataBufferEnd</i> to the address next to the end of the data you are providing, that is, <i>CbdataBufferStart</i> + the number of bytes you are providing.
<i>CbisLastPtr</i>	Set <i>*CbisLastPtr</i> to TRUE (not zero) when you are returning with the last block of stream data.

## Remarks

**MC64\_Stream\_To\_Message** requests that the contents of a “streamed message” (i.e. a message in the form defined by the DICOM standard) be converted and placed in the message object or item object identified by *MessageID*. The streamed message is passed to Merge DICOM Toolkit by

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*YourStreamToFunction*. Merge DICOM Toolkit repeatedly calls *YourStreamToFunction* until all of the streamed message has been processed.

**MC64\_Stream\_To\_Message** can pass data to *YourStreamToFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourStreamToFunction* in *Cuserinfo* each time it is called. *UserInfo* may be NULL.

If an error occurs while processing the stream, Merge DICOM Toolkit will put the tag of the attribute in error in *\*ErrorTagPtr*.

**MC64\_Stream\_To\_Message\_With\_Offset** is identical to **MC64\_Stream\_To\_Message** except that it returns the byte offset from the beginning of the stream to the next attribute after *StopTag*. If there is not a tag after *StopTag*, the length of the file will be returned.

*StartTag* and *StopTag* specify which attributes in the stream are to be placed in the message object. Any attributes in the stream with tags less than *StartTag* or greater than *StopTag* will be ignored. Neither *StartTag* nor *StopTag* need be in the stream.

*SyntaxType* must be set to **one of the values listed above**. The transfer syntax specifies the byte order used in the streamed message, whether or not each attribute's value representation is explicitly encoded in the stream, and how the pixel data is encoded in the message.

If the stream contains any attributes with a value representation of SQ (i.e. the stream contains one or more sequence of items), an item object is automatically opened for each item in the stream. The *ItemID* associated with each opened item object is used as the value for each item in the sequence attribute. Later, the **MC64\_Get\_Value...** functions may be used to retrieve the *ItemID*'s from the SQ attribute. Then, again using the **MC64\_Get\_Value...** functions, the attributes of the *ItemID* object may be retrieved.

**NOTE:** A runtime configuration parameter determines what happens if the input stream contains an attribute which is not in the message. The default is to ignore such attributes (with a warning message logged). If requested, however, such attributes and their values are added to the message. If the Value Representation of the attribute being added cannot be determined, the attribute is given a pseudo Value Representation of "**Unknown\_VR**". Only the **MC64\_Get\_Value\_To\_Buffer** function retrieves the value of such attributes. To change the value of such attributes, **MC\_Set\_Value\_Representation** or **MC\_Set\_pValue\_Representation** must first be called to assign a valid Value Representation to the attribute. If **MC64\_Message\_To\_Stream** is used, attributes with unknown VRs are simply copied (memcpy) to the stream with no consideration given to byte ordering.

### *YourStreamToFunction*

It is the responsibility of *YourStreamToFunction* to pass blocks of data back to Merge DICOM Toolkit each time it is called. As a convenience, Merge DICOM Toolkit sets *CBFirstCall* to TRUE (non-zero) the first time it calls *YourStreamToFunction* for this attribute.

*YourSetFunction* must set *\*CbdataBufferStart* to the address of a block data. It also must set *\*CbdataBufferEnd* to the address next to the end of a block data, that is, *\*CbdataBufferStart + the number of bytes in the block*.

*YourStreamToFunction* must set *\*CbisLast* to TRUE (non-zero) when it is providing the last block of the streamed message.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>YourStreamToFunction</i> or <i>ErrorTagPtr</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>MessageID</i> value is not a valid message object ID.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid code was used for the <i>SyntaxType</i> parameter.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourStreamToFunction</i> returned with a status other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_CALLBACK_DATA_SIZE_UNEVEN</b>	The number of bytes returned by the <i>YourStreamToFunction</i> was an uneven number.
<b>MC_CALLBACK_PARM_ERROR</b>	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See <b>MC64_Register_Callback_Function</b> .
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The message contains an invalid tag. The tag is placed at <i>*ErrorTagPtr</i> .
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the stream message (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_UNEXPECTED_EOD</b>	<i>YourStreamToFunction</i> stopped without passing the entire value for an attribute.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value(s) for one of the stream attributes was not legal for its value representation.

Any of the status codes returned by **MC\_Set\_Value** may also be returned.

### See Also

**MC64\_Register\_Callback\_Function**   **MC64\_Message\_To\_Stream**

## MC64\_Write\_File

### MC64\_Write\_File\_By\_Callback

Writes a file object to media.

#### Synopsis

```
#include "mc3media.h"

MC_STATUS MC64_Write_File (
    int FileID,
    int NumBytes,
    void *UserInfo,
    MC_STATUS (*YourToMediaFunction()
)

MC_STATUS MC64_Write_File_By_Callback (
    int ApplicationID,
    int FileID,
    int NumBytes,
    void *UserInfo,
    MC_STATUS (*YourToMediaFunction()
)
```

<i>ApplicationID</i>	The identifier for an application object assigned by the <b>MC_Register_Application</b> function.
<i>FileID</i>	The identifier assigned to this object by the <b>MC_Create_Empty_File</b> or <b>MC_Create_File</b> function.
<i>NumBytes</i>	The attribute (FFFC,FFFC) will be added to the file object and given a length such that the total length of the file being written is a multiple of <i>NumBytes</i> . If <i>NumBytes</i> is set to 0, there will be no padding of the file. <i>NumBytes</i> must be an even number.
<i>UserInfo</i>	Address of data which will be passed on to <i>YourToMediaFunction</i> each time it is called. This may be NULL.
<i>YourToMediaFunction</i>	Name of a function which will be called repeatedly to provide blocks of DICOM file data.

The function must be prototyped as follows:

```
MC_STATUS YourToMediaFunction (
    char *Cbfilename,
    void *CbuserInfo,
    void *CbdataBufferStart,
    void *CbdataBufferEnd,
    int CbisFirst,
    int CbisLast
)
```

<i>Cbfilename</i>	The filename associated with the file object by the <b>MC_Create_Empty_File</b> or <b>MC_Create_File</b> function.
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<i>CbuserInfo</i>	Address of data which is being passed from the <b>MC64_Write_File</b> function. This may be NULL.
<i>CbdataBufferStart</i>	The address of the buffer containing file data from the file object.
<i>CbdataBufferEnd</i>	The address next after the address of buffer end, that is <i>CbdataBufferStart</i> + the number of bytes of file data being provided in <i>CbdataBufferStart</i> .
<i>CbisFirst</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of file data.
<i>CbisLast</i>	Is TRUE (not zero) when Merge DICOM Toolkit is providing the last block of file data.

### Remarks

**MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** request that the contents of the file object identified by *FileID* be put in a form specified by the DICOM standard for files. The file is passed to the user in blocks by calling *YourToMediaFunction* repeatedly until the entire file has been transferred.

**MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** can pass data to *YourToMediaFunction* by specifying the data's address in *UserInfo*. Merge DICOM Toolkit passes the address to *YourToMediaFunction* in *CbuserInfo* each time it is called. *UserInfo* may be NULL.

**MC64\_Write\_File\_By\_Callback** is identical to **MC64\_Write\_File** except that it can be used in conjunction with **MC64\_Register\_Callback\_Function** to have pixel data supplied to the function as it is being streamed out.

**NOTE:** If the file object is a DICOMDIR, **MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** will resolve the directory record offsets within the object before passing the user the file data.

**NOTE:** If the file contains "group length" attributes (i.e. attributes with tags of the form gggg0000: any group, element zero), **MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** will automatically calculate the group length value when supplying it to *YourToMediaFunction*.

**NOTE:** **MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** will format the byte stream passed to *YourToMediaFunction* in the attribute transfer syntax UID (0002, 0010).

**NOTE:** **MC64\_Write\_File** and **MC64\_Write\_File\_By\_Callback** will automatically fill in two group 2 attributes within the file meta information – **if you have not set them:**

- The Implementation Class UID (0002,0012) will be filled in with the value set for the **IMPLEMENTATION\_CLASS\_UID** configuration value in the mergecom.pro file.



- The Implementation Version Name (0002,0013) will be filled in with the value set for the **IMPLEMENTATION\_VERSION** configuration value in the mergecom.pro file.

### *YourToMediaFunction*

*YourToMediaFunction* will be called repeatedly to pass blocks of data to it. Merge DICOM Toolkit sets *CbisFirst* to TRUE (non-zero) the first time it calls *YourToMediaFunction* for this attribute and it sets *CbisLast* to TRUE (non-zero) when it calls *YourToMediaFunction* with the final block of file data.

*CbdataBufferStart* is set to the address of a buffer containing the file data block, and *CbdataBufferEnd* is to be set to *CbdataBufferStart* + **the number of bytes** placed at *CbdataBuffer*, that is, the next address after the address of a buffer end.

### **Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INVALID_APPLICATION_ID</b>	The <i>ApplicationID</i> value is not a valid application object ID.
<b>MC_INVALID_FILE_ID</b>	The <i>FileID</i> value is not a valid file object ID.
<b>MC_INVALID_PAD</b>	The <i>NumBytes</i> parameter contained too large of a number or an odd number.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_MESSAGE_EMPTY</b>	The file has no attributes in it.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	<i>YourToMediaFunction</i> returned a value other than <b>MC_NORMAL_COMPLETION</b> .
<b>MC_INVALID_TRANSFER_SYNTAX</b>	The transfer syntax is improperly specified or is not specified in the DICOM File Meta Information attributes.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.

### **See Also**

<b>MC64_Open_File</b>	<b>MC_Create_File</b>
<b>MC_Create_Empty_File</b>	

## High Level API Reference

This section of the Reference Manual includes the function reference for the domain-specific functionality of the Toolkit. Each reference page provides:

- a brief description of the API function
- a synopsis of the API function which contains a list of include files required to use the function, the function prototype and a description of each function parameter
- remarks outlining the use of the function
- a list of status codes returned by the function
- a “See also” cross reference to other functions

### MC\_DDH\_Create

Creates a new DICOMDIR file and its associated toolkit object.

#### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Create (
    const char *FilePath,
    const char *FileSetID,
    int TemplateFileID,
    int *DirMsgIDPtr
)
```

<i>FilePath</i>	Path to the DICOMDIR file (including the file name).
<i>FileSetID</i>	The value to be assigned to the File Set ID attribute (0004,1130). If this argument is NULL the toolkit will copy the value of the File Set ID attribute from the template file if specified.
<i>TemplateFileID</i>	The ID of a file object containing attribute values for the new DICODMIR. If this argument is 0 the toolkit creates an empty DICOMDIR with a minimal number of attributes.
<i>DirMsgIDPtr</i>	Pointer to a variable receiving the toolkit identifier of the new directory object.

#### Remarks

This function writes a new **DICOMDIR** file with no records and returns the directory object identifier representing the new directory file. If a file with the same name exists, its content is overwritten.

The directory object must be freed via **MC\_Free\_File** when it is no longer needed.

The toolkit copies group 2 and 4 attribute values from the specified template file. If the Media Storage SOP Instance UID attribute is not present in the template file or the template file ID is 0 the toolkit will generate a UID based on the **IMPLEMENTATION\_CLASS\_UID** configuration item.

See **MC\_DDH\_Open** function for details on managing the directory object.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	<i>FilePath</i> or <i>DirMsgIDPtr</i> was NULL.
<b>MC_INVALID_MESSAGE_ID</b>	The <i>TemplateFileID</i> is not a valid toolkit file object identifier.
<b>MC_INVALID_CHARS_IN_VALUE</b>	The <i>FileSetID</i> argument contains invalid characters.
<b>MC_INVALID_VALUE_FOR_VR</b>	The <i>FileSetID</i> argument does not conform to the requirements of the CS value representation.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read or write operation failed.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.

### See Also

**MC\_DDH\_Open**                      **MC\_Free\_File**

## MC\_DDH\_Open

Creates a DICOMDIR toolkit object which represents the content of an existing DICOMDIR file.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Create (
    const char *FilePath,
    int *DirMsgIDPtr
)
```

<i>FilePath</i>	Path to the DICOMDIR file (including the file name).
<i>DirMsgIDPtr</i>	Pointer to a variable receiving the toolkit identifier of the new directory object.

## Remarks

This function opens an existing DICOMDIR file for reading and/or updating and returns the directory object identifier representing its content. If the specified file does not exist or is not accessible the toolkit returns an error.

As opposed to opening DICODMIR files using **MC\_Open\_File**, this function does not read the whole content of the DICOMDIR in the memory but instead reads only the first directory record if it exists. Subsequent directory records are read only on demand, when the application requires access to them, providing fast and efficient access to large DICOMDIR's.

The directory object created by **MC\_DDH\_Open** allows the application to incrementally add new records or delete existing records using **MC\_DDH\_Add\_Record**, **MC\_DDH\_Delete\_Record** and **MC\_DDH\_Update** function, without rewriting the whole file.

The returned directory object identifier can be used with all **MC\_DDH...** functions that require a directory ID or with **MC\_Get\_Value...** functions to obtain group 2 and 4 attribute values, but it can not be used with any **MC\_Dir...** function.

The Directory Record Sequence (0004,1220) attribute and its content is not accessible to the application as it is managed internally by the toolkit.

Although the toolkit allows the application to modify the content of existing directory records or the attributes in the directory object itself, the changes will not be reflected in the DICOMDIR file.

The directory file object must be freed via **MC\_Free\_File** when it is no longer needed.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_UNEXPECTED_EOD</b>	The specified file does not contain all data necessary to decode an attribute's value.
<b>MC_INVALID_FILE</b>	The specified file does not conform to the requirements of a DICOMDIR file. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TRANSFER_SYNTAX</b>	An invalid transfer syntax code was found within the file's DICOM File Meta Information.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	The file contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read operation failed.

<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The <i>FileSetID</i> argument does not conform to the requirements of the CS value representation.
<b>MC_NULL_POINTER_PARM</b>	<i>FilePath</i> or <i>DirMsgIDPtr</i> was NULL.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_UNABLE_TO_GET_ITEM_ID</b>	The toolkit failed to read the first directory record.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

Any of the status codes returned by **MC\_Set\_Value** may also be returned.

### See Also

**MC\_Free\_File**

## MC\_DDH\_Update

Commits all pending changes to the DICOMDIR file.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Update (
    int DirMsgID
)
```

*DirMsgID*                      The identifier of a directory object obtained using **MC\_DDH\_Create** or **MC\_DDH\_Open** functions.

### Remarks

This function updates the DICOMDIR file to reflect all changes to the dicomdir object requested through **MC\_DDH\_Add\_Record** and **MC\_DDH\_Delete\_Record** functions. The toolkit writes new records to the end of the directory record sequence and bridges over deleted records so that they are no longer accessible.

**MC\_DDH\_Update** does not make changes to existing records or the attributes of the directory object, except for the values of the offset attributes required to represent the modified record hierarchy.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	<i>DirMsgID</i> is not a valid toolkit directory object identifier.
<b>MC_INVALID_FILE</b>	A failure occurred while writing the file. The DICOMDIR file may be corrupted.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	The DICOMDIR file could not be opened for writing or a file read or write operation failed. The DICOMDIR file is in a consistent state but the directory object can not be reliably used and it should be freed using <b>MC_Free_File</b> .
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct and new records cannot be written, the directory object can still be used in read-only mode.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred. The DICOMDIR file may be in an inconsistent state.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file. The DICOMDIR file is in a consistent state but the directory object can not be reliably used and it should be freed using <b>MC_Free_File</b> .
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

<b>MC_DDH_Create</b>	<b>MC_DDH_Open</b>
<b>MC_DDH_Add_Record</b>	<b>MC_DDH_Delete_Record</b>

## MC\_DDH\_Traverse\_Records

Provides easy record traversal functionality.

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_DDH_Traverse_Records (
    int RootID,
    void *UserData,
    MC_TRAVERSAL_STATUS (*YourTraverseCallback) ()
)
```

<i>RootID</i>	The object identifier of the record or directory representing the root for the traversal.
<i>UserData</i>	The pointer to be passed to the user's callback. The value of this argument is not interpreted by the toolkit and it can be NULL

*YourTraverseCallback* The function to be called for each record being  
*k* visited

The function must be prototyped as follows:

```
MC_TRAVERSAL_STATUS YourTraverseCallback (
    int CurrentRecID,
    void *UserData
)
```

*CurrentRecID* The identifier of the directory record being traversed.  
*D*

*UserData* The value passed in the *UserData* argument of the  
**MC\_DDH\_Traverse\_Records** function.

### Remarks

This function traverses all directory records that are below the specified directory record, or all records if the *RootID* is the identifier of a directory object. The application can control the traversal through the various status codes returned by the callback for each call:

- **MC\_TS\_CONTINUE** - The traversal continues normally with the lower level records of the current record or with the next record if the current record does not have lower level records.
- **MC\_TS\_STOP\_LEVEL** - The traversal continues with the next record of the current record's parent, skipping all lower level records and next records of the current record.
- **MC\_TS\_STOP\_LOWER** - The traversal continues with the next record of the current record, skipping the current record's lower level records
- **MC\_TS\_STOP** - Stop the traversal. **MC\_DDH\_Traverse\_Records** will return **MC\_NORMAL\_COMPLETION**.
- **MC\_TS\_ERROR** - Stop the traversal because an error occurred in the callback. **MC\_DDH\_Traverse\_Records** will return **MC\_CALLBACK\_CANNOT\_COMPLY**.

**MC\_DDH\_Traverse\_Records** provides an easy and fast way of searching and counting records.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_DICOMDIR_ID</b>	The <i>RootID</i> argument does not represent a valid record or directory object identifier
<b>MC_NULL_POINTER_PARM</b>	The <i>YourTraverseCallback</i> argument was NULL.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	The callback function returned <b>MC_TS_ERROR</b> or an invalid status or a file read operation failed.
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct.
<b>MC_UNEXPECTED_EOD</b>	Not enough data to decode an attribute's value.

<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	A record item contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The value for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Get\_Record\_Type

Gets a directory record's type.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Get_Record_Type (
    int RecordID,
    MC_DIR_RECORD_TYPE *RecType
)
```

<i>RecordID</i>	The toolkit identifier of the record.
<i>RecType</i>	Pointer to the variable receiving the record type. The MC_DIR_RECORD_TYPE enumeration is defined in mc3media.h.

### Remarks

This function can be used to obtain an integer representing the type of the specified directory record as specified by the value of the Directory Record Type attribute (0004,1430).

If the value of the Directory Record Type attribute does not correspond to any of the values in the MC\_DIR\_RECORD\_TYPE enum the toolkit returns MC\_REC\_TYPE\_UNKNOWN as the record type.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":



Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>RecordID</i> argument does not represent a valid record object identifier.
<b>MC_NULL_POINTER_PARM</b>	The <i>RecType</i> argument was NULL.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Get\_Parent\_Record

Gets the parent directory record of the specified record.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Get_Parent_Record (
    int RecordID,
    int *ParentID
)
```

<i>RecordID</i>	The identifier of the record object for which the parent record is requested.
<i>ParentID</i>	Pointer to the variable receiving the parent record's identifier.

### Remarks

**MC\_DDH\_Get\_Parent\_Record** provides the parent directory record of a record object. If the specified record is a top level record this function sets the value pointed by the *ParentID* argument to 0 and returns **MC\_NORMAL\_COMPLETION**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>RecordID</i> argument does not represent a valid record object identifier.
<b>MC_NULL_POINTER_PARM</b>	The <i>ParentID</i> argument was NULL.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read operation failed.
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct.
<b>MC_UNEXPECTED_EOD</b>	Not enough data to decode an attribute's value.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	A record item contains an invalid tag.

<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The value for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Get\_Next\_Record

Gets the next directory record in a directory entity.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Get_Next_Record (
    int RecordID,
    int *NextID
)
```

<i>RecordID</i>	The identifier of the record object of which the next record is requested.
<i>ParentID</i>	Pointer to the variable receiving the next record's identifier.

### Remarks

**MC\_DDH\_Get\_Next\_Record** retrieves the directory record following the specified record in the directory record hierarchy. If the specified record is the last record in the list of lower level record of its parent record this function sets the value of the *NextID* to 0 and returns MC\_NORMAL\_COMPLETION.

The returned record identifier can be used with the **MC\_Get\_Value...** functions to access the record's attribute values.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.

<b>MC_INVALID_RECORD_ID</b>	The <i>RecordID</i> argument does not represent a valid record object identifier.
<b>MC_NULL_POINTER_PARM</b>	The <i>NextID</i> argument was NULL.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read operation failed.
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct.
<b>MC_UNEXPECTED_EOD</b>	Not enough data to decode an attribute's value.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	A record item contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The value for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Get\_First\_Lower\_Record

Gets the first lower level directory record of the specified record.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Get_First_Lower_Record (
    int ParentID,
    int *LowerID
)
```

*ParentID*

The identifier of the record object for which the lower level record is requested or the identifier of the directory object if the first record in the root entity is requested.

---

*LowerID* Pointer to the variable receiving the first lower level record's identifier.

### Remarks

**MC\_DDH\_Get\_First\_Lower\_Record** retrieves the first lower level directory record of the specified record. If the specified record does not have lower level records this function sets the value of the *LowerID* to 0 and returns MC\_NORMAL\_COMPLETION.

The returned record identifier can be used with the **MC\_Get\_Value...** functions to access the record's attribute values.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>ParentID</i> argument does not represent a valid record or DICOMDIR object identifier.
<b>MC_NULL_POINTER_PARM</b>	The <i>LowerID</i> argument was NULL.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read operation failed.
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct.
<b>MC_UNEXPECTED_EOD</b>	Not enough data to decode an attribute's value.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	A record item contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The value for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Copy\_Values

Copies attribute values from one message or item to another message or item.

### Synopsis

```
#include "mc3media.h"

MC_STATUS MC_DDH_Copy_Values (
    int SourceID,
    int DestID,
    unsigned long *TagList
)
```

<i>SourceID</i>	The ID of the source message, file, item or record object containing the values to be copied.
<i>DestID</i>	The ID of the destination message, file, item or record object which will receive the values.
<i>TagList</i>	A zero ended array of tag numbers of the attributes to be copied. If a tag is a group length tag, the attributes in the whole group are copied. If this parameter is NULL, all attributes are copied.

