Merge DICOM Toolkit™

5.21.0

C/C++ REFERENCE MANUAL

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Symbol	Title
REF	Part or Catalog number
	Manufacturer

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Part	Date	Revision	Description
COM-6285	July 2025	1.0	Updated bi-annually

The latest version of this document can be found at https://merge.my.site.com/mergecommunity.

Contents

OVERVIEW 14
Structure of Documentation 14
Conventions 15
CONFIGURATION 16
Initialization File Integration 17
APPLICATION PROGRAMMING INTERFACE 19
Overview of API 19
API Function Reference 30
MC_Abort_Association 30
MC_Accept_Association MC_Accept_Association_With_Identity 31
MC_Add_Nonstandard_Attribute 33
MC_Add_Private_Attribute 34
MC_Add_Private_Block 36
MC_Add_Standard_Attribute 37
MC_Byte_To_Unicode 38
MC_Byte_To_Long_Unicode 39
MC_Byte_Swap_OBOW 40
MC_Cleanup_Memory 41
MC_Clear_Negotiation_Info 42
MC_Close_Association 43
MC_Close_Encapsulated_Value 44
MC_Close_Listen_Port MC_Close_Listen_Port_On_Address 45
MC_Continue_Read_Message 47
MC_Continue_Read_Message_To_Stream 48
MC_Continue_Read_Message_To_Tag 50
MC_Create_Empty_File 51
MC_Create_File 52
MC_Delete_Attribute 54
MC_Delete_Current_Value 55
MC_Delete_Private_Attribute 56
MC_Delete_Private_Block 57
MC_Delete_Range 58

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MC_Dir_Add_Entity 59
MC_Dir_Add_Record 60
MC_Dir_Delete_Record 62
MC_Dir_Delete_Referenced_Entity 63
MC_Dir_Entity_Count 64
MC_Dir_First_Record 65
MC_Dir_Item_Count 66
MC_Dir_Next_Entity 67
MC_Dir_Next_Record 69
MC_Dir_Open_MRDR 70
MC_Dir_Reference_MRDR 71
MC_Dir_Remove_Ref_MRDR 72
MC_Dir_Root_Count 73
MC_Dir_Root_Entity 74
MC_Dir_Sort 75
MC_Dir_Stream_Directory_Record 78
MC_Duplicate_Message 79
MC_Empty_File 83
MC_Empty_Item 84
MC_Empty_Message 84
MC_Enable_Unicode_Conversion 85
MC_Error_Message 86
MC_File_To_Message 87
MC_Free_Item 87
MC_Free_File 88
MC_Free_Message 89
MC_FreeService 90
MC_FreeServiceList 91
MC_FreeSyntaxList 92
MC_Get_Association_Info 92
MC_Get_Attribute_Info 94
MC_Get_Bool_Config_Value 95
MC_Get_Encapsulated_Value_To_Function 97
MC_Get_Enum_From_Transfer_Syntax 100
MC_Get_File_Length 102
MC_Get_File_Preamble 103
MC_Get_Filename 104
MC_Get_First_Acceptable_Service 104

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MC_Get_First_Attribute....106
MC_Get_Frame_To_Function....107
MC_Get_Int_Config_Value....109
MC_Get_Listen_Socket....111
MC_Get_Listen_Socket_For_Port....112
MC_Get_Log_Destination....113
MC_Get_Long_Config_Value....114
MC_Get_MergeCOM_Service....115
MC_Get_MergeCOM_Service_From_UID....116
MC_Get_Message_Service....116
MC_Get_Message_Transfer_Syntax....118
MC_Get_Meta_ServiceName....119
MC_Get_Negotiation_Info....120
MC_Get_Next_Acceptable_Service....122
MC_Get_Next_Attribute....123
MC_Get_Next_Encapsulated_Value_To_Function....124
MC_Get_Next_pValue... Functions....127
MC_Get_Next_Validate_Error....131
MC_Get_Next_Value... Functions....133
MC_Get_Offset_Table_To_Function....137
MC_Get_pAttribute_Info....140
MC_Get_pTag_Info....141
MC_Get_pTags_Dict_Info....142
MC_Get_pValue... Functions....143
MC_Get_pValue_Count....148
MC_Get_pValue_Length....150
MC_Get_pValue_To_Function....151
MC_Get_Stream_Length....154
MC_Get_String_Config_Value....156
MC_Get_Tag_Info....159
MC_Get_Tags_Dict_Info....160
MC_Get_Tag_Keyword....161
MC_Get_Transfer_Syntax_From_Enum....161
MC_Get_UID_From_MergeCOM_Service....163
MC_Get_User_Identity_Info....164
MC_Get_User_Identity_Length....166
MC_Get_Value… Functions....167
MC_Get_Value_Count....171

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MC_Get_Value_Length....172
MC_Get_Value_To_Function....174
MC_Get_Version_String....176
MC_Json_To_Message....176
MC_Library_Initialization....178
MC_Library_Release....179
MC_Library_Reset....180
MC_List_File (All toolkits except Windows versions)....181
MC_List_File (Windows toolkit versions)....182
MC_List_Item (All toolkits except Windows versions)....182
MC_List_Item (Windows toolkit versions)....183
MC_List_Message (All toolkits except Windows versions)....184
MC_List_Message (Windows toolkit versions)....185
MC_Long_Unicode_To_Byte....185
MC_MemoryLog_To_Function....187
MC_Message_To_File....188
MC_Message_To_Json....189
MC_Message_To_SR....191
MC_Message_To_Stream....192
MC_Message_To_XML....196
MC_Message_To_XML_Native....198
MC_NewProposedServiceList MC_NewProposedServiceListAsync....200
MC_NewSyntaxList....202
MC_NewService… Functions....202
MC_Open_Association....204
MC_Open_Association_With_Connect_Timeout....204
MC_Open_Association_With_Identity....204
MC_Open_Association_With_Identity_With_Reject_Info....204
MC_Open_Association_With_Identity_With_Reject_Info_With_Connect_Timeout....204
MC_Open_Association_With_Reject_Info....204
MC_Open_Association_With_Callback....204
MC_Open_Association_With_All_Optional_Parameters....204
MC_Open_Empty_Item....211
MC_Open_Empty_Message....212
MC_Open_File MC_Open_File_Bypass_OBOW MC_Open_File_Upto_Tag
MC_Open_File_Upto_Tag_Bypass_Value....213
MC_Open_Item....218
MC_Open_Message....219

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MC_Open_Secure_Association MC_Open_Secure_Association_With_Reject_Info 221
MC_Process_Association_Request MC_Process_Secure_Association_Request 226
MC_Read_Message 229
MC_Read_Message_To_Tag 232
MC_Read_To_Stream 235
MC_Register_Application 239
MC_Register_Callback_Function MC_Register_pCallback_Function 239
MC_Register_Compression_Callbacks 247
MC_Register_Enhanced_MemoryLog_Function 250
MC_Register_MemoryLog_Function 252
MC_Register_Network_Capture_Callbacks (deprecated) 254
MC_Reject_Association MC_Reject_Association_With_Reason_Codes 257
MC_Release_Application 259
MC_Release_Callback_Function MC_Release_pCallback_Function 259
MC_Release_Library_Exception_Handler 260
MC_Release_Parent_Association (UNIX Only) 261
MC_Release_Parent_Connection (UNIX Only) 262
MC_Report_Memory 262
MC_Reset_Filename 263
MC_Reset_Message_Transfer_Syntax 264
MC_Send_Request_Message 265
MC_Send_Request_Message_For_Service 267
MC_Send_Request 269
MC_Send_Request_For_Service 271
MC_Send_Response_Message 273
MC_Send_Response 275
MC_Set_Bool_Config_Value 277
MC_Set_Encapsulated_Value_From_Function 279
MC_Set_File_Preamble 282
MC_Set_Int_Config_Value 282
MC_Set_Library_Exception_Handler 284
MC_Set_Log_Destination 285
MC_Set_Log_Prefix 286
MC_Set_Long_Config_Value 286
MC_Set_MergeINI MC_Set_MergeINI_Unicode 287
MC_Set_Message_Callbacks 288
MC_Set_Message_Transfer_Syntax 289
MC_Set_Negotiation_Info 290

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MC_Set_Negotiation_Info_For_Association 291
MC_Set_Next_Encapsulated_Value_From_Function 293
MC_Set_Next_pValue... Functions 295
MC_Set_Next_pValue_To_NULL 300
MC_Set_Next_Value... Functions 301
MC_Set_Next_Value_To_NULL 306
MC_Set_pValue... Functions....307
MC_Set_pValue_From_Function 312
MC_Set_pValue_Representation....315
MC_Set_pValue_To_Empty....316
MC_Set_pValue_To_NULL....318
MC_Set_Service_Command....319
MC_Set_String_Config_Value 321
MC_Set_Value... Functions....324
MC_Set_Value_From_Function 329
MC_Set_Value_Representation....331
MC_Set_Value_To_Empty....332
MC_Set_Value_To_NULL....334
MC_SR_Add_Child 335
MC_SR_Add_Root....335
MC_SR_Delete_Child 336
MC_SR_Get_Child_Count 337
MC_SR_Get_First_Child....338
MC_SR_Get_Location 339
MC_SR_Get_Next_Child 340
MC_SR_Get_Root 340
MC_SR_To_Message 341
MC_Stream_To_Message MC_Stream_To_Message_With_Offset 342
MC_Thread_Release 347
MC_Unicode_Get_Substitution_Characters 348
MC_Unicode_To_Byte 349
MC_Validate_Attribute 350
MC_Validate_File 353
MC_Validate_Message 356
MC_Wait_For_Association MC_Wait_For_Association_On_Port MC_Wait_For_Association_On_Address 359
MC_Wait_For_Connection MC_Wait_For_Connection_On_Port MC_Wait_For_Connection_On_Address 362
MC_Wait_For_Secure_Association MC_Wait_For_Secure_Association_On_Port
MC_Wait_For_Secure_Association_On_Address 364

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MC_Write_File MC_Write_File_By_Callback....369
MC_XML_To_Message....372
MC_XML_Native_To_Message....374
64-bit API Reference....375
Note....376
MC64_Continue_Read_Message_To_Stream....376
MC64_Get_Encapsulated_Value_To_Function....378
MC64_Get_File_Length....381
MC64_Get_Frame_To_Function....381
MC64_Get_Next_Encapsulated_Value_To_Function....384
MC64_Get_Next_pValue... Functions....386
MC64_Get_Next_Value... Functions....389
MC64_Get_Offset_Table_To_Function....392
MC64_Get_pValue... Functions....394
MC64_Get_pValue_Length....397
MC64_Get_pValue_To_Function....399
MC64_Get_Stream_Length....402
MC64_Get_Value… Functions....404
MC64_Get_Value_Length....407
MC64_Get_Value_To_Function....408
MC64_Message_To_Stream....411
MC64_Open_File MC64_Open_File_Bypass_OBOW MC64_Open_File_Upto_Tag MC64_Open_File_Upto_Tag_Bypass_Value....414
MC64_Read_To_Stream....420
MC64_Register_Callback_Function MC64_Register_pCallback_Function....423
MC64_Send_Response....432
MC64_Send_Request....434
MC64_Send_Request_For_Service....436
MC64_Set_Encapsulated_Value_From_Function....438
MC64_Set_Next_Encapsulated_Value_From_Function....441
MC64_Set_Next_pValue... Functions....443
MC64_Set_Next_Value... Functions....445
MC64_Set_pValue... Functions....448
MC64_Set_pValue_From_Function....450
MC64_Set_Value... Functions....453
MC64_Set_Value_From_Function....455
MC64_Stream_To_Message MC64_Stream_To_Message_With_Offset....458
MC64_Write_File MC64_Write_File_By_Callback....463

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High Level API Reference....466
MC_DDH_Create....466
MC_DDH_Open....467
MC_DDH_Update....469
MC_DDH_Traverse_Records....470
MC_DDH_Get_Record_Type....472
MC_DDH_Get_Parent_Record....473
MC_DDH_Get_Next_Record....474
MC_DDH_Get_First_Lower_Record....475
MC_DDH_Copy_Values....477
MC_DDH_Add_Record....478
MC_DDH_Delete_Record....479
MC_DDH_Release_Record....480
MC_SRH_Create_SR....481
MC_SRH_Free_SR....482
MC_SRH_Add_Child....482
MC_SRH_Add_TEXT_Child....483
MC_SRH_Create_TEXT_Node....484
MC_SRH_Set_Concept_Name....485
MC_SRH_Add_CODE_Child....486
MC_SRH_Create_CODE_Node....487
MC_SRH_Add_NUM_Child....488
MC_SRH_Create_NUM_Node....489
MC_SRH_Set_NUM_Qualifier....490
MC_SRH_Set_NUM_Next_Data....491
MC_SRH_Add_DATETIME_Child....492
MC_SRH_Create_DATETIME_Node....493
MC_SRH_Add_DATE_Child....494
MC_SRH_Create_DATE_Node....495
MC_SRH_Add_TIME_Child....495
MC_SRH_Create_TIME_Node....496
MC_SRH_Add_UIDREF_Child....497
MC_SRH_Create_UIDREF_Node....498
MC_SRH_Add_PNAME_Child....499
MC_SRH_Create_PNAME_Node....500
MC_SRH_Add_SCOORD_Child....501
MC_SRH_Set_SCOORD_Next_Data....503
MC_SRH_Create_SCOORD_Node....503

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MC_SRH_Add_TCOORD_R_Child 505
MC_SRH_Create_TCOORD_R_Node 506
MC_SRH_Set_TCOORD_R_Next_Data 507
MC_SRH_Add_TCOORD_O_Child 508
MC_SRH_Create_TCOORD_O_Node 509
MC_SRH_Set_TCOORD_O_Next_Data 510
MC_SRH_Add_TCOORD_D_Child 511
MC_SRH_Create_TCOORD_D_Node 512
MC_SRH_Set_TCOORD_D_Next_Data 513
MC_SRH_Add_COMPOSITE_Child 514
MC_SRH_Create_COMPOSITE_Node 515
MC_SRH_Add_IMAGE_Child 516
MC_SRH_Create_IMAGE_Node 516
MC_SRH_Set_IMAGE_Frames 517
MC_SRH_Add_WAVEFORM_Child 518
MC_SRH_Create_WAVEFORM_Node 519
MC_SRH_Set_WAVEFORM_Channels 519
MC_SRH_Add_CONTAINER_Child 520
MC_SRH_Create_CONTAINER_Node 521
MC_SRH_Add_TABLE_Child 522
MC_SRH_Create_TABLE_Node 523
MC_SRH_Set_TABLE_Next_Row_Definition 524
MC_SRH_Set_TABLE_Next_Column_Definition 525
MC_SRH_Set_TABLE_Next_Cell_Values 526
MC_SRH_Add_Reference 526
MC_SRH_Get_Reference 527
MC_SRH_Get_NodeType 527
MC_SRH_Get_First_Child 529
MC_SRH_Get_Next_Child 530
MC_SRH_Get_Concept_Name 531
MC_SRH_Get_TEXT_Data 532
MC_SRH_Get_CODE_Data 533
MC_SRH_Get_NUM_Data 534
MC_SRH_Get_NUM_Next_Data 535
MC_SRH_Get_NUM_Qualifier 536
MC_SRH_Get_DATETIME_Data 537
MC_SRH_Get_DATE_Data 538
MC_SRH_Get_TIME_Data 538

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MC_SRH_Get_UIDREF_Data 539
MC_SRH_Get_PNAME_Data 540
MC_SRH_Get_SCOORD_First_Data 540
MC_SRH_Get_SCOORD_Next_Data 541
MC_SRH_Get_TCOORD_D_First_Data 542
MC_SRH_Get_TCOORD_D_Next_Data 544
MC_SRH_Get_TCOORD_O_First_Data 545
MC_SRH_Get_TCOORD_O_Next_Data 546
MC_SRH_Get_TCOORD_R_First_Data 547
MC_SRH_Get_TCOORD_R_Next_Data 548
MC_SRH_Get_COMPOSITE_Data 549
MC_SRH_Get_IMAGE_Data 549
MC_SRH_Get_IMAGE_Frames 550
MC_SRH_Get_WAVEFORM_Data 551
MC_SRH_Get_WAVEFORM_Channels 552
MC_SRH_Get_TABLE_First_Cell_Values_Counts 553
MC_SRH_Get_TABLE_First_Column_Definition 554
MC_SRH_Get_TABLE_First_Row_Definition 555
MC_SRH_Get_TABLE_Next_Cell_Values_Counts 556
MC_SRH_Get_TABLE_Next_Column_Definition 557
MC_SRH_Get_TABLE_Next_Row_Definition 558
MC_SRH_Get_TABLE_Cell_Values_Item 558
MC_SRH_Get_CONTAINER_Data 559
APPENDIX A: WRITING A DICOM CONFORMANCE STATEMENT 561
Conformance Statement Sections 561
Implementation Model 561
Application Data Flow 561
Functional Definition of Application Entities (AE) 562
AE Specifications 562
APPENDIX B: CONFIGURATION PARAMETERS 567
Initialization File 567
Application Profile 571
Service List 573
Transfer Syntax Lists 586
Role Negotiation 590
DICOM Asynchronous Communication 592
Extended Negotiation 593
Related General SOP Classes and Service Classes 593

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System Profile 594
Service Profile 620

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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*.

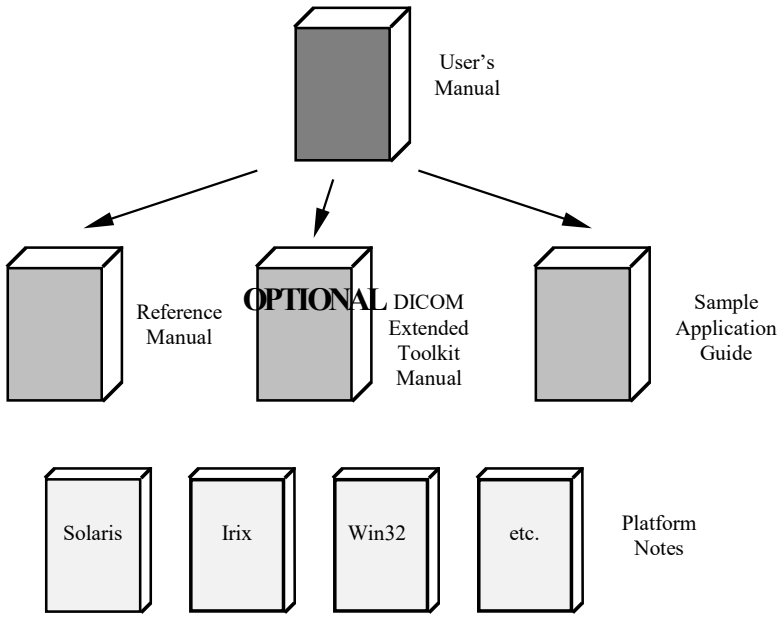

Figure 1: Merge DICOM Toolkit Documentation Roadmap

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

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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.

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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.

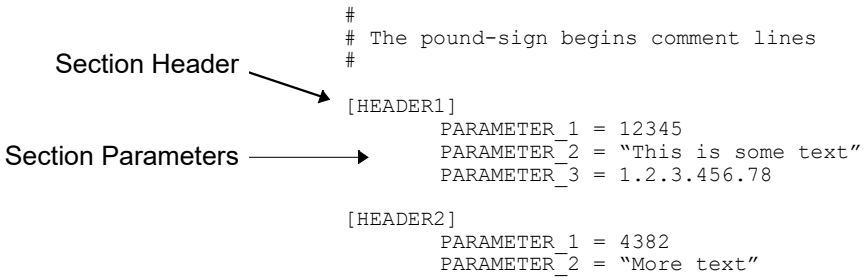

Figure 2: Format of a configuration file.

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.

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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 `MERGECOM_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.

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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`.

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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**.

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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:

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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

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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.

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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

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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.

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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

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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

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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

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The *AssociationID* parameter was NULL.
MC_INVALID_ASSOC_ID	**AssociationID* is not a valid association object ID.
MC_LIBRARY_NOT_INITIALIZED	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
)
```

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AssociationID	The association object's identification number
ServerResponse	A server response to a User Identity request from the association request as defined in DICOM Supplement 99
ServerResponseLength	The length of the buffer passed in the *ServerResponse* parameter. If *ServerResponse* is NULL, *ServerResponseLength* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_NO_REQUEST_PENDING	There are no pending association request for this *AssociationID*.
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_ASSOCIATION_ABORTED	The association has been aborted.

See Also

MC_Wait_For_Association **MC_Get_Association_Info** **MC_Get_User_Identity_Info**
MC_Get_User_Identity_Length **MC_Open_Association_With_Identity**
MC_Wait_For_Secure_Association **MC_Reject_Association**

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

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID, or item object ID.
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_Add_Standard_Attribute
MC_Add_Private_Attribute
MC_Add_Private_Block
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Private_Block
MC_Delete_Range

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
)
```

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 is to "own" the new attribute.
Group	The number identifying the private group. It must be an odd number.
ElementByte	The number identifying this attribute within the private block.
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, SV, UV, AT, SL, UL, FL, FD, OB, OW, OV, OL, OD, OF, SQ**

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*PrivateCode* was NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID, or item object ID.
MC_NOT_FOUND	There is no private block identified by *PrivateCode*.
MC_INVALID_GROUP	*Group* is not an odd number.
MC_INVALID_VR_CODE	*ValueRep* is invalid.
MC_TAG_ALREADY_EXISTS	The private attribute already exists in the message object.
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_Add_Standard_Attribute
MC_Add_Private_Attribute
MC_Add_Nonstandard_Attribute
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Private_Block
MC_Delete_Range

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*PrivateCode* was NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_GROUP	*Group* is not an odd number.
MC_INVALID_VR_CODE	*ValueRep* is invalid.
MC_TOO_MANY_BLOCKS	There already exists the maximum 240 private blocks in the group.
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.

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See Also

MC_Add_Standard_Attribute
MC_Add_Private_Attribute
MC_Add_Nonstandard_Attribute
MC_Delete_Range
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Private_Block

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_TAG_ALREADY_EXISTS	The message already contains an attribute with an ID of *Tag*.
MC_INVALID_TAG	The Data Dictionary does not contain an attribute with an ID of *Tag*.
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.

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See Also

MC_Add_Nonstandard_Attribute
MC_Add_Private_Attribute
MC_Add_Private_Block
MC_Delete_Range
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Private_Block

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_Uhar *OutVal
)
```

DefaultCharset	The DICOM specific character set name for the default character set.
Val	Input bytes array
InLen	Input bytes count (excluding NULL terminator)
BufferSize	Output buffer size
OutLen	Output length (returned by this call)
OutVal	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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.

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MC_CANNOT_COMPLY	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
MC_BUFFER_TOO_SMALL	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_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_Uhar *OutVal
)
```

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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_CANNOT_COMPLY	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
MC_BUFFER_TOO_SMALL	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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID, or item object ID.
MC_INVALID_TAG	*Tag* is not a valid tag in *MsgFileItemID*.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_INCOMPATIBLE_VR	The VR of *Tag* was not OB, OW, OD or OF.
MC_CALLBACK_REGISTERED	This function is not allowed when the **MC_Register_Callback_Function** function was issued for the same attribute.
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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	Call made prior to library initialization
MC_TIMEOUT	The timeout expired before the entire cleanup was finished.
MC_VALUE_OUT_OF_RANGE	The timeout was less then 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_APPLICATION_ID	*ApplicationID* is not a valid application identifier.
MC_NULL_POINTER_PARM	*ServiceName* was NULL.
MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files.
MC_NO_INFO_REGISTERED	There was no extended negotiation information registered for *ServiceName* 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
)
```

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The *AssociationID* parameter was NULL.
MC_INVALID_ASSOC_ID	**AssociationID* is not a valid association object ID.
MC_ASSOCIATION_ABORTED	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
)
```

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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 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.

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
)
```

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Port	Listen port opened by a call to **MC_Wait_For_Association**, **MC_Wait_For_Association_On_Port**, **MC_Wait_For_Association_On_Address**, **MC_Wait_For_Connection,** **MC_Wait_For_Connection_On_Port,** **MC_Wait_For_Connection_On_Address** **MC_Wait_For_Secure_Association**, **MC_Wait_For_Secure_Association_On_Port** or **MC_Wait_For_Secure_Association_On_Address** function.
Address	The network name or IP address of the network interface on which the listener was started by a call to **MC_Wait_For_Association_On_Address**, **MC_Wait_For_Connection_On_Address** or **MC_Wait_For_Secure_Association_On_Address** 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_INVALID_PORT_NUMBER	*Port* is not a valid listen port.

See Also

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_Association_On_Address**
MC_Wait_For_Connection_On_Address
MC_Wait_For_Secure_Association_On_Port
MC_Wait_For_Secure_Association_On_Address

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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 then (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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID.
MC_NULL_POINTER_PARM	The *MessageID* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	The message information file describing the message's service/command pair could not be accessed.

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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_Read_Message_To_Tag
MC_Continue_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)()
)
```

AssociationID	The association object's identification number.
MessageID	The ID of the message to be continued.
UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

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_Continue_Read_Message_To_Stream** function. This may be NULL.

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CBdataSize	The number of bytes of stream data being provided to you in *CbdataBuffer*.
CBdataBuffer	The buffer containing stream data from the message object.
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID or MC_Read_Message_To_Tag was not called for *MessageID*.
MC_NULL_POINTER_PARM	The *MessageID* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_STATE_VIOLATION	*AssociationID* is not a valid association that has been accepted.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	The message information file describing the message's service/command pair could not be accessed.

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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_Continue_Read_Message
MC_Read_Message_To_Tag
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 then *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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID.

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MC_INVALID_TAG	*StopTag* was within the command set (less then (0001,0000)), or the tag requested has already been read in.
MC_MUST_CONTINUE_BEFORE_READING	A previous message was not finished before this call
MC_NULL_POINTER_PARM	The *MessageID* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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_Read_Message_To_Tag**
MC_Continue_Read_Message
MC_Continue_Read_Message_To_Stream

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The *FileIDPtr* or *Filename* parameter was NULL.
MC_SYSTEM_ERROR	An unexpected, potentially serious, problem was detected in the operating environment.

See Also

MC_Create_File
MC_Open_Item
MC_Open_Message
MC_Reset_Filename

MC_Create_File

Creates a new file object

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The *FileIDPtr*, *Filename*, or *ServiceName* parameter was NULL.
MC_INVALID_COMMAND	*Command* is not a supported command.

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MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file.
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_Create_Empty_File **MC_Open_Message**
MC_Open_Item

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.

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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_Add_Private_Attribute
MC_Add_Private_Block
MC_Add_Nonstandard_Attribute
MC_Delete_Range
MC_Delete_Private_Attribute
MC_Delete_Private_Block

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 **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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NO_MORE_VALUES	There are no more values for this attribute.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INCOMPATIBLE_VR	The function was called to delete an attribute value whose value representation (VR) was OB, OW, or OF.
MC_NULL_VALUE	The attribute's value was set to NULL.
MC_EMPTY_VALUE	The attribute is empty.
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_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

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

See Also

MC_Add_Standard_Attribute
MC_Add_Private_Attribute
MC_Add_Private_Block
MC_Add_Nonstandard_Attribute
MC_Delete_Attribute
MC_Delete_Range
MC_Delete_Private_Block

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
)
```

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

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

See Also

MC_Add_Standard_Attribute
MC_Add_Private_Attribute
MC_Add_Private_Block
MC_Add_Nonstandard_Attribute
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Range

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
)
```

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.
FirstTag	Identifier of the first attribute which is to be removed from the message object.
LastTag	Identifier of the last attribute which is to be removed from the message object.

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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
MC_NORMAL_COMPLETION	The function completed normally.
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_Add_Private_Attribute
MC_Add_Private_Block
MC_Add_Nonstandard_Attribute
MC_Delete_Attribute
MC_Delete_Private_Attribute
MC_Delete_Private_Block

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
)
```

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 which the lower level entity is to be added.
NewItemName	String name of the item to be associated with this item object.
NewEntityID	Upon successful completion, the entity object identifier is returned here.
NewItemID	Upon successful completion, the item object identifier of the first directory record in the new entity object is returned here.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid directory record object ID.
MC_NULL_POINTER_PARM	The *NewEntityID*, *NewItemID*, or *NewItemName* parameter was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_INVALID_LOWER_DIR_RECORD	The directory record type specified by *NewItemName* is an invalid lower level type for the directory record *ItemID*.
MC_BAD_DIR_RECORD_TYPE	The directory record type specified in the directory record *ItemID* 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,
```

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```
      char *NewItemName,
      int *NewItemID
)
```

DirID	The identifier assigned to this DICOMDIR object by the **MC_Create_File** or **MC_Create_Empty_File** functions.
EntityID	The identifier of the directory entity object in which the directory record is being added.
NewItemName	String name of the item to be associated with this item object. See mergecom.srv item table for list of names.
NewItemID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ENTITY_ID	The *EntityID* value is not a valid entity object ID.
MC_NULL_POINTER_PARM	The *NewItemID* or *NewItemName* parameter was NULL.
MC_UNABLE_TO_GET_ITEM_ID	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by *DirID*.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_INVALID_LOWER_DIR_RECORD	The directory record type specified by *NewItemName* is an invalid lower level type for the parent directory record of *EntityID*.

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

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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid directory record object ID.
MC_INVALID_ENTITY_ID	The *EntityID* value is not a valid DICOMDIR entity object ID.
MC_UNABLE_TO_GET_ITEM_ID	The *DirID* value does not contain a reference to a valid root item.

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MC_NULL_POINTER_PARM	The *Count* parameter was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_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
)
```

DirID	The identifier assigned to this DICOMDIR object by the **MC_Create_File** or **MC_Create_Empty_File** functions.
EntityID	The identifier assigned to this directory entity object.
ItemID	Upon successful completion, the item object identifier of the first directory record in the directory entity *EntityID* is returned here.
ItemName	Upon successful completion, a pointer to the string name of the item associated with this item 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 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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

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

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid directory record object ID.
MC_INVALID_ENTITY_ID	The *EntityID* value is not a valid DICOMDIR entity object ID.
MC_UNABLE_TO_GET_ITEM_ID	The *DirID* value does not contain a reference to a valid root item.
MC_NULL_POINTER_PARM	The *Count* parameter was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_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
)
```

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 to retrieve the next lower directory entity from.
NextEntityID	Upon successful completion, the entity object identifier of the next lower directory entity referenced by *ItemID* is returned here.
NextItemID	Upon successful completion, the item object identifier of the first directory record in the directory entity *NextEntityID* is returned here.

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NextItemName	Upon successful completion, a pointer to the string name of the item associated with the item object *NextItemID* is returned here.
IsLast	Upon successful completion, this parameter is set to true (non-zero) if the first record in the directory entity *NextEntityID* 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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

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

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
)
```

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

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

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.