### Remarks

This function can be used to fill in directory record values from messages when adding instances to a file set.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_MESSAGE_ID</b>	The source or destination ID value is not a valid toolkit object identifier.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

## MC\_DDH\_Add\_Record

Adds a new directory record to a directory object.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Add_Record (
    int ParentID,
    const char *RecordType
    int *RecordID
)
```

<i>ParentID</i>	The identifier of a directory object obtained using <b>MC_DDH_Create</b> or <b>MC_DDH_Open</b> functions or the identifier of a record object obtained using one of the <b>MC_DDH_...</b> record navigation functions.
<i>RecordType</i>	The directory record type name for the new record or the SOP Class UID of the referenced instance. If this argument is NULL the toolkit will set the record type based on the type of the parent record: "PATIENT" for root level records, "STUDY" if the parent is "PATIENT", "SERIES" if the parent is "STUDY" and "IMAGE" if the parent is "SERIES". The application can change the value of the Directory Record Type attribute of the new record item after this function returns, before calling <b>MC_DDH_Update</b> .
<i>RecordID</i>	Pointer to the variable receiving the identifier of the new record.

### Remarks

**MC\_DDH\_Add\_Record** creates a new directory record object and appends it to the end of the child record list of the specified parent record or to the end of the root entity if the specified parent is the directory object itself.

If the type of the record is not specified the toolkit will try to determine it based on the type of the parent record. For instance level records, the application can specify the SOP Class UID of the referenced object in the *RecordType* argument and the toolkit will create the corresponding record type.

The returned record identifier can be used with the **MC\_Set\_Value...** or **MC\_DDH\_Copy\_Values** functions to set the attribute values in the new record.

The new record and any values set for its attributes are written to the DICOMDIR file when the application calls **MC\_DDH\_Update**. If the directory object is freed without calling **MC\_DDH\_Update**, all changes to the record hierarchy will be lost.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>ParentID</i> argument does not represent a valid record or DICOMDIR object identifier.
<b>MC_NULL_POINTER_PARM</b>	The <i>RecordID</i> argument was NULL.
<b>MC_INVALID_LOWER_DIR_RECORD</b>	The record type specified in the <i>RecordType</i> argument is not a valid lower level record of the parent record.
<b>MC_BAD_DIR_RECORD_TYPE</b>	The type of the parent record is unknown.
<b>MC_CALLBACK_CANNOT_COMPLY</b>	A file read operation failed.
<b>MC_INVALID_DIRECTORY_RECORD_OFFSET</b>	A directory record offset value is not correct.
<b>MC_UNEXPECTED_EOD</b>	Not enough data to decode an attribute's value.
<b>MC_OUT_OF_ORDER_TAG</b>	A tag was found in the file that was not in ascending order. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_INVALID_TAG</b>	A record item contains an invalid tag.
<b>MC_VALUE_TOO_LARGE</b>	An attribute in the file (other than those with value representations of OB, OW, or OF) was larger than that acceptable for its value representation.
<b>MC_INVALID_LENGTH_FOR_VR</b>	The value length for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_VALUE_FOR_VR</b>	The value for one of the file attributes was not legal for its value representation.
<b>MC_INVALID_CHARS_IN_VALUE</b>	A value for an attribute does not contain valid characters for its value representation.
<b>MC_TEMPFILE_ERROR</b>	A value for an attribute is stored temporarily on file and an I/O error occurred.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

**MC\_DDH\_Create**  
**MC\_DDH\_Update**

**MC\_DDH\_Open**

### MC\_DDH\_Delete\_Record

Deletes a directory record.

### Synopsis

```
#include "mc3media.h"
```

---

```
MC_STATUS MC_DDH_Delete_Record (
    int RecordID
)
```

*RecordID*                      The toolkit identifier of the directory record to delete.

### Remarks

**MC\_DDH\_Delete\_Record** removes the specified directory record and any lower level record from the record hierarchy.

The resources allocated for the directory record objects are automatically freed.

The changes made by this function are not reflected in the DICOMDIR file until the application calls **MC\_DDH\_Update**.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>RecordID</i> argument does not represent a valid record object identifier.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

**MC\_DDH\_Update**

## MC\_DDH\_Release\_Record

Releases the content of the record.

### Synopsis

```
#include "mc3media.h"
```

```
MC_STATUS MC_DDH_Release_Record (
    int RecordID
)
```

*RecordID*                      The toolkit identifier of the directory record to release.

### Remarks

This function releases the specified record and its lower level records to reduce the toolkit's memory usage. Although the record identifier becomes invalid after this call, the record itself is not deleted and can be accessed again using one of the record navigation functions, **MC\_DDH\_Get\_Next\_Record** or **MC\_DDH\_Get\_First\_Lower\_Level\_Record**, in which case the toolkit will read the content of the record from the DICOMDIR file again and assign a new record identifier.



This function does not modify the directory record hierarchy.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_RECORD_ID</b>	The <i>RecordID</i> argument does not represent a valid record object identifier.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.
<b>MC_LIBRARY_NOT_INITIALIZED</b>	The library has not been properly initialized.

### See Also

**MC\_DDH\_Get\_Next\_Record**  
**MC\_DDH\_Get\_First\_Lower\_Level\_Record**

## MC\_SRH\_Create\_SR

Creates a new SR root node.

### Synopsis

```
MC_STATUS MC_SRH_Create_SR (
    const char *AserviceName,
    const char *AtemplateId,
    SR_CONT_CONTINUITY Acontinuity,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    int *AsrRootID
)
```

<i>AserviceName</i>	The service (Sop Class) the SR uses.
<i>AtemplateId</i>	DICOM Template Identifier that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
<i>Acontinuity</i>	Enumerated value specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
<i>AconceptNameValue</i>	Code Value describing the concept represented by the root Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning

*AsrRootID* Pointer that receives a numeric identifier for an SR node.

### Remarks

**MC\_SRH\_Create\_SR** creates SR tree management object. This returned item identifier can then be used to set and retrieve SR values.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One of the parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Free\_SR

Releases all memory allocated by SR.

### Synopsis

```
MC_STATUS MC_SRH_Free_SR (
    int AsrRootID
)
```

*AsrRootID* The identifier of the SR root node to be released.

### Remarks

Underlying message object will be released as well.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrRootID value is not a valid SR tree management object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_Child

Adds a child node to the provided parent SR node.

## Synopsis

```
MC_STATUS MC_SRH_Add_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    int *AsrChildNodeID
)
```

*AsrNodeID* The identifier assigned to the given SR object to which the child is to be added.

*Arelationship* Enumerated value representing a relationship.

*AsrChildNodeID* Pointer to the identifier assigned to the child item object which is to be added to the parent. On successful completion returns a new child SR node identifier.

## Remarks

This function shall be used for adding existing items to the SR tree. It is recommended to use specific functions like MC\_SRH\_Add\_XXX\_Child to create child nodes from scratch.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_TEXT\_Child

Creates a new child TEXT node under the provided parent.

## Synopsis

```
MC_STATUS MC_SRH_Add_TEXT_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Atext,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Atext</i>	A text value to be stored in this node.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The <i>Arelationship</i> value is not valid.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_TEXT\_Node

Creates a new TEXT node.

#### Synopsis

```
MC_STATUS MC_SRH_Create_TEXT_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Atext,
    int *AsrNodeID
)
```

<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Atext</i>	A text value to be stored in this node.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_Concept\_Name

Sets the Concept Name values for the node.

#### Synopsis

```
MC_STATUS MC_SRH_Set_Concept_Name (
    int AsrNodeID,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning
)
```

<i>AsrNodeID</i>	Numeric handle pointing to the SR node.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_CODE\_Child

Creates a new child CODE node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_CODE_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AconceptCodeValue,
    const char *AconceptCodingScheme,
    const char *AconceptCodeMeaning,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>AconceptCodeValue</i>	Coded expression of the concept.
<i>AconceptCodingScheme</i>	Coding Scheme Designator of the concept.
<i>AconceptCodeMeaning</i>	Code Meaning of the concept.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_CODE\_Node

Creates a new CODE node.

### Synopsis

```
MC_STATUS MC_SRH_Create_CODE_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AconceptCodeValue,
    const char *AconceptCodingScheme,
    const char *AconceptCodeMeaning,
    int *AsrNodeID)
```

*AconceptNameValue* Code Value describing the concept represented by this Content Item.

*AconceptNameScheme* Coding Scheme Designator

*AconceptNameMeaning* Code Meaning

*AconceptCodeValue* Coded expression of the concept.

*AconceptCodingScheme* Coding Scheme Designator of the concept.

*AconceptCodeMeaning* Code Meaning of the concept.

*AsrNodeID* Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.

<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_NUM\_Child

Creates a new child NUM node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_NUM_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AnumericValue,
    const char *AunitsCodeValue,
    const char *AunitsCodingScheme,
    const char *AunitsCodeMeaning,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>AnumericValue</i>	Numeric Value
<i>AunitsCodeValue</i>	Coded expression of measurement units.
<i>AunitsCodingScheme</i>	Coding Scheme Designator of the measurement units.
<i>AunitsCodeMeaning</i>	Code Meaning of the measurement units.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "**mcstatus.h**":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.



<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_NUM\_Node

Creates a new NUM node. Note that the Measured Value Sequence (0040, A300) may be empty to convey the concept of a measurement whose value is unknown or missing, or a measurement or calculation failure.

### Synopsis

```
MC_STATUS MC_SRH_Create_NUM_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AnumericValue,
    const char *AunitsCodeValue,
    const char *AunitsCodingScheme,
    const char *AunitsCodeMeaning,
    int *AsrNodeID
)
```

*AconceptNameValue* Code Value describing the concept represented by this Content Item.

*AconceptNameScheme* Coding Scheme Designator

*AconceptNameMeaning* Code Meaning

*AnumericValue* Numeric Value. Can be NULL.

*AunitsCodeValue* Coded expression of measurement units.

*AunitsCodingScheme* Coding Scheme Designator of the measurement units.

*AunitsCodeMeaning* Code Meaning of the measurement units.

*AsrNodeID* Pointer to the variable receiving an identifier of the new SR node.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Set\_NUM\_Qualifier**

Sets the Qualification of Numeric Value in the Measured Value Sequence, or as a reason for the absence of Measured Value Sequence Item.

**Synopsis**

```
MC_STATUS MC_SRH_Set_NUM_Qualifier (
    int AsrNodeID,
    const char *AqualifierCodeValue,
    const char *AqualifierCodingScheme,
    const char *AqualifierCodeMeaning
)
```

*AsrNodeID*                    An Identifier of the NUM SR item.  
*AqualifierCodeValue*        Sets Qualification of Numeric Value.  
*AqualifierCodingScheme*    Coding Scheme Designator  
*AqualifierCodeMeaning*    Code Meaning

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.

<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Set\_NUM\_Next\_Data

Sets the next Numeric Value.

### Synopsis

```
MC_STATUS MC_SRH_Set_NUM_Next_Data (
    int AsrNodeID,
    char *AnumericValue
)
```

<i>AsrNodeID</i>	An Identifier of the NUM SR item.
<i>AnumericValue</i>	Numeric Value

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_DATETIME\_Child

Creates a new child DATETIME node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_DATETIME_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Adatetime,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Adatetime</i>	A date time string in the DICOM format.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_DATETIME\_Node

Creates a new DATETIME node.

### Synopsis

```
MC_STATUS MC_SRH_Create_DATETIME_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Adatetime,
    int *AsrNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Adatetime</i>	A date time string in the DICOM format.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_DATE\_Child

Creates a new child DATE node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_DATE_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Adate,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Adate</i>	A date string in the DICOM format.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_DATE\_Node

Creates a new DATE node.

### Synopsis

```
MC_STATUS MC_SRH_Create_DATE_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Adate,
    int *AsrNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Adate</i>	A date string in the DICOM format.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_TIME\_Child

Creates a new child DATETIME node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_TIME_Child (
```

```

    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Atime,
    int *AsrChildNodeID
)

```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Atime</i>	A time string in the DICOM format.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_TIME\_Node

Creates a new TIME node.

### Synopsis

```
MC_STATUS MC_SRH_Create_TIME_Node (
```



```

    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *Atime,
    int *AsrNodeID
)

```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator.
<i>AconceptNameMeaning</i>	Code Meaning.
<i>Atime</i>	A time string in the DICOM format.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Add\_UIDREF\_Child

Creates a new child UIDREF node under the provided parent.

#### Synopsis

```

MC_STATUS MC_SRH_Add_UIDREF_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AuidRef,
)

```

```

    int *AsrChildNodeID
)

```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>AuidRef</i>	Unique Identifier (UID) of the entity identified by the Concept Name.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The <i>Arelationship</i> value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_UIDREF\_Node

Creates a new UIDREF node.

#### Synopsis

```

MC_STATUS MC_SRH_Create_UIDREF_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *AuidRef,
    int *AsrNodeID
)

```

)

<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>AuidRef</i>	Unique Identifier (UID) of the entity identified by the Concept Name.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Add\_PNAME\_Child

Creates a new child PNAME node under the provided parent.

#### Synopsis

```
MC_STATUS MC_SRH_Add_PNAME_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *ApersonName,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.

<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>ApersonName</i>	Person name of the person whose role is described by the Concept Name.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_PNAME\_Node

Creates a new PNAME node.

#### Synopsis

```
MC_STATUS MC_SRH_Create_PNAME_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    const char *ApersonName,
    int *AsrNodeID
)
```

<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator

*AconceptNameMeaning* Code Meaning

<i>ApersonName</i>	Person name of the person whose role is described by the Concept Name.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Add\_SCOORD\_Child**

Creates a new child SCOORD node under the provided parent.

**Synopsis**

```
MC_STATUS MC_SRH_Add_SCOORD_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    float Acolumn,
    float Arow,
    SR_GRAPHIC_TYPE AgraphicType,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>Acolumn, Arow</i>	Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship. Data shall be provided as an ordered set of (column, row) pairs.

<i>AgraphicType</i>	This attribute defines the type of geometry of the annotated region of interest. The following Enumerated Values are specified for image spatial coordinate geometries: SR_GRT_POINT = a single pixel denoted by a single (column, row) pair SR_GRT_MULTIPPOINT = multiple pixels each denoted by an (column, row) pair SR_GRT_POLYLINE = a series of connected line segments with ordered vertices denoted by (column, row) pairs; if the first and last vertices are the same it is a closed polygon SR_GRT_CIRCLE = a circle defined by two (column, row) pairs. The first point is the central pixel. The second point is a pixel on the perimeter of the circle. SR_GRT_ELLIPSE = an ellipse defined by four pixel (column, row) pairs, the first two points specifying the endpoints of the major axis and the second two points specifying the endpoints of the minor axis of an ellipse.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Remarks

The data can be set by using MC\_SRH\_Set\_SCOORD\_First\_Data and MC\_SRH\_Set\_SCOORD\_Next\_Data.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Set\_SCOORD\_Next\_Data

Appends the next coordinated pair to the SCOORD node.

### Synopsis

```
MC_STATUS MC_SRH_Set_SCOORD_Next_Data (
    int AsrNodeID,
    float Acolumn,
    float Arow
)
```

*AsrNodeID* An Identifier of the SCOORD SR item.

*Acolumn*, *Arow* Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship. Data shall be provided as an ordered set of (column, row) pairs.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_SCOORD\_Node

Creates a new SCOORD node.

### Synopsis

```
MC_STATUS MC_SRH_Create_SCOORD_Node (
    float Acolumn,
```

```

    float Arow,
    SR_GRAPHIC_TYPE AgraphicType,
    int *AsrNodeID
)

```

<i>Acolumn,</i> <i>Arow</i>	Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship. Data shall be provided as an ordered set of (column, row) pairs.
<i>AgraphicType</i>	This attribute defines the type of geometry of the annotated region of interest. The following Enumerated Values are specified for image spatial coordinate geometries: SR_GRT_POINT = a single pixel denoted by a single (column, row) pair SR_GRT_MULTIPPOINT = multiple pixels each denoted by an (column, row) pair SR_GRT_POLYLINE = a series of connected line segments with ordered vertices denoted by (column, row) pairs; if the first and last vertices are the same it is a closed polygon SR_GRT_CIRCLE = a circle defined by two (column, row) pairs. The first point is the central pixel. The second point is a pixel on the perimeter of the circle. SR_GRT_ELLIPSE = an ellipse defined by four pixel (column, row) pairs, the first two points specifying the endpoints of the major axis and the second two points specifying the endpoints of the minor axis of an ellipse.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.



## MC\_SRH\_Add\_TCOORD\_R\_Child

Creates a new child TCOORD node under the provided parent where data are provided as Referenced Sample Positions.

### Synopsis

```
MC_STATUS MC_SRH_Add_TCOORD_R_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    unsigned long ArefSamplePosition,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>ArefSamplePosition</i>	The first value from the list of samples within a multiplex group specifying temporal points of the referenced data. Position of first sample is 1.
<i>AtempRangeType</i>	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used: SR_TRT_POINT a single temporal point SR_TRT_MULTIPPOINT multiple temporal points SR_TRT_SEGMENT a range between two temporal points SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_TCOORD\_R\_Node

Creates a new child TCOORD node under the provided parent where data are provided as Referenced Sample Positions.

### Synopsis

```
MC_STATUS MC_SRH_Create_TCOORD_R_Node (
    unsigned long ArefSamplePosition,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrNodeID
)
```

*ArefSamplePosition* The first value from the list of samples within a multiplex group specifying temporal points of the referenced data. Position of first sample is 1.

*AtempRangeType* Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:

SR\_TRT\_POINT a single temporal point  
 SR\_TRT\_MULTIPPOINT multiple temporal points  
 SR\_TRT\_SEGMENT a range between two temporal points  
 SR\_TRT\_MULTISEGMENT multiple segments, each denoted by two temporal points

	SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data
	SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_TCOORD\_R\_Next\_Data

Adds a value to the existing TCOORD node where data are provided as Referenced Sample Positions.

#### Synopsis

```
MC_STATUS MC_SRH_Set_TCOORD_R_Next_Data (
    int AsrNodeID,
    unsigned long ArefSamplePosition
)
```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>ArefSamplePosition</i>	Sequential value from the list of samples within a multiplex group specifying temporal points of the referenced data. Position of first sample is 1.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>SRID</i> value is not a valid SR tree management object ID.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_TCOORD\_O\_Child

Creates a new child TCOORD node under the provided parent where data are provided as Referenced Time Offsets.

### Synopsis

```
MC_STATUS MC_SRH_Add_TCOORD_O_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AtimeOffset,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AtimeOffset</i>	The first point from temporal points for reference by number of seconds after start of data Data shall be provided as a DICOM DS string format.
<i>AtempRangeType</i>	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used: SR_TRT_POINT a single temporal point SR_TRT_MULTIPPOINT multiple temporal points SR_TRT_SEGMENT a range between two temporal points SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_TCOORD\_O\_Node

Creates a new TCOORD node where data are provided as Referenced Time Offsets.

### Synopsis

```
MC_STATUS MC_SRH_Create_TCOORD_O_Node (
    const char *AtimeOffset,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrNodeID
)
```

*AtimeOffset*            The first point from temporal points for reference by number of seconds after start of data Data shall be provided as a DICOM DS string format.

	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used: SR_TRT_POINT a single temporal point SR_TRT_MULTIPPOINT multiple temporal points
<i>AtempRangeType</i>	SR_TRT_SEGMENT a range between two temporal points SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_TCOORD\_O\_Next\_Data

Adds a value to the existing TCOORD node where data are provided as Referenced Time Offsets.

#### Synopsis

```
MC_STATUS MC_SRH_Set_TCOORD_O_Next_Data (
    int AsrNodeID,
    const char *AtimeOffset
)
```

*AsrNodeID* An Identifier of the TCOORD SR item.

*AtimeOffset* Sequential temporal point for reference by number of seconds after start of data Data shall be provided as a DICOM DS string format.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Add\_TCOORD\_D\_Child

Creates a new child TCOORD node under the provided parent where data are provided as Referenced DateTime.

### Synopsis

```
MC_STATUS MC_SRH_Add_TCOORD_D_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AdateTimeOffset,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrChildNodeID
)
```

*AsrNodeID* An Identifier of the parent SR item to which the child is to be added.

*Arelationship* Enumerated value representing a relationship.

*AdateTimeOffset* The first point from temporal points list for reference by absolute time. Data shall be provided as DICOM DT string.

*AtempRangeType* Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:  
 SR\_TRT\_POINT a single temporal point  
 SR\_TRT\_MULTIPPOINT multiple temporal points

	SR_TRT_SEGMENT a range between two temporal points
	SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points
	SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data
	SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_TCOORD\_D\_Node

Creates a new TCOORD node where data are provided as Referenced DateTime.

#### Synopsis

```
MC_STATUS MC_SRH_Create_TCOORD_D_Node (
    const char *AdateTimeOffset,
    SR_TRANGE_TYPE AtempRangeType,
    int *AsrNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AdateTimeOffset</i>	The first point from temporal points list for reference by absolute time. Data shall be provided as DICOM DT string.



	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:
	SR_TRT_POINT a single temporal point
	SR_TRT_MULTIPPOINT multiple temporal points
<i>AtempRangeType</i>	SR_TRT_SEGMENT a range between two temporal points
	SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points
	SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data
	SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Remarks

None.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_TCOORD\_D\_Next\_Data

Adds a value to the existing TCOORD node where data are provided as Referenced DateTime.

### Synopsis

```
MC_STATUS MC_SRH_Set_TCOORD_D_Next_Data (
    int AsrNodeID,
    const char *AdateTimeOffset
)
```

*AsrNodeID* An Identifier of the TCOORD SR item.

*AdateTimeOffset* Sequential point from temporal points list for reference by absolute time. Data shall be provided as DICOM DT string.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_COMPOSITE\_Child

Creates a new child COMPOSITE node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_COMPOSITE_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AsopClassUid</i>	A SOP Class UID of a Composite object which is not an Image or Waveform.
<i>AsopInstanceUid</i>	A SOP Instance UID of a Composite object which is not an Image or Waveform.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_COMPOSITE\_Node

Creates a new COMPOSITE node.

### Synopsis

```
MC_STATUS MC_SRH_Create_COMPOSITE_Node (
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrNodeID
)
```

<i>AsopClassUid</i>	A SOP Class UID of a Composite object which is not an Image or Waveform.
<i>AsopInstanceUid</i>	A SOP Instance UID of a Composite object which is not an Image or Waveform.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_IMAGE\_Child

Creates a new child IMAGE node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_IMAGE_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AsopClassUid</i>	A SOP Class UID of an Image object.
<i>AsopInstanceUid</i>	A SOP Instance UID of an Image object.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Create\_IMAGE\_Node

Creates a new IMAGE node.

### Synopsis

```
MC_STATUS MC_SRH_Create_IMAGE_Node (
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrNodeID
)
```

<i>AsopClassUid</i>	An SOP Class UID of an Image object.
<i>AsopInstanceUid</i>	An SOP Instance UID of an Image object.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_IMAGE\_Frames

Sets frame numbers within Referenced SOP Instance to which the reference applies.

### Synopsis

```
MC_STATUS MC_SRH_Set_IMAGE_Frames (
    int AsrNodeID,
    long AreferencedFrames[],
    long AframesArraySize
)
```

<i>AsrNodeID</i>	An Identifier of the IMAGE SR item.
<i>AreferencedFrames</i>	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1.
<i>AframesArraySize</i>	Size of the AreferencedFrames array.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.

<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_WAVEFORM\_Child

Creates a new child WAVEFORM node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_WAVEFORM_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AsopClassUid</i>	An SOP Class UID of a Waveform object.
<i>AsopInstanceUid</i>	An SOP Instance UID of a Waveform object.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.

**MC\_SYSTEM\_ERROR**

An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Create\_WAVEFORM\_Node**

Creates A new WAVEFORM node.

**Synopsis**

```
MC_STATUS MC_SRH_Create_WAVEFORM_Node (
    const char *AsopClassUid,
    const char *AsopInstanceUid,
    int *AsrNodeID
)
```

*AsopClassUid* An SOP Class UID of a Waveform object.

*AsopInstanceUid* An SOP Instance UID of a Waveform object.

*AsrNodeID* Pointer to the variable receiving an identifier of the new SR node.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Set\_WAVEFORM\_Channels**

Sets channels referenced within the Referenced SOP Instance to which the reference applies.

**Synopsis**

```
MC_STATUS MC_SRH_Set_WAVEFORM_Channels (
    int AsrNodeID,
    unsigned short ArefChannels[],
    long ArefChannelsSize
)
```

*AsrNodeID* An Identifier of the SR WAVEFORM node.

*ArefChannels* A multi-value attribute which lists the channels referenced. Each channel is specified as a pair of values (M,C), where the first value is the sequence item number of the Waveform Sequence (5400,0100) attribute in the referenced object (i.e. the Multiplex Group Number), and the second value is the sequence item number of the Channel Definition Sequence (003A,0200) attribute (i.e., the Channel Number) within the multiplex group.

*ArefChannelsSize* Size of the ArefChannels array.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The ArefChannelsSize value is < 1.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Add\_CONTAINER\_Child

Creates a new child CONTAINER node under the provided parent.

#### Synopsis

```
MC_STATUS MC_SRH_Add_CONTAINER_Child (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    SR_CONT_CONTINUITY Acontinuity,
    const char *AtemplateId,
    int *AsrChildNodeID
)
```

*AsrNodeID* An Identifier of the parent SR item to which the child is to be added.

*Arelationship* Enumerated value representing a relationship.

*Acontinuity* Enumerated value specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.



<i>AtemplateId</i>	Template Identifier that describes the content of this Content Item and its subsidiary Content Items.
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_CONTAINER\_Node

Creates a new CONTAINER node.

#### Synopsis

```
MC_STATUS MC_SRH_Create_CONTAINER_Node (
    SR_CONT_CONTINUITY Acontinuity,
    const char *AtemplateId,
    int *AsrNodeID
)
```

<i>Acontinuity</i>	Enumerated value specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
<i>AtemplateId</i>	DICOM Template Identifier that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
-------	---------

<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_TABLE\_Child

Create a new child TABLE node under the provided parent.

### Synopsis

```
MC_STATUS MC_SRH_Add_TABLE_Child (
    SR_RELATIONSHIP Arelationship,
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    int Arows,
    int Acolumns,
    TABLE_ROW_DEF *AtableRowDefs,
    int AtableRowDefsCount,
    TABLE_COL_DEF *AtableColDefs,
    int AtableColDefsCount,
    TABLE_CELL_VALUES *AtableCellValues,
    int AtableCellValuesCount,
    int *AsrChildNodeID
)
```

<i>AsrNodeID</i>	An Identifier of the parent SR item to which the child is to be added.
<i>Arelationship</i>	Enumerated value representing a relationship.
<i>AconceptNameValue</i>	Code Value describing the concept represented by this Content Item.
<i>AconceptNameScheme</i>	Coding Scheme Designator
<i>AconceptNameMeaning</i>	Code Meaning
<i>Arows</i>	The number of rows in this TABLE item
<i>Acolumns</i>	The number of columns in this TABLE item
<i>AtableRowDefs</i>	The concepts that define the meaning of the rows of the table
<i>AtableRowDefsCount</i>	The number of items in the Table Row Definition Sequence
<i>AtableColDefs</i>	The concepts that define the meaning of the columns of the table

<i>AtableColDefsCount</i>	The number of items in the Table Column Definition Sequence
<i>AtableCellValues</i>	The values of each populated cell in the table, identified by row and column
<i>AtableCellValuesCount</i>	The number of items in the Cell Values Sequence
<i>AsrChildNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Create\_TABLE\_Node

Creates a new TABLE node.

#### Synopsis

```
MC_STATUS MC_SRH_Create_TABLE_Node (
    const char *AconceptNameValue,
    const char *AconceptNameScheme,
    const char *AconceptNameMeaning,
    int Arows,
    int Acolumns,
    TABLE_ROW_DEF *AtableRowDefs,
    int AtableRowDefsCount,
    TABLE_COL_DEF *AtableColDefs,
    int AtableColDefsCount,
    TABLE_CELL_VALUES *AtableCellValues,
    int AtableCellValuesCount,
    int *AsrNodeID
)
```

*AconceptNameValue* Code Value describing the concept represented by this Content Item.

*AconceptNameScheme* Coding Scheme Designator

<i>AconceptNameMeaning</i>	Code Meaning
<i>Arows</i>	The number of rows in this TABLE item
<i>Acolumns</i>	The number of columns in this TABLE item
<i>AtableRowDefs</i>	The concepts that define the meaning of the rows of the table
<i>AtableRowDefsCount</i>	The number of items in the Table Row Definition Sequence
<i>AtableColDefs</i>	The concepts that define the meaning of the columns of the table
<i>AtableColDefsCount</i>	The number of items in the Table Column Definition Sequence
<i>AtableCellValues</i>	The values of each populated cell in the table, identified by row and column
<i>AtableCellValuesCount</i>	The number of items in the Cell Values Sequence
<i>AsrNodeID</i>	Pointer to the variable receiving an identifier of the new SR node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_TABLE\_Next\_Row\_Definition

Add a new item to the Table Row Definition Sequence in the TABLE Content Item.

#### Synopsis

```
MC_STATUS MC_SRH_Set_TABLE_Next_Row_Definition (
    int AsrNodeID,
    TABLE_ROW_DEF *AtableRowDef
)
```

*AsrNodeID*      An Identifier of the TABLE SR item.

<i>AtableRowDef</i>	Pointer to the structure representing the Table Row Definition Sequence item to be added to the TABLE Content Item
---------------------	--

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Set\_TABLE\_Next\_Column\_Definition

Add a new item to the Table Column Definition Sequence in the TABLE Content Item.

#### Synopsis

```
MC_STATUS MC_SRH_Set_TABLE_Next_Column_Definition (
    int AsrNodeID,
    TABLE_COL_DEF *AtableColDef
)
```

<i>AsrNodeID</i>	An Identifier of the TABLE SR item.
<i>AtableColDef</i>	Pointer to the structure representing the Table Column Definition Sequence item to be added to the TABLE Content Item

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Set\_TABLE\_Next\_Cell\_Values

Creates a new CONTAINER node.

### Synopsis

```
MC_STATUS MC_SRH_Set_TABLE_Next_Cell_Values (
    int AsrNodeID,
    TABLE_CELL_VALUES *AtableCellValues
)
```

*AsrNodeID* An Identifier of the TABLE SR item.

*AtableCellValues* Pointer to the structure representing the Cell Values  
Sequence item to be added to the TABLE

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Add\_Reference

Adds a Referenced Content Item.

### Synopsis

```
MC_STATUS MC_SRH_Add_Reference (
    int AsrNodeID,
    SR_RELATIONSHIP Arelationship,
    int AsrRefNodeID
)
```

*AsrNodeID* An Identifier of the parent SR item to which the child is to be added.

*Arelationship* Enumerated value representing a relationship.

*AsrRefNodeID* SR node that will be referenced from the current node.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_VALUE_NOT_ALLOWED</b>	The Arelationship value is not valid.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_Reference**

Returns a Referenced Content Item.

**Synopsis**

```
MC_STATUS MC_SRH_Get_Reference (
    int AsrNodeID,
    int *AsrRefNodeID
)
```

*AsrNodeID* An Identifier of the parent SR item to which the child is to be added.

*AsrRefNodeID* SR node that is referenced from the current node.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_NodeType**

Returns node type for the specified SR node.

## Synopsis

```
MC_STATUS MC_SRH_Get_NodeType (
    int AsrNodeID,
    SR_CONTENT_TYPE *ANodeType
)
```

*AsrNodeID* An Identifier of the SR node.

*ANodeType* Pointer to the variable that receives an enumerated node type from the list below

## Enumerated values for the Node Type

SR_NODE_TEXT	Free text, narrative description of unlimited length. May also be used to provide a label or identifier value.
SR_NODE_NUM	Numeric value fully qualified by coded representation of the measurement name and unit of measurement.
SR_NODE_CODE	Categorical coded value. Representation of nominal or non-numeric ordinal values.
SR_NODE_DATETIME	Date and time of occurrence of the type of event denoted by the Concept Name.
SR_NODE_DATE	Date of occurrence of the type of event denoted by the Concept Name.
SR_NODE_TIME	Time of occurrence of the type of event denoted by the Concept Name.
SR_NODE_UIDREF	Unique Identifier (UID) of the entity identified by the Concept Name.
SR_NODE_PNAME	Person name of the person whose role is described by the Concept Name.
SR_NODE_COMPOSITE	A reference to one Composite SOP Instance which is not an Image or Waveform.
SR_NODE_IMAGE	A reference to one Image. IMAGE Content Item may convey a reference to a Softcopy Presentation State associated with the Image.
SR_NODE_WAVEFORM	A reference to one Waveform.
SR_NODE_SCOORD	Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship.
SR_NODE_TCOORD_D	Temporal Coordinates (i.e. time or event based coordinates) of a region of interest in the DICOM waveform coordinate system. The WAVEFORM or IMAGE or SCOORD Content Item from which Temporal Coordinates are selected is denoted by a SELECTED



	FROM relationship. The value is stored as a Referenced DateTime here.
SR_NODE_TCOORD_O	Temporal Coordinates (i.e. time or event based coordinates) of a region of interest in the DICOM waveform coordinate system. The WAVEFORM or IMAGE or SCOORD Content Item from which Temporal Coordinates are selected is denoted by a SELECTED FROM relationship. The value is stored as Referenced Time Offsets here.
SR_NODE_TCOORD_R	Temporal Coordinates (i.e. time or event based coordinates) of a region of interest in the DICOM waveform coordinate system. The WAVEFORM or IMAGE or SCOORD Content Item from which Temporal Coordinates are selected is denoted by a SELECTED FROM relationship. The value is stored as Referenced Sample Positions here.
SR_NODE_CONTAINER	CONTAINER groups Content Items and defines the heading or category of observation that applies to that content. The heading describes the content of the CONTAINER Content Item and may map to a document section heading in a printed or displayed document.
SR_REFERENCE	This item is not a child SR content node. It is a reference to another node.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_First\_Child

Returns the ID of the first child in the list of children that the parent node maintains.

### Synopsis

```
MC_STATUS MC_SRH_Get_First_Child (
    int AsrNodeID,
    int *AsrChildNodeID,
```

```

    SR_RELATIONSHIP *Arelationship,
    SR_CONTENT_TYPE *AnodeType,
    int *AisLast
)

```

<i>AsrNodeID</i>	The identifier assigned to this SR tree item.
<i>AsrChildNodeID</i>	Upon successful completion, the item object identifier of the first SR tree management node in the SR tree management entity <i>AsrChildNodeID</i> is returned here. At a given parent <i>SRID</i> a pointer to the next record is maintained.
<i>Arelationship</i>	Enumerated value representing a relationship between parent and child nodes <i>SR_REL_CONTAINS</i> , <i>SR_REL_HAS_OBS_CONTEXT</i> , <i>SR_REL_HAS_ACQ_CONTEXT</i> , <i>SR_REL_HAS_CONCEPT_MOD</i> , <i>SR_REL_HAS_PROPERTIES</i> , <i>SR_REL_INFERRED_FROM</i> , <i>SR_REL_SELECTED_FROM</i>
<i>AnodeType</i>	Returns an enumerated node type. See <b>MC_SRH_Get_NodeType</b> function.
<i>AisLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the first record in the SR tree management entity <i>AsrChildNodeID</i> is also the last record (i.e. it is the only element)

### Remarks

This function is an extension of the **MC\_SR\_Get\_First\_Child** function and it is using it internally.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_Next\_Child

Returns the ID of the next child in the list of children that the parent node maintains.

### Synopsis

```
MC_STATUS MC_SRH_Get_Next_Child (
```

```

    int AsrNodeID,
    int *AsrChildNodeID,
    SR_RELATIONSHIP *Arelationship,
    SR_CONTENT_TYPE *AnodeType,
    int *AisLast
)

```

<i>AsrNodeID</i>	The identifier assigned to this SR tree item.  Upon successful completion, the item object identifier of the next SR tree management node in the SR tree
<i>AsrChildNodeID</i>	management entity <i>AsrChildNodeID</i> is returned here. At a given parent <i>SRID</i> a pointer to the next record is maintained.
<i>Arelationship</i>	Enumerated value representing a relationship between parent and child nodes SR_REL_CONTAINS, SR_REL_HAS_OBS_CONTEXT, SR_REL_HAS_ACQ_CONTEXT, SR_REL_HAS_CONCEPT_MOD, SR_REL_HAS_PROPERTIES, SR_REL_INFERRED_FROM, SR_REL_SELECTED_FROM
<i>AnodeType</i>	Returns an enumerated node type. See <b>MC_SRH_Get_NodeType</b> function.
<i>AisLast</i>	Upon successful completion, this parameter is set to true (non-zero) if the next record in the SR tree management entity <i>AsrChildNodeID</i> is also the last record.

### Remarks

This function is an extension of the **MC\_SR\_Get\_Next\_Child** function and it is using it internally.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_Concept\_Name

Returns the Concept Name values for the node.

## Synopsis

```
MC_STATUS MC_SRH_Get_Concept_Name (
    int AsrNodeID,
    char AconceptNameValue[],
    int AconceptNameValueSize,
    char AconceptNameScheme[],
    int AconceptNameSchemeSize,
    char AconceptNameMeaning[],
    int AconceptNameMeaningSize
)
```

<i>AsrNodeID</i>	An Identifier of the SR item.
<i>AconceptNameValue</i>	Returns Code Value describing the concept represented by this Content Item.
<i>AconceptNameValueSize</i>	Code Value buffer size
<i>AconceptNameScheme</i>	Returns Coding Scheme Designator
<i>AconceptNameSchemeSize</i>	Coding Scheme Designator buffer size
<i>AconceptNameMeaning</i>	Returns Code Meaning
<i>AconceptNameMeaningSize</i>	Code Meaning buffer size

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TEXT\_Data

Returns a TEXT node data.

## Synopsis

```
MC_STATUS MC_SRH_Get_TEXT_Data (
    int AsrNodeID,
    char Atext[],
    int AtextSize
)
```

*AsrNodeID* An Identifier of the TEXT SR item.  
*Atext* Returns A text value stored in this node  
*AtextSize* Text buffer size

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute’s value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_CODE\_Data

Returns the Code Name values for the node.

#### Synopsis

```
MC_STATUS MC_SRH_Get_CODE_Data (
    int AsrNodeID,
    char AconceptCodeValue[],
    int AconceptCodeValueSize,
    char AconceptCodingScheme[],
    int AconceptCodingSchemeSize,
    char AconceptCodeMeaning[],
    int AconceptCodeMeaningSize
)
```

*AsrNodeID* An Identifier of the CODE SR item.  
*AconceptCodeValue* Returns Code Value  
*AconceptCodeValueSize* Code Value buffer size  
*AconceptCodingScheme* Returns Coding Scheme Designator  
*AconceptCodingSchemeSize* Coding Scheme Designator buffer size  
*AconceptCodeMeaning* Returns Code Meaning  
*AconceptCodeMeaningSize* Code Meaning buffer size

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_NUM\_Data

Reads value from the NUM node.

### Synopsis

```
MC_STATUS MC_SRH_Get_NUM_Data (
    int AsrNodeID,
    char AnumericValue[],
    int AnumericValueSize,
    int *AvalueCount,
    char AunitsCodeValue[],
    int AunitsCodeValueSize,
    char AunitsCodingScheme[],
    int AunitsCodingSchemeSize,
    char AunitsCodeMeaning[],
    int AunitsCodeMeaningSize
)
```

<i>AsrNodeID</i>	An Identifier of the NUM SR item.
<i>AnumericValue</i>	Numeric Value
<i>AnumericValueSize</i>	Numeric Value buffer size
<i>AvalueCount</i>	Number of values stored
<i>AunitsCodeValue</i>	Coded expression of measurement units
<i>AunitsCodeValueSize</i>	AunitsCodeValue buffer size
<i>AunitsCodingScheme</i>	Coding Scheme Designator of the measurement units.
<i>AunitsCodingSchemeSize</i>	AunitsCodingScheme buffer size
<i>AunitsCodeMeaning</i>	Code Meaning of the measurement units.

*AunitsCodeMeaningSize* AunitsCodeMeaning buffer size

### Remarks

The Measured Value Sequence (0040, A300) may be empty to convey the concept of a measurement whose value is unknown or missing, or a measurement or calculation failure in that case function will return the MC\_EMPTY\_VALUE code.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_NUM\_Next\_Data

Reads next value from the NUM node.

### Synopsis

```
MC_STATUS MC_SRH_Get_NUM_Next_Data (
    int AsrNodeID,
    char AnumericValue[],
    int AnumericValueSize
)
```

*AsrNodeID* An Identifier of the NUM SR item.

*AnumericValue* Numeric Value

*AnumericValueSize* Numeric Value buffer size

### Remarks

The Measured Value Sequence (0040,A300) may be empty to convey the concept of a measurement whose value is unknown or missing, or a measurement or calculation failure in that case function will return the MC\_EMPTY\_VALUE code.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

<b>Value</b>	<b>Meaning</b>
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_NUM\_Qualifier**

Gets Qualification of Numeric Value in Measured Value Sequence, or reason for absence of Measured Value Sequence Item.

**Synopsis**

```
MC_STATUS MC_SRH_Get_NUM_Qualifier (
    int AsrNodeID,
    char AqualifierCodeValue[],
    int AqualifierCodeValueSize,
    char AqualifierCodingScheme[],
    int AqualifierCodingSchemeSize,
    char AqualifierCodeMeaning[],
    int AqualifierCodeMeaningSize
)
```

<i>AsrNodeID</i>	An Identifier of the NUM SR item.
<i>AqualifierCodeValue</i>	Sets Qualification of Numeric Value
<i>AqualifierCodeValueSize</i>	Size of AqualifierCodeValue buffer
<i>AqualifierCodingScheme</i>	Coding Scheme Designator
<i>AqualifierCodingSchemeSize</i>	Size of AqualifierCodingScheme buffer
<i>AqualifierCodeMeaning</i>	Code Meaning
<i>AqualifierCodeMeaningSize</i>	Size of AqualifierCodeMeaning buffer



**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_DATETIME\_Data**

Returns a DATETIME node data.

**Synopsis**

```
MC_STATUS MC_SRH_Get_DATETIME_Data (
    int AsrNodeID,
    char AdateTime[],
    int AdateTimeSize
)
```

*AsrNodeID* An Identifier of the DATETIME SR item.

*AdateTime* Returns a text value stored in this node

*AdateTimeSize* Datetime buffer size

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_DATE\_Data

Returns a DATE node data.

### Synopsis

```
MC_STATUS MC_SRH_Get_DATE_Data (
    int AsrNodeID,
    char Adate[],
    int AdateSize
)
```

*AsrNodeID* An Identifier of the DATE SR item.

*Adate* Returns A text value stored in this node.

*AdateSize* Date buffer size

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TIME\_Data

Returns a TIME node data.

### Synopsis

```
MC_STATUS MC_SRH_Get_TIME_Data (
    int AsrNodeID,
    char Atime[],
    int AtimeSize
)
```

*AsrNodeID* An Identifier of the TIME SR item.

*Atime* Returns a text value stored in this node.

*AtimeSize* Time buffer size

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_UIDREF\_Data**

Returns a UIDREF node data.

**Synopsis**

```
MC_STATUS MC_SRH_Get_UIDREF_Data (
    int AsrNodeID,
    char AuidRef[],
    int AuidRefSize
)
```

*AsrNodeID* An Identifier of the UIDREF SR item.

*AuidRef* Returns a uid value stored in this node.

*AuidRefSize* uidRef buffer size

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_PNAME\_Data

Returns a PNAME node data.

### Synopsis

```
MC_STATUS MC_SRH_Get_PNAME_Data (
    int AsrNodeID,
    char ApersonName[],
    int ApersonNameSize
)
```

*AsrNodeID* An Identifier of the PNAME SR item.  
*ApersonName* Returns a person name value stored in this node.  
*ApersonNameSize* ApersonName buffer size

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_SCOORD\_First\_Data

Returns an SCOORD node data.

### Synopsis

```
MC_STATUS MC_SRH_Get_SCOORD_First_Data (
    int AsrNodeID,
    float *Acolumnn,
    float *Arow,
    int *AvalueCount,
    SR_GRAPHIC_TYPE *AgraphicType
)
```

*AsrNodeID* An Identifier of the SCOORD SR item.

<i>Acolumn,</i> <i>Arow</i>	Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship. Data shall be provided as an ordered set of (column, row) pairs.
<i>AvalueCount</i>	Returns number of value pairs stored.
<i>AgraphicType</i>	This attribute defines the type of geometry of the annotated region of interest. The following Enumerated Values are specified for image spatial coordinate geometries: SR_GRT_POINT = a single pixel denoted by a single (column, row) pair SR_GRT_MULTIPPOINT = multiple pixels each denoted by an (column, row) pair SR_GRT_POLYLINE = a series of connected line segments with ordered vertices denoted by (column, row) pairs; if the first and last vertices are the same it is a closed polygon SR_GRT_CIRCLE = a circle defined by two (column, row) pairs. The first point is the central pixel. The second point is a pixel on the perimeter of the circle. SR_GRT_ELLIPSE = an ellipse defined by four pixel (column, row) pairs, the first two points specifying the endpoints of the major axis and the second two points specifying the endpoints of the minor axis of an ellipse.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_SCOORD\_Next\_Data

Returns an SCOORD node data.

#### Synopsis

```
MC_STATUS MC_SRH_Get_SCOORD_Next_Data (
    int AsrNodeID,
```

```

    float *Acolumn,
    float *Arow
)

```

*AsrNodeID* An Identifier of the SCOORD SR item.

*Acolumn*,  
*Arow* Spatial coordinates of a geometric region of interest in the DICOM image coordinate system. The IMAGE Content Item from which spatial coordinates are selected is denoted by a SELECTED FROM relationship. Data shall be provided as an ordered set of (column, row) pairs.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VR</b>	The attribute’s value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute’s value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_TCOORD\_D\_First\_Data

Returns a TCOORD node’s data that were provided as a Referenced DateTime.

#### Synopsis

```

MC_STATUS MC_SRH_Get_TCOORD_D_First_Data (
    int AsrNodeID,
    char AdateTimeOffset[],
    int AdateTimeOffsetSize,
    int *AvalueCount,
    SR_TRANGE_TYPE *AtempRangeType
)

```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>AdateTimeOffset</i>	Specifies temporal point for reference by absolute time. Data is formatted as DICOM DT string.
<i>AdateTimeOffsetSize</i>	Specifies temporal point buffer size.
<i>AvalueCount</i>	Returns number of values stored.
	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:
	SR_TRT_POINT a single temporal point
	SR_TRT_MULTIPPOINT multiple temporal points
<i>AtempRangeType</i>	SR_TRT_SEGMENT a range between two temporal points
	SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points
	SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data
	SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TCOORD\_D\_Next\_Data

Returns a TCOORD node's data that were provided as a Referenced DateTime.

### Synopsis

```
MC_STATUS MC_SRH_Get_TCOORD_D_Next_Data (
    int AsrNodeID,
    char AdateTimeOffset[],
    int AdateTimeOffsetSize
)
```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>AdateTimeOffset</i>	Specifies temporal points for reference by absolute time. Data is formatted as DICOM DT string.
<i>AdateTimeOffsetsSize</i>	Specifies temporal points for buffer size. Note that it is a multi-value string that can long.
<i>AvalueCount</i>	Returns number of values stored.
<i>AtempRangeType</i>	<p>Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:</p> <p>SR_TRT_POINT a single temporal point</p> <p>SR_TRT_MULTIPPOINT multiple temporal points</p> <p>SR_TRT_SEGMENT a range between two temporal points</p> <p>SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points</p> <p>SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data</p> <p>SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point</p>

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.



<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TCOORD\_O\_First\_Data

Returns a TCOORD node's data that were provided as Referenced Time Offsets.

### Synopsis

```
MC_STATUS MC_SRH_Get_TCOORD_O_First_Data (
    int AsrNodeID,
    char AtimeOffset[],
    int AtimeOffsetSize,
    int *AvalueCount,
    SR_TRANGE_TYPE *AtempRangeType
)
```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>AtimeOffset</i>	Specifies temporal points for reference by number of seconds after start of data.
<i>AdateTimeOffsetSize</i>	Specifies temporal point buffer size.
<i>AvalueCount</i>	Returns number of values stored.
<i>AtempRangeType</i>	<p>Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used:</p> <ul style="list-style-type: none"> <li>SR_TRT_POINT a single temporal point</li> <li>SR_TRT_MULTIPPOINT multiple temporal points</li> <li>SR_TRT_SEGMENT a range between two temporal points</li> <li>SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points</li> <li>SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data</li> <li>SR_TRT_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point</li> </ul>

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_TCOORD\_O\_Next\_Data**

Returns a TCOORD node's data that were provided as Referenced Time Offsets.

**Synopsis**

```
MC_STATUS MC_SRH_Get_TCOORD_O_Next_Data (
    int AsrNodeID,
    char AtimeOffset[],
    int AtimeOffsetSize
)
```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>AtimeOffset</i>	Specifies temporal points for reference by number of seconds after start of data.
<i>AdateTimeOffsetSize</i>	Specifies temporal point buffer size.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.

<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TCOORD\_R\_First\_Data

Returns a TCOORD node's data that were provided as Referenced Sample Positions.

### Synopsis

```
MC_STATUS MC_SRH_Get_TCOORD_R_First_Data (
    int AsrNodeID,
    unsigned long *ArefSamplePosition,
    int *AvalueCount,
    SR_TRANGE_TYPE *AtempRangeType
)
```

<i>AsrNodeID</i>	An Identifier of the TCOORD SR item.
<i>ArefSamplePosition</i>	List of samples within a multiplex group specifying temporal points of the referenced data. Position of first sample is 1. Only the first value returned here.
<i>AvalueCount</i>	Returns number of values stored.
<i>AtempRangeType</i>	Defines the type of temporal extent of the region of interest. A temporal point (or instant of time) may be defined by a waveform sample offset (for a single waveform multiplex group only), time offset, or absolute time. Following enumerated values shall be used: SR_TRT_POINT a single temporal point SR_TRT_MULTIPPOINT multiple temporal points SR_TRT_SEGMENT a range between two temporal points SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points SR_TRT_BEGIN a range beginning at one temporal point, and extending beyond the end of the acquired data

SR\_TRT\_END a range beginning before the start of the acquired data, and extending to (and including) the identified temporal point

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_TCOORD\_R\_Next\_Data

Returns a TCOORD node's data that were provided as Referenced Sample Positions.

#### Synopsis

```
MC_STATUS MC_SRH_Get_TCOORD_R_Next_Data (
    int AsrNodeID,
    unsigned long *ArefSamplePosition
)
```

*AsrNodeID* An Identifier of the TCOORD SR item.

*ArefSamplePosition* List of samples within a multiplex group specifying temporal points of the referenced data. Position of the first sample is 1. Only the first value is returned here.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).

**MC\_SYSTEM\_ERROR** An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_COMPOSITE\_Data

Returns a COMPOSITE node data.

### Synopsis

```
MC_STATUS MC_SRH_Get_COMPOSITE_Data (
    int AsrNodeID,
    char AsopClassUid[],
    int AsopClassUidSize,
    char AsopInstanceUid[],
    int AsopInstanceUidSize
)
```

*AsrNodeID* An Identifier of the COMPOSITE SR item.

*AsopClassUid* A SOP Class UID of a Composite object which is not an Image or Waveform.

*AsopClassUidSize* The size of the SOP Class UID buffer.