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ItemID	The identifier of the directory record that will reference the MRDR.
MrdrName	The string name of the item to be associated with the MRDR.
MrdrID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid item or record object ID.
MC_NULL_POINTER_PARM	The *MrdrID* or *MrdrName* parameter was NULL.
MC_UNABLE_TO_GET_ITEM_ID	Merge DICOM Toolkit found a corrupted record ID in a directory record offset attribute while trying to traverse the DICOMDIR object pointed to by *DirID*.
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_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.

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ItemID	The item object identifier of the directory record that will reference the MRDR.
MrdrID	The identifier of the MRDR that *ItemID* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid item object ID.
MC_INVALID_MRDR_ID	The *MrdrID* value is not a valid MRDR object ID.
MC_UNABLE_TO_GET_ITEM_ID	While trying to traverse the DICOMDIR object pointed to by *DirID*, Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid item or record object ID.
MC_UNABLE_TO_GET_ITEM_ID	While trying to traverse the DICOMDIR object pointed to by *DirID*, Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
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_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
)
```

DirID	The identifier assigned to this DICOMDIR object by the **MC_Create_File** or **MC_Create_Empty_File** functions.
Count	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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_UNABLE_TO_GET_ITEM_ID	The *DirID* value does not contain a reference to a valid root item.
MC_NULL_POINTER_PARM	The *Count* parameter was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_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 **ItemType,
      int *IsLast
)
```

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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_NULL_POINTER_PARM	The *RootEntityID*, *ItemID*, or *ItemName* parameter was NULL.
MC_UNABLE_TO_GET_ITEM_ID	While trying to traverse the DICOMDIR object pointed to by *DirID*, 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

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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

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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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_INVALID_DICOMDIR_ID	*DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_LOWER_DIR_RECORD	While trying to traverse the DICOMDIR object pointed to by *DirID*, Merge DICOM Toolkit found an invalid item ID contained in a lower-level directory entity attribute.
MC_UNABLE_TO_GET_ITEM_ID	While trying to traverse the DICOMDIR object pointed to by *DirID*, Merge DICOM Toolkit found an invalid item ID contained in a directory record offset attribute.
MC_VALUE_OUT_OF_RANGE	While trying to traverse the DICOMDIR object pointed to by *DirID*, Merge DICOM Toolkit found an item ID that contained an attribute with an invalid value.
MC_SYSTEM_ERROR	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *DirID* value is not a valid DICOMDIR object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid item or record object ID.
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_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)
)
```

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SourceMsgID	The identifier assigned to the source message by the MC_Open_Message or MC_Open_Empty_Message function.
DestMsgID	Upon successful completion, the message object identifier is returned here.
DestMsgTransferSyntax	The DICOM transfer syntax to be used for the destination message. One of the enumerated TRANSFER_SYNTAX types defined in “mc3msg.h”.
YourDestMsgCompressionCallback	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 **MC_Standard_Compressor**. To use the build in RLE compressor, set this to **MC_RLE_Compressor**.
YourDestMsgDecompressionCallback	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 **MC_Standard_Decompressor**. To use the built in RLE decompressor, set this to **MC_RLE_Decompressor**.

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.

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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

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 build in RLE compressor and decompressor.

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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 build 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 ***YourDesMsg(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
MC_NORMAL_COMPLETION	The function completed normally.
MC_COMPRESSOR_REQUIRED	A compression function must be passed in for the destination message.
MC_DECOMPRESSOR_REQUIRED	A decompression function must be registered with the source message.
MC_INVALID_MESSAGE_ID	*SourceMsgID* is not a valid message object ID.
MC_CALLBACK_CANNOT_COMPLY	***YourDestMsg(De)Compression Callback*** returned with MC_CANNOT_COMPLY, or the callback function registered for this attribute, and providing data, returned MC_CANNOT_COMPLY.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ITEM_ID	The *ItemID* 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
)
```

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The *MessageID* 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_CANNOT_COMPLY	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* 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).

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ITEM_ID	The **ItemID* value is not a valid item object ID.
MC_NULL_POINTER_PARM	*ItemID* 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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The **FileID* value is not a valid file object ID.
MC_NULL_POINTER_PARM	*FileID* 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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The **MessageID* value is not a valid message object ID.
MC_NULL_POINTER_PARM	*MessageID* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_SERVICE_IN_USE	The service is in use in a service list
MC_INVALID_SERVICE_NAME	The service name does not represent a name currently defined.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SERVICE_LIST_NAME	The service list name does not represent a name currently defined.

See Also

MC_NewService
MC_NewProposedServiceList
MC_FreeService

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SYNTAX_LIST_NAME	The syntax list name does not represent a name currently defined.
MC_SYNTAX_IN_USE	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
)
```

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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.

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

See Also

MC_Get_First_Acceptable_Service
MC_Get_Next_Acceptable_Service
MC_Library_Initialization
MC_Get_Listen_Socket
MC_Get_Listen_Socket_For_Port

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
)
```

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	A tag identifying a message attribute.
ValueRep	The attribute's value representation code is returned here.

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.

See Also

MC_Get_First_Attribute
MC_Get_Next_Attribute
MC_Get_Tags_Dict_Info
MC_Get_pAttribute_Info

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

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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

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Value* was NULL.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Get_Int_Config_Value **MC_Set_Int_Config_Value**
MC_Get_Log_Destination **MC_Set_Log_Destination**
MC_Get_Long_Config_Value **MC_Set_Long_Config_Value**
MC_Get_String_Config_Value **MC_Set_String_Config_Value MC_Set_Bool_Config_Value**

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,
```

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```
      unsigned long Tag,
      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.
Tag	A tag identifying a message attribute containing pixel data.
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 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
)
```

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 **MC_Get_Encapsulated_Value_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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 **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

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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_Encapsulalated_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"**:

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

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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:

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IMPLICIT_LITTLE_ENDIAN
IMPLICIT_BIG_ENDIAN
EXPLICIT_LITTLE_ENDIAN
EXPLICIT_BIG_ENDIAN
DEFLATED_EXPLICIT_LITTLE_ENDIAN
ENCAPSULATED_UNCOMPRESSED_ELE
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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TRANSFER_SYNTAX	*Uid* 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**.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_INVALID_TRANSFER_SYNTAX	The transfer syntax UID contained in the file objects group 2 elements was incorrect.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_NULL_POINTER_PARM	*FileLength* was NULL.
MC_SYSTEM_ERROR	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_NULL_POINTER_PARM	*Preamble* was NULL.

See Also

MC_Set_File_Preamble

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_NULL_POINTER_PARM	*Filename* was NULL.
MC_BUFFER_TOO_SMALL	*Filename* was too small to contain the complete filename.

See Also

MC_Write_File **MC_Empty_File**

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
)
```

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

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See Also

MC_Open_Association
MC_Open_Secure_Association
MC_Wait_For_Association
MC_Wait_For_Secure_Association
MC_Get_Next_Acceptable_Service

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
)
```

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.
ValueRep	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 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

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

See Also

MC_Get_Next_Attribute **MC_Get_Attribute_Info**
MC_Get_pAttribute_Info

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(),
)
```

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.
Frame	An integer identifying a frame number of encapsulated pixel data (starting from 0).
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 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
)
```

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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 **MC_Get_Frame_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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 **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.

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

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

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Value* was NULL.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_MUST_BE_POSITIVE	Parameter value cannot be negative.

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MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Set_Int_Config_Value
MC_Get_Log_Destination **MC_Set_Log_Destination**
MC_Get_Long_Config_Value **MC_Set_Long_Config_Value**
MC_Get_String_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*AlistenSocket* was NULL.
MC_SYSTEM_ERROR	An unexpected, potentially serious, problem was detected in the operating environment.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*ListenSocket* was NULL.
MC_INVALID_PORT_NUMBER	*Port* is not currently being listened on.
MC_SYSTEM_ERROR	An unexpected, potentially serious, problem was detected in the operating environment.

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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 retreived. *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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Value* was NULL.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Set_Int_Config_Value **MC_Get_Int_Config_Value** **MC_Set_Long_Config_Value** **MC_Get_Long_Config_Value**
MC_Set_String_Config_Value **MC_Get_String_Config_Value**
MC_Set_Log_Destination

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Value* was NULL.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

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See Also

MC_Get_Int_Config_Value
MC_Get_Log_Destination
MC_Set_Long_Config_Value
MC_Set_String_Config_Value
MC_Set_Int_Config_Value
MC_Set_Log_Destination
MC_Get_String_Config_Value

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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*UID* or *ServiceName* was NULL.
MC_BUFFER_TOO_SMALL	*ServiceName* was not large enough to contain the Merge DICOM Toolkit service name.
MC_INVALID_SOP_CLASS_UID	*UID* does not contain a Merge DICOM Toolkit supported SOP Class UID.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files.
MC_BUFFER_TOO_SMALL	*Uid* 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"
```

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```
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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*ServiceName* or *Command* was NULL.
MC_INVALID_MESSAGE_ID	*MessageID* 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**).

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*TransferSyntax* was NULL.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID.
MC_INVALID_TRANSFER_SYNTAX	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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	The association ID passed in was not valid.
MC_NULL_POINTER_PARM	*Value* was NULL.
MC_BUFFER_TOO_SMALL	*Value* is not large enough.
MC_NOT_META_SOP	The most recent received message was not sent on a presentation context that belongs to a Meta SOP.
MC_NOT_FOUND	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
)
```

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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.
ServiceName	The name given to a valid DICOM service.
ExtInfoBuffer	A pointer to the buffer containing extended negotiation information will be returned here.
ExtInfoLength	The number of bytes contained in the *ExtInfoBuffer* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association identifier.
MC_NULL_POINTER_PARM	Either *ServiceName* or *ExtInfoBuffer* or *ExtInfoLength* was NULL.

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MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files.
MC_EXT_INFO_UNAVAILABLE	No extended negotiation information was received for *ServiceName*.

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;
```

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“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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssocID* is not a valid association object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_STATE_VIOLATION	Call was made after reading or sending a message.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_END_OF_LIST	No more services in list of accepted services.

See Also

MC_Open_Association
MC_Open_Secure_Association
MC_Wait_For_Association
MC_Wait_For_Secure_Association
MC_Get_First_Acceptable_Service
MC_Process_Association_Request
MC_Process_Secure_Association_Request

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.

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ValueRep	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 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_MESSAGE_EMPTY	The message contains no attributes.
MC_NO_MORE_ATTRIBUTES	There are no more attributes in the message.

See Also

MC_Get_First_Attribute
MC_Get_Attribute_Info
MC_Get_pAttribute_Info

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,
)
```

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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	A tag identifying a message attribute containing pixel data.
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 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
)
```

CBMsgFileItemID	The message identifier assigned to this object by the **MC_Open_Message**, **MC_Open_Empty_Message** functions.
CBtag	DICOM tag which identifies the attribute.
CBuserInfo	Address of user data which is being passed from the **MC_Get_Next_Encapsulated_Value_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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 **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

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message, the data will be passed back decompressed. An optional *UserInfo* parameter may be used to pass information between the **MC_Get_Next_Encapsulalated_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”**:

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

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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 (
```

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```
      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,
```

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```
    int *ValueSize,
    MC_Uhar *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:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	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 the *Value* buffer in bytes. This parameter is type size_t on 64-bit Windows and int 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 with 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

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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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_NO_MORE_VALUES	There are no more values for this attribute.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC_Get_Next_pValue** and **MC_Get_Next_pValue_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using **MC_Get_pValue_To_Int** when the value is 123.45; or instances where the value's sign (+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* 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

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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
MC_NORMAL_COMPLETION	Another validation violation exists and its information is returned at **ErrorInfo*.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_NULL_POINTER_PARM	*ErrorInfo* was NULL.
MC_END_OF_LIST	The error list has been exhausted, or no **MC_Validate_Message** 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:

MC_NO_CONDITION_FUNCTION	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.

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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,
```

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```
      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 (
```

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```
      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_Uhar *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:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	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. This parameter is type size_t on 64-bit Windows and int 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 with 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

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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 *DataType* parameter.

Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning

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MC_NORMAL_COMPLETION	The function completed normally.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_NO_MORE_VALUES	There are no more values for this attribute.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC_Get_Next_Value** and **MC_Get_Next_Value_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using **MC_Get_Value_To_Int** when the value is 123.45; or instances where the value's sign (+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.
MC_CANNOT_COMPLY	**The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.**

See Also

MC_Get_pValue... Functions
MC_Get_Next_pValue... Functions
MC_Get_Next_Value... Functions
MC_Get_Value_To_Function
MC_Enable_Unicode_Conversion

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,
)
```

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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,
      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.
CBuserInfo	Address of user data which is being passed from the **MC_Get_Offset_Table_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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 **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.

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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
MC_NORMAL_COMPLETION	The function completed normally, and there are no more frames in the message.
MC_NULL_POINTER_PARM	*YourGetFunction* is NULL
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* 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

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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
)
```

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	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_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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain attributes in *Group* for *PrivateCode*.
MC_INVALID_GROUP	*Group* was not an odd number.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.

See Also

MC_Get_First_Attribute **MC_Get_Next_Attribute**
MC_Get_Attribute_Info

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
)
```

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*.
Name	The tag's name is returned here.
NameLength	The length in bytes of *Name*.

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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The Merge DICOM Toolkit data dictionary does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_GROUP	*Group* was not an odd number.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_DDFILE_ERROR	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.
MC_MISSING_CONFIG_PARM	This error occurs when the toolkit can not obtain the name of the data dictionary.
MC_BUFFER_TOO_SMALL	*Name* 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
)
```

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*.
Tag	A tag identifying a message attribute.
Name	A buffer to contain the tag's name.
NameSize	The size, in bytes, of *Name*

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ValueRep	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**
ValueMult_low	The minimum multiplicity will be returned here
ValueMult_high	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 alue 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Name, ValueRep, ValueMult_low, ValueMult_High, and/*or *PrivateCode* are invalid.
MC_BUFFER_TOO_SMALL	*NameSize* is not large enough to contain *Name.*
MC_MISSING_CONFIG_PARM	This error occurs when the toolkit can not obtain the name of the data dictionary.
MC_DDFILE_ERROR	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.
MC_INVALID_TAG	The Merge DICOM Toolkit data dictionary does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.

See Also

MC_Get_pTag_Info **MC_Get_Tags_Dict_Info**

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,
```

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```
      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,
```

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```
      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_Uhar *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 **MC_Open_Message**, **MC_Open_Empty_Message**, **MC_Create_File**, **MC_Create_Empty_File**, or **MC_Open_Item** functions.

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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 which should be used for the returned value in *Value*. The MC_DT enumerated type is defined in "mc3msg.h". They are:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	The attribute's value will be returned here.
BufferSize	The size of the *Value* buffer in bytes. This parameter is type size_t on 64-bit Windows and int on all other platforms.
ValueSize	The size (in bytes) of the value returned in the *Value* 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 *DataType* 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 *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_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

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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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC_Get_pValue, MC_Get_pValue_To_Buffer** and **MC_Get_pValue_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using **MC_Get_pValue_To_Int** when the value is 123.45; or instances where the value's sign(+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.

See Also

MC_Get_pValue_To_Function
MC_Get_Next_pValue... Functions
MC_Get_Next_Value... Functions
MC_Get_Value_To_Function
MC_Get_Value... Functions

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,
```

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```
      unsigned short Group,
      unsigned char ElementByte,
      int *CountPtr
)
```

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*.
CountPtr	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*CountPtr* was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	No value has been assigned to the attribute.

See Also

MC_Get_Value_Count

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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
)
```

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*.
ValueNumber	Retrieve the length of this attribute value.
Length	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_NULL_POINTER_PARM	*Length* or *PrivateCode* was NULL.

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MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	No value has been assigned to the attribute.
MC_INVALID_VALUE_NUMBER	*ValueNumber* was negative or the attribute does not have that many values.
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_TEMP_FILE_ERROR	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)()
)
```

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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*.
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,
      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.
CBuserInfo	Address of user data which is being passed from the **MC_Get_pValue_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB, OW, or OF.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* returned with **MC_CANNOT_COMPLY***.*

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See Also

MC_Get_Value
MC_Get_Value_To_Function
MC_Get_Value_To_Float
MC_Get_Value_To_Double
MC_Get_Value_To_ShortInt
MC_Get_Value_To_UShortInt
MC_Get_Value_To_LongInt
MC_Get_Value_To_Int
MC_Get_Value_To_ULongInt
MC_Get_Value_To_Uint
MC_Get_Value_To_NULL
MC_Get_Value_To_Empty

MC_Get_pValue
MC_Get_pValue_To_Float
MC_Get_pValue_To_Double
MC_Get_pValue_To_ShortInt
MC_Get_pValue_To_UShortInt
MC_Get_pValue_To_LongInt
MC_Get_pValue_To_Int
MC_Get_pValue_To_ULongInt
MC_Get_pValue_To_Uint
MC_Get_pValue_To_NULL
MC_Get_pValue_To_Empty

MC_Get_Next_Value
MC_Get_Next_Value_To_Float
MC_Get_Next_Value_To_Double
MC_Get_Next_Value_To_ShortInt
MC_Get_Next_Value_To_UShortInt
MC_Get_Next_Value_To_LongInt
MC_Get_Next_Value_To_Int
MC_Get_Next_Value_To_ULongInt
MC_Get_Next_Value_To_UInt

MC_Get_Next_pValue
MC_Get_Next_pValue_To_Float
MC_Get_Next_pValue_To_Double
MC_Get_Next_pValue_To_ShortInt
MC_Get_Next_pValue_To_UShortInt
MC_Get_Next_pValue_To_LongInt
MC_Get_Next_pValue_To_Int
MC_Get_Next_pValue_To_ULongInt
MC_Get_Next_pValue_To_UInt

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
)
```

MessageID	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
StartTag	The DICOM tag identifying the first attribute which would be streamed.

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StopTag	The DICOM tag identifying the last attribute which would be streamed
LengthPtr	Location where Merge DICOM Toolkit will return the stream length.
SyntaxType	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_ELE 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

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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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_INVALID_TRANSFER_SYNTAX	*SyntaxType* is not one of the **TRANSFER_SYNTAX** codes defined in "mc3msg.h".
MC_NULL_POINTER_PARM	*LengthPtr* 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

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	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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_NULL_POINTER_PARM	*Value* was a null pointer.
MC_BUFFER_TOO_SMALL	*Value* is not large enough to contain the configuration string.
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_Set_String_Config_Value
MC_Set_Int_Config_Value
MC_Set_Log_Destination
MC_Set_Long_Config_Value

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The attribute identified by *Tag* is not a valid DICOM attribute.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_DDFILE_ERROR	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.
MC_MISSING_CONFIG_PARM	This error occurs when the toolkit can not obtain the name of the data dictionary.
MC_BUFFER_TOO_SMALL	*Name* is not large enough to contain the descriptive string.

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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
)
```

Tag	A tag identifying a message attribute.
Name	A buffer to contain the tag's name.
NameSize	The size, in bytes, of *Name*
ValueRep	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**
ValueMult_low	The minimum multiplicity will be returned here
ValueMult_high	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, v*alue 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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Name, ValueRep, ValueMult_low, ValueMult_High, and/*or *Tag* are invalid.
MC_BUFFER_TOO_SMALL	*NameSize* is not large enough to contain *Name.*
MC_MISSING_CONFIG_PARM	DICTIONARY_FILE is invalid
MC_DDFILE_ERROR	Data Dictionary problem

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	Tag is not found or private tag
MC_NULL_POINTER_PARM	*Keyword, Length* and/or *Tag* are invalid.
MC_BUFFER_TOO_SMALL	*Keyword Size* is not large enough to contain *Keyword.*
MC_MISSING_CONFIG_PARM	DICTIONARY_FILE is invalid
MC_DDFILE_ERROR	Data Dictionary problem
MC_INVALID_TAG	Tag is not found

MC_Get_Transfer_Syntax_From_Enum

Gets the DICOM UID for a transfer syntax.

Synopsis

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

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```
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_ELE
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

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TRANSFER_SYNTAX	*SyntaxName* is not registered in the Merge DICOM Toolkit configuration files.
MC_BUFFER_TOO_SMALL	*Uid* 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,
```

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```
      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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files.
MC_BUFFER_TOO_SMALL	*Uid* 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.

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FieldType	An enumerated value specifying the User Identity related field to retrieve.
Field	A buffer into which the user identity field specified by *FieldType* is copied into. Note that if *Field* is a text field, a NULL termination character will not be included in the value returned in this parameter.
FieldLength	The length of *Field* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Field* was NULL.
MC_BUFFER_TOO_SMALL	*Field* was not large enough to contain the user identity field requested.
MC_INVALID_ASSOC_ID	*AssocID* is not a valid association object ID.
MC_STATE_VIOLATION	The call was made after messages have been exchanged over the 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.

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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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*FieldLength* was NULL.
MC_INVALID_ASSOC_ID	*AssocID* is not a valid association object ID.
MC_STATE_VIOLATION	The call was made after messages have been exchanged over the 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.

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
)
```

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```
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_Uhar *Value
)
MC_STATUS MC_Get_Value_To_Buffer (
      int MsgFileItemID,
      unsigned long Tag,
```

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```
      MC_size_t BufferSize,
      char *Value,
      int *ValueSize
)
```

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 which should be used for the returned value in *Value*. The MC_DT enumerated type is defined in "mc3msg.h". They are:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	The attribute's value will be returned here.
BufferSize	The size of the *Value* buffer in bytes. This parameter is type size_t on 64-bit Windows and int on all other platforms.
ValueSize	The size (in bytes) of the value returned in the *Value* buffer. If *DataType* is **String_Type**, 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.**

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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 vepresentation 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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. it's length is zero).
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC_Get_Value, MC_Get_Value_To_Buffer** and **MC_Get_Value_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using **MC_Get_Value_To_Int** when the value is 123.45; or instances where the value's sign(+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.
MC_CANNOT_COMPLY	**The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.**

See Also

MC_Get_pValue... Functions
MC_Get_Next_pValue... Functions
MC_Get_Next_Value... Functions
MC_Get_pValue_To_Function
MC_Get_Value_To_Function
MC_Enable_Unicode_Conversion

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
)
```

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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.
CountPtr	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*CountPtr* was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	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
)
```

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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

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Length* was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	No value has been assigned to the attribute.
MC_INVALID_VALUE_NUMBER	*ValueNumber* was negative, or the attribute does not have that many values.
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.

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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* CBuserInfo,
      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.

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CBuserInfo	Address of user data which is being passed from the **MC_Get_Value_To_Function** function. This may be NULL.
CBdataSize	The number of bytes in *CBdataBuffer*.
CBdataBuffer	Address of the buffer containing a portion of the attribute's value.
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 **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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB, OW, OF, SL, SS, UL, US, AT, FL or FD.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* returned with **MC_CANNOT_COMPLY**.

See Also

MC_Get_Value... Functions
MC_Get_pValue... Functions
MC_Get_pValue_To_Function
MC_Get_Next_Value... Functions
MC_Get_Next_pValue... Functions

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
)
```

VersionLength	The length in bytes of *Version*.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Version* was NULL.
MC_BUFFER_TOO_SMALL	*Version* 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.

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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.

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***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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	YourGetJsonFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.
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_CALLBACK_CANNOT_COMPLY	**YourGetJsonFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	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!

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_CONFIG_INFO_ERROR	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.
MC_DDFILE_ERROR	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.
MC_LIBRARY_ALREADY_INITIALIZED	The **MC_Library_Initialization** has already been called and the library is already initialized.
MC_MISSING_CONFIG_PARM	This error occurs when the toolkit can not obtain the name of the data dictionary.
MC_NO_FILE_SYSTEM	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 can not open the toolkit initialization file. See the section titled "Configuration" in this manual and the *Merge DICOM Toolkit Users Manual* for a detailed discussion of the initialization file(s).
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_Library_Reset
MC_Library_Release
MC_Set_MergeINI

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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been initialized by a call to **MC_Library_Initialization**.

See Also

MC_Library_Initialization
MC_Library_Reset
MC_Set_MergeINI

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been initialized by a call to **MC_Library_Initialization**.
MC_CONFIG_INFO_ERROR	An error occurred while trying to initialize configuration information. A message describing the error is written to the Merge DICOM Toolkit log file.
MC_DDFILE_ERROR	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.
MC_MISSING_CONFIG_PARM	This error occurs when the toolkit cannot obtain the name of the data dictionary.
MC_NO_FILE_SYSTEM	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.

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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_Library_Release**
MC_Set_MergeINI

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**

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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,
```

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```
      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.

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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

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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,
```

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```
      int NumCharsets,
      const MC_UChar *Val,
      unsigned long long InLen,
      unsigned long long BufferSize,
      unsigned long long *OutLen,
      char *OutVal
)
```

Charsets	An array of character strings from the DICOM specific character set attribute.
NumCharsets	Number of character set strings in the *Charsets* array
Val	Input Unicode array
InLen	Input Unicode character count
BufferSize	Output buffer size
OutLen	Output length (returned by this call)
OutVal	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_CANNOT_COMPLY	Fail to process the input. Check the Merge DICOM Toolkit log file for details of failure.
MC_BUFFER_TOO_SMALL	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_Unicode_To_Byte

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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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*UserFunction parameter* was NULL.
MC_LOG_EMPTY	The memory log buffer has not been created yet or is empty.
MC_CALLBACK_CANNOT_COMPLY	*UserFunction* returned with **MC_CANNOT_COMPLY**.

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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_NULL_POINTER_PARM	*Filename* 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)()
)
```

MessageID	The identifier of a message, file or item object.
UserInfo	Address of data which will be passed on to *YourReceiveJsonFunction* each time it is called. This may be NULL.
JsonOptions	Combination of the JSON configuration flags that are defined in the JSON_OPTIONS enumerator list: JsonOptDefault JsonOptIncludeBulks JsonOptIncludePixelData JsonOptExcludeSequences JsonOptExcludePrivateAttributes JsonOptIndentation
YourReceiveJsonFunction	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,
```

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```
      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_Json** function. This may be NULL.
CBdataSize	The number of bytes of JSON data being provided to you in *CBdataBuffer*.
CBdataBuffer	The buffer containing JSON data from the message object.
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of JSON data.
CBisLast	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
JsonOptDefault	Use the default JSON conversion settings.
JsonOptIncludeBulks	Store bulk attributes (VR is OB or OW) in the JSON.
JsonOptIncludePixelData	Store Pixel Data buffer in the JSON.
JsonOptExcludeSequences	Do not store Sequence attributes in the JSON.
JsonOptExcludePrivateAttributes	Do not store Private attributes in the JSON.
JsonOptIndentation	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The YourReceiveJsonFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.
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_MESSAGE_EMPTY	The message has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	**YourReceiveJsonFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The *MsgID* value is not a valid object ID.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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_SR_Add_Child

MC_SR_Get_First_Child

MC_ SR_Get_Next_Child

MC_ SR_Get_Root

MC_SR_Delete_Child

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)()
)
```

MessageID	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
StartTag	The DICOM tag identifying the first attribute which should be streamed.
StopTag	The DICOM tag identifying the last attribute which should be streamed

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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_ELE 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

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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
UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

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_Stream** function. This may be NULL.
CBdataSize	The number of bytes of stream data being provided to you in *CBdataBuffer*.
CBdataBuffer	The buffer containing stream data from the message object.
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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.

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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 be set to the number of bytes placed at **CBdataBuffer.*

Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
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_MESSAGE_EMPTY	The message has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	***YourReceiveStreamFunction*** returned a value other than MC_NORMAL_COMPLETION.
MC_INVALID_TRANSFER_SYNTAX	An invalid code was used for the *SyntaxType* parameter.
MC_TEMPFILE_ERROR	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**

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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)()
)
```

MessageID	The identifier of a message, file or item object.
UserInfo	Address of data which will be passed on to *YourReceiveXMLFunction* each time it is called. This may be NULL.
XmlOptions	Combination of the XML configuration flags that are defined in the XML_OPTIONS enumerator list: XmlOptDefault XmlOptIncludeBulks XmlOptIncludePixelData XmlOptExcludeSequences XmlOptExcludePrivateAttributes XmlOptBase64Binary
YourReceiveXMLFunction	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** function. This may be NULL.
CBdataSize	The number of bytes of XML data being provided to you in *CBdataBuffer*.

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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 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
XmlOptDefault	Use the default XML conversion settings.
XmlOptIncludeBulks	Store bulk attributes (VR is OB or OW) in the XML.
XmlOptIncludePixelData	Store Pixel Data buffer in the XML.
XmlOptExcludeSequences	Do not store Sequence attributes in the XML.
XmlOptExcludePrivateAttributes	Do not store Private attributes in the XML.
XmlOptBase64Binary	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The YourReceiveXMLFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.

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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_MESSAGE_EMPTY	The message has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	**YourReceiveXMLFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	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)()
)
```

MessageID	The identifier of a message, file or item object.
UserInfo	Address of data which will be passed on to *YourReceiveXMLFunction* each time it is called. This may be NULL.
XmlOptions	Combination of the XML configuration flags that are defined in the XML_OPTIONS enumerator list: XmlOptDefault XmlOptIncludeBulks XmlOptIncludePixelData XmlOptExcludeSequences XmlOptExcludePrivateAttributes XmlOptBase64Binary XmlOptIndentation
YourReceiveXMLFunction	Pointer to a function which will be called repeatedly by the toolkit to receive the XML string.

The function must be prototyped as follows:

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```
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
XmlOptDefault	Use the default XML conversion settings.
XmlOptIncludeBulks	Store bulk attributes (VR is OB or OW) in the XML.
XmlOptIncludePixelData	Store Pixel Data buffer in the XML.
XmlOptExcludeSequences	Do not store Sequence attributes in the XML.
XmlOptExcludePrivateAttributes	Do not store Private attributes in the XML.
XmlOptBase64Binary	Use Base64 encoding for bulks and UN VR attributes.
XmlOptIndentation	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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The YourReceiveXMLFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.
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_MESSAGE_EMPTY	The message has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	**YourReceiveXMLFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	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

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ServiceNameArray	NULL terminated array of Service Names to be used in this list
MaxOperationsInvoked	The maximum operations invoked by the association requestor. Note that a setting of 0 means an unlimited number of operations can be invoked
MaxOperationsPerformed	The maximum operations performed by the association reqestor. 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 Operstions Invoked during association negotation. 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
MC_NORMAL_COMPLETION	The function completed normally.
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_DUPLICATE_NAME	A Duplicate Name is present in the SeviceNameArray or the request service list name is already in use.