*AsopInstanceUid* A SOP Instance UID of a Composite object which is not an Image or Waveform.

*AsopInstanceUidSize* The size of the SOP Instance UID buffer.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The <i>AsrNodeID</i> value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_IMAGE\_Data

Returns an IMAGE node data.

## Synopsis

```
MC_STATUS MC_SRH_Get_IMAGE_Data (
    int AsrNodeID,
    char AsopClassUid[],
    int AsopClassUidSize,
    char AsopInstanceUid[],
    int AsopInstanceUidSize,
    int *ArefFramesCount
)
```

<i>AsrNodeID</i>	An Identifier of the IMAGE SR item.
<i>AsopClassUid</i>	An SOP Class UID of a Composite object which is an Image.
<i>AsopClassUidSize</i>	The size of the SOP Class UID buffer.
<i>AsopInstanceUid</i>	An SOP Instance UID of a Composite object which is an Image.
<i>AsopInstanceUidSize</i>	The size of the SOP Instance UID buffer.
<i>ArefFramesCount</i>	Returns a count of references frames within the Referenced SOP Instance to which the reference applies. Frames array can be retrieved via MC_SRH_Get_IMAGE_Frames.

## Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_IMAGE\_Frames

Gets frame numbers within a Referenced SOP Instance to which the reference applies.

## Synopsis

```
MC_STATUS MC_SRH_Get_IMAGE_Frames (
    int AsrNodeID,
    long AreferencedFrames[],
)
```

```

    long AframesArraySize
)

```

*AsrNodeID* An Identifier of the IMAGE SR item.

*AreferencedFrames* Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1.

*AframesArraySize* Size of the AreferencedFrames array.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VR</b>	The attribute's value representation cannot be derived from <i>Value</i> . See the table below.
<b>MC_VALUE_OUT_OF_RANGE</b>	A numeric <i>Value</i> was larger than could be accommodated by the attribute. (E.g. setting an attribute with an unsigned int VR to the value 123.45, or setting it to 128000, or setting it to -1).
<b>MC_TEMP_FILE_ERROR</b>	If the attribute's value is large, it may be stored in a temporary file (if so configured). If a file I/O error occurs, this status is returned.
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_WAVEFORM\_Data

Returns an IMAGE node data.

#### Synopsis

```

MC_STATUS MC_SRH_Get_WAVEFORM_Data (
    int AsrNodeID,
    char AsopClassUid[],
    int AsopClassUidSize,
    char AsopInstanceUid[],
    int AsopInstanceUidSize,
    int *ArefChannelsCount
)

```

*AsrNodeID* An Identifier of the WAVEFORM SR item.

<i>AsopClassUid</i>	An SOP Class UID of a Composite object which is a Waveform.
<i>AsopClassUidSize</i>	Size of the SOP Class UID buffer.
<i>AsopInstanceUid</i>	An SOP Instance UID of a Composite object which is a Waveform.
<i>AsopInstanceUidSize</i>	Size of the SOP Instance UID buffer.
<i>ArefChannelsCount</i>	A value count for the channels referenced. Channels array can be retrieved via MC_SRH_Get_WAVEFORM_Channels.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute’s value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_WAVEFORM\_Channels

Gets channels referenced within the Referenced SOP Instance to which the reference applies.

#### Synopsis

```
MC_STATUS MC_SRH_Get_WAVEFORM_Channels (
    int AsrNodeID,
    short ArefChannels[],
    long ArefChannelsSize
)
```

*AsrNodeID*          An Identifier of the WAVEFORM SR item.



<i>ArefChannels</i>	A multi-value attribute which lists the channels referenced. Each channel is specified as a pair of values (M,C), where the first value is the sequence item number of the Waveform Sequence (5400,0100) attribute in the referenced object (i.e. the Multiplex Group Number), and the second value is the sequence item number of the Channel Definition Sequence (003A, 0200) attribute (i.e., the Channel Number) within the multiplex group.
<i>ArefChannelsSize</i>	Size of the ArefChannels array that shall be enough to fit all data.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_TABLE\_First\_Cell\_Values\_Counts

Retrieve the value counts of the internal attributes of the first item in the Cell Values Sequence in the TABLE Content Item. These value counts will be necessary for allocating the memory space for the subsequent retrieval of those attributes.

#### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_First_Cell_Values_Counts (
    int AsrNodeID,
    int *AvalueCount,
    int *ArefContentItemIdCount,
    int *AselectorAttrValueCount,
    unsigned long *AselectorAttrTag,
    int *AcellValuesID
)
```

<i>AsrNodeID</i>	An Identifier of the TABLE content item.
<i>AvalueCount</i>	Returning the number of items in the Cell Values Sequence

<i>ArefContentItemIdCount</i>	Returning the number of values in the Referenced Content Item Identifier.
<i>AselectorAttrValueCount</i>	Returning the number of values in the Selector XX Value data element denoted by the Selector Attribute VR.
<i>AselectorAttrTag</i>	Returning the Selector XX Value data element denoted by the Selector Attribute VR.
<i>ACellValuesID</i>	Returning the numeric handle of the first item in the Cell Value Sequence.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_TABLE\_First\_Column\_Definition

Retrieve the data of the first item of the Table Column Definition Sequence in the TABLE Content Item.

#### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_First_Column_Definition (
    int AsrNodeID,
    TABLE_ROW_DEF *AtableColDef,
    int *AvalueCount
)
```

<i>AsrNodeID</i>	An Identifier of the TIME SR item.
<i>AtableColDef</i>	Pointer to a supplied structure in which the next Table Column Definition Sequence item is to be retrieved.

*AvalueCount* Returns the number of items stored in the Table Column Definition Sequence

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

### MC\_SRH\_Get\_TABLE\_First\_Row\_Definition

Retrieve the data of the first item of the Table Row Definition Sequence in the TABLE Content Item.

#### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_First_Row_Definition (
    int AsrNodeID,
    TABLE_ROW_DEF *AtableRowDef,
    int *AvalueCount
)
```

*AsrNodeID* An Identifier of the TIME SR item.

*AtableRowDef* Pointer to a supplied structure in which the next Table Row Definition Sequence item is to be retrieved.

*AvalueCount* Returns the number of items stored in the Table Row Definition Sequence

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TABLE\_Next\_Cell\_Values\_Counts

Retrieve the value counts of the internal attributes of the next Cell Values Sequence item in the TABLE Content Item. These value counts will be necessary for allocating the memory space for the subsequent retrieval of those attributes.

### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_Next_Cell_Values_Counts (
    int AsrNodeID,
    int *ArefContentItemIdCount,
    int *AselectorAttrValueCount,
    unsigned long *AselectorAttrTag,
    int *AcellValuesID
)
```

<i>AsrNodeID</i>	An Identifier of the TABLE content item.
<i>ArefContentItemIdCount</i>	Returning the number of values in the Referenced Content Item Identifier.
<i>AselectorAttrValueCount</i>	Returning the number of values in the Selector XX Value data element denoted by the Selector Attribute VR.
<i>AselectorAttrTag</i>	Returning the Selector XX Value data element denoted by the Selector Attribute VR.
<i>AcellValuesID</i>	Returning the numeric handle of the first item in the Cell Value Sequence.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in "mcstatus.h":

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.

<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TABLE\_Next\_Column\_Definition

Retrieve the data in the next item of the Table Column Definition Sequence in the TABLE Content Item.

### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_Next_Column_Definition (
    int AsrNodeID,
    TABLE_COL_DEF *AtableColDef
)
```

<i>AsrNodeID</i>	An Identifier of the TABLE content item.
<i>AtableColDef</i>	Pointer to a supplied structure in which the next Table Column Definition Sequence item is to be retrieved.
<i>AtimeSize</i>	Time buffer size

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TABLE\_Next\_Row\_Definition

Retrieve the data in the next item of the Table Row Definition Sequence in the TABLE Content Item.

### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_Next_Row_Definition (
    int AsrNodeID,
    TABLE_ROW_DEF *AtableRowDef
)
```

*AsrNodeID* An Identifier of the TABLE content item.

*AtableRowDef* Pointer to a supplied structure in which the next Table Row Definition Sequence item is to be retrieved.

### Return Value

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

## MC\_SRH\_Get\_TABLE\_Cell\_Values\_Item

Retrieve the data in a Cell Value Sequence item in a TABLE Content item.

### Synopsis

```
MC_STATUS MC_SRH_Get_TABLE_Cell_Values_Item (
    int AcellValuesID,
    TABLE_CELL_VALUES* AtableCellValues
)
```

*AcellValuesID* Numeric handle pointing to the Cell Value Sequence Item to be retrieved.

*AtableCellValues* Pointer to a supplied structure in which the attributes of the Cell Value Sequence item are to be retrieved.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.
<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.

**MC\_SRH\_Get\_CONTAINER\_Data**

Returns a CONTAINER node data.

**Synopsis**

```
MC_STATUS MC_SRH_Get_CONTAINER_Data (
    int AsrNodeID,
    SR_CONT_CONTINUITY *Acontinuity,
    char AtemplateId[],
    int AtemplateIdSize
)
```

<i>AsrNodeID</i>	An Identifier of the TIME SR item.
<i>Acontinuity</i>	Enumerated return value that specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
<i>AtemplateId</i>	DICOM Template Identifier that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
<i>AtemplateIdSize</i>	The size in bytes of the template Identifier array.

**Return Value**

One of the enumerated **MC\_STATUS** codes defined in “**mcstatus.h**”:

Value	Meaning
<b>MC_NORMAL_COMPLETION</b>	The function completed normally.
<b>MC_INVALID_SR_ID</b>	The AsrNodeID value is not a valid SR tree management object ID.

---

<b>MC_NULL_POINTER_PARM</b>	One or more of the pointer-type parameters was NULL.
<b>MC_INCOMPATIBLE_VALUE</b>	The <i>Acontinuity</i> value is not valid.
<b>MC_EMPTY_VALUE</b>	The attribute has no value assigned to it.
<b>MC_NULL_VALUE</b>	The attribute's value is NULL (i.e. its length is zero).
<b>MC_SYSTEM_ERROR</b>	An unexpected, potentially serious, problem was detected in the operating environment. A message describing the error has been written to the Merge DICOM Toolkit log file.



# Appendix A: Writing a DICOM Conformance Statement

Detailed below is a guideline for writing a conformance statement for your application. Since the Toolkit is *not* an application, this section only gives an outline of the DICOM services it supports. Responsibility for full DICOM conformance to particular SOP classes rests with the application developer, since many of the requirements for such conformance lie outside the realm of the Toolkit. For example, the high level behavior of Query/Retrieve service class SCUs and SCPs as defined in Part 4 of the DICOM standard, is implemented by the application developer in conjunction with the toolkit functionality.

## Conformance Statement Sections

### Implementation Model

The Implementation model consists of three sections:

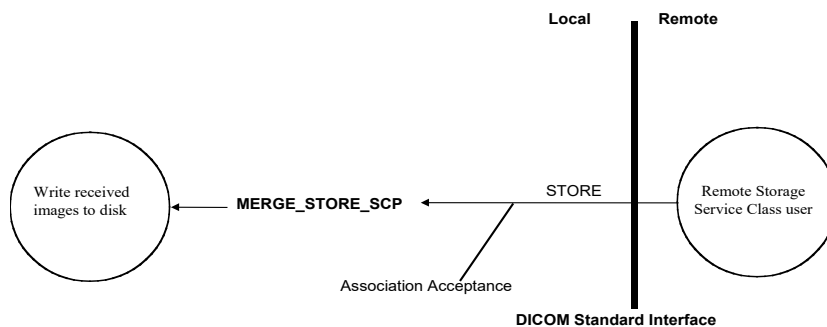
- the Application Data Flow Diagram which specifies the relationship between the Application Entities and the “external world” or Real-World activities
- a functional description of each Application Entity
- the sequencing constraints among them.

### Application Data Flow

As part of the Implementation model, an Application Data Flow Diagram shall be included. This diagram represents all of the Application Entities present in an implementation, and graphically depicts the relationship of the AE's use of DICOM to Real-World Activities as well as any applicable User interaction.

The Merge DICOM Toolkit provides the core functionality required to facilitate data flow between SCUs and SCPs.

Application conformance statements will include a data flow diagram. An example is shown below for a simple Storage Service Class SCP.



---

*Figure A-1: MERGE\_STORE\_SCP application data flow diagram*

## Functional Definition of Application Entities (AE)

This part shall contain a functional definition for each individual, local Application Entity. It will describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions. In this sense, "DICOM services" refers not only to DICOM Service Classes, but also to lower level DICOM services, such as Association Services.

Application conformance statements will fill in this section with a general specification of functions to be performed by SCU or SCP.

### Sequencing of Real World Activities

If applicable, this section shall contain a description of sequencing as well as potential constraints on real-world activities. These include any applicable user interaction as performed by all the AEs. A UML sequence diagram that depicts the real-world activities as vertical bars, and shows events exchanged between them as arrows, is strongly recommended.

Application conformance statements fill this section in with any associated sequence of real-world activities. For example, a Storage Service Class SCP might perform the following real-world activities: store an image, modify it in some defined manner and act as a Storage Service Class SCU and forward the modified image somewhere.

## AE Specifications

The next section in the DICOM Conformance Statement is a set of Application Entity specifications. There shall be one specification for AE. Each individual AE specification has a subsection. There are as many of these subsections as there are different AE's in the implementation. That is, if there are two distinct AEs, then there will be two subsections. The Merge DICOM Toolkit is using the mergecom.app configuration file to read configuration parameters for each AE. The following subsections are filled in for each AE:

- Application Entity
  - SOP Classes
  - Association Policies
    - General
    - Number of Associations
    - Asynchronous Nature
    - Implementation Identifying Information
  - Association Initiation Policy
    - Activity

- Description and Sequencing of Activities
- Proposed Presentation Contexts
- SOP Specific Conformance for SOP Class(es)
- Association Acceptance Policy
  - Activity
    - Description and sequencing of Activities
    - Accepted Presentation Contexts
    - SOP Specific Conformance for SOP Class(es)

### ***SOP Classes***

Application conformance statements specify the DICOM SOPs which are supported by each Application Entity. For SCP Entities, the initiation of associations. Please see the “System Profile” section in ANNEX B: CONFIGURATION PARAMETERS and the “MC\_Wait\_For\_Association” or “MC\_Wait\_For\_Secure\_Association” definition in this Reference Manual. For SCU Entities, the list of supported SOP classes will correspond to the services specified in “mergecom.app” for any SCPs to which the SCU wishes to connect.

### ***Number of Associations***

The Merge DICOM Toolkit does not impose any limit on the number of simultaneous associations that can be requested or accepted. The only limitation on the number of simultaneous associations is imposed by the operating system and available resources. However, if your application enforces that limit, it is defined here.

The MAX\_PENDING\_CONNECTIONS setting in the “mergecom.pro” file refers to the maximum number of outstanding connection requests per listener socket. It does not limit the maximum number of simultaneous associations.

### ***Asynchronous Nature***

Merge DICOM Toolkit does not currently support multiple outstanding transactions over a single association.

### ***Implementation Identifying Information***

Application conformance statements specify the Implementation Class Unique Identifier (UID) for the application, as well as the Implementation version name. These identifiers are taken from the mergecom.pro configuration file under the following keys:

**IMPLEMENTATION\_CLASS\_UID**

**IMPLEMENTATION\_VERSION**

This UID must follow the syntax rules specified in Part 5 of the DICOM standard.

## Proposed or Accepted Presentation Contexts

Application conformance statements specify all presentation contexts that are used for association negotiation. A presentation context consists of:

- an Abstract Syntax which is a DICOM service class name and unique identifier (UID)
- a transfer syntax name and UID. A transfer syntax represents a set of data encoding rules that are specified in the “mergecom.pro” file. Please see the “System Profile” section in Appendix B: Configuration Parameters.
- the role that the application will perform within the service class. The roles associated with a particular service class are discussed in Part 4 of the DICOM standard.
- any extended negotiation information used when creating associations. See the “MC\_Get\_Negotiation\_Info” function in this Reference Manual.
- any rules that govern the acceptance of presentation contexts for the AE. This includes rules for which combinations of Abstract/Transfer Syntaxes are acceptable, and rules for prioritization of presentation contexts. Rules that govern selection of transfer syntax within a presentation context shall be stated here. Please see the “Application Profile” section in the Appendix B: Configuration Parameters. Also, see the “MC\_Get\_Association\_Info” function in this Reference Manual to learn about the presentation contexts that are queryable by an application program.

Refer to Table A-1 for an example.

Table A-1: Example Presentation Context

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2		

Merge DICOM Toolkit uses mergecom.app configuration settings to specify presentation contexts shown above.

## SOP Specific Conformance

This section includes the SOP specific behavior, i.e. error codes, error and exception handling and time-outs, etc. The information is described in the SOP specific Conformance Statement section of PS 3.4 (or relevant private SOP definition).

## Transfer Syntax Selection Policies

Merge DICOM Toolkit uses the following policy when selecting transfer syntax:

- An SCU offers any transfer syntaxes which are defined in its mergecom.pro file.
- The SCP prefers its native byte ordering, and will prefer explicit over implicit VR.

## **Network Interfaces**

### **Physical Network Interface**

Merge DICOM Toolkit runs over the TCP/IP protocol stack on any physical interconnection media supporting the TCP/IP stack.

### **IPv4 and IPv6 Support**

Merge DICOM Toolkit supports both IPv4 and IPV6 protocols and is configurable in the system profile.

### **Configuration**

Refer to the Appendix B: Configuration Parameters for complete configuration information.

Applications reference four (4) configuration files. The first, merge.ini, is found through the MERGE\_INI environment variable. They are as follows:

- merge.ini — Specifies the names of the other three (3) configuration files and also contains message logging parameters.
- mergecom.pro — Specifies run-time parameters for the application
- mergecom.app — Defines service lists and applications on other network nodes to which connections are possible.
- mergecom.srv — Service and sequence definitions.

## **AE Title/Presentation Address Mapping**

Presentation address mapping is configured in the mergecom.app file. The Presentation Address of an SCU/SCP application is specified by configuring the Listen Port in the mergecom.pro file, and specifying the AE title for the SCU/SCP within the application itself.

## **Configurable Parameters**

The mergecom.pro configuration file can be used to set or modify other lower-level communication parameters. This includes time-outs and other parameters. Some information about supported SOP classes is also stored here. **Most parameters in this file should NEVER be changed. Doing so may compromise DICOM conformance.** Before modifying any parameters, such as time-out, be sure to have a backup of the originally supplied mergecom.pro file. Also, before modifying other parameters, you should consider contacting Merge Healthcare for advice.

### **PDU size**

The maximum PDU size is configurable with a minimum of 4,096 bytes.

Application conformance statements specify the chosen PDU (Protocol Data Units) size and any general rules governing the initiation of associations. Please see the “System Profile” section of this Reference Manual for further information about configuring the PDU size.

## **Extensions/Specializations/Privatizations**

### **Standard Extended/Specialized/Private SOPs**

Application conformance statements list extended, specialized, or private SOPs that are supported.

**Private Transfer Syntaxes**

This section describes private transfer syntaxes that are listed in the Transfer Syntax Tables. See the System Profile section in Appendix B: Configuration Parameters for details.

# Appendix B: Configuration Parameters

This appendix describes each configuration parameter in detail.

Merge DICOM Toolkit is a highly configurable toolkit, and understanding its configuration is critical to using the library effectively.

Related parameters are grouped into sections in a configuration file as follows:

```
[SECTION_1]
    PARAMETER_1 = value1
    PARAMETER_2 = value2
[SECTION_2]
    PARAMETER_3 = value3
```

Information contained in these tables are parameter names including descriptions and sections where they are contained. The parameters are listed alphabetically and organized by the initialization file where they are used.

The structure of initialization and configuration files are detailed in the “Configuration” section in this Reference Manual.

## Initialization File

The Merge DICOM Toolkit Initialization file (usually called merge.ini) provides the DICOM Toolkit with its top-level configuration. It specifies the location of the other three configuration files, along with message and error logging characteristics.

There are two ways of accessing the merge.ini file in your runtime environment. The functions `MC_Set_MergeINI()` or `MC_Set_MergeINI_Unicode()` can be used to assign the path where the merge.ini file is located. You can also set the `MERGE_INI` environment variable to point to the Merge Initialization File. This variable can be set within a command shell. For example:

In Unix C-shell:

```
setenv MERGE_INI /users/mc3adv/merge.ini
```

In Unix Bourne, Korn, or Bash shell:

```
MERGE_INI=/users/mc3adv/merge.ini; export MERGE_INI
```

In DOS command shell:

```
set MERGE_INI=\mc3adv\merge.ini
```

See the Merge DICOM Toolkit Platform Notes for your platform if none of these methods apply.

The initialization file contains one `[MergeCOM3]` section that points to the other three Merge DICOM Toolkit initialization files. It specifies characteristics of the message/error log kept by the DICOM Toolkit library, turns particular types of logging on and off, and specifies where the messages are logged (file, screen, both or none). In most cases the INFO, WARNING and ERROR messages are sufficient. The `Tn_MESSAGE` settings (where *n* is an integer between 1 and 9) turns on lower-level protocol tracing capabilities. These capabilities can prove useful when running into

difficulties communicating with other implementations of DICOM over a network and can be used by Merge Healthcare service engineers in diagnosing lower-level network problems.

The following parameters are recognized by Merge DICOM Toolkit in the initialization file.

*Table B-1: Initialization file parameters*

Name	Section	Description
ALLOW_LIBRARY_EXCEPTION_HANDLER	MergeCOM3	This parameter, if set to YES, directs the toolkit to call the internal (and the user defined, if present) exception handler in the case System exception or System signal is raised. This allows for the (limited) recovery of the user program by at least giving it a chance to cleanup and exit gracefully and avoid a straight crash.  DEFAULT: NO
BLANK_FILL_LOG_FILE	MergeCOM3	This parameter informs the toolkit whether or not to expand the log file to its maximum size on initialization. Setting this value to "NO" will decrease the time spent in MC_Library_Initialization() but increase the time spent doing actual logging while the application is running.  DEFAULT: YES
ERROR_MESSAGE	MergeCOM3	This parameter instructs the toolkit to which destination (File, Screen and/or Memory) to log error messages.
INFO_MESSAGE	MergeCOM3	This parameter instructs the toolkit to which destination (File, Screen and/or Memory or none) to log information messages.
LOG_FILE	MergeCOM3	This is the name of the Merge DICOM Toolkit message log. The file will be [re-]created by Merge DICOM Toolkit. This parameter is ignored by embedded toolkits.  The path to the file can be specified using environment variables (including the pseudo environment variable MC3INIDIR which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).  Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.  DEFAULT: ./merge.log
LOG_FILE_BACKUP	MergeCOM3	This parameter tells the Merge DICOM Toolkit to create a backup of the log file before starting a new log. If "ON", any existing log file is renamed with a file extension of .Lnn where nn is an integer number between 01 and 99.  DEFAULT: OFF.



Name	Section	Description
LOG_FILE_LINE_LENGTH	MergeCOM3	This option specifies the number of characters that occur on a line within the merge.log file. DEFAULT: 78 MINIMUM: 16 MAXIMUM: 254
LOG_FILE_SIZE	MergeCOM3	This is the number of lines which will be created for the log file. If BLANK_FILL_LOG_FILE is set to YES, the file is initialized to all binary zeros before the first message is logged. DEFAULT: 1000 MINIMUM: 100 MAXIMUM: 30720 (30 * 1024)
LOG_MEMORY_SIZE	MergeCOM3	This is the number of lines of length equal to LOG_FILE_LINE_LENGTH which will be created for the memory log. Used when logging is set to "Memory" in merge.ini. DEFAULT: 1
MERGECOM_3_APPLICATIONS	MergeCOM3	File containing the Merge DICOM Toolkit application configurations.  The path to the file can be specified using environment variables (including the pseudo environment variable MC3INIDIR which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).  Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.
MERGECOM_3_PROFILE	MergeCOM3	File containing the Merge DICOM Toolkit system profile parameters.  The path to the file can be specified using environment variables (including the pseudo environment variable MC3INIDIR which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).  Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.

Name	Section	Description
MERGE_COM_3_SERVICES	MergeCOM3	File containing the Merge DICOM Toolkit system service and message definitions.  The path to the file can be specified using environment variables (including the pseudo environment variable MC3INIDIR which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).  Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.
NUM_HISTORICAL_LOG_FILES	MergeCOM3	This parameter informs the toolkit of the number of historical log files to keep. The valid range of number for this parameter is 1 – 99. The historical log files are named <i>basename.L01</i> to <i>basename.LXX</i> where <i>basename.LXX</i> is the latest log file. The <i>basename</i> is determined by the LOG_FILE parameter. When the maximum number of historical log files is met, the oldest log file is deleted and the log files are renamed. Note that a new log file is created each time the library is initialized. This parameter is only used when LOG_FILE_BACKUP is set to YES.
T1_MESSAGE	MergeCOM3	Not used (internal tracing).
T2_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log the entire contents of messages sent or received over the network. The format is similar to MC_List_Message's output.
T3_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to association negotiation.
T4_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages when incoming associations are automatically rejected.
T5_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to regular and extended validation.
T6_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to configuration.
T7_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to logging of command level attributes in messages sent or received.
T8_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to the streaming in and out of messages and file objects.