See Also

MC_Open_Association
MC_Open_Secure_Association
MC_Wait_For_Association
MC_Wait_For_Secure_Association
MC_NewServiceFromName
MC_NewServiceFromUID
MC_FreeServiceList
MC_Get_Association_Info

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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
MC_NORMAL_COMPLETION	The function completed normally.
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_DUPLICATE_NAME	The requested syntax list name is already in use.
MC_DUPLICATE_SYNTAX	A syntax id is duplicated in the array supplied.

See Also

MC_Open_Association
MC_Open_Secure_Association
MC_Wait_For_Association
MC_Wait_For_Secure_Association
MC_NewServiceFromName
MC_NewServiceFromUID
MC_FreeSyntaxList

MC_NewService... Functions

Creates a new service description for use in the creation of service lists.

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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
)
```

ServiceName	Application supplied name to associate with this service
SOPClassName	Name as defined in **mergecom.srv**
SOPClassUID	UID as defined by DICOM and found in **mergecom.srv**
SyntaxListName	Name of a syntax list as defined by **MC_NewSyntaxList** or in the **mergecom.app.** Can be NULL, if so the default syntax lists will be utilized.
SCURole	Sets the scu role negotiation parameters for this service, 0 or 1
SCPRole	Sets the scp role negotiation parameters for this service, 0 or 1
ExtInfoBuffer	A pointer to the buffer containing extended negotiation information.
ExtInfoLength	The number of bytes contained in the *ExtInfoBuffer*.

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Remarks

These routines are utilized to create a service with a specific name to be used in a service list. Each service utilitized in a dynamic service list must be created with a call to one of these functions. The service lists created can then be used in subsequent calls to **MC_Open_Association,** **MC_Open_Secure_Association**, **MC_Wait_For_Association**, or **MC_Wait_For_Secure_Association** to specify the services negotiated for an association.

When creating a new service, it can be identified by its Merge DICOM Toolkit service name specified in the **mergecom.srv** file or by its SOP Class UID depending on which call is utilized. The SCU and SCP roles are specified for the service along with the name of a syntax list to be used. The **MC_NewServiceWithExtInfoFromUID** and **MC_NewServiceWithExtInfoFromName** routines can be used to optionally specify extended negotiatoin information for the service.

The application assigned name is utilized by **MC_NewProposedServiceList**.

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
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_INVALID_SOP_CLASS_UID	The SOPClassName or SOPClassUID do not reference a defined SOP in **mergecom.srv**

See Also

MC_NewSyntaxList **MC_NewProposedServiceList**
MC_FreeService
MC_Set_Negotiation_Information_For_Association

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

Establishes a connection with a remote DICOM application.

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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 (
```

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```
      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)()
)
```

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```
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)()
)
```

ApplicationID	The application ID returned from the MC_Register_Application function.
AssociationID	The identification number of an association object is returned here.
RemoteApplicationTitle	The DICOM Application Title of the remote application.

Each of the following parameters is optional. Use NULL if not used.

RemoteHostPortNumber	The TCP/IP port used by the remote application to "listen" for DICOM associations
RemoteHostTCPIPName	The remote host's TCP/IP Name. This parameter can be a hostname, an IPv4 address, or an IPv6 address.
ServiceList	Name of a service list in the Merge DICOM Toolkit configuration file.
SecureFunctions	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 **MC_Open_Secure_Association** for details.
SecureContext	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in *SecureFunctions*. See **MC_Open_Secure_Association** for details.
IdentityType	The type of User Identity negotiation to perform as specified in DICOM PS3.7, Section D.3.3.7.

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ResponseRequested	If response from the server is required, this field should be set to `POSITIVE_RESPONSE_REQUESTED`, if a response is not required, this field should be set to `NO_RESPONSE_REQUESTED`.
PrimaryField	A buffer pointing to the primary field used in User Identity Negotiation.
PrimaryFieldLength	The length of *PrimaryField*. Note that when passing a text string in *PrimaryField*, the NULL terminator should not be included in the length.
SecondaryField	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 *IdentityType*, this field can be set to NULL.
SecondaryFieldLength	The length of *SecondaryField*. Note that when passing a text string in *SecondaryField*, the NULL terminator should not be included in the length.
RejectInfo	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).
Timeout	The number of seconds to wait for the network connect to be accepted. If greater than zero, the parameter supersedes the application-wide CONNECT_TIMEOUT configuration setting. If negative or zero, the CONNECT_TIMEOUT configuration setting takes effect.
YourCallback	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
)
```

AssociationID	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* paramater 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.

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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
MC_NORMAL_COMPLETION	The function completed normally. *AssociationID* has been set to the association's identification number.
MC_ASSOCIATION_REJECTED	The remote system rejected the open association request.
MC_NEGOTIATION_ABORTED	The association was aborted during negotiation
MC_CONFIG_INFO_MISSING	*RemoteApplicationTitle* or *ServiceList* could not be found in the mergecom.app configuration file.
MC_CONFIG_INFO_ERROR	The service list contained too many services. DICOM has a limit of 128 presentation contexts/services when negotiating an association.
MC_CONNECTION_FAILED	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.
MC_NULL_POINTER_PARM	*AssociationID* and/or *RemoteApplicationTitle* was NULL.
MC_INVALID_APPLICATION_TITLE	*RemoteApplicationTitle* was not 1-16 bytes long.
MC_INVALID_APPLICATION_ID	*ApplicationID* does not identify a valid Merge DICOM Toolkit application.
MC_INVALID_PORT_NUMBER	*RemoteHostPortNumber* was not NULL and pointed at a negative number.
MC_INVALID_SERVICE_LIST_NAME	*ServiceList* was not NULL and pointed at an empty string.
MC_INVALID_HOST_NAME	*RemoteHostTCPIPName* was not NULL and it was not 1-39 bytes long.
MC_UNKNOWN_HOST_NAME	The *RemoteHostTCPIPName* is unknown to the system.
MC_TIMEOUT	Timeout attempting the association.

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MC_SYSTEM_CALL_INTERRUPTED	The operating system interrupted the network call. Retry the connection.
MC_NO_APPLICATIONS_REGISTERED	An application title for this application has not yet be registered.
MC_LIBRARY_NOT_INITIALIZED	This call was made prior to the initialization of the library
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_Register_Application
MC_Wait_For_Association
MC_Get_Association_Info
MC_Get_Negotiation_Info
MC_Get_User_Identity_Info
MC_Close_Association
MC_Open_Secure_Association
MC_Wait_For_Secure_Association
MC_Set_Negotiation_Info
MC_Get_User_Identity_Length
MC_Clear_Negotiation_Info
MC_Abort_Association

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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*ItemIDPtr* was NULL.
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_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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*MessageIDPtr* was NULL.
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_Message **MC_Create_File**
MC_Free_Message **MC_Free_Item**

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())
)
```

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ApplicationID	The identifier assigned to this object by the **MC_Register_Application** function.
FileID	The identifier assigned to this object by the **MC_Create_File** or **MC_Create_Empty_File** functions.
UserInfo	Address of data which will be passed on to *YourFromMediaFunction* each time it is called. This may be NULL.
AbypassTagValue	Bypass an attribute value if TRUE. **Note:** For **MC_Open_File_Upto_Tag_Bypass_Value** this argument is unused, as the function will *by definition* bypass the attribute value. Retained for backward compatibility only.
Tag	The attribute after which to stop reading the file from media.
Offset	Upon successful completion, the offset in bytes from the beginning of the file of: - the first attribute greater than *Tag* (for **MC_Open_File_Upto_Tag**) - the data of the attribute at *Tag* (for **MC_Open_File_Upto_Tag_Bypass_Value**) is returned here.
YourFromMediaFunction	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
)
```

CBfilename	String filename associated with the file object
CBuserInfo	Address of data which is being passed from the **MC_Open_File...** function. This may be NULL.
CBdataSizePtr	Set **CBdataSizePtr* to the number of bytes you are providing. This must be an even number.
CBdataBufferPtr	Set **CBdataBufferPtr* to the address of the data you are providing.

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CBisFirst	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourFromMediaFunction* to request data blocks.
CBisLastPtr	Set **CBisLastPtr* 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.

Performance Tuning

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.

Performance Tuning

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 then *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.*

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*FileIDPtr, **YourFromMediaFunction***, or *Filename* was NULL.
MC_INVALID_APPLICATION_ID	The application ID does not identify a valid Merge DICOM Toolkit application.
MC_INVALID_FILE	An invalid DICOM Prefix was found within the file. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_INVALID_TRANSFER_SYNTAX	An invalid transfer syntax code was found within the file's DICOM File Meta Information.
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_CALLBACK_CANNOT_COMPLY	*YourFromMediaFunction* returned with a status other than MC_NORMAL_COMPLETION.
MC_CALLBACK_DATA_SIZE_UNEVEN	The *CBdataSizePtr* parameter returned by *YourFromMediaFunction* was an uneven number.
MC_CALLBACK_PARM_ERROR	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See **MC_Register_Callback_Function** for details.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	The file contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_UNEXPECTED_EOD	*YourFromMediaFunction* stopped without passing the entire value for an attribute.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file.
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.

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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:

Command	Description
C_STORE_RQ	DICOM Composite Store Service Request
C_STORE_RSP	DICOM Composite Store Service Response

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_COMMAND	*Command* is not a supported command.

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MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file.
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_Empty_Message **MC_Free_Message**
MC_Free_Item

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
)
```

ApplicationID	The application ID returned from the MC_Register_Application function.
AssociationID	The identification number of an association object is returned here.

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RemoteApplicationTitle	The DICOM Application Title of the remote application.
SS_functions	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

RejectInfo	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).
RemoteHostPortNumber	The TCP/IP port used by the remote application to "listen" for DICOM associations
RemoteHostTCPIPName	The remote host's TCP/IP Name. This parameter can be a hostname, an IPv4 address, or an IPv6 address.
ServiceList	Name of a service list in the Merge DICOM Toolkit configuration file.
SS_context	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in *SS_functions*.

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.

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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
    );
```

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```
    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

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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
MC_NORMAL_COMPLETION	The function completed normally. *AssociationID* has been set to the association's identification number.
MC_ASSOCIATION_REJECTED	The remote system rejected the open association request.
MC_NEGOTIATION_ABORTED	The association was aborted during negotiation
MC_CONNECTION_FAILED	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.

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MC_NULL_POINTER_PARM	*AssociationID*, *SS_functions* or *RemoteApplicationTitle* was NULL.
MC_NULL_VALUE	One or more of the function parameters within *SS_functions* was NULL.
MC_INVALID_APPLICATION_TITLE	*RemoteApplicationTitle* was not 1-16 bytes long.
MC_INVALID_APPLICATION_ID	*ApplicationID* does not identify a valid Merge DICOM Toolkit application.
MC_INVALID_PORT_NUMBER	*RemoteHostPortNumber* was not NULL and pointed at a negative number.
MC_INVALID_SERVICE_LIST_NAME	*ServiceList* was not NULL and pointed at an empty string.
MC_INVALID_HOST_NAME	*RemoteHostTCPIPName* was not NULL and it was not 1-39 bytes long.
MC_TIMEOUT	Timeout attempting the association.
MC_SYSTEM_CALL_INTERRUPTED	The operating system interrupted the network call. Retry the connection.
MC_NO_APPLICATIONS_REGISTERED	An application title for this application has not yet be registered.
MC_LIBRARY_NOT_INITIALIZED	This call was made prior to the initialization of the library
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_Register_Application
MC_Wait_For_Association
MC_Wait_For_Secure_Association
MC_Set_Negotiation_Info
MC_Get_Negotiation_Info
MC_Clear_Negotiation_Info
MC_Close_Association
MC_Abort_Association
MC_Wait_For_Connection
MC_Wait_For_Connection_On_Port
MC_Process_Association_Request
MC_Process_Secure_Association_Request

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,
```

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```
      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
)
```

Socket	Socket returned by MC_Wait_For_Connection or MC_Wait_For_Connection_On_Port.
ServiceListName	Name of a service list in the Merge DICOM Toolkit configuration file.
ApplicationID	The identification number of a previously registered application is returned here.
AssociationID	The identification number of an association object is returned here.
SS_functions	Pointer to a structure containing functions that will be called by Merge DICOM Toolkit while processing network I/O over the secure connection. The `SecureSocketFunctions` structure is defined in "mergecom.h" (see **MC_Open_Secure_Association**)
SS_context	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in *SS_functions*.

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.

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inetd must be properly configured in order 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_NEGOTIATION_ABORTED	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the **MC_Process_Association_Request** call.
MC_SYSTEM_CALL_INTERRUPTED	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the **MC_Process_Association_Request** call.
MC_NULL_POINTER_PARM	*AssociationID, ApplicationID* or *ServiceList* parameter was NULL.

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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_Secure_Association**
MC_Wait_For_Connection **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".

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_MUST_CONTINUE_BEFORE_READING	A previous message was not read completely before making this call.
MC_NULL_POINTER_PARM	The *MessageID*, *ServiceName* or *Command* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.

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MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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_Free_Message**
MC_Register_Callback_Function **MC_Continue_Read_Message**
MC_Continue_Read_Message_To_Tag

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
)
```

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".
StopTag	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))
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*.

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_MUST_CONTINUE_BEFORE_READING	A previous message was not read completely before making this call.
MC_TIMEOUT	The *Timeout* period expired.
MC_NULL_POINTER_PARM	The *MessageID*, *ServiceName* or *Command* parameter was NULL.

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MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_INVALID_TAG	*StopTag* was within the command set (less then (0001,0000)).

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

MC_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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
MC_Continue_Read_Message_To_Tag
MC_Register_Callback_Function
MC_Free_Message

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)()
)
```

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".
ServiceName	The name of the service is returned here.

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Command	The command which is associated with the message is returned here. The **MC_COMMAND** enumerated values are defined in "mc3msg.h".
Filename	The name of file associated with the receiving message. This may be NULL.
UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

CBmessageID	The internal identifier assigned to the receiving message object. It becomes invalid once the message is received.
CBuserInfo	Address of data which is being passed from the **MC_Message_To_Stream** function. This may be NULL.
CBdataSize	The number of bytes of stream data being provided to you in *CBdataBuffer*.
CBdataBuffer	The buffer containing stream data from the message object.
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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.

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_MUST_CONTINUE_BEFORE_READING	A previous message was not read completely before making this call.
MC_NULL_POINTER_PARM	The *MessageID*, *ServiceName* or *Command* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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**
MC_Continue_Read_Message_To_Tag

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*ApplicationID* or *AEtitle* was NULL.
MC_INVALID_LENGTH_FOR_TITLE	*AEtitle* must be 1 to 16 bytes long.
MC_ALREADY_REGISTERED	An application title with this name has already been registered.
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_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"
```

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```
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 or *pCallbackFunction*	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,
      unsigned long *CBdataSizePtr,
      void **CBdataBufferPtr,
      int CBisFirst,
      int *CBisLastPtr
)
MC_STATUS pCallbackFunction (
      int CBmessageID,
      char *CBprivateCode,
      unsigned short CBgroup,
      unsigned char CBelementByte,
      void *CBuserInfo,
```

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```
      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

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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.

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CBdataBufferPtr	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_LENGTH or *CBtype* is PROVIDING_DATA_LENGTH this parameter is not used. If *CBtype* is PROVIDING_MEDIA_DATA_LENGTH, **CbdataBufferPtr* is a pointer to long that contains the offset of the attribute's value from the beginning of the DICOM file. If *CBtype* is FREE_DATA then Merge DICOM Toolkit has set *CBdataBufferPtr* to NULL.
CBisFirst	If *CBtype* is REQUEST_FOR_DATA, then Merge DICOM Toolkit will set *CBisFirst* 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). If *CBtype* is PROVIDING_DATA , then Merge DICOM Toolkit will set *CBisFirst* 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). If *CBtype* is PROVIDING_OFFSET_TABLE, then Merge DICOM Toolkit will set *CBisFirst* to TRUE (not zero) the first time it is providing data for the basic offset table. If *CBtype* is REQUEST_FOR_DATA_LENGTH, *CBtype* is PROVIDING_DATA_LENGTH, or *CBtype* is PROVIDING_MEDIA_DATA_LENGTH this parameter is not used.
CBisLastPtr	If *CBtype* is REQUEST_FOR_DATA or REQUEST_FOR_DATA_WITH_OFFSET, then you must set **CBisLastPtr* 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). If *CBtype* is PROVIDING_DATA, then Merge DICOM Toolkit has set **CBisLastPtr* 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).

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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

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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."

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*CallbackFunction*, *pCallbackFunction* or *PrivateCode* were NULL.
MC_INVALID_APPLICATION_ID	ApplicationID does not identify a valid application object.
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_Set_Value_From_Function **MC_Get_Value_To_Function**
MC_Set_pValue_From_Function **MC_Get_pValue_To_Function** **MC_Get_Message_Service**
MC_Open_File
MC_Open_File_Bypass_OBOW **MC_Open_File_Upto_Tag**
MC_Open_File_Upto_Tag_Bypass_Value
MC_Release_Callback_Function **MC_Register_Application**
MC_Set_Message_Callbacks

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)()
```

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```
      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.