Name	Section	Description
T9_MESSAGE	MergeCOM3	This logging level parameter instructs the toolkit to log messages relating to PDU's sent and received. Note: Receipt and transmission of P-DATA PDU's are logged; not the actual PDU itself.
WARNING_MESSAGE	MergeCOM3	This parameter instructs the toolkit to which destination (File, Screen and/or Memory or none) to log warning messages.

**NOTE:** **Note:** The destination for the logging from the T2\_MESSAGE to T9\_MESSAGE trace levels can be one or more of File, Screen and Memory or none.

## Application Profile

The Merge DICOM Toolkit application profile (usually called mergecom.app) specifies the characteristics of your application entity and the Application Entities (AE) your application connects with over a network. The name and location of this file is specified in the [MergeCOM3] section of the Merge DICOM Toolkit initialization file.

When your application acts as a client (SCU), the application profile must specify the network address of the server (SCP) and the application entities you wish to connect (open an association) to. Your client refers to the Application Entity using a DICOM AE title, which is the same way it is referred to in the application profile. The AE title consists of a string of characters containing no spaces and having a length of 16 characters or less. A section of the profile exists for each Server AE that you wish to connect to.

For example, if your application is an image source and also performs query and retrieval of images from two separate DICOM AE's, it might contain sections like the following:

```
[Acme_Store_SCP]
  PORT_NUMBER      = 104
  HOST_NAME        = acme_sun1
  SERVICE_LIST     = Storage_Service_List
[Acme_QR_SCP]
  PORT_NUMBER      = 104
  HOST_NAME        = acme_hp2
  SERVICE_LIST     = Query_Service_List
```

Acme\_Store\_SCP and Acme\_QR\_SCP are the AE titles for the applications you wish to connect to. The storage server runs on a SUN Solaris computer with the host name acme\_sun1, while the query/retrieve server runs on an HP workstation with the host name acme\_hp2. Both servers listen on port 104 (the standard DICOM listen port). The host name and port combined make up the TCP/IP network address for a listening server application. See Figure 9.

Besides entering a hostname for the HOST\_NAME parameter, it is also possible to simply enter an IP address. Both IPv4 addresses and IPv6 addresses are allowed in this field.

## Sections

Table B-2: Application profile section headings

The application profile contains the following sections:

Section	Description
<remote_application_title>	Section describing a remote DICOM Application Entity title(s). The remote Application Entity titles listed here must be 1 to 16 bytes in length with no embedded spaces. Simply, this section is where you list the DICOM applications you want to communicate with.
<service_list_name>	List(s) of DICOM services that will be provided by the Application Entities listed in the [<remote_application_title>] sections. The service names listed here must be 1 to 33 bytes in length with no embedded spaces. Simply, this section is where you list the services that are provided by the remote DICOM applications.
<syntax_list_name>	List(s) of DICOM transfer syntaxes that will be supported by the services listed in the [<service_list_name>] sections. The transfer syntaxes must be one of those listed in Table 5.

## Parameters

Table B-3: Application profile section headers.

The application profile contains the following parameters:

Parameter	Section	Description
PORT_NUMBER	<remote_application_title>	This parameter is the TCP/IP port on which the remote DICOM system <u>listens</u> for connections. The commonly used port number is 104. This default value may be overridden by the <code>MC_Open_Association</code> or <code>MC_Open_Secure_Association</code> function call.
HOST_NAME	<remote_application_title>	This parameter is the name of the remote host as it is known to your TCP/IP system. This default value may be overridden by the <code>MC_Open_Association</code> or <code>MC_Open_Secure_Association</code> function call. The parameters value must be 1 to 19 bytes in length with no embedded spaces. Note: A numeric internet address may be used: e.g. 192.204.32.1

SERVICE_LIST	<remote_application_title>	This parameter is the name of a section in the application profile which provides a list of services for which local applications will negotiate when attempting to establish an association. This is a default list; another list may be specified in the MC_Open_Association or MC_Open_Secure_Association function call. The parameters value names must be 1 to 33 bytes in length with no embedded spaces.
--------------	----------------------------	---

## Service List

The SERVICE\_LIST section of the application profile is used to describe the DICOM services that will be negotiated by the listed Application Entity.

For example, these sections might look like the following:

```
[Storage_Service_List]
  SERVICES_SUPPORTED = 11      # Number of Services in list
  SERVICE_1           = STANDARD_MR
  SERVICE_2           = STANDARD_CR
  SERVICE_3           = STANDARD_CT
  SERVICE_4           = STANDARD_CURVE
  SERVICE_5           = STANDARD_MODALITY_LUT
  SERVICE_6           = STANDARD_OVERLAY
  SERVICE_7           = STANDARD_SEC_CAPTURE
  SERVICE_8           = STANDARD_US
  SERVICE_9           = STANDARD_US_MF
  SERVICE_10          = STANDARD_VOI_LUT
  SERVICE_11          = STANDARD_NM

[Query_Service_List]
  SERVICES_SUPPORTED = 2      # Number of Services in list
  SERVICE_1           = STUDY_ROOT_FIND
  SERVICE_2           = STUDY_ROOT_MOVE
```

[Storage\_Service\_List] lists the storage services that are requested, while [Query\_Service\_List] lists the type of query/retrieve that are requested. These service names are the strings used in Merge DICOM Toolkit to identify standard DICOM services, and are discussed further in specific application guides. Any services listed must be defined in the service profile, discussed below.

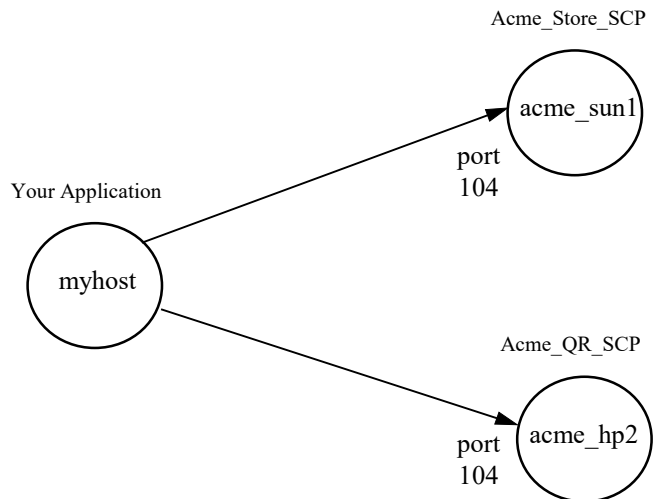


Figure B-1: A sample configuration of DICOM applications

A service list also needs to be defined for each of your own server AE's. Even though you do not need a section for your server AE title (since it is running on your local machine), you do need to specify a service list that your application supports as an SCP. If your application also acts as a storage server, it

Might use `[Storage_Service_List]`. You also need to specify a listen port for your server AE in the system profile, which is discussed below.

The parameter values are text strings recognizable by the Merge DICOM Toolkit. These strings are defined in `mergecom.srv` in the toolkit distribution. They are also made available to the application writer at compile time in the header file `mc3services.h` and source file `mc3services.c` as symbolic constants. The following is a list of currently supported services:

Table B-4: Application profile parameters

Merge DICOM Toolkit Service Parameter	DICOM Service Class
ACQUISITION_CONTEXT_SR	Storage
ADVANCED_BLENDING_PRESENTATION_STATE	Storage
ARTERIAL_PULSE_WAVEFORM	Storage
AUDIO_WAVEFORM_REAL_TIME_COMMUNICATION	Storage
AUTOREFRACTION_MEASUREMENTS	Storage
BASIC_ANNOTATION_BOX	Print Management
BASIC_COLOR_IMAGE_BOX	Print Management
BASIC_FILM_BOX	Print Management

Merge DICOM Toolkit Service Parameter	DICOM Service Class
BASIC_FILM_SESSION	Print Management
BASIC_GRAYSCALE_IMAGE_BOX	Print Management
BASIC_PRINT_IMAGE_OVERLAY_BOX	Print Management
BASIC_STRUCTURED_DISPLAY	Storage
BODY_POSITION_WAVEFORM	Storage
BREAST_IMAGING_RPI_QUERY	Relevant Patient Information Query
BREAST_PROJ_PRESENT	Storage
BREAST_PROJ_PROCESS	Storage
BREAST_TOMO_IMAGE_STORAGE	Storage
C_ARM_PHOTON_ELECTRON_RADIATION	Storage
C_ARM_PHOTON_ELECTRON_RADIATION_RECORD	Storage
CARDIAC_RPI_QUERY	Relevant Patient Information Query
CHEST_CAD_SR	Storage
COLON_CAD_SR	Storage
COLOR_PALETTE_FIND	Query/Retrieve
COLOR_PALETTE_GET	Query/Retrieve
COLOR_PALETTE_MOVE	Query/Retrieve
COLOR_PALETTE_STORAGE	Storage
COMPOSITE_INST_RET_NO_BULK_GET	Query/Retrieve
COMPOSITE_INSTANCE_ROOT_RET_GET	Query/Retrieve
COMPOSITE_INSTANCE_ROOT_RET_MOVE	Query/Retrieve
COMPOSITING_PLANAR_MPR_VOLUMETRIC_PS	Storage
COMPREHENSIVE_3D_SR	Storage
CONFOCAL_MICROSCOPY_IMAGE	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
CONFOCAL_MICROSCOPY_TILED_PYRAMIDAL_IMAGE	Storage
CONTENT_ASSESSMENT_RESULTS	Storage
CORNEAL_TOPOGRAPHY_MAP	Storage
CT_DEFINED_PROCEDURE_PROTOCOL	Storage
CT_PERFORMED_PROCEDURE_PROTOCOL	Storage
DEFINED_PROCEDURE_PROTOCOL_FIND	Query/Retrieve
DEFINED_PROCEDURE_PROTOCOL_GET	Query/Retrieve
DEFINED_PROCEDURE_PROTOCOL_MOVE	Query/Retrieve
DEFORMABLE_SPATIAL_REGISTRATION	Storage
DERMOSCOPIC_PHOTOGRAPHY_IMAGE	Storage
DETACHED_INTERP_MANAGEMENT	Results Management
DETACHED_PATIENT_MANAGEMENT	Patient Management
DETACHED_RESULTS_MANAGEMENT	Results Management
DETACHED_STUDY_MANAGEMENT	Study Management
DETACHED_VISIT_MANAGEMENT	Patient Management
DICOMDIR	Media Storage
DISPLAY_SYSTEM	Display System Management
ELECTROMYOGRAM_WAVEFORM	Storage
ELECTROOCULOGRAM_WAVEFORM	Storage
ENCAPSULATED_CDA	Storage
ENCAPSULATED_MTL	Storage
ENCAPSULATED_OBJ	Storage
ENCAPSULATED_STL	Storage
ENHANCED_CONTINUOUS_RT_IMAGE	Storage
ENHANCED_CT_IMAGE	Storage



Merge DICOM Toolkit Service Parameter	DICOM Service Class
ENHANCED_MR_COLOR_IMAGE	Storage
ENHANCED_MR_IMAGE	Storage
ENHANCED_PET_IMAGE	Storage
ENHANCED_RT_IMAGE	Storage
ENHANCED_US_VOLUME	Storage
ENHANCED_XA_IMAGE	Storage
ENHANCED_XRAY_RADIATION_DOSE_SR	Storage
ENHANCED_XRF_IMAGE	Storage
EXTENSIBLE_SR	Storage
G_P_PERFORMED_PROCEDURE_STEP_RETIRED	Study Management
G_P_SCHEDULED_PROCEDURE_STEP_RETIRED	Study Management
G_P_WORKLIST_RETIRED	Basic Worklist Management
GENERAL_AUDIO_WAVEFORM	Storage
GENERAL_RPI_QUERY	Relevant Patient Information Query
GENERIC_IMPLANT_TEMPLATE	Storage
GENERIC_IMPLANT_TEMPLATE_FIND	Query/Retrieve
GENERIC_IMPLANT_TEMPLATE_GET	Query/Retrieve
GENERIC_IMPLANT_TEMPLATE_MOVE	Query/Retrieve
GRAYSCALE_PLANAR_MPR_VOLUMETRIC_PS	Storage
HANGING_PROTOCOL	Hanging Protocol Storage
HANGING_PROTOCOL_FIND	Hanging Protocol Query/Retrieve
HANGING_PROTOCOL_GET	Hanging Protocol Query/Retrieve
HANGING_PROTOCOL_MOVE	Hanging Protocol Query/Retrieve

Merge DICOM Toolkit Service Parameter	DICOM Service Class
IMAGE_OVERLAY_BOX_RETIRED	Print Management
IMPLANT_ASSEMBLY_TEMPLATE	Storage
IMPLANT_ASSEMBLY_TEMPLATE_FIND	Query/Retrieve
IMPLANT_ASSEMBLY_TEMPLATE_GET	Query/Retrieve
IMPLANT_ASSEMBLY_TEMPLATE_MOVE	Query/Retrieve
IMPLANT_TEMPLATE_GROUP	Storage
IMPLANT_TEMPLATE_GROUP_FIND	Query/Retrieve
IMPLANT_TEMPLATE_GROUP_GET	Query/Retrieve
IMPLANT_TEMPLATE_GROUP_MOVE	Query/Retrieve
IMPLANTATION_PLAN_SR_DOCUMENT	Storage
INSTANCE_AVAIL_NOTIFICATION	Instance Availability Notification
INTRAOCULAR_LENS_CALCULATIONS	Storage
INVENTORY	Storage
INVENTORY_CREATION	Storage Management
INVENTORY_FIND	Query/Retrieve
INVENTORY_GET	Query/Retrieve
INVENTORY_MOVE	Query/Retrieve
KERATOMETRY_MEASUREMENTS	Storage
KEY_OBJECT_SELECTION_DOC	Storage
LEGACY_CONVERTED_ENHANCED_CT_IMAGE	Storage
LEGACY_CONVERTED_ENHANCED_MR_IMAGE	Storage
LEGACY_CONVERTED_ENHANCED_PET_IMAGE	Storage
LENSOMETRY_MEASUREMENTS	Storage
MACULAR_GRID_THIICKNESS_VOLUME	Storage
MAMMOGRAPHY_CAD_SR	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
MEDIA_CREATION_MANAGEMENT	Media Creation Management
MICROSCOPY_BULK_SIMPLE_ANNOTATIONS	Storage
MODALITY_WORKLIST_FIND	Modality Work list
MR_SPECTROSCOPY	Storage
MULTI_CHANNEL_RESPIRATORY_WAVEFORM	Storage
MULTIPLE_VOLUME_RENDERING_VOLUMETRIC_PRESENTATION_STATE	Storage
OPHT_VIS_FIELD_STATIC_PERIM_MEAS	Storage
OPHTHALMIC_AXIAL_MEASUREMENTS	Storage
OPHTHALMIC_OCT_BSCAN_VOLUME_ANALYSIS	Storage
OPHTHALMIC_OCT_EN_FACE_IMAGE	Storage
OPHTHALMIC_TOMOGRAPHY_IMAGE	Storage
OPM_THICKNESS_MAP	Storage
PARAMETRIC_MAP	Storage
PATIENT_RADIATION_DOSE_SR	Storage
PATIENT_ROOT_QR_FIND	Query/Retrieve
PATIENT_ROOT_QR_GET	Query/Retrieve
PATIENT_ROOT_QR_MOVE	Query/Retrieve
PATIENT_STUDY_ONLY_QR_FIND_RETIRED	Query/Retrieve
PATIENT_STUDY_ONLY_QR_GET_RETIRED	Query/Retrieve
PATIENT_STUDY_ONLY_QR_MOVE_RETIRED	Query/Retrieve
PERFORMED_IMAGING_AGENT_ADMINISTRATION_SR	Storage
PERFORMED_PROCEDURE_STEP	Study Management
PERFORMED_PROCEDURE_STEP_NOTIFY	Study Management
PERFORMED_PROCEDURE_STEP_RETRIEVE	Study Management
PHOTOACOUSTIC_IMAGE	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
PLANNED_IMAGING_AGENT_ADMINISTRATION_SR	Storage
PRESENTATION_LUT	Print Management
PRINT_JOB	Print Management
PRINT_QUEUE_MANAGEMENT	Print Management
PRINTER	Print Management
PRINTER_CONFIGURATION	Print Management
PROCEDURAL_EVENT_LOGGING	Application Event Logging
PROCEDURE_LOG	Storage
PRODUCT_CHARACTERISTICS_QUERY	Query/Retrieve
PROTOCOL_APPROVAL	Storage
PROTOCOL_APPROVAL_FIND	Query/Retrieve
PROTOCOL_APPROVAL_GET	Query/Retrieve
PROTOCOL_APPROVAL_MOVE	Query/Retrieve
PULL_PRINT_REQUEST	Print Management
RADIOPHARMACEUTICAL_RADIATION_DOSE_SR	Storage
RAW_DATA	Storage
REAL_WORLD_VALUE_MAPPING	Storage
REFERENCED_IMAGE_BOX	Print Management
RENDITION_SELECTION_DOCUMENT_REAL_TIME_COMMUNICATION	Storage
REPOSITORY_QUERY	Query/Retrieve
RESPIRATORY_WAVEFORM	Storage
ROBOTIC_ARM_RADIATION	Storage
ROBOTIC_ARM_RADIATION_RECORD	Storage
ROUTINE_SCALP_ELECTROENCEPHALOGRAPH_WAVEFORM	Storage
RT_BEAMS_DELIVERY_INSTRUCTION	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
RT_BRACHY_APP_SETUP_DELIVERY_INSTR	Storage
RT_CONVENTIONAL_MACHINE_VERIFICATION	Verification
RT_ION_MACHINE_VERIFICATION	Verification
RT_PATIENT_POSITION_ACQUISITION_INSTRUCTION	Storage
RT_PHYSICIAN_INTENT	Storage
RT_RADIATION_RECORD_SET	Storage
RT_RADIATION_SALVAGE_RECORD	Storage
RT_RADIATION_SET	Storage
RT_RADIATION_SET_DELIVERY_INSTRUCTION	Storage
RT_SEGMENT_ANNOTATION	Storage
RT_TREATMENT_PREPARATION	Storage
SC_MULTIFRAME_GRAYSCALE_BYTE	Storage
SC_MULTIFRAME_GRAYSCALE_WORD	Storage
SC_MULTIFRAME_SINGLE_BIT	Storage
SC_MULTIFRAME_TRUE_COLOR	Storage
SEGMENTATION	Storage
SEGMENTED_VOLUME_RENDERING_VOLUMETRIC_PRESENTATION_STATE	Storage
SIMPLIFIED_ADULT_ECHO_SR	Storage
SLEEP_ELECTROENCEPHALOGRAM_WAVEFORM	Storage
SPATIAL_FIDUCIALS	Storage
SPATIAL_REGISTRATION	Storage
SPECTACLE_PRESCRIPTION_REPORT	Storage
STANDARD_BASIC_TEXT_SR	Storage
STANDARD_BLENDING_SOFTCOPY_PS	Storage
STANDARD_COLOR_SOFTCOPY_PS	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_COMPREHENSIVE_SR	Storage
STANDARD_CR	Storage
STANDARD_CT	Storage
STANDARD_CURVE	Storage
STANDARD_DX_PRESENT	Storage
STANDARD_DX_PROCESS	Storage
STANDARD_ECHO	Verification
STANDARD_ENCAPSULATED_PDF	Storage
STANDARD_ENHANCED_SR	Storage
STANDARD_GRAYSCALE_SOFTCOPY_PS	Storage
STANDARD_HARDCOPY_COLOR	Storage
STANDARD_HARDCOPY_GRAYSCALE	Storage
STANDARD_IO_PRESENT	Storage
STANDARD_IO_PROCESS	Storage
STANDARD_IVOCT_PRESENT	Storage
STANDARD_IVOCT_PROCESS	Storage
STANDARD_MG_PRESENT	Storage
STANDARD_MG_PROCESS	Storage
STANDARD_MODALITY_LUT	Storage
STANDARD_MR	Storage
STANDARD_NM	Storage
STANDARD_NM_RETIRED	Storage
STANDARD_OPTHALMIC_16_BIT	Storage
STANDARD_OPTHALMIC_8_BIT	Storage
STANDARD_OVERLAY	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_PET	Storage
STANDARD_PET_CURVE	Storage
STANDARD_PRINT_STORAGE	Storage
STANDARD_PSEUDOCOLOR_SOFTCOPY_PS	Storage
STANDARD_RT_BEAMS_TREAT	Storage
STANDARD_RT_BRACHY_TREAT	Storage
STANDARD_RT_DOSE	Storage
STANDARD_RT_IMAGE	Storage
STANDARD_RT_ION_BEAMS_TREAT	Storage
STANDARD_RT_ION_PLAN	Storage
STANDARD_RT_PLAN	Storage
STANDARD_RT_STRUCTURE_SET	Storage
STANDARD_RT_TREAT_SUM	Storage
STANDARD_SEC_CAPTURE	Storage
STANDARD_US	Storage
STANDARD_US_MF	Storage
STANDARD_US_MF_RETIRED	Storage
STANDARD_US_RETIRED	Storage
STANDARD_VIDEO_ENDOSCOPIC	Storage
STANDARD_VIDEO_MICROSCOPIC	Storage
STANDARD_VIDEO_PHOTOGRAPHIC	Storage
STANDARD_VL_ENDOSCOPIC	Storage
STANDARD_VL_MICROSCOPIC	Storage
STANDARD_VL_PHOTOGRAPHIC	Storage
STANDARD_VL_SLIDE_MICROSCOPIC	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_VOI_LUT	Storage
STANDARD_WAVEFORM_12_LEAD_ECG	Storage
STANDARD_WAVEFORM_AMBULATORY_ECG	Storage
STANDARD_WAVEFORM_BASIC_VOICE_AUDIO	Storage
STANDARD_WAVEFORM_CARDIAC_EP	Storage
STANDARD_WAVEFORM_GENERAL_32_BIT_ECG	Storage
STANDARD_WAVEFORM_GENERAL_ECG	Storage
STANDARD_WAVEFORM_HEMODYNAMIC	Storage
STANDARD_XRAY_ANGIO	Storage
STANDARD_XRAY_ANGIO_BIPLANE	Storage
STANDARD_XRAY_RF	Storage
STEREOMETRIC_RELATIONSHIP	Storage
STORAGE_COMMITMENT_PULL	Storage Commitment
STORAGE_COMMITMENT_PUSH	Storage Commitment
STUDY_COMPONENT_MANAGEMENT	Study Management
STUDY_CONTENT_NOTIFICATION	Study Content Notification
STUDY_ROOT_QR_FIND	Query/Retrieve
STUDY_ROOT_QR_GET	Query/Retrieve
STUDY_ROOT_QR_MOVE	Query/Retrieve
SUBJ_REFRACTION_MEASUREMENTS	Storage
SUBSTANCE_ADMIN_LOGGING	Storage
SUBSTANCE_APPROVAL_QUERY	Storage
SURFACE_SCAN_MESH	Storage
SURFACE_SCAN_POINT_CLOUD	Storage
SURFACE_SEGMENTATION	Storage



Merge DICOM Toolkit Service Parameter	DICOM Service Class
TOMOTHERAPEUTIC_RADIATION	Storage
TOMOTHERAPEUTIC_RADIATION_RECORD	Storage
TRACTOGRAPHY_RESULTS	Storage
UPS_EVENT_SOP	Unified Procedure Step Management
UPS_EVENT_SOP_TRIAL_RETIRED	Unified Procedure Step Management
UPS_PULL_SOP	Unified Procedure Step Management
UPS_PULL_SOP_TRIAL_RETIRED	Unified Procedure Step Management
UPS_PUSH_SOP	Unified Procedure Step Management
UPS_PUSH_SOP_TRIAL_RETIRED	Unified Procedure Step Management
UPS_QUERY_SOP	Unified Procedure Step Management
UPS_WATCH_SOP	Unified Procedure Step Management
UPS_WATCH_SOP_TRIAL_RETIRED	Unified Procedure Step Management
VARIABLE_MODALITY_LUT_SOFTCOPY_PRESENTATION_STATE	Storage
VIDEO_ENDOSCOPIC_IMAGE_REAL_TIME_COMMUNICATION	Storage
VIDEO_PHOTOGRAPHIC_IMAGE_REAL_TIME_COMMUNICATION	Storage
VISUAL_ACUITY_MEASUREMENTS	Storage
VL_WHOLE_SLIDE_MICROSCOPY_IMAGE	Storage
VOI_LUT_BOX	Print Management
VOLUME_RENDERING_VOLUMETRIC_PRESENTATION_STATE	Storage
WIDE_FIELD_OPHTHALMIC_PHOTO_3D_COORDINATES	Storage
WIDE_FIELD_OPHTHALMIC_PHOTO_STEREOGRAPHIC_PROJ	Storage

Merge DICOM Toolkit Service Parameter	DICOM Service Class
XA_DEFINED_PROCEDURE_PROTOCOL	Storage
XA_PERFORMED_PROCEDURE_PROTOCOL	Storage
XA_XRF_GRAYSCALE_SOFTCOPY_PS	Storage
XRAY_3D_ANGIO_IMAGE	Storage
XRAY_3D_CRANIO_IMAGE	Storage
XRAY_RADIATION_DOSE_SR	Storage
BASIC_COLOR_PRINT_MANAGEMENT (META_SOP)	Print Management
BASIC_GRAYSCALE_PRINT_MANAGEMENT (META_SOP)	Print Management
DETACHED_PATIENT_MANAGEMENT_META (META_SOP)	Patient Management
DETACHED_RESULTS_MANAGEMENT_META (META_SOP)	Results Management
G_P_WORKLIST_MANAGEMENT_META_RETIRED (META_SOP)	Basic Worklist Management
PULL_STORED_PRINT_MANAGEMENT (META_SOP)	Print Management
REF_COLOR_PRINT_MANAGEMENT (META_SOP)	Print Management
REF_GRAYSCALE_PRINT_MANAGEMENT (META_SOP)	Print Management
STUDY_MANAGEMENT (META_SOP)	Study Management

## Transfer Syntax Lists

For DICOM Toolkit users, Merge DICOM Toolkit allows you to define transfer syntaxes supported for each service in a service list. This functionality is implemented through the use of transfer syntax lists. The basic service lists discussed above can be modified to include these transfer syntax lists. The following is an example service list that has transfer syntaxes specified for each service:

```
[Storage_Service_List]
SERVICES_SUPPORTED    = 3 # Number of Services
SERVICE_1           = STANDARD_MR
SYNTAX_LIST_1        = MR_Syntax_List
SERVICE_2           = STANDARD_US
SYNTAX_LIST_2        = US_Syntax_List
SERVICE_3           = STANDARD_CT
SYNTAX_LIST_3        = CT_Syntax_List
```

```

[MR_Syntax_List]
  SYNTAXES_SUPPORTED = 4 # Number of Syntaxes
  SYNTAX_1           = JPEG_BASELINE
  SYNTAX_2           = EXPLICIT_BIG_ENDIAN
  SYNTAX_3           = EXPLICIT_LITTLE_ENDIAN
  SYNTAX_4           = IMPLICIT_LITTLE_ENDIAN

[US_Syntax_List]
  SYNTAXES_SUPPORTED = 2 # Number of Syntaxes
  SYNTAX_1           = RLE
  SYNTAX_2           = IMPLICIT_LITTLE_ENDIAN

[CT_Syntax_List]
  SYNTAXES_SUPPORTED = 2 # Number of Syntaxes
  SYNTAX_1           = EXPLICIT_LITTLE_ENDIAN
  SYNTAX_2           = IMPLICIT_LITTLE_ENDIAN

```

[Storage\_Service\_List] lists various standard storage service class services used by Merge DICOM Toolkit. The SYNTAX\_LIST\_N parameter has been added to this example to specify a transfer syntax list for each service. This optional parameter is set to the name of another section in the application profile which lists DICOM transfer syntaxes to be negotiated. If this parameter is not set, the default non-compressed transfers syntaxes (implicit VR little endian, explicit VR little endian, and explicit VR big endian) are negotiated.

The [MR\_Syntax\_List], [US\_Syntax\_List] and [CT\_Syntax\_List] sections each define a separate transfer syntax list for the MR, US, and CT services, respectively. Merge DICOM Toolkit currently supports all transfer syntaxes specified in the DICOM standard. The names used for these transfer syntaxes are defined below in this Reference Manual.

For server (SCP) applications, the order in which transfer syntaxes are specified in a transfer syntax list dictates the priority Merge DICOM Toolkit places on them during association negotiation. For example, using the [US\_Syntax\_List] specified above, if a client (SCU) proposes the Ultrasound storage service with the RLE compressed transfer syntax and the implicit VR little endian transfer syntax, Merge DICOM Toolkit selects the RLE transfer syntax because it is listed first in the transfer syntax list.

When a transfer syntax list is not specified in a service list, the priority Merge DICOM Toolkit places on transfer syntaxes during association negotiation is dependent on the hardware platform. On little endian machines (Intel and DEC Alpha based systems) the priority order is: Explicit VR Little Endian, Implicit VR Little Endian, and Explicit VR Big Endian. On big endian machines the priority order is: Explicit VR Big Endian, Explicit VR Little Endian, and Implicit VR Little Endian.

The following is a list of the currently supported transfer syntaxes:

*Table B-5: Transfer Syntax List Parameters*

Merge DICOM Toolkit Transfer Syntax Parameter	Description
IMPLICIT_LITTLE_ENDIAN	Implicit VR Little Endian: Default Transfer Syntax for DICOM

Merge DICOM Toolkit Transfer Syntax Parameter	Description
IMPLICIT_BIG_ENDIAN	Implicit VR Big Endian
EXPLICIT_LITTLE_ENDIAN	Explicit VR Little Endian
EXPLICIT_BIG_ENDIAN	Explicit VR Big Endian
DEFLATED_EXPLICIT_LITTLE_ENDIAN	Deflated Explicit VR Little Endian
ENCAPSULATED_UNCOMPRESSED_ELE	Encapsulated Explicit VR Little Endian
RLE	Run length Encoding
HEVC_H265_M10P_LEVEL_5_1	HEVC/H.265 Main 10 Profile / Level 5.1
HEVC_H265_MP_LEVEL_5_1	HEVC/H.265 Main Profile / Level 5.1
HTJ2K_SYNTAX	High-Throughput JPEG 2000 Image Compression
HTJ2K_LOSSLESS_ONLY_SYNTAX	High-Throughput JPEG 2000 Image Compression (Lossless Only)
HTJ2K_LOSSLESS_RPCL_SYNTAX	High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only)
JPEG_BASELINE	JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression
JPEG_EXTENDED_2_4	JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)
JPEG_EXTENDED_3_5	JPEG Extended (Process 3 & 5)
JPEG_SPEC_NON_HIER_6_8	JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8)
JPEG_SPEC_NON_HIER_7_9	JPEG Spectral Selection, Non-Hierarchical (Process 7 & 9)
JPEG_FULL_PROG_NON_HIER_10_12	JPEG Full Progression, Non-Hierarchical (Process 10 & 12)
JPEG_FULL_PROG_NON_HIER_11_13	JPEG Full Progression, Non-Hierarchical (Process 11 & 13)
JPEG_LOSSLESS_NON_HIER_14	JPEG Lossless, Non-Hierarchical (Process 14)
JPEG_LOSSLESS_NON_HIER_15	JPEG Lossless, Non-Hierarchical (Process 15)
JPEG_EXTENDED_HIER_16_18	JPEG Extended, Hierarchical (Process 16 & 18)

Merge DICOM Toolkit Transfer Syntax Parameter	Description
JPEG_EXTENDED_HIER_17_19	JPEG Extended, Hierarchical (Process 17 & 19)
JPEG_SPEC_HIER_20_22	JPEG Spectral Selection, Hierarchical (Process 20 & 22)
JPEG_SPEC_HIER_21_23	JPEG Spectral Selection, Hierarchical (Process 21 & 23)
JPEG_FULL_PROG_HIER_24_26	JPEG Full Progression, Hierarchical (Process 24 & 26)
JPEG_FULL_PROG_HIER_25_27	JPEG Full Progression, Hierarchical (Process 25 & 27)
JPEG_LOSSLESS_HIER_28	JPEG Lossless, Hierarchical (Process 28)
JPEG_LOSSLESS_HIER_29	JPEG Lossless, Hierarchical (Process 29)
JPEG_LOSSLESS_HIER_14	JPEG Lossless, Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression
JPEG_2000_LOSSLESS_ONLY	JPEG 2000, Lossless
JPEG_2000	JPEG 2000, Lossless or Lossy
JPEG_2000_MC_LOSSLESS_ONLY	JPEG 2000 Part 2 Multi-component Image Compression (Lossless Only)
JPEG_2000_MC	JPEG 2000 Part 2 Multi-component Image Compression
JPEG_LS_LOSSLESS	JPEG LS Lossless
JPEG_LS_LOSSY	JPEG LS Lossy (Near-Lossless)
JPIP_REFERENCED	JPIP Referenced
JPIP_REFERENCED_DEFLATE	JPIP Referenced Deflate
MPEG2_MPHL	MPEG2 Main Profile / High Level
MPEG2_MPML	MPEG2 Main Profile @ Main Level
MPEG4_AVC_H264_BDC_HP_LEVEL_4_1	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1
MPEG4_AVC_H264_HP_LEVEL_4_1	MPEG-4 AVC/H.264 High Profile / Level 4.1
MPEG4_AVC_H264_HP_LEVEL_4_2_2D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video

Merge DICOM Toolkit Transfer Syntax Parameter	Description
MPEG4_AVC_H264_HP_LEVEL_4_2_3D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video
MPEG4_AVC_H264_STEREO_HP_LEVEL_4_2	MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2
SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_ACTIVE_VIDEO	SMPTE ST 2110-20 Uncompressed Interlaced Active Video
SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_ACTIVE_VIDEO	SMPTE ST 2110-20 Uncompressed Progressive Active Video
SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO	SMPTE ST 2110-30 PCM Digital Audio
PRIVATE_SYNTAX_1	Private transfer syntax 1 with the characteristics specified by the PRIVATE_SYNTAX_1_LITTLE_ENDIAN, PRIVATE_SYNTAX_1_EXPLICIT_VR, and PRIVATE_SYNTAX_1_ENCAPSULATED configuration options.
PRIVATE_SYNTAX_2	Private transfer syntax 2 with the characteristics specified by the PRIVATE_SYNTAX_2_LITTLE_ENDIAN, PRIVATE_SYNTAX_2_EXPLICIT_VR, and PRIVATE_SYNTAX_2_ENCAPSULATED configuration options.

## Role Negotiation

Merge DICOM Toolkit also supports DICOM role negotiation through its service lists. Whereas in previous examples, the same service list could be used for both client (SCU) and server (SCP), these service lists are specific to the role to be negotiated for each service.

```
[SCU_Service_List]
SERVICES_SUPPORTED = 1 # Number of Services
SERVICE_1        = STORAGE_COMMITMENT_PUSH
ROLE_1           = SCU

[SCP_Service_List]
SERVICES_SUPPORTED = 1 # Number of Services
SERVICE_1        = STORAGE_COMMITMENT_PUSH
ROLE_1           = SCP
```

In this case, the [SCU\_Service\_List] supports the Storage Commitment Push SOP class as an SCU, and the [SCP\_Service\_List] supports the Storage Commitment Push SOP class as an SCP. Merge DICOM Toolkit negotiates the association based on the settings for these roles.

The role for a service can be defined as SCU, SCP, BOTH or remain undefined. Table 9 contains a complete list of configurable roles for both requestors and acceptors along with the resultant negotiated roles.

**NOTE:** In some cases, a service will be rejected because the roles being negotiated do not match.

Table B-6: Negotiated Roles

Requestor's Configured Role	Acceptor's Configured Role	Requestor's Negotiated Role	Acceptor's Negotiated Role
SCU	SCP	SCU	SCP
	SCU	Rejected	Rejected
	BOTH	SCU	SCP
	NOT DEFINED	SCU	SCP
SCP	SCP	Rejected	Rejected
	SCU	SCP	SCU
	BOTH	SCP	SCU
	NOT DEFINED	Rejected	Rejected
BOTH	SCP	SCU	SCP
	SCU	SCP	SCU
	BOTH	BOTH	BOTH
	NOT DEFINED	SCP	SCP
NOT DEFINED	SCP	SCU	SCP
	SCU	Rejected	Rejected
	BOTH	SCU	SCP
	NOT DEFINED	SCU	SCP

## DICOM Asynchronous Communication

Merge DICOM Toolkit optionally supports DICOM Asynchronous Operations Window Negotiation through service lists. The service list in this case can be used for both the client (SCU) and server (SCP). The following is a sample service list that configures DICOM asynchronous communication negotiation:

```
[SCU_Or_SCP_Service_List]
SERVICES_SUPPORTED = 1 # Number of Services
MAX_OPERATIONS_INVOKED = 10
MAX_OPERATIONS_PERFORMED = 10
SERVICE_1 = STANDARD_MR
```



In this case, the [SCU\_Or\_SCP\_Service\_List] supports the Standard MR SOP Class. For all services, it supports 10 maximum operations invoked and 10 maximum operations performed. When MAX\_OPERATIONS\_INVOKED and MAX\_OPERATIONS\_PERFORMED are not included in the service list, asynchronous communications are not negotiated. See a subsequent section for details on implementing DICOM asynchronous communications with Merge DICOM Toolkit.

## Extended Negotiation

Merge DICOM Toolkit optionally supports configuration of DICOM extended negotiation information in service lists. Currently, the DICOM standard allows extended negotiation information for Storage and Query/Retrieve Service classes as defined in PS3.4 of the standard. The extended negotiation information can be set for only the client (SCU). Server applications utilizing extended negotiation must set this information with a call to MC\_Set\_Negotiation\_Info\_For\_Association.

```
[SCU_Service_List]
SERVICES_SUPPORTED      = 2 # Number of Services
SERVICE_1              = STUDY_ROOT_QR_FIND
EXT_NEG_INFO_1         = 0x01
SERVICE_2              = STUDY_ROOT_QR_MOVE
EXT_NEG_INFO_2         = 0x01
```

In this case, the [SCU\_Service\_List] supports the Study Root Q/R Find and Move services. Both services have set a single byte of extended negotiation information set to hexadecimal 0x01 (this implies the Client supports relational Queries and Moves).

Multiple hexadecimal bytes can be set in the service list by listing each byte in the format "0x00 0x01 0x02".

## Related General SOP Classes and Service Classes

DICOM Supplement 90 defines a mechanism in association negotiation for identifying when an SOP Class is a customization of a generalized SOP Class. It also defines a method to identify the service class of an SOP Class that is proposed by an SCU. This allows flexibility in an SCP to support service classes for which it supports the generalized version of an SOP class, but does not explicitly support the customized SOP class. It also allows a mechanism to easily make an SCP that supports all storage service class SOP classes that are proposed to it.

Related General SOP classes can be supported in the application profile by defining a service list containing the related general SOP classes for a given SOP class, then assigning the service list to the SOP class. The following example demonstrates how this is done:

```
[SCU_SR_General]
SERVICES_SUPPORTED      = 2
SERVICE_1              = STANDARD_ENHANCED_SR
SERVICE_2              = STANDARD_COMPREHENSIVE_SR

[SCU_DX_General]
SERVICES_SUPPORTED      = 1
SERVICE_1              = STANDARD_DX_PRESENT
```

```
[SCU_Service_List]
  SERVICES_SUPPORTED      = 3
  SERVICE_1              = STANDARD_BASIC_TEXT_SR
  REL_GENERAL_1          = SCU_SR_General
  SERVICE_CLASS_1        = 1.2.840.10008.4.2
  SERVICE_2              = STANDARD_IO_PRESENT
  REL_GENERAL_2          = SCU_DX_General
  SERVICE_CLASS_2        = 1.2.840.10008.4.2
  SERVICE_3              = STANDARD_CT
  SERVICE_CLASS_3        = 1.2.840.10008.4.2
```

In this case, the `SCU_SR_General` service list contains the related general SOP Classes for the `STANDARD_BASIC_TEXT_SR` service. The `REL_GENERAL_1` option points to the service list to use as the related general services for `SERVICE_1`.

The example above also shows how the service class can be defined for each SOP Class within a service list. For instance, `SERVICE_CLASS_3` in the example specifies the service class for `SERVICE_3`. The UID for the Storage Service Class as defined in Supplement 90 is used.

The service lists above are only utilized by SCU applications. For SCP applications, there are several configuration options that define how Merge DICOM Toolkit negotiates an association when related general SOP Classes are included, or the Service Class is included for an SOP Class.

When the `ACCEPT_STORAGE_SERVICE_CONTEXTS` configuration option is set to Yes, Merge DICOM Toolkit accepts any proposed SOP Class that is defined as supporting the Storage Service Class.

When the `ACCEPT_RELATED_GENERAL_SERVICES` configuration option is set to Yes, Merge DICOM Toolkit accepts any SOP Class proposed if the SCP lists any of the related general SOP Classes defined for the SOP Class proposed.

## System Profile

The System Profile is used to define system-wide parameters. These parameters apply across all associations with other DICOM application entities. The location of this file is provided by the `MERGE_COM_3_PROFILE` parameter of the `[MergeCOM3]` section of the `MERGE.INI` file.

The following are a few notes to keep in mind concerning the System Profile:

- **You must specify your own unique DICOM Implementation Class UID and place it in this file along with an optional Implementation Version. These need to be documented in your DICOM conformance statement.**
- There are several exception options specified at both the association and DIMSE levels of DICOM communication. You should not have to modify these options in normal circumstances and doing so could make your application non DICOM conformant.
- The DICOM Upper Layer section network time-outs can be modified. This is useful on slower or less-predictable networks (e.g. WAN's).
- The section of the System Profile dealing with transport parameters is important. This is where you specify the default **TCP/IP listen port** for a DICOM server (SCP) application.

Most importantly, you must place the license number you received when you purchased the Merge DICOM Toolkit in the [ASSOC\_PARMS] section of the system profile. If the license you received with your Toolkit was DA53-31D34, you would set it in the [ASSOC\_PARMS] section as follows:

```
[ASSOC_PARMS]
LICENSE      = DA53-31D34
IMPLEMENTATION_CLASS_UID = 2.16.840.1.113669.2.1.2
IMPLEMENTATION_VERSION   = MergeCOM3_340
ACCEPT_MULTIPLE_PRES_CONTEXTS = Yes
```

Both Toolkit sample applications and your own applications which use the DICOM Toolkit Library will not work without a valid license number.

The example of the [ASSOC\_PARMS] section of the system profile also contains a sample implementation class UID and implementation version configuration values. The implementation class UID is intended by the DICOM standard to be unique for major revisions of an Application Entity. The implementation version is intended to be unique for minor revisions of an Application Entity. These configuration values are used during association negotiation by Merge DICOM Toolkit, and are intended to aid in tracking versions of applications in the field.

The ACCEPT\_MULTIPLE\_PRES\_CONTEXTS configuration value is used by server (SCP) applications. This value determines whether multiple presentation contexts can be negotiated for a single DICOM Service.

As mentioned earlier, a listen port must be identified for your server AE. Port 104 is the standard DICOM listen port. This, along with the number of simultaneous TCP connection requests that can be queued up for acceptance (pending) for Merge DICOM Toolkit, is specified in the [TRANSPORT\_PARMS] section.

The MAX\_PENDING\_CONNECTIONS setting in the “mergecom.pro” file refers to the maximum number of outstanding connection requests per listener socket. **Note that this is not the "Maximum number of simultaneous associations"**. The value of this configuration is passed by the toolkit to the listen() call on the socket as the backlog parameter and it specifies how many pending connections can be queued at any given time.

The MAX\_PENDING\_CONNECTIONS configuration option affects the accepting of associations but not the requesting of associations and it affects the behavior at the TCP level. In the default case, if more than 5 association requests arrive at once then only the first 5 will be accepted by TCP and passed to Merge DICOM Toolkit, the others would be refused at the TCP level.

```
[TRANSPORT_PARMS]
TCPIP_LISTEN_PORT          = 104
# Max number of open listen channels
MAX_PENDING_CONNECTIONS   = 5
```

An important section of the System Profile is the [MESSAGE\_PARMS] section:

```
[MESSAGE_PARMS]
LARGE_DATA_STORE          = FILE # | MEM Default = FILE
LARGE_DATA_SIZE           = 200
OBOW_BUFFER_SIZE         = 4096
DICTIONARY_ACCESS         = MEM # | FILE Default = FILE
```

---

DICTIONARY_FILE	= /users/mc3adv/mrgcom3.dct
TEMP_FILE_DIRECTORY	= /users/mc3adv/tmp_files/
MSG_INFO_FILE	= /users/mc3adv/mrgcom3.msg

The `LARGE_DATA_STORE` parameter informs the toolkit where it should store large data: either in memory, or in temporary files on disk. Large data is defined as a value for an attribute larger than `LARGE_DATA_SIZE` bytes. Pixel data associated with a medical image would most certainly be considered large data. If you are running your process on a resource rich system that supplies plenty of physical and virtual memory, you should select `LARGE_DATA_STORE = MEM` to improve your performance. If your process is not so fortunate or you are dealing with messages with very large data values, you will want to use `LARGE_DATA_STORE = FILE`. In this case, the DICOM Toolkit will manage the large data in temporary files located in the `TEMP_FILE_DIRECTORY` you specify.

Large data that is of value representation OB (Other Byte), OW (Other Word), or OF (Other Float) is treated specially by the toolkit. Pixel Data, Curves, and Overlays are composed of this type of data. You can let the toolkit manage OB/OW data for you like any other large data, or register your own Callback Function in your applications to deal with such data as it is being received or transmitted over the network. The use of Callbacks will be covered later when we discuss developing DICOM applications with the toolkit.

The `OBOW_BUFFER_SIZE` is used to tell the toolkit what size ‘chunks’ in bytes of OB/OW data it should read in before either writing the data to a temporary file or passing it to your Callback Function. Choosing a large number for `OBOW_BUFFER_SIZE` means less time spent by your application process writing to temporary files or making callbacks, but results in a larger process size.

You must also take into account that there is a  $2^{16}$  limit in how many “chunks” can be stored in the temporary files. For example, when the chunk size is 16KB (as set by `OBOW_BUFFER_SIZE`), the maximum value for pixel data is only 1GB (i.e.,  $16K * 64K$ ). According to the DICOM standard, the maximum pixel data size can be 4GB. In order to support storing the maximum possible pixel data, the `OBOW_BUFFER_SIZE` must not be less than 64KB. If you need to use temporary files, you should tune this parameter to maximize performance within the constraints of your runtime environment.

The `DICTIONARY_ACCESS` parameter specifies whether the DICOM Data Dictionary should be loaded and stored into memory the first time it is accessed, or be accessed from a file every time it is referenced. The **dictionary file** is a binary file supplied with your toolkit with the default name of `mrgcom3.dct`. This file is accessed very frequently by the toolkit and you should set this parameter to `MEM` in all but the most extreme cases of memory limitation. You also specify the location and name of the data dictionary file using the `DICTIONARY_FILE` parameter.

Another binary file supplied with the Toolkit is the message info file. This file contains binary encoded message objects and is accessed when an application opens a message. Once open, these objects reside in memory, and are “filled in” by your application. They then become a message object instance that can be exchanged over the network. The message info file along with the data dictionary file, make possible the powerful message validation capabilities of the DICOM Toolkit. The message info file is a binary file supplied by your Toolkit with the default name of

`mrgcom3.msg`. You also specify the location and name of the message info file using the `MSG_INFO_FILE` parameter.

Tables B-7 through B-12 define how each parameter should be defined within each section of the system profile.