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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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	MsgFileItemID's transfer syntax is not one of the encapsulated transfer syntaxes.
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_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;
```

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```
      char        *processID;
      char        *timeStamp;
      char        *function;
      char        *message;
} LogInfo;
```

typeCode	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_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
timeValues	A **LogTime** structure containing the exact time the message was being logged. (See structure definition below.)
type	The string representation of the message type. For example, “E”, “W”, “I”, “T1” etc.
prefix	An option prefix string. Normally this will be an empty string. The **MC_Set_Log_Prefix** function is used to provide a string that will be prefixed to all log messages.
processID	A string that represents the ID of the process that generated the message. In some operating environments this may be an empty string.
timeStamp	A string representation of the time the message was logged. This string may or may not be included in the actual log *message*.
function	A string representation of the Merge DICOM Toolkit function that generated the message. This may be an empty string.
message	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:

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```
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"
```

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```
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

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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) (
```

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```
        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:

AppContext	The application context provided by **CAP_applicationContext.**
MaxFileSize	the current value of the **CAPTURE_FILE_SIZE** configuration parameter
FileName	the current value of the **CAPTURE_FILE** configuration parameter
NumFiles	the current value of the **NUMBER_OF_CAP_FILES** configuration parameter

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RewriteFiles	the current value of the **REWRITE_CAPTURE_FILES** 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:

AppContext	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).

AppContext	The application context provided by CAP_applicationContext.
SourceIPaddr	The first Internet Protocol address used on the connection.
DestIPaddr	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.

AppContext	The application context provided by CAP_applicationContext.
ConnContext	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:

AppContext	The application context provided by CAP_applicationContext.
ConnContext	The connection context provided by the CAP_getConnectionContext callback.
SourceIPaddr	The Internet Protocol address of the node that opened the connection.
DestIPaddr	The Internet Protocol address of the node that accepted the connection.

CAP_conectionClosed - Merge DICOM Toolkit calls this function

AppContext	The application context provided by CAP_applicationContext.
ConnContext	The connection context provided by the CAP_getConnectionContext callback.
SourceIPaddr	The Internet Protocol address of the node that opened the connection.
DestIPaddr	The Internet Protocol address of the node that accepted the connection.

CAP_dataSent - Merge DICOM Toolkit calls this function

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AppContext	The application context provided by CAP_applicationContext.
ConnContext	The connection context provided by the CAP_getConnectionContext callback.
SourceIPaddr	The Internet Protocol address of the node that sent the data.
DestIPaddr	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the functions provided in the MC_NetworkCaptureInfo 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
)
```

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```
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NO_REQUEST_PENDING	There is no pending association request for this *AssociationID*.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	The *ApplicationID* parameter was NULL.
MC_INVALID_APPLICATION_ID	**ApplicationID* 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,
```

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```
      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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_APPLICATION_ID	*ApplicationID* does not identify a valid Merge DICOM Toolkit application.
MC_INVALID_TAG	There was no callback function registered for *Tag*.

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
)
```

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* does not identify a valid Merge DICOM Toolkit association.

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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
)
```

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bytesAllocated	The number of bytes that the toolkit has allocated. This parameter is type size_t on 64-bit Windows and unsigned long on other platforms.
bytesInUse	The number of bytes of non-freeable memory. This parameter is type size_t 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_NULL_POINTER_PARM	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
)
```

FileID	The identifier assigned to this object by the **MC_Create_Empty_File** or **MC_Create_File** function.
NewFilename	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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_NULL_POINTER_PARM	*NewFilename* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID.

See Also

MC_Send_Request_Message **MC_Get_Message_Transfer_Syntax**
MC_Set_Message_Transfer_Syntax

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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.

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- 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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

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

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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**:

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- 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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.

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See Also

MC_Register_Callback_Function
MC_Open_Message
MC_Send_Request_Message
MC_Send_Request
MC_Send_Response_Message
MC_Send_Response
MC_Read_Message
MC_Read_To_Stream
MC_Get_Meta_ServiceName

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)()
)
```

AssociationID	The association object's identification number
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 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:

CBAssociationID	The association object's identification number
CBtag	Not used and has undefined value (`0xFFFFFFFF`)

and all other ***CallbackFunction*** parameters as described in ***MC_Register_Callback_Function*** section.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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.

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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)()
)
```

AssociationID	The association object's identification number
AserviceName	Name of the service negotiated to utilize for the presentation context.
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 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:

CBAssociationID	The association object's identification number
CBtag	Not used and has undefined value (`0xFFFFFFFF`)

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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.

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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

MC_Register_Callback_Function
MC_Open_Message
MC_Send_Request_Message
MC_Send_Request
MC_Send_Response_Message
MC_Send_Response
MC_Read_Message
MC_Read_To_Stream
MC_Get_Meta_ServiceName

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
)
```

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".
ResponseMessageID	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
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.

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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:

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CBAssociationID	The association object's identification number
CBtag	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
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.

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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

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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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
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_Int_Config_Value
MC_Set_Log_Destination
MC_Set_Long_Config_Value
MC_Set_String_Config_Value

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)()
)
```

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.

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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**.

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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 *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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB or OW.
MC_CALLBACK_DATA_SIZE_UNEVEN	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter was not an even number.
MC_CALLBACK_PARM_ERROR	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter was an odd number
MC_CALLBACK_CANNOT_COMPLY	***YourSetFunction*** returned with **MC_CANNOT_COMPLY**.

See Also

MC_Set_Next_Encapsulated_Value_From_Function
MC_Close_Encapsulated_Value
MC_Register_Compression_Callbacks

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_NULL_POINTER_PARM	*Preamble* 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 Aparm,
      int Avalue
)
```

Aparm	An enumerated constant identifying the integer configuration parameter to be (re)set. Aparm can have any of the following values: ARTIM_TIMEOUT ASSOC_REPLY_TIMEOUT

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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 Aparm 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_MUST_BE_POSITIVE	Parameter value cannot be negative.

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MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Get_Int_Config_Value
MC_Get_Log_Destination **MC_Set_Log_Destination**
MC_Get_Long_Config_Value **MC_Set_Long_Config_Value**
MC_Get_String_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
MC_NORMAL_COMPLETION	The function completed normally.

See Also

MC_Release_Library_Exception_Handler

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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
)
```

Aparm — An enumerated constant identifying the class of logging that is to be redirected. *Aparm* 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

Avalue — A defined term identifying where the logging is to be directed. *Avalue* 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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Get_Int_Config_Value **MC_Set_Int_Config_Value**
MC_Get_Log_Destination **MC_Get_Long_Config_Value** **MC_Set_Long_Config_Value**
MC_Get_String_Config_Value **MC_Set_String_Config_Value**

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

MC_Get_Log_Destination **MC_Set_Log_Destination**

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

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	This name is the same as those given to the parameters in the toolkit configuration files.
Avalue	The long integer value to which Aparm 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 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_MUST_BE_POSITIVE	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_Long_Config_Value
MC_Get_String_Config_Value
MC_Get_Log_Destination
MC_Set_Int_Config_Value
MC_Set_Long_Config_Value
MC_Set_String_Config_Value

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
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_LIBRARY_ALREADY_INITIALIZED	The library has already been initialized.

See Also

MC_Library_Initialization **MC_Library_Release**
MC_Library_Reset

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_APPLICATION_ID	*ApplicationID* does not identify a valid application object.
MC_INVALID_MESSAGE_ID	*MessageFileID* is not a valid message or file object ID.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_Set_Value_From_Function **MC_Get_Value_To_Function**
MC_Register_Callback_Function **MC_Release_Callback_Function**

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
)
```

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

TransferSyntax The name of the transfer syntax to associate with the message. Use one of the enumerated TRANSFER_SYNTAX types defined in "**mc3msg.h**" (see **MC_Get_Transfer_Syntax_From_Enum**).

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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_APPLICATION_ID	*ApplicationID* is not a valid application identifier.
MC_NULL_POINTER_PARM	Either *ServiceName* or *ExtInfoBuffer* was NULL.
MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
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_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 retruend by an **MC_Wait_For_Association** or **MC_Wait_For_Secure_Association** call.

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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*.

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association identifier.
MC_NO_REQUEST_PENDING	*AssociationID* references to an association that has already been accepted.
MC_NULL_POINTER_PARM	Either *ServiceName* or *ExtInfoBuffer* was NULL.
MC_UNKNOWN_SERVICE	*ServiceName* was not registered in the Merge DICOM Toolkit configuration files or was not negotiated for the association.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
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_Get_Negotiation_Info **MC_Clear_Negotiation_Info**

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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)()
)
```

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,
      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.

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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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. This status will not be returned if setting the value of a message object which was opened

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	using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB or OW.
MC_CALLBACK_DATA_SIZE_UNEVEN	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter was not an even number.
MC_CALLBACK_PARM_ERROR	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter was an odd number
MC_CALLBACK_CANNOT_COMPLY	*YourSetFunction* returned with **MC_CANNOT_COMPLY**.

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,
```

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```
      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,
```

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```
      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_Uhar *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:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	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*

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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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
INFORMATIONAL MESSAGES:	
MC_NORMAL_COMPLETION	The function completed normally.
WARNINGS: (VALUE WAS STILL ENCODED)	
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.
ERRORS:	
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table above.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_Set_Value... Functions
MC_Set_Value_From_Function
MC_Set_Value_To_NULL
MC_Set_Value_To_Empty
MC_Set_pValue... Functions
MC_Set_pValue_From_Function
MC_Set_pValue_To_NULL
MC_Set_pValue_To_Empty
MC_Set_Next_Value... Functions
MC_Stream_To_Message

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INCOMPATIBLE_VR	The attribute identified by *Tag* can not be set to NULL.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*

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MC_INVALID_TAG	The message does not contain an attribute identified by *Tag*. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value to NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
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_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,
```

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```
      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_Uhar *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:

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	String_Type	Null-terminated character string
	Int_Type	Binary integer number
	UInt_Type	Binary unsigned integer number
	ShortInt_Type	Binary short integer number
	UShortInt_Type	Binary unsigned short integer number
	LongInt_Type	Binary long integer number
	ULongInt_Type	Binary unsigned long integer number
	LongLong_Type	Binary 64-bit integer number
	UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
	Double_Type	Binary Floating point number
	Buffer_Type	Binary byte value
Value	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

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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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
INFORMATIONAL MESSAGES:	
MC_NORMAL_COMPLETION	The function completed normally.
WARNINGS: (VALUE WAS STILL ENCODED)	
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.
ERRORS:	
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_CANNOT_COMPLY	**The function fails to process the request. Check Merge DICOM Toolkit log for detail.**

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See Also

MC_Set_Value... Functions
MC_Set_Value_To_NULL
MC_Set_pValue... Functions
MC_Set_pValue_To_NULL
MC_Set_Next_pValue... Functions
MC_Enable_Unicode_Conversion
MC_Set_Value_From_Function
MC_Set_Value_To_Empty
MC_Set_pValue_From_Function
MC_Set_pValue_To_Empty
MC_Stream_To_Message

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INCOMPATIBLE_VR	The attribute identified by *Tag* can not be set to NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value to NULL.

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
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_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
```

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```
)
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,
```

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```
      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
)
```

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:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number
Float_Type	Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	The attribute should be set to this value.
ValueLength	Length of provided *Value*.

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 *DataType* 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 *DataType* specified

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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

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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 *DataType* 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
INFORMATIONAL MESSAGES:	
MC_NORMAL_COMPLETION	The function completed normally.
WARNINGS: (VALUE WAS STILL ENCODED)	
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.
ERRORS:	
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table above.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).

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MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_Set_Value... Functions
MC_Set_Value_From_Function
MC_Set_Value_To_NULL
MC_Set_Value_To_Empty
MC_Set_pValue_From_Function
MC_Set_pValue_To_NULL
MC_Set_pValue_To_Empty
MC_Set_Next_Value... Functions
MC_Set_Next_pValue... Functions
MC_Stream_To_Message

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)()
)
```

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*.
UserInfo	Address of data which will be passed on to *YourSetFunction* each time it is called. This may be NULL.

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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,
      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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*PrivateCode* or *YourSetFunction* was NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INCOMPATIBLE_VR	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_PARM_ERROR	The value set by ***YourSetFunction*** in its **CBdataBufferPtr* parameter was NULL and **CBisLastPtr* was not set to true(non-zero).
MC_CALLBACK_DATA_SIZE_NEGATIVE	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter was a negative number
MC_CALLBACK_DATA_SIZE_UNEVEN	The value set by ***YourSetFunction*** in its **CBdataSizePtr* parameter 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*** int **CBdataSizePtr* was too large. It may not be larger than the largest unsigned int on your machine.
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.

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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:

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Original VR	New VR
US	SS
	OW
SS	US
SS	OW
OW	US
OW	SS
UV	SV
	OV
OV	UV
OV	SV
OW	OB
OB	OW
OV	OB
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_VR_CODE	*ValueRep* is invalid.
MC_ATTRIBUTE_HAS_VALUES	When *ValueRep* is SQ, the attribute may not already have a value.
MC_VR_ALREADY_VALID	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.