*Table B-7 [ASSOC\_PARMS] section of system profile parameters*

Name	Description
<code>ACCEPT_ANY_APPLICATION_TITLE</code> †	If set to YES, the remote system need not specify a correct DICOM application title when requesting an association. If set to NO a correct application title must be used. When this value is set to YES, the toolkit will report the remote application as connecting to the first application registered.  DEFAULT: NO
<code>ACCEPT_ANY_CONTEXT_NAME</code> †	If set to YES, the remote system need not specify the <code>LOCAL_APPL_CONTEXT_NAME</code> when requesting an association. If set to NO, the correct context name must be used.  DEFAULT: NO
<code>ACCEPT_ANY_HOSTNAME</code>	If set to YES, the toolkit will not check if applications connecting to an SCP can have their hostname resolved through the SCP's hostfile or domain name server. If set to NO, the toolkit will automatically reject associations from unknown hosts.  DEFAULT: NO
<code>ACCEPT_ANY_PRESENTATION_CONTEXT</code> †	If set to YES, the toolkit will not validate that the presentation context ID contained in a message's PDU header information matches the ID of the presentation context negotiated for the type of message contained in the PDU. If set to NO, the toolkit will abort associations when these values do not match.  DEFAULT: NO
<code>ACCEPT_DIFFERENT_IC_UID</code> †	If set to NO, the remote system must specify the local <code>IMPLEMENTATION_CLASS_UID</code> when requesting an association. If set to YES, a different implementation class UID may be used.  DEFAULT: YES
<code>ACCEPT_DIFFERENT_VERSION</code> †	If set to NO, the remote system must specify the local <code>IMPLEMENTATION_VERSION</code> when requesting an association. If set to YES, a different implementation version may be used.  DEFAULT: YES

Name	Description
<b>ACCEPT_LIST_OF_APPLICATION_TITLES</b>	<p>List of AE titles which the remote system might use when requesting an association. The parameters line should contain all AE titles separated by one of predefined delimiters: ',' '\ ' ';'. The length of each AE title can not exceed 16 characters.</p> <p>Example: ACCEPT_LIST_OF_APPLICATION_TITLES = MERGE_STORE_SCP/MERGE_STORE_SCU/MERGE_STORE_RQ</p> <p>DEFAULT: &lt;none&gt;</p>
<b>ACCEPT_MULTIPLE_PRES_CONTEXTS</b>	<p>If set to YES, SCP applications will allow multiple presentation contexts to be negotiated for a single DICOM service. If set to NO, an SCP will only accept a single presentation context for a DICOM service.</p> <p>DEFAULT: YES</p>
<b>ACCEPT_RELATED_GENERAL_SERVICES</b>	<p>This parameter sets the Merge DICOM Toolkit behavior in regards to support for DICOM Supplement 90. Supplement 90 defines a method for association requestors to specify the generalized version of a SOP Class. When set to YES, Merge DICOM Toolkit will allow association acceptors to accept a presentation context whose generalized SOP Class is supported; however, the customized SOP Class is not specifically supported.</p> <p>DEFAULT: NO</p>
<b>ACCEPT_STORAGE_SERVICE_CONTEXTS</b>	<p>This parameter sets the Merge DICOM Toolkit behavior in regards to support for DICOM Supplement 90. When set to YES, Merge DICOM Toolkit will accept any presentation context which is defined as a Storage Service Class SOP Class.</p> <p>DEFAULT: NO</p>
<b>ALLOW_EMPTY_PDV_LENGTH</b>	<p>The DICOM standard specifies that PDVs shall not be sent without any content in the fragment. The toolkit however can send and accept empty PDVs. To enforce the standard requirement, this setting should be set to No.</p> <p>DEFAULT: YES</p>
<b>AUTO_ECHO_SUPPORT</b>	<p>If set to YES, the toolkit automatically handles C-ECHO requests when the application doesn't explicitly include STANDARD_ECHO in its supported service list. If set to NO, the toolkit rejects C-ECHO requests when the application doesn't explicitly include STANDARD_ECHO in its supported service list.</p> <p>DEFAULT: YES</p>
<b>DEFLATED_EXPLICIT_LITTLE_ENDIAN_SYNTAX</b>	<p>This value defines the UID of the Deflated Explicit VR Little Endian transfer syntax.</p> <p>DEFAULT: 1.2.840.10008.1.2.1.99</p>

Name	Description
<b>ENCAPSULATED_UNCOMPRESSED_ELE_SYNTAX</b>	This value defines the UID of the Encapsulated Uncompressed Explicit VR Little Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.1.98
<b>EXPLICIT_BIG_ENDIAN_SYNTAX</b>	This value defines the UID of the Explicit VR Big Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.2
<b>EXPLICIT_LITTLE_ENDIAN_SYNTAX</b>	This value defines the UID of the Explicit VR Little Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.1
<b>HTJ2K_SYNTAX</b>	This value defines the UID of the High-Throughput JPEG 2000 Image Compression transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.203
<b>HTJ2K_LOSSLESS_ONLY_SYNTAX</b>	This value defines the UID of the High-Throughput JPEG 2000 Image Compression (Lossless Only) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.201
<b>HTJ2K_LOSSLESS_RPC_L_SYNTAX</b>	This value defines the UID of the High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.202
<b>HARD_CLOSE_TCP_IP_CONNECTION</b>	This parameter specifies how TCP/IP connections are closed by the toolkit. When set to YES, TCP/IP connections are instantaneously closed with an RST packet. When set to NO, TCP/IP connections are closed gracefully with a FIN packet. Note, that in the NO case the toolkit must wait for an operating system dependent amount of time for the response to the FIN packet. DEFAULT: YES
<b>IMPLEMENTATION_CLASS_UID</b>	The DICOM Implementation Class UID (as specified in your DICOM conformance statement).
<b>IMPLEMENTATION_VERSION</b>	The Implementation Version Number (as specified in your DICOM conformance statement).
<b>IMPLICIT_BIG_ENDIAN_SYNTAX</b>	The Implicit VR Big Endian transfer syntax is not defined by the DICOM standard. This value is provided to supply compatibility with private implementations. DEFAULT: <none>
<b>IMPLICIT_LITTLE_ENDIAN_SYNTAX</b>	The Implicit VR Little Endian transfer syntax is the default network transfer syntax of the DICOM standard. The Implicit VR Little Endian transfer syntax must always be defined. DEFAULT: 1.2.840.10008.1.2

Name	Description
JPEG_2000_LOSSLESS_ONLY_SYNTAX	This value defines the UID for JPEG 2000, Lossless transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.90
JPEG_2000_MC_LOSSLESS_ONLY_SYNTAX	This value defines the UID for JPEG 2000 Part 2 Multi-component Image Compression (Lossless Only) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.92
JPEG_2000_MC_SYNTAX	This value defines the UID for JPEG 2000 Part 2 Multi-component Image Compression transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.93
JPEG_2000_SYNTAX	This value defines the UID for JPEG 2000 transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.91
JPEG_BASELINE_SYNTAX	This value defines the UID for JPEG Baseline (Process 1) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.50
JPEG_EXTENDED_2_4_SYNTAX	This value defines the UID for JPEG Extended (Process 2 & 4) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.51
JPEG_EXTENDED_3_5_SYNTAX	This value defines the UID for JPEG Extended (Process 3 & 5) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.52
JPEG_EXTENDED_HIER_16_18_SYNTAX	This value defines the UID for JPEG Extended, Hierarchical (Process 16 & 18) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.59
JPEG_EXTENDED_HIER_17_19_SYNTAX	This value defines the UID for JPEG Extended, Hierarchical (Process 17 & 19) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.60
JPEG_FULL_PROG_HIER_24_26_SYNTAX	This value defines the UID for JPEG Full Progression, Hierarchical (Process 24 & 26) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.63
JPEG_FULL_PROG_HIER_25_27_SYNTAX	This value defines the UID for JPEG Full Progression, Hierarchical (Process 25 & 27) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.64
JPEG_FULL_PROG_NON_HIER_10_12_SYNTAX	This value defines the UID for JPEG Full Progression, Non-Hierarchical (Process 10 & 12) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.55



Name	Description
JPEG_FULL_PROG_NON_HIER_11_13_SYNTAX	This value defines the UID for JPEG Full Progression, Non-Hierarchical (Process 11 & 13) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.56
JPEG_LOSSLESS_HIER_14_SYNTAX	This value defines the UID for JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14, Selection Value 1) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.70
JPEG_LOSSLESS_HIER_28_SYNTAX	This value defines the UID for JPEG Lossless, Hierarchical (Process 28) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.65
JPEG_LOSSLESS_HIER_29_SYNTAX	This value defines the UID for JPEG Lossless, Hierarchical (Process 29) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.66
JPEG_LOSSLESS_NON_HIER_14_SYNTAX	This value defines the UID for JPEG Lossless, Non-Hierarchical (Process 14) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.57
JPEG_LOSSLESS_NON_HIER_15_SYNTAX	This value defines the UID for JPEG Lossless, Non-Hierarchical (Process 15) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.58
JPEG_LS_LOSSLESS_SYNTAX	This value defines the UID for JPEG LS Lossless transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.80
JPEG_LS_LOSSY_SYNTAX	This value defines the UID for JPEG LS Lossy (Near Lossless) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.81
JPEG_SPEC_HIER_20_22_SYNTAX	This value defines the UID for JPEG Spectral Selection, Hierarchical (Process 20 & 22) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.61
JPEG_SPEC_HIER_21_23_SYNTAX	This value defines the UID for JPEG Spectral Selection, Hierarchical (Process 21 & 23) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.62
JPEG_SPEC_NON_HIER_6_8_SYNTAX	This value defines the UID for JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.53
JPEG_SPEC_NON_HIER_7_9_SYNTAX	This value defines the UID for JPEG Spectral Selection, Non-Hierarchical (Process 7 & 9) transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.54

Name	Description
JPIP_REFERENCED_DEFLATE_SYNTAX	This value defines the UID for JPIP Referenced Deflate transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.95
JPIP_REFERENCED_SYNTAX	This value defines the UID for JPIP Referenced transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.94
LICENSE	The Merge DICOM Toolkit license number that was supplied when the toolkit was purchased.
LOCAL_APPL_CONTEXT_NAME	The DICOM Application Context Name (UID) (as specified in the DICOM Standard). DEFAULT: 1.2.840.10008.3.1.1.1
MPEG2_MPHL_SYNTAX	This value defines the UID for MPEG2 Main Profile @ High Level transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.101
MPEG2_MPML_SYNTAX	This value defines the UID for MPEG2 Main Profile @ Main Level transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.100
MPEG4_AVC_H264_BDC_HP_LEVEL_4_1_SYNTAX	This value defines the UID for MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1 transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.103
MPEG4_AVC_H264_HP_LEVEL_4_1_SYNTAX	This value defines the UID for MPEG-4 AVC/H.264 High Profile / Level 4.1 transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.102
MPEG4_AVC_H264_HP_LEVEL_4_2_2D_SYNTAX	This value defines the UID for MPEG-4 AVC/H.264 High Profile / Level 4.2For 2D Video transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.104
MPEG4_AVC_H264_HP_LEVEL_4_2_3D_SYNTAX	This value defines the UID for MPEG-4 AVC/H.264 High Profile / Level 4.2For 3D Video transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.105
MPEG4_AVC_H264_STEREO_HP_LEVEL_4_2_SYNTAX	This value defines the UID for MPEG-4 AVC/H.264 Stereo High Profile /Level 4.2 transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.106

Name	Description
<b>PDU_MAXIMUM_LENGTH *</b>	<p>The maximum size of Protocol Data Units that can be received by this Merge DICOM Toolkit implementation. This value will also place a limit on how large PDU values being sent can be. Setting this so that a PDU fits within an even multiple of the default TCP/IP MSS (Maximum Segment Size) of 1460 will optimize network performance. Note that 6 bytes for the PDU header must be added to the configured maximum PDU size when calculating a multiple of the MSS.</p> <p>Note also to see the TCPIP_SEND_BUFFER_SIZE and TCPIP_RECEIVE_BUFFER_SIZE configuration values for improving performance.</p> <p>Example: <math>(1460*44)-6 = 64234</math> PDU Size</p> <p>DEFAULT: 64234</p> <p>MINIMUM: 4K</p> <p>MAXIMUM: NONE</p>
<b>PRIVATE_SYNTAX_1_ENCAPSULATED</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 1 as having its pixel data tag (7fe0,0010) being encoded as undefined length in the same manner as the JPEG and RLE transfer syntaxes are encoded.</p> <p>DEFAULT: NO</p>
<b>PRIVATE_SYNTAX_1_EXPLICIT_VR</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 1 as being encoded in explicit VR format.</p> <p>DEFAULT: YES</p>
<b>PRIVATE_SYNTAX_1_LITTLE_ENDIAN</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 1 as being encoded in little endian format.</p> <p>DEFAULT: YES</p>
<b>PRIVATE_SYNTAX_1_SYNTAX</b>	<p>The unique identifier (UID) Merge DICOM Toolkit will use to identify private transfer syntax 1. When this value is set to "&lt;none&gt;", private transfer syntax support is shut off.</p> <p>DEFAULT: &lt;none&gt;</p>
<b>PRIVATE_SYNTAX_2_ENCAPSULATED</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 2 as having its pixel data tag (7fe0,0010) being encoded as undefined length in the same manner as the JPEG and RLE transfer syntaxes are encoded.</p> <p>DEFAULT: NO</p>
<b>PRIVATE_SYNTAX_2_EXPLICIT_VR</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 2 as being encoded in explicit VR format.</p> <p>DEFAULT: YES</p>
<b>PRIVATE_SYNTAX_2_LITTLE_ENDIAN</b>	<p>When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 2 as being encoded in little endian format.</p> <p>DEFAULT: YES</p>

Name	Description
PRIVATE_SYNTAX_2_SYNTAX	The unique identifier (UID) Merge DICOM Toolkit will use to identify private transfer syntax 2. When this value is set to "<none>", private transfer syntax support is shut off. DEFAULT: <none>
RLE_SYNTAX	This value defines the UID of the RLE Lossless transfer syntax. DEFAULT: 1.2.840.10008.1.2.5
SMPTE_ST_2110_20_UNCOMPRESSED_INTERLACED_ACTIVE_VIDEO_SYNTAX	This value defines the UID for SMPTE ST 2110-20 Uncompressed Interlaced Active Video transfer syntax. DEFAULT: 1.2.840.10008.1.2.7.2
SMPTE_ST_2110_20_UNCOMPRESSED_PROGRESSIVE_ACTIVE_VIDEO_SYNTAX	This value defines the UID for SMPTE ST 2110-20 Uncompressed Progressive Active Video transfer syntax. DEFAULT: 1.2.840.10008.1.2.7.1
SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO_SYNTAX	This value defines the UID for SMPTE ST 2110-30 PCM Digital Audio transfer syntax. DEFAULT: 1.2.840.10008.1.2.7.3

† These options allow for non-standard DICOM operations. Such exceptions, if used, should be noted in your DICOM conformance statement.

\* Performance tuning.

Table B-8: [DIMSE\_PARAMS] section of system profile parameters

Name	Description
INITIATOR_NAME †	The DICOM standard has retired the old ACR/NEMA Initiator Name attribute in command messages. To generate such an attribute in command messages, specify an initiator name. <none> means do not put initiator name in messages. DEFAULT: <none>
RECEIVER_NAME †	The DICOM standard has retired the old ACR/NEMA Receiver Name attribute in command messages. To generate such an attribute in command messages, specify a receiver name. <none> means do not put receiver name in messages. DEFAULT: <none>
SEND_ECHO_PRIORITY †	The DICOM standard has retired the message priority attribute in echo command messages. To generate such an attribute in command messages, specify YES. To NOT use message priority in echo messages, specify NO. DEFAULT: NO

Name	Description
<code>SEND_LENGTH_TO_END</code> †	The DICOM standard has retired the old Group-Length-To-End attribute in command messages. To generate such an attribute in command messages, specify YES. If you do not want to generate Group-Length-To-End, specify NO.  DEFAULT: NO
<code>SEND_MSG_ID_RESPONSE</code> †	The DICOM standard has retired the message ID attribute in response command messages. To generate such an attribute in command messages, specify YES. To NOT use message ID in response messages, specify NO.  DEFAULT: NO
<code>SEND_RECOGNITION_CODE</code> †	The DICOM standard has retired the old Recognition Code attribute in command messages. To generate such an attribute in command messages, specify YES. If you do not want to generate such an attribute, specify NO.  DEFAULT: NO
<code>SEND_RESPONSE_PRIORITY</code> †	The DICOM standard has retired the message priority attribute in response messages. To generate such an attribute in response messages, specify YES. To NOT use message priority in response messages, specify NO.  DEFAULT: NO
<code>SEND_SOP_CLASS_UID</code> †	Certain DICOM service classes demand that the affected SOP class UID be present in the message. To prevent the library from ensuring that this is done, specify NO. To ensure that Affected SOP class UID is present, specify YES.  DEFAULT: YES
<code>SEND_SOP_INSTANCE_UID</code> †	Certain DICOM service classes demand that the affected SOP instance UID be present in the message. To prevent the library from ensuring that this is done, specify NO. To ensure that Affected SOP instance UID is present, specify YES.  DEFAULT: YES

† **These options allow for non-standard DICOM operations.** Such exceptions, if used, should be noted in your DICOM conformance statement.

Table B-9: [DUL\_PARMS] section of system profile parameters

Name	Description
<code>ARTIM_TIMEOUT</code>	The number of seconds to use as a time out waiting for an association request or waiting for the peer to shut down an association.  DEFAULT: 30

Name	Description
ASSOC_REPLY_TIMEOUT	The number of seconds to wait for a reply to an associate request. DEFAULT: 15.
CONNECT_TIMEOUT	The number of seconds to wait for a network connect to be accepted. DEFAULT: 15.
INACTIVITY_TIMEOUT	The number of seconds to wait in between packets of data received over the network after the initial packet of data in a message is received. Used by the <code>MC_Read_Message()</code> and <code>MC_Read_To_Stream</code> functions. DEFAULT: 15.
INSURE_EVEN_UID_LENGTH †	Set to NO, if odd-length UIDs in PDU's should NOT be padded with a NULL to ensure even length unique Ids. Set to YES to ensure even length UIDs in PDUs. DEFAULT: NO
RELEASE_TIMEOUT	The number of seconds to wait for a reply to an associate release. DEFAULT: 15.
WRITE_TIMEOUT	The number of seconds to wait for a network write to be accepted. DEFAULT: 15.

† These options allow for non-standard DICOM operations. Such exceptions, if used, should be noted in your DICOM conformance statement.

Table B-10: [MEDIA\_PARMS] section of system profile parameters

Name	Description
DICOMDIR_STREAM_STORAGE	When set to yes, DICOMDIRs read in leave their directory records internally in "stream" format and are not parsed until the directory record is referenced. This can greatly reduce memory usage when reading in large DICOMDIRs when the entire DICOMDIR is not referenced. Default: NO
EXPORT_GROUP_LENGTHS_TO_MEDIA *	When set to NO, do not write group length attributes with <code>MC_Write_File()</code> and <code>MC_Write_File_By_Callback()</code> . DEFAULT: YES
EXPORT_PRIVATE_ATTRIBUTES_TO_MEDIA	When set to NO, disable the exporting of private attributes in files written with the <code>MC_Write_File()</code> and <code>MC_Write_File_By_Callback()</code> functions. DEFAULT: YES

Name	Description
<code>EXPORT_UN_VR_TO_MEDIA</code>	When set to NO, disable the exporting of attributes with a VR of UN in files written with the <code>MC_Write_File()</code> and <code>MC_Write_File_By_Callback()</code> functions. DEFAULT: YES
<code>EXPORT_UNDEFINED_LENGTH_SEQ_IN_DICOMDIR *</code>	When set to NO, DICOMDIRs written with <code>MC_Write_File()</code> are created with their sequence attributes having defined lengths. Setting this option to Yes will increase performance. DEFAULT: YES

\* Performance tuning.

Table B-11: `[MESSAGE_PARAMS]` section of system profile parameters

Name	Description
<code>ALLOW_COMMA_IN_DS_FL_FD_STRINGS</code>	When set to Yes, a comma or a period will be allowed in the value passed to <code>MC_Set_Value_From_String()</code> for attributes with a VR of DS, FL or FD. When set to No, only a period will be acceptable as a decimal separator. Note that the toolkit will always ensure that DS attributes use a period decimal separator when streaming to the network or to a file, regardless of current locale settings. DEFAULT: NO
<code>ALLOW_INVALID_LENGTH_FOR_VR</code>	When set to 'No', attribute data values with incorrect length according to DICOM, i.e., more than the maximum allowed length or not a multiple of the unit size for fixed length VRs (SS, US, AT, SL, UL, SV, UV, FL, FD) will cause an <code>MC_INVALID_LENGTH_FOR_VR</code> error on DICOM data reading. DEFAULT: YES
<code>ALLOW_INVALID_PRIVATE_ATTRIBUTES</code>	When reading messages or file objects, this parameter specifies if private attributes encoded in an invalid format should be ignored or parsed. DEFAULT: NO
<code>ALLOW_INVALID_PRIVATE_CREATOR_CODES</code>	When reading messages or file objects, this parameter specifies if private creator codes encoded with invalid characters should be ignored or parsed. DEFAULT: NO
<code>ALLOW_OUT_OF_RANGE_BITS_JPEG_LOSSLESS</code>	During decompression of JPEG lossless images, the Pegasus decompressor may discover that the original compressor had failed to mask off the out-of-range bits for the image bit depth. However, if all other lossless JPEG computations are correct, the original image, including such incorrect out-of-range bits, can be losslessly recovered. The Pegasus decompressor will return a warning status, along with the fully decoded image.

Name	Description
	<p>If this flag is set by the application, the out-of-range bits in output pixels will not be masked off, but returned in the decoded image. Without this flag, out-of-range bits will be masked off to keep pixel values in range.</p> <p>DEFAULT: NO</p>
ATT_00081190_USE_UT_VR	<p>In the 2014b edition of the DICOM Standard, the value representation of attribute (0008,1190) Retrieve URL was changed from UT to the newly introduced UR. For backward compatibility, this parameter specifies that, when reading messages or file objects, the attribute is expected to have the old UT value representation.</p> <p>DEFAULT: NO</p>
ATT_00287FE0_USE_UT_VR	<p>In the 2014b edition of the DICOM Standard, the value representation of attribute (0028,7FE0) Pixel Data Provider URL was changed from UT to the newly introduced UR. For backward compatibility, this parameter specifies that, when reading messages or file objects, the attribute is expected to have the old UT value representation.</p> <p>DEFAULT: NO</p>
ATT_0040E010_USE_UT_VR	<p>In the 2014b edition of the DICOM Standard, the value representation of attribute (0040,E010) Retrieve URI was changed from UT to the newly introduced UR. For backward compatibility, this parameter specifies that, when reading messages or file objects, the attribute is expected to have the old UT value representation.</p> <p>DEFAULT: NO</p>
ATT_0074100A_USE_ST_VR	<p>In the 2014b edition of the DICOM Standard, the value representation of attribute (0074,100A) Contact URI was changed from ST to the newly introduced UR. For backward compatibility, this parameter specifies that, when reading messages or file objects, the attribute is expected to have the old ST value representation.</p> <p>DEFAULT: NO</p>
CALCULATE_DEFINED_LENGTH_FOR_CB	<p>This parameter is applied when a registered callback function expects the data length to be provided to it and the data length is undefined. If the parameter is set to No, the undefined length will be passed as is to the callback function. If the parameter value is Yes, the toolkit will calculate the actual value of the data length before passing it tot the callback function.</p> <p>DEFAULT: NO</p>
CALLBACK_MIN_DATA_SIZE	<p>When using the <code>MC_Register_Callback_Function()</code> call to store large data such as pixel data, this option specifies the minimum size of value for which the callback function should be used. This option was specifically added</p>



Name	Description
	so pixel data contained in icons are not managed with a callback function. DEFAULT: 1
<b>COMPRESSION_ALLOW_FRAGS</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . The Pegasus libraries allow compressed image data to be returned as it continues to compress more image data. This may result in an image frame having one or more fragments. This is perfectly legal, however some viewers may not be able to display the image if they do not support multiple fragments per frame. DEFAULT: YES
<b>COMPRESSION_CHROM_FACTOR</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . Values 0 through 255. The chrominance compression factor is used to adjust the default chrominance quantization table values. When <code>ChromFactor</code> is 32, the default chrominance quantization table values are used as is. A value of 255 corresponds to high compression, low quality. DEFAULT: 32
<b>COMPRESSION_J2K_LOSSY_QUALITY</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . When <code>JPEG_2000</code> with <code>COMPRESSION_WHEN_J2K_USE_LOSSY = Yes</code> , and <code>COMPRESSION_J2K_LOSSY_USE_QUALITY = Yes</code> , a quality can be specified. Valid values are 1 to 10, 1 being highest quality image. DEFAULT: 1
<b>COMPRESSION_J2K_LOSSY_RATIO</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . When <code>JPEG_2000</code> with <code>COMPRESSION_WHEN_J2K_USE_LOSSY = Yes</code> , and <code>COMPRESSION_J2K_LOSSY_USE_QUALITY = No</code> , a ratio can be specified. The compressor attempts to reduce the image size to $1/\text{COMPRESSION\_J2K\_LOSSY\_RATIO}$ . DEFAULT: 10
<b>COMPRESSION_J2K_LOSSY_USE_QUALITY</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . When <code>JPEG_2000</code> with <code>COMPRESSION_WHEN_J2K_USE_LOSSY = Yes</code> , this indicates which metric should be used for lossy compression, ratio or quality. DEFAULT: YES
<b>COMPRESSION_LUM_FACTOR</b>	Configuration Parameter for <code>MC_Standard_Compressor</code> . Values 0 through 255. 0 is the highest quality, giving a quantization table of all 1's. 32 corresponds to the standard quantization tables. For values between 0 and 128, the standard tables are scaled linearly. For values between 128 and 255, the standard tables are scaled non-linearly and the compression increases (and the quality decreases) by a very large amount.