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Synopsis

```
#include "mc3msg.h"

MC_STATUS MC_Set_pValue_To_Empty (
      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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.

See Also

MC_Set_Value_To_Empty
MC_Set_Value_To_NULL
MC_Set_pValue_To_NULL

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.

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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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*ServiceName* was NULL.

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MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message or file object ID.
MC_INVALID_COMMAND	*Command* is not a supported command.
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_Create_Empty_File **MC_Create_File MC_Open_Empty_Message MC_Open_Message MC_Get_MergeCOM_Service MC_Get_UID_From_MergeCOM_Service**

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
)
```

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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

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	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 Aparm 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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_PARAMETER_NAME	Parameter specified is not one of the above listed parameters.
MC_NULL_POINTER_PARM	Avalue was a null pointer.
MC_SYSTEM_ERROR	Out of memory condition occurred.
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_Int_Config_Value
MC_Set_Log_Destination
MC_Set_Long_Config_Value
MC_Set_String_Config_Value

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
)
```

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```
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.
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:

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	String_Type	Null-terminated character string
	Int_Type	Binary integer number
	Uint_Type	Binary unsigned integer number
	ShortInt_Type	Binary short integer number
	UshortInt_Type	Binary unsigned short integer number
	LongInt_Type	Binary long integer number
	UlongInt_Type	Binary unsigned long integer number
	LongLong_Type	Binary 64-bit integer number
	UlongLong_Type	Binary 64-bit unsigned integer number
	Float_Type	Binary Floating point number
	Double_Type	Binary Floating point number
	Buffer_Type	Binary byte value
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 **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**.

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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:	
MC_NORMAL_COMPLETION	The function completed normally.
WARNINGS: (VALUE WAS STILL ENCODED)	
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.

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MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.

ERROR MESSAGES:

MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_CANNOT_COMPLY	**The function fails to process the request. Check Merge DICOM Toolkit log for detail.**

See Also

MC_Set_Value_From_Function
MC_Set_Value_To_Empty
MC_Set_Value_To_NULL
MC_Set_pValue... Functions
MC_Set_pValue_From_Function
MC_Set_pValue_To_Empty Functions
MC_Set_pValue_To_NULL
MC_Set_Next_Value... Functions
MC_Set_Next_pValue...
MC_Enable_Unicode_Conversion

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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)()
)
```

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,
      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.

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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, 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	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 value set by ***YourSetFunction*** in its **CbdataSizePtr* parameter was not an even number.
MC_CALLBACK_PARM_ERROR	The value set by ***YourSetFunction*** in its **CbdataSizePtr* parameter was an odd number
MC_CALLBACK_CANNOT_COMPLY	***YourSetFunction*** returned with **MC_CANNOT_COMPLY**.

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
)
```

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	A tag identifying the attribute.
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_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.

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The valid VR conversions are:

Original VR	New VR
US	SS
	OW
SS	US
SS	OW
OW	US
OW	SS
UV	OV
SV	OV
OV	UV
OV	SV
OW	OB
OB	OW
OV	OB
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_VR_CODE	*ValueRep* is invalid.
MC_ATTRIBUTE_HAS_VALUES	When *ValueRep* is SQ, the attribute may not already have a value.
MC_VR_ALREADY_VALID	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"
```

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

MsgItemItemID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
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_pValue_To_NULL
MC_Set_Value_To_NULL

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value to NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_INVALID_ITEM_ID	The *ItemID* value is not a valid SR tree management record object ID.
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_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_Delete_Child

MC_SR_Add_Root

Adds the root node to the SR tree management structure.

Synopsis

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

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```
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	The *SRID* parameter was NULL.
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_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_SR_Delete_Child

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).

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
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_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_SR_Delete_Child

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	The *Count* parameter was NULL.
MC_UNABLE_TO_GET_SR_ID	An internal error was encountered, Merge DICOM Toolkit was unable to retrieve the ID of an SR object.

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See Also

MC_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_SR_Delete_Child

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_INVALID_SR_ITEM_ID	The *ItemID* value is not a valid SR tree management record object ID.
MC_NULL_POINTER_PARM	The *ItemID*, or *IsLast* parameter was NULL.
MC_MSGFILE_ERROR	An error occurred attempting to access the configuration data file for the directory record.
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.

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See Also

MC_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_SR_Delete_Child

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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	The *Location* parameter was NULL.
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_SR_Add_Child
MC_SR_First_Child
MC_SR_Next_Child
MC_SR_Root
MC_Delete_Child

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	The *NextChildID* or *IsLast* parameter was NULL.
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_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_Delete_Child

MC_SR_Get_Root

Returns a pointer to the root node of an SR tree management structure.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *MsgID* value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	The *SRID* parameter was NULL.
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_SR_Add_Child
MC_SR_Delete_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
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_SR_Add_Child
MC_SR_Get_First_Child
MC_SR_Get_Next_Child
MC_SR_Get_Root
MC_SR_Delete_Child

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,
```

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```
      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.
SyntaxType	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_ELE 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

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	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
ErrorTagPtr	If an error occurs, **ErrorTagPtr* will be set to the tag which caused the error.
Offset	The offset from the beginning of the stream to the attribute after *StopTag*.
UserInfo	Address of data which will be passed on to *YourStreamToFunction* each time it is called. This may be NULL.
YourStreamToFunction	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
)
```

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_Stream_To_Message** function. This may be NULL.
CBFirstCall	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourStreamToFunction* to request data blocks.
CbdataSizePtr	Set **CbdataSizePtr* to the number of bytes you are providing. This must be an even number.

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CbdataBuffer	Set **CbdataBuffer* 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 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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*YourStreamToFunction* or *ErrorTagPtr* was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_INVALID_TRANSFER_SYNTAX	An invalid code was used for the *SyntaxType* parameter.
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_CALLBACK_CANNOT_COMPLY	***YourStreamToFunction*** returned with a status other than MC_NORMAL_COMPLETION.
MC_CALLBACK_DATA_SIZE_UNEVEN	The *CbdataSizePtr* parameter returned by the *YourStreamToFunction* was an uneven number.
MC_CALLBACK_PARM_ERROR	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See **MC_Register_Callback_Function**.

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MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	The message contains an invalid tag. The tag is placed at **ErrorTagPtr.*
MC_VALUE_TOO_LARGE	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.
MC_UNEXPECTED_EOD	*YourStreamToFunction* stopped without passing the entire value for an attribute.
MC_INVALID_LENGTH_FOR_VR	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_LIBRARY_NOT_INITIALIZED	The library has not been initialized by a call to **MC_Library_Initialization**.

See Also

MC_Library_Initialization

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_CANNOT_COMPLY	Fail to process the input. Check the Merge DICOM Toolkit log file for detail of failure.
MC_BUFFER_TOO_SMALL	The output buffer doesn't have enough space to hold the output.
MC_NULL_POINTER_PARM	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

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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
)
```

Charsets	An array of character strings from the DICOM specific character set attribute.
NumCharsets	Number of character set strings in the *Charsets* array
Val	Input Unicode array
InLen	Input Unicode character count
BufferSize	Output buffer size
OutLen	Output length (returned by this call)
OutVal	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_CANNOT_COMPLY	Fail to process the input. Check the Merge DICOM Toolkit log file for details of failure.
MC_BUFFER_TOO_SMALL	The output buffer doesn't have enough space to hold the output.

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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;
```

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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_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.

Performance Tuning

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.

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WARNINGS:

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_MESSAGE_VALIDATES	The attribute contained no validation violations of the type specified in *ErrorLevel*.
MC_DOES_NOT_VALIDATE	The attribute contained at least one validation violation of the type specified in *ErrorLevel*.
MC_INVALID_MESSAGE_ID	*MessageFileID* does not identify a valid message or file object.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	*Tag* was not in the message.
MC_MSGFILE_ERROR	An error occurred involving the message info file for the file object. The exact error is logged in the Merge DICOM Toolkit log file.
MC_INVALID_ITEM_ID	The message or file object contains a sequence of items attribute with an invalid item ID value.
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.

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:

MC_NO_CONDITION_FUNCTION	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.
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 file'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 file 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.

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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_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; */
```

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} **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

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MC_MESSAGE_VALIDATES	The file object contained no validation violations of the type specified in *ErrorLevel*.
MC_DOES_NOT_VALIDATE	The file object contained at least one validation violation of the type specified in *ErrorLevel*.
MC_INVALID_FILE_ID	*FileID* does not identify a valid file object.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_MSGFILE_ERROR	An error occurred involving the message info file for the file object. The exact error is logged in the Merge DICOM Toolkit log file.
MC_INVALID_ITEM_ID	The file object contains a sequence of items attribute with an invalid item ID value.
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.

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:

MC_NO_CONDITION_FUNCTION	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 file'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 file 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.

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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_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
```

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```
                              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*.

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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
MC_MESSAGE_VALIDATES	The message contained no validation violations of the type specified in *ErrorLevel*.
MC_DOES_NOT_VALIDATE	The message contained at least one validation violation of the type specified in *ErrorLevel*.
MC_INVALID_MESSAGE_ID	*MessageID* does not identify a valid message object.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_MSGFILE_ERROR	An error occurred involving the message info file for the message. The exact error is logged in the Merge DICOM Toolkit log file.
MC_INVALID_ITEM_ID	The message contains a sequence of items attribute with an invalid item ID value.
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.

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:

MC_NO_CONDITION_FUNCTION	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.

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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
)
```

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```
MC_STATUS MC_Wait_For_Association_On_Address (
      char *ServiceList,
      int Timeout,
      int ApplicationID,
      int Port,
      const char *Address,
      int *AssociationID
)
```

ServiceList	Name of a service list in the Merge DICOM Toolkit configuration file.
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”.
ApplicationID	The identification number of a previously registered application is returned here, or the application ID to negotiate is supplied here.
AssociationID	The identification number of an association object is returned here.
Port	Port number to listen on.
Address	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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_NEGOTIATION_ABORTED	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the **MC_Wait_For_Association** call.
MC_ASSOCIATION_REJECTED	An incoming association was aborted because no services were acceptable.
MC_SYSTEM_CALL_INTERRUPTED	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the **MC_Wait_For_Association** call.
MC_NULL_POINTER_PARM	*AssociationID, ApplicationID* or *ServiceList* 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_CONFIG_INFO_MISSING	Could not access *ServiceList* configuration parameters.
MC_CONFIG_INFO_ERROR	The *ServiceList* contained too many services.

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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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_SYSTEM_CALL_INTERRUPTED	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the **MC_Wait_For_Connection** call.

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MC_UNKNOWN_HOST_CONNECTED	A host whose remote hostname could be be resolved has attempted to connect and the connection has been droped.
MC_NEGOTIATION_ABORTED	An unexpected network error occurred when attempting to accept the connection.
MC_NULL_POINTER_PARM	The *Socket* parameter was NULL.
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_Wait_For_Secure_Association
MC_Close_Listen_Port
MC_Close_Listen_Port_On_Address
MC_Wait_For_Association
MC_Wait_For_Association_On_Port
MC_Process_Association_Request
MC_Wait_For_Association_On_Address
MC_Wait_For_Secure_Association_On_Address
MC_Process_Secure_Association_Request
MC_Release_Parent_Connection

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,
```

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```
        int Port,
        const char *Address,
        int *AssociationID,
        SecureSocketFunctions *SS_functions,
        void *SS_context
)
```

ServiceList	Name of a service list in the Merge DICOM Toolkit configuration file.
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”.
ApplicationID	The identification number of a previously registered application is returned here, or the application ID to negotiate is supplied here.
AssociationID	The identification number of an association object is returned here.
Port	Port number to listen on.
Address	The network nameor IP address of the network interface to listen on. If this argument is NULL the toolkit will accept connections on all available network interfaces.
SS_functions	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)
SS_context	An optional pointer to application-specific data that Merge DICOM Toolkit passes to the functions declared in *SS_functions*.

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.

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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,
```

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```
        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

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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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_NEGOTIATION_ABORTED	An incoming association was aborted during negotiation. Normally this situation is handled by retrying the **MC_Wait_For_Secure_Association** call. This will also be returned if the **SS_Session_Start** callback function returned an SS_ERROR status.
MC_ASSOCIATION_REJECTED	An incoming association was aborted because no services were acceptable.
MC_SYSTEM_CALL_INTERRUPTED	The system call used to wait for an association request was interrupted by a signal. Normally this situation is handled by retrying the **MC_Wait_For_Secure_Association** call.
MC_NULL_POINTER_PARM	*AssociationID, ApplicationID, SS_functions* or *ServiceList* parameter was NULL.
MC_NULL_VALUE	One or more of the function parameters within *SS_functions* 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_CONFIG_INFO_MISSING	Could not access *ServiceList* configuration parameters.
MC_CONFIG_INFO_ERROR	The *ServiceList* 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_Association MC_Close_Listen_Port MC_Close_Listen_Port_On_Address**

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,
```

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```
      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.

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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 be set to the number of bytes placed at *CbdataBuffer.*

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_APPLICATION_ID	The *ApplicationID* value is not a valid application object ID.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_INVALID_PAD	The *NumBytes* parameter contained too large of a number or an odd number.
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_MESSAGE_EMPTY	The file has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	*YourToMediaFunction* returned a value other than MC_NORMAL_COMPLETION.
MC_INVALID_TRANSFER_SYNTAX	The transfer syntax is improperly specified or is not specified in the DICOM File Meta Information attributes.
MC_TEMPFILE_ERROR	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,
```

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```
      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_XML_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 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	YourGetXMLFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.
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_CALLBACK_CANNOT_COMPLY	**YourGetXMLFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	This call was made prior to the initialization of the library.

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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)()
)
```

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
)
```

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_XML_Native_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 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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	YourGetXMLFunction parameter was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message, file or item object ID.
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_CALLBACK_CANNOT_COMPLY	**YourGetXMLFunction** returned a value other than MC_NORMAL_COMPLETION.
MC_LIBRARY_NOT_INITIALIZED	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.

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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)()
)
```

AssociationID	The association object's identification number.
MessageID	The ID of the message to be continued.
UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

CBmessageID	The identifier assigned to the message object by the **MC_Open_Message** function.
CBuserInfo	Address of data which is being passed from the **MC64_Continue_Read_Message_To_Stream** function. This may be NULL.

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CBdataBufferStart	The address of the buffer containing stream data from the message object.
CBdataBufferEnd	The address next to the end of the buffer containing stream data from the message object, that is, *CBdataBufferStart* + the number of bytes of stream data being provided to you in *CBdataBufferStart.*
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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 **CBdataBufferEns* 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	*MessageID* is not a valid message object ID or MC_Read_Message_To_Tag was not called for *MessageID*.
MC_NULL_POINTER_PARM	The *MessageID* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.

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MC_STATE_VIOLATION	*AssociationID* is not a valid association that has been accepted.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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

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,
)
```

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	A tag identifying a message attribute containing pixel data.
UserInfo	Address of data which will be passed on to *YourGetFunction* each time it is called. This may be NULL.

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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 *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_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_Encapsulalated_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_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.

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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_INVALID_TRANSFER_SYNTAX	The transfer syntax UID contained in the file objects group 2 elements was incorrect.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_NULL_POINTER_PARM	*FileLength* was NULL.
MC_SYSTEM_ERROR	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,
```

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```
      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.
Frame	An integer identifying a frame number of encapsulated pixel data (starting from 0).
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 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 **MC_Get_Frame_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.

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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
MC_NORMAL_COMPLETION	The function completed normally, and there are no more frames in the message.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_END_OF_FRAME	The function completed normally, and there are more frames in the message.
MC_NULL_POINTER_PARM	*YourGetFunction* is NULL

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MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INCOMPATIBLE_VR	The attribute does not contain OB or OW data
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_NULL_VALUE	The attribute has a value of NULL.
MC_NO_MORE_VALUES	The attribute has no more values.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* returned MC_CANNOT_COMPLY.
MC_COMPRESSION_FAILURE	There was an error while trying to decompress the data.
MC_MISSING_DELIMITER	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,
)
```

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	A tag identifying a message attribute containing pixel data.
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 attribute's value

The function must be prototyped as follows:

```
MC_STATUS YourGetFunction (
      int CBMsgFileItemID,
```

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```
      unsigned long CBtag,
      void *CBuserInfo,
      void *CBdataBufferStart,
      void *CBdataBufferEnd,
      int CBisFirst,
      int CBisLast
)
```

CBMsgFileItemID	The message identifier assigned to this object by the **MC_Open_Message**, **MC_Open_Empty_Message** functions.
CBtag	DICOM tag which identifies the attribute.
CBuserInfo	Address of user data which is being passed from the **MC64_Get_Next_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_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_Encapsulalated_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*.