Name	Description
	DEFAULT: 32
COMPRESSION_RGB_TRANSFORM_FORMAT	<p>This parameter allows the user to select the output format when doing Lossy JPEG compression of RGB images. The value can be set to YBR_FULL or YBR_FULL_422 to specify what photometric interpretation Merge DICOM Toolkit should compress into when compressing RGB images.</p> <p>DEFAULT: YBR_FULL_422</p>
COMPRESSION_USE_HEADER_QUERY	<p>If set to YES, it instructs the toolkit to give precedence to the image parameters (rows, columns, etc.) from the JPEG header, in case disagreement is suspected between the the DICOM header the JPEG header. If set to NO, the DICOM header will be used.</p> <p>DEFAULT: NO</p>
COMPRESSION_WHEN_J2K_USE_LOSSY	<p>Configuration Parameter for MC_Standard_Compressor. When JPEG_2000 is used as a transfer syntax, this could mean either lossy or lossless compression. This parameter specifies the intended syntax.</p> <p>DEFAULT: NO</p>
CREATE_OFFSET_TABLE	<p>This parameter specifies if an offset table is created when MC_Duplicate_Message() is used to compress a DICOM message or file. It also specifies if an offset table is created when the MC_Set_Encapsulated_Value_From_Function() and MC_Set_Next_Encapsulated_Value_From_Function() routines are used.</p> <p>DEFAULT: YES</p>
DECODER_TAG_FILTER	<p>Specifies the list of tags to be ignored when reading DICOM files or messages. The values are separated by commas and can be specified in different formats:</p> <ul style="list-style-type: none"> <li>• Single tag, e.g.: 00080020</li> <li>• Tag range, e.g.: 00080020-000800FF</li> <li>• Single group, e.g.: G0020</li> <li>• Group range, e.g.: G0020-G0022</li> <li>• All private as: PRIVATE</li> </ul> <p>All ranges are inclusive, meaning that G0020-G0022 will filter groups 20 and 22.</p> <p>DEFAULT: (empty)</p>
DECODER_PRIVATE_TAG_WHITELIST	<p>Specifies the list of private tags to be allowed during reading DICOM files or messages. The values are separated by commas and can be specified in different formats:</p> <ul style="list-style-type: none"> <li>• Single tag, e.g.: 00090001</li> <li>• Tag range, e.g.: 00090000-000900FF</li> <li>• Single group, e.g.: G0021</li> <li>• Group range, e.g.: G0021-G0025</li> </ul>

Name	Description
	<p>All ranges are inclusive, meaning that G0021-G0025 will allow all private groups in the range including 21 and 25.</p> <p>DEFAULT: (empty)</p>
<p><b>DEFLATE_ALLOW_FLUSH</b></p>	<p>Allows deflate to flush data occasionally to limit buffering.</p> <p>DEFAULT: YES</p>
<p><b>DEFLATE_COMPRESSION_LEVEL</b></p>	<p>Allows the compression level of deflate to be specified when using deflated explicit VR little endian transfer syntax. 0 is no compression, 1 is fastest, and 9 compresses best.</p> <p>DEFAULT: -1</p>
<p><b>DESIRED_LAST_PDU_SIZE</b></p>	<p>This parameter allows the user to configure the length of the last PDU sent. This allows for interoperability with other DICOM implementations that may be intolerant with either a zero or two byte final PDU length. The default value used is 8.</p> <p>Note: Starting with release 3.5.1, this configuration option has a limited effect.</p>
<p><b>DICTIONARY_ACCESS</b></p>	<p>This parameter specifies whether or not the DICOM dictionary is to be loaded into memory or accessed from the dictionary file. FILE means access information directly from the dictionary file. MEM means load the dictionary into memory and access it there.</p> <p>Note: Starting with the 3.5.1 Merge DICOM Toolkit release, dictionary access is always memory based and can no longer be file based. This option is now ignored.</p> <p>DEFAULT: MEM</p>
<p><b>DICTIONARY_FILE</b></p>	<p>This parameter specifies the name (path) of the DICOM dictionary. An absolute or relative path may be specified.</p> <p>The path to the file can also be specified using environment variables (including the pseudo environment variable MC3INIDIR which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).</p> <p>Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.</p> <p>Note: This parameter is ignored if the dictionary has been pre-compiled.</p> <p>DEFAULT: ../mc3msg/mrgcom3.dct</p>

Name	Description
<b>DUPLICATE_ENCAPSULATED_ICON</b>	When duplicating to an encapsulated transfer syntax, this configuration value specifies whether an ICON IMAGE SEQUENCE should also be encapsulated.  DEFAULT: NO
<b>ELIMINATE_ITEM_REFERENCES *</b>	This parameter specifies the behavior of the message/item/file handling functions <code>MC_Free_Message()</code> , <code>MC_Empty_Message()</code> , <code>MC_Free_Item()</code> , <code>MC_Empty_Item()</code> , <code>MC_Free_File()</code> and <code>MC_Empty_File()</code> . If this parameter is set to YES, the above functions will search for references in every currently open object to delete when they encounter an item to free within an object.  DEFAULT: NO.
<b>EMPTY_PRIVATE_CREATOR_CODES</b>	If set to NO, private creator codes contained in messages are not emptied when the <code>MC_Empty_Message()</code> or <code>MC_Empty_File()</code> function calls are made.  DEFAULT: YES
<b>EXPLICIT_VR_TO_UN_FOR_LENGTH_GT_64K</b>	If set to YES, the toolkit will allow encoding in explicit VR of data elements whose VR is none of OB, OW, OD, OF, SQ or UT and whose value length exceeds 65534 bytes by effectively changing the VR to UN (as per CP-1066).  If set to NO, the attempt to encode such data elements will result in an <code>MC_INVALID_LENGTH_FOR_VR</code> error.  DEFAULT: NO
<b>EXPORT_EMPTY_PRIVATE_CREATOR_CODES</b>	If set to NO it prevents the toolkit from exporting private creator data elements which don't have any private attributes in the private block. If set to YES, exporting private creator data elements with empty private blocks is allowed.  DEFAULT: YES
<b>EXPORT_GROUP_LENGTHS_TO_NETWORK *</b>	When set to NO, do not export group length attributes when using the <code>MC_Send_Request_Message()</code> , <code>MC_Send_Request()</code> , <code>MC_Send_Response_Message()</code> and <code>MC_Send_Response()</code> functions  DEFAULT: YES
<b>EXPORT_PRIVATE_ATTRIBUTES_TO_NETWORK</b>	When set to NO, disable the exporting of private attributes in messages written to the network with the <code>MC_Send_Request_Message()</code> , <code>MC_Send_Request()</code> , <code>MC_Send_Response_Message()</code> and <code>MC_Send_Response()</code> functions.  DEFAULT: YES
<b>EXPORT_UN_VR_TO_NETWORK</b>	When set to NO, disable the exporting of attributes with a VR of UN in messages written to the network with the <code>MC_Send_Request_Message()</code> , <code>MC_Send_Request()</code> ,

Name	Description
	<p>MC_Send_Response_Message() and MC_Send_Response() functions.</p> <p>DEFAULT: YES</p>
EXPORT_UNDEFINED_LENGTH_SQ *	<p>If YES, messages transferred over the network or written to disk have their sequence attributes encoded as undefined length. This increases performance of the library.</p> <p>DEFAULT: NO</p>
FLATE_GROW_OUTPUT_BUF_SIZE *	<p>The size that the output buffer of deflate or inflate should grow to when its size is insufficient. An Info message is logged each time the buffer grows.</p> <p>DEFAULT: 1024</p>
FORCE_OPEN_EMPTY_ITEM *	<p>When set to YES, the MC_Open_Item() function will act similar to the MC_Open_Empty_Message() function. The up-front performance cost of the MC_Open_Item() function will be reduced, but the amount of validation done when adding tags to the item is reduced. Setting this value to YES will also improve the performance of the DICOMDIR directory functions. This configuration value does not have any effect on embedded platforms.</p> <p>DEFAULT: NO</p>
IGNORE_JPEG_BAD_SUFFIX	<p>Configuration Parameter for MC_Standard-Decompressor to deal with lossless JPEG images whose suffix have been invalidly written according to the JPEG specification. These images have a 16-zero-bit suffix following a -32768 prefix where the JPEG spec says the suffix is omitted following a -32768 prefix. The following are the valid settings:</p> <p>-1 = Default, fail on these images</p> <p>0 = Ignore when user detects such images</p> <p>1 = Let the toolkit detect and ignore automatically</p>
LARGE_DATA_SIZE	<p>Defines "Large Data" to the toolkit. "Large Data" is defined as an attribute value which has a length of LARGE_DATA_SIZE or more.</p> <p>DEFAULT: 200.</p>
LARGE_DATA_STORE	<p>This parameter specifies where "Large Data" values should be stored. FILE means store the values in temporary files. MEM means store the values in memory.</p> <p>Note: Embedded systems should ignore this parameter and always use MEM.</p> <p>DEFAULT: MEM</p>
LIST_SQ_DEPTH_LIMIT	<p>Limit the depth of sequences listing. This parameter should be set to the maximum number of levels any sequence should be listed.</p>

Name	Description
	DEFAULT: is 0 - means do not limit the listing of sequences
<b>LIST_UN_ATTRIBUTES</b>	If No, attributes with Unknown VR will not be listed by <code>MC_List_Message()</code> and T2 logging option. DEFAULT: YES
<b>LIST_VALUE_LIMIT</b>	Limit the size of listed values by <code>MC_List_Message()</code> or T2 logging option. This parameter should be set to the maximum number of lines to be printed for any attribute in the list. DEFAULT: 0 - means show the whole value.
<b>MSG_FILE_ITEM_OBJ_TRACE</b>	This parameter allows the tracking of the creation, referencing and freeing of message, file and item objects. This option can be used if the user suspects a memory leak in their application from not freeing one of these object types. The logging is done at the T1 trace level which must be enabled in the merge.ini file. DEFAULT: NO
<b>MSG_INFO_FILE</b>	This parameter specifies the name (path) of the DICOM message information file. An absolute or relative path may be specified.  The path to the file can also be specified using environment variables (including the pseudo environment variable <code>MC3INIDIR</code> which does not need to be set as the toolkit will resolve it internally to the directory where the merge.ini file resides).  Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.  Note: This parameter is ignored if the message database has been pre-compiled. DEFAULT: ../mc3msg/mrgcom3.msg
<b>NULL_TYPE3_VALIDATION</b>	This parameter specifies how the toolkit will validate a single NULL value in a type 3 attribute with VM > 1. Valid values are ERR, WARN and INFO. DEFAULT: ERR
<b>OBOV_BUFFER_SIZE</b>	This parameter specifies the number of bytes of "Large Data" that should be buffered before they are written to disk. This value is only used when the parameter <code>LARGE_DATA_STORE</code> is set to FILE. DEFAULT: 4096
<b>PEGASUS_DISP_REG_NAME</b>	When using your own Pegasus license to remove the 3 frames/second limitation, this should have the company name that was used to generate your Pegasus license.

Name	Description
<b>PEGASUS_DISP_REGISTRATION</b>	When using your own Pegasus license to remove the 3 frames/second limitation, this should have the registration code that goes with the Pegasus dispatcher.
<b>PEGASUS_NUMBER_OF_THREADS</b>	Certain Pegasus opcodes can operate in a multithreaded manner. Use this setting to specify the number of threads to be used by the opcode.  DEFAULT: 1
<b>PEGASUS_OP_*_NAME</b>	When using your own Pegasus license to remove the 3 frames/second limitation, this should have the company name that was used to generate your Pegasus license.
<b>PEGASUS_OP_*_REGISTRATION</b>	When using your own Pegasus license to remove the 3 frames/second limitation, this should have the registration code that goes with its respective PEGASUS_OP_*_NAME.
<b>PEGASUS_OPCODE_PATH</b>	This parameter specifies the directory where Pegasus opcode DLLs are to be loaded from. The opcode DLL refers to files like picn6220 and not the dispatcher DLL picn20. If the option is empty, the SSM/DLL is loaded from the same directory as the dispatcher DLL. If these files are not found, opcode SSM/DLL is loaded using the directory order Windows uses when loading DLLs. The SSM/DLL is loaded from the current directory if '.' is specified.  DEFAULT: (empty)
<b>RELEASE_SQ_ITEMS</b>	If set to NO, existing item IDs will not be freed when setting a null value or an empty value or a new value to a sequence attribute. Setting it to YES will allow sequence items that have no other references to be freed.  DEFAULT: NO
<b>REJECT_INVALID_VR</b>	This parameter specifies whether or not to reject invalid VR values in DICOM messages. If set to Yes, the parsing is aborted and the data set is rejected with a status of MC_INVALID_VR. This is useful in some scenarios when invalid attribute VR and length can result in runaway read/copy operations which may lead to crashes.  DEFAULT: NO
<b>REMOVE_PADDING_CHARS</b>	When set to Yes, Merge DICOM Toolkit will remove space padding characters from all text based attributes. This removal will occur when the attribute is encoded with one of the MC_Set_Value... functions, or when the attribute is read with one of the streaming or network read functions.  DEFAULT: NO
<b>REMOVE_SINGLE_TRAILING_SPACE</b>	If set to YES, the toolkit will strip a single trailing padding space character from an attribute value of string type. Otherwise it will not.

Name	Description
	DEFAULT: YES
<b>RETURN_COMMA_IN_DS_FL_FD_STRINGS</b>	<p>When set to Yes, Merge DICOM Toolkit will return a comma character as a decimal separator in a value when <code>MC_Get_Value_To_String()</code> is called for an attribute with a VR of DS, FL, or FD. When set to No, a period will always be returned for the decimal separator. Note that DS values will always be properly encoded with a period in DICOM message objects.</p> <p>DEFAULT: NO</p>
<b>TEMP_FILE_DIRECTORY</b>	<p>This parameter specifies the directory in which temporary files should be created. This parameter is used only if <code>LARGE_DATA_STORE = FILE</code>. An absolute or relative path may be specified.</p> <p>The path to the directory can also be specified using environment variables (including the pseudo environment variable <code>MC3INIDIR</code> which does not need to be set as the toolkit will resolve it internally to the directory where the <code>merge.ini</code> file resides).</p> <p>Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style (\$) notations for the environment variables are accepted.</p> <p>DEFAULT: ./</p>
<b>TOLERATE_INVALID_IN_DEFAULT_CHARSET</b>	<p>This parameter specifies if non-ASCII characters are to be tolerated in the default repertoire. When set to Yes, the validation of the attribute/message will not be enforced, but a warning message will still be logged.</p> <p>DEFAULT: YES</p>
<b>UN_VR_CODE</b>	<p>VR Code to use for attributes with unknown VRs. This may be set to 'OB' if an implementation does not understand 'UN'.</p> <p>DEFAULT: UN</p> <p>VALID VALUES: UN, OB</p>
<b>UPDATE_GROUP_0028_ON_DUPLICATE</b>	<p>When set to Yes, the group 0028 attributes within a message will be updated when duplicating a message or file with <code>MC_Duplicate_Message()</code> and the standard compressor or decompressor. The Photometric Interpretation will be updated as appropriate, and the Lossy Image Compression, Lossy Image Compression Ratio and Lossy Image Compression Method tags will be updated if Lossy Image Compression was applied to the image.</p> <p>DEFAULT: NO</p>
<b>USE_FREE_DATA_CALLBACK</b>	<p>When set to Yes, all registered callback functions registered with <code>MC_Register_Callback_Function</code> are called with the <code>FREE_DATA</code> callback type when the memory associated with the callback is to be freed, because the enclosing message, file, or item is being freed.</p>



Name	Description
	DEFAULT: NO
<b>WORK_BUFFER_SIZE *</b>	<p>This parameter specifies the amount of data that is buffered in the toolkit before being stored internally or passed to a user's callback function. This option impacts the <code>MC_Message_To_Stream()</code>, <code>MC_Stream_To_Message()</code>, <code>MC_Send_Request_Message()</code>, <code>MC_Send_Request()</code>, <code>MC_Send_Response_Message()</code>, <code>MC_Send_Response()</code>, <code>MC_Read_Message()</code>, <code>MC_Read_To_Stream()</code>, <code>MC_Open_File()</code>, <code>MC_Open_File_Bypass_OBOW()</code>, <code>MC_Open_File_Upto_Tag()</code>, <code>MC_Write_File()</code> and <code>MC_Write_File_By_Callback()</code> functions.</p> <p>Setting this option to values larger than 28K will in most cases cause the toolkit to use the operating system's memory management scheme instead of the toolkit's internal mechanism.</p> <p>DEFAULT: 28K</p>

\* Performance tuning.

Table B-12: [TRANSPORT\_PARMS] section of system profile parameters

Name	Description
<b>CAPTURE_FILE</b>	<p>This parameter specifies the base name to use for capture files. (Capture files are generated if the NETWORK_CAPTURE value is set to Yes.) If only one capture file is requested (see NUMBER_OF_CAP_FILES), the capture file will have the name specified. If more than one is requested, nnn will be appended to the base file name specified (e.g. merge001.cap)</p> <p>DEFAULT: merge.cap (in the current directory)</p> <p><b>Note:</b> Use of this parameter is deprecated.</p>
<b>CAPTURE_FILE_SIZE</b>	<p>This parameter specifies the maximum size (in kilobytes) that capture files are allowed to grow (capture files are generated if the NETWORK_CAPTURE value is set to Yes). If more than one capture file is requested (see NUMBER_OF_CAP_FILES), each file generated will have this maximum size. If a value less than 1 is specified only one capture file of unlimited length will be generated.</p> <p>DEFAULT: 0</p> <p><b>Note:</b> Use of this parameter is deprecated.</p>
<b>IP_TYPE</b>	<p>This parameter specifies the preferred IP type for network communications. When set to IPV4, Merge DICOM Toolkit will attempt to utilize only IPV4 network connections. When set to IPV6, Merge DICOM Toolkit will attempt to use only IPV6 network connections. When set to AVAILABLE in an SCP, Merge DICOM Toolkit will prefer IPV6 if it is enabled in the operating system over IPV4. If IPV6 is used, the socket is put into dual stack mode, if supported by the operating system, to accept connections from both IPV4 and IPV6. When set to AVAILABLE in an SCU, Merge DICOM Toolkit will use the available type of IP networking.</p> <p>DEFAULT: AVAILABLE</p> <p>VALID VALUES: AVAILABLE, IPV4, IPV6</p>
<b>MAX_PENDING_CONNECTIONS</b>	<p>This parameter specifies the maximum number of open listen channels. Its value is used as the second argument of a TCP <code>listen()</code> call.</p> <p>DEFAULT: 5</p>
<b>NETWORK_CAPTURE</b>	<p>This parameter specifies whether or not network data should be captured in files suitable to be read by the MergeDPM utility. Use these parameters to customize the network capture:</p> <p>CAPTURE_FILE CAPTURE_FILE_SIZE NUMBER_OF_CAP_FILES REWRITE_CAPTURE_FILES</p> <p>DEFAULT: NO</p> <p><b>Note:</b> Use of this parameter is deprecated.</p>

Name	Description
<b>NUMBER_OF_CAP_FILES</b>	<p>This parameter specifies the number of capture files to generate (capture files are generated if the NETWORK_CAPTURE value is set to Yes). Each capture file generated will have maximum size specified by CAPTURE_FILE_SIZE. If CAPTURE_FILE_SIZE is less than 1 (unlimited size) this parameter's value is ignored.</p> <p>DEFAULT: 1</p> <p><b>Note:</b> Use of this parameter is deprecated.</p>
<b>REWRITE_CAPTURE_FILES</b>	<p>This parameter specifies whether or not the capture files should be rewritten when all files have reached the maximum size specified by CAPTURE_FILE_SIZE (capture files are generated if the NETWORK_CAPTURE value is set to Yes). If Yes is specified, the oldest file will be rewritten. If No is specified and all requested files have been written (see NUMBER_OF_CAP_FILES), no more data will be captured.</p> <p>DEFAULT: YES</p> <p><b>Note:</b> Use of this parameter is deprecated.</p>
<b>TCPIP_DISABLE_NAGLE</b>	<p>This parameter specifies if the Nagle Algorithm should be used when sending packets at the TCP/IP level. Most operating systems enable this by default. It allows small segments of data to delay sending a fixed amount of time to possibly be combined with other small segments and be sent as one larger packet. Disabling this may cause high network traffic.</p> <p>DEFAULT: NO</p>
<b>TCPIP_LISTEN_PORT</b>	<p>This parameter specifies the TCP/IP port on which server applications are to listen for associate requests.</p> <p>DEFAULT: 104</p>
<b>TCPIP_RECEIVE_BUFFER_SIZE *</b>	<p>This parameter specifies the TCP/IP receive buffer size for each connection. Note that the maximum values for this constant and TCPIP_SEND_BUFFER_SIZE are operating system dependent. If the values of these options are set too high, a message will be logged to the toolkit's log files, although no errors will be returned through the toolkit's API.</p> <p>Larger values for these constants will greatly improve network performance on networks with minimal network activity. Note that for optimum performance, these values should be at least slightly larger than the PDU_MAXIMUM_LENGTH configuration value.</p> <p>Note also that setting these values to an even multiple of the TCP/IP MSS (Maximum Segment Size) of 1460 bytes can help increase performance.</p> <p>Note, also that some operating systems such as Linux have auto-tuning of TCP/IP buffer sizes implemented when an explicit TCP/IP Send and Receive buffer size are not set. These options can be set to zero to disable Merge DICOM Toolkit's setting of each buffer size.</p> <p>DEFAULT: 131400</p> <p>MAXIMUM: Operating System dependent</p>

Name	Description
<b>TCPIP_SEND_BUFFER_SIZE *</b>	<p>This parameter specifies the TCP/IP send buffer size for each connection. Note that the maximum values for this constant and <code>TCPIP_RECEIVE_BUFFER_SIZE</code> are operating system dependent. If the values of these options are set too high, a message will be logged to the toolkit's log files, although no errors will be returned through the toolkit's API.</p> <p>Larger values for these constants will greatly improve network performance on networks with minimal network activity. Note that for optimum performance, these values should be at least slightly larger than the <code>PDU_MAXIMUM_LENGTH</code> configuration value.</p> <p>Note also that setting these values to an even multiple of the TCP/IP MSS (Maximum Segment Size) of 1460 bytes can help increase performance.</p> <p>Note, also that some operating systems such as Linux have auto-tuning of TCP/IP buffer sizes implemented when an explicit TCP/IP Send and Receive buffer size are not set. These options can be set to zero to disable Merge DICOM Toolkit's setting of each buffer size.</p> <p>DEFAULT: 131400</p> <p>MAXIMUM: Operating System dependent</p>

\* Performance tuning.

## Service Profile

The Service Profile (usually called `mergecom.srv`) contains DICOM standard services and commands and is a useful reference (along with the `message.txt` file) to find the Merge DICOM Toolkit names for the standard DICOM services and items. It is used by the library to negotiate the proper SOP Class UIDs and to access the binary dictionary and message information files when creating instances of message objects and validating messages.

In most cases, it will not be necessary to modify the Service Profile. However, if you are using an extended toolkit to create your own private services, you will need to add specifications for these private services to the Service Profile. See the *Merge DICOM Toolkit: Database Manual* for further details.

The location of the Service Profile is provided by the `MERGE_COM_3_SERVICES` parameter of the `[MergeCOM3]` section of the `MERGE.INI` file.

Remember, the Service Profile is GENERATED by the Merge DICOM Toolkit Profile Database Utilities. Unless you are absolutely confident about changes being made, DO NOT CHANGE THE CONTENTS OF THIS FILE.

The Service Profile contains the following sections:

*Table B-13: Service profile parameters.*

Name	Description
[SERVICE_TABLE]	List of service names and numbers. This list registers every service available to an Application Entity. The parameters associated with [SERVICE_LIST] are NUMBER_OF_SERVICES_SUPPORTED (the number of service names that will be listed immediately following NUMBER_OF_SERVICES_SUPPORTED) and one entry for each supported service.
[<service_number>]	One section number for each of the above services registered in [SERVICE_TABLE]. Each section contains a Service Name, a DICOM SOP Class UID for the Service, a flag that tells whether it is a BASE or META Service (SOP) and a list of commands supported for that service.
[ITEM_TABLE]	One item name and number for each DICOM item that can be encoded in an attribute of Value representation SQ (Sequence of Items).