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

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```
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_Uhar *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:

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	String_Type	Null-terminated character string
	Int_Type	Binary integer number
	UInt_Type	Binary unsigned integer number
	ShortInt_Type	Binary short integer number
	UShortInt_Type	Binary unsigned short integer number
	LongInt_Type	Binary long integer number
	ULongInt_Type	Binary unsigned long integer number
	LongLong_Type	Binary 64-bit integer number
	UlongLong_Type	Binary 64-bit unsigned integer
	number **Float_Type**	Binary Floating point number
	Double_Type	Binary Floating point number
	Buffer_Type	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 the *Value* 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 with be returned.

If **MC64_Get_Next_pValue** is used, the data type of the fetched value is specified by the *DataType* 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_UnicodeStrin g`	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**.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_NO_MORE_VALUES	There are no more values for this attribute.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC64_Get_Next_pValue** and **MC64_Get_Next_pValue_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g. Using **MC64_Get_pValue_To_Int** when the value is 123.45; or instances where the value's sign (+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* 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"
```

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```
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_Uhar *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:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	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"

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removed from the name. If one or more values have already been fetched from this attribute, the next value with 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_NO_MORE_VALUES	There are no more values for this attribute.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC_Get_Next_Value** and **MC_Get_Next_Value_To_String** only)

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MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using **MC_Get_Value_To_Int** when the value is 123.45; or instances where the value's sign (+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.
MC_CANNOT_COMPLY	**The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.**

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,
```

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```
      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_Offset_Table_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_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".

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally, and there are no more frames in the message.
MC_NULL_POINTER_PARM	*YourGetFunction* is NULL
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* 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,
```

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```
      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
)
```

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 which should be used for the returned value in *Value*. The MC_DT enumerated type is defined in "mc3msg.h". They are:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number
Float_Type	Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	The attribute's value will be returned here.
BufferSize	The size of the *Value* buffer in bytes.
ValueSize	The size (in bytes) of the value returned in the *Value* buffer.

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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.

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).
MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC64_Get_pValue, MC64_Get_pValue_To_Buffer** and **MC64_Get_pValue_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type. (E.g., using **MC64_Get_pValue_To_Int** when the value is 123.45; or instances where the value's sign(+|–) would be affected)
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.

See Also

MC64_Get_pValue_To_Function
MC64_Get_Next_pValue... Functions
MC64_Get_Next_Value... Functions
MC64_Get_Value_To_Function
MC64_Get_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,
```

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```
      unsigned short Group,
      unsigned char ElementByte,
      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.
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*.
ValueNumber	Retrieve the length of this attribute value.
Length	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_NULL_POINTER_PARM	*Length* or *PrivateCode* was NULL.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	No value has been assigned to the attribute.

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MC_INVALID_VALUE_NUMBER	*ValueNumber* was negative or the attribute does not have that many values.
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_TEMP_FILE_ERROR	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)()
)
```

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*.
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:

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```
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_pValue_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_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 *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*.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB, OW, or OF.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	*YourGetFunction* returned with **MC_CANNOT_COMPLY***.*

See Also

MC64_Get_Value
MC64_Get_pValue
MC64_Get_Next_pValue
MC64_Get_Value_To_Function
MC64_Get_Next_Value

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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
)
```

MessageID	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
StartTag	The DICOM tag identifying the first attribute which would be streamed.
StopTag	The DICOM tag identifying the last attribute which would be streamed
LengthPtr	Location where Merge DICOM Toolkit will return the stream length.
SyntaxType	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”:

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IMPLICIT_LITTLE_ENDIAN
IMPLICIT_BIG_ENDIAN
EXPLICIT_LITTLE_ENDIAN
EXPLICIT_BIG_ENDIAN
DEFLATED_EXPLICIT_LITTLE_ENDIAN
ENCAPSULATED_UNCOMPRESSED_ELE
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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_INVALID_TRANSFER_SYNTAX	*SyntaxType* is not one of the **TRANSFER_SYNTAX** codes defined in "mc3msg.h".
MC_NULL_POINTER_PARM	*LengthPtr* 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,
```

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```
      unsigned long long *ValueSize,
      MC_Uhar *Value
)
MC_STATUS MC64_Get_Value_To_Buffer (
      int MsgFileItemID,
      unsigned long Tag,
      unsigned long long BufferSize,
      char *Value,
      unsigned long long *ValueSize
)
```

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 which should be used for the returned value in *Value*. The MC_DT enumerated type is defined in "mc3msg.h". They are:

String_Type	Null-terminated character string
Int_Type	Binary integer number
UInt_Type	Binary unsigned integer number
ShortInt_Type	Binary short integer number
UShortInt_Type	Binary unsigned short integer number
LongInt_Type	Binary long integer number
ULongInt_Type	Binary unsigned long integer number
LongLong_Type	Binary 64-bit integer number
UlongLong_Type	Binary 64-bit unsigned integer number **Float_Type** Binary Floating point number
Double_Type	Binary Floating point number
Buffer_Type	Binary byte value

Value	The attribute's value will be returned here.
BufferSize	The size of the *Value* buffer in bytes.
ValueSize	The size (in bytes) of the value returned in the *Value* buffer. If *DataType* is **String_Type**, 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 *DataType* 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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).

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MC_BUFFER_TOO_SMALL	Buffer is not large enough to contain the value. (**MC64_Get_Value, MC64_Get_Value_To_Buffer** and **MC64_Get_Value_To_String** only)
MC_INCOMPATIBLE_VR	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.
MC_INCOMPATIBLE_VALUE	The attribute's value is not consistent with its VR. (This should never happen.)
MC_VALUE_OUT_OF_RANGE	The attribute numeric value is too large to be accommodated by the receiving data type.
MC_INVALID_DATA_TYPE	The *DataType* parameter is invalid.
MC_CANNOT_COMPLY	**The function fails to process the request. Consult Merge DICOM Toolkit log file for detail.**

See Also

MC64_Get_pValue... Functions
MC64_Get_Next_pValue... Functions
MC64_Get_Next_Value... Functions
MC64_Get_pValue_To_Function
MC64_Get_Value_To_Function
MC_Enable_Unicode_Conversion

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

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*Length* was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_NULL_VALUE	The attribute contains a NULL value (i.e. its value is of length zero).
MC_EMPTY_VALUE	No value has been assigned to the attribute.
MC_INVALID_VALUE_NUMBER	*ValueNumber* was negative, or the attribute does not have that many values.
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_TEMP_FILE_ERROR	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"
```

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```
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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB, OW, OF, SL, SS, UL, US, AT, FL or FD.
MC_EMPTY_VALUE	No value has been assigned to this attribute yet.
MC_CALLBACK_CANNOT_COMPLY	***YourGetFunction*** returned with **MC_CANNOT_COMPLY**.

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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)()
)
```

MessageID	The identifier assigned to this object by the MC_Open_Message function or the MC_Open_Item function.
StartTag	The DICOM tag identifying the first attribute which should be streamed.
StopTag	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_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_PROG
RESSIVE_ACTIVE_VIDEO
SMPTE_ST_2110_20_UNCOMPRESSED_INTER
LACED_ACTIVE_VIDEO
SMPTE_ST_2110_30_PCM_DIGITAL_AUDIO
PRIVATE_SYNTAX_1
PRIVATE_SYNTAX_2

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UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

CBmessageID	The identifier assigned to the message object by the **MC_Open_Message** function.
CBuserInfo	Address of data which is being passed from the **MC64_Message_To_Stream** function. This may be NULL.
CBdataBufferStart	The address of the buffer containing stream data from the message object.
CBdataBufferEnd	The address next to the end of the buffer containing stream data from the message object, that is, *CBdataBufferStart* + the number of bytes of stream data being provided to you in *CBdataBufferStart.*
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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.

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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 **CBdataBufferEns* 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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
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_MESSAGE_EMPTY	The message has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	***YourReceiveStreamFunction*** returned a value other than MC_NORMAL_COMPLETION.
MC_INVALID_TRANSFER_SYNTAX	An invalid code was used for the *SyntaxType* parameter.
MC_TEMPFILE_ERROR	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

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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())
)
```

ApplicationID	The identifier assigned to this object by the **MC_Register_Application** function.
FileID	The identifier assigned to this object by the **MC_Create_File** or **MC_Create_Empty_File** functions.
UserInfo	Address of data which will be passed on to *YourFromMediaFunction* each time it is called. This may be NULL.
AbypassTagValue	Bypass an attribute value if TRUE.
	Note:

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	For **MC64_Open_File_Upto_Tag_Bypass_Value** this argument is unused, as the function will *by definition* bypass the attribute value. Retained for backward compatibility only.
Tag	The attribute after which to stop reading the file from media.
Offset	Upon successful completion, the offset in bytes from the beginning of the file of: - the first attribute greater than *Tag* (for **MC64_Open_File_Upto_Tag**) - the data of the attribute at *Tag* (for **MC64_Open_File_Upto_Tag_Bypass_Value**) is returned here.
YourFromMediaFunction	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
)
```

CBfilename	String filename associated with the file object
CBuserInfo	Address of data which is being passed from the **MC64_Open_File...** function. This may be NULL.
CBdataBufferStart	Set **CBdataBufferStart* to the address of the data you are providing.
CBdataBufferEnd	Set **CBdataBufferEnd* to the address next after the address of the end of the data, that is *CBdataBufferStart +* the number of bytes of the data
CBisFirst	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourFromMediaFunction* to request data blocks.
CBisLastPtr	Set **CBisLastPtr* 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.

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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 *CBuserInfo* 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 then *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

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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.

Do not reuse data in your buffer

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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*FileIDPtr, **YourFromMediaFunction***, or *Filename* was NULL.
MC_INVALID_APPLICATION_ID	The application ID does not identify a valid Merge DICOM Toolkit application.
MC_INVALID_FILE	An invalid DICOM Prefix was found within the file. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_INVALID_TRANSFER_SYNTAX	An invalid transfer syntax code was found within the file's DICOM File Meta Information.
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_CALLBACK_CANNOT_COMPLY	*YourFromMediaFunction* returned with a status other than MC_NORMAL_COMPLETION.
MC_CALLBACK_DATA_SIZE_UNEVEN	The size parameter returned by *YourFromMediaFunction* was an uneven number.
MC_CALLBACK_PARM_ERROR	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See **MC64_Register_Callback_Function** for details.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	The file contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_UNEXPECTED_EOD	*YourFromMediaFunction* 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

MC64_Register_Callback_Function **MC64_Write_File** **MC64_Write_File_By_Callback**

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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)()
)
```

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".
ServiceName	The name of the service is returned here.
Command	The command which is associated with the message is returned here. The **MC_COMMAND** enumerated values are defined in "mc3msg.h".
Filename	The name of file associated with the receiving message. This may be NULL.
UserInfo	Address of data which will be passed on to *YourReceiveStreamFunction* each time it is called. This may be NULL.
YourReceiveStreamFunction	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
)
```

CBmessageID	The internal identifier assigned to the receiving message object. It becomes invalid once the message is received.

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CBuserInfo	Address of data which is being passed from the **MC64_Message_To_Stream** function. This may be NULL.
CBdataBufferStart	The address of the buffer containing stream data from the message object.
CBdataBufferEnd	The address next to the end of the buffer containing stream data from the message object, that is, *CBdataBufferStart* + the number of bytes of stream data being provided to you in *CBdataBufferStart.*
CBisFirst	Is TRUE (not zero) when Merge DICOM Toolkit is providing the first block of stream data.
CBisLast	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 **CBdataBufferEns* 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*.

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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”**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_TIMEOUT	The *Timeout* period expired.
MC_MUST_CONTINUE_BEFORE_READING	A previous message was not read completely before making this call.
MC_NULL_POINTER_PARM	The *MessageID*, *ServiceName* or *Command* parameter was NULL.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
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_NETWORK_SHUT_DOWN	The network connect unexpectedly dropped.
MC_ASSOCIATION_ABORTED	The association has been aborted. A message describing the error has been written to the Merge DICOM Toolkit log file.
MC_ASSOCIATION_CLOSED	The association has been closed.
MC_INACTIVITY_TIMEOUT	A timeout occurred in the middle of receiving a message.
MC_CONFIG_INFO_ERROR	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**
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,
```

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```
      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 or *pCallbackFunction*	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
)
```

CBmessageID	Merge DICOM Toolkit sets this to the identifier assigned to the message, item or file object by the **MC_Open_Message** function.

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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 **MC64_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

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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.

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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.

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CBisFirst	If *CBtype* is REQUEST_FOR_DATA, then Merge DICOM Toolkit will set *CBisFirst* 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). If *CBtype* is PROVIDING_DATA , then Merge DICOM Toolkit will set *CBisFirst* 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). If *CBtype* is PROVIDING_OFFSET_TABLE, then Merge DICOM Toolkit will set *CBisFirst* to TRUE (not zero) the first time it is providing data for the basic offset table. If *CBtype* is REQUEST_FOR_DATA_LENGTH, *CBtype* is PROVIDING_DATA_LENGTH, or *CBtype* is PROVIDING_MEDIA_DATA_LENGTH this parameter is not used.
CBisLastPtr	If *CBtype* is REQUEST_FOR_DATA or REQUEST_FOR_DATA_WITH_OFFSET, then you must set **CBisLastPtr* 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). If *CBtype* is PROVIDING_DATA, then Merge DICOM Toolkit has set **CBisLastPtr* 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). 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

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

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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:

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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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*CallbackFunction*, *pCallbackFunction* or *PrivateCode* were NULL.
MC_INVALID_APPLICATION_ID	ApplicationID does not identify a valid application object.
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_Value_From_Function **MC64_Get_Value_To_Function**
MC64_Set_pValue_From_Function **MC64_Get_pValue_To_Function** **MC_Get_Message_Service**
MC64_Open_File
MC64_Open_File_Bypass_OBOW **MC64_Open_File_Upto_Tag**
MC64_Open_File_Upto_Tag_Bypass_Value
MC64_Release_Callback_Function **MC_Register_Application**
MC_Set_Message_Callbacks

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)()
)
```

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
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

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)()
)
```

AssociationID	The association object's identification number
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 request data.

The function must be prototyped as follows:

```
MC_STATUS CallbackFunction (
      int CBAssociationID,
```

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```
      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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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.

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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)()
)
```

AssociationID	The association object's identification number
AserviceName	Name of the service negotiated to utilize for the presentation context.
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.

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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* 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_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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_ASSOC_ID	*AssociationID* is not a valid association object ID.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_MAX_OPERATIONS_EXCEEDED	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_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)()
)
```

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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
)
```

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_Encapsulated_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 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

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(*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 *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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation was not OB or OW.

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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
)
```

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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_Next_Encapsulated_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 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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_TRANSFER_SYNTAX	The message's transfer syntax is non-encapsulated.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	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_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,
```

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```
      const MC_Uhar *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.
Value	The attribute should be set to this value.
ValueLength	Length of provided *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.

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*

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MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table above.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_Value... Functions
MC_Set_Value_To_NULL
MC64_Set_pValue... Functions
MC_Set_pValue_To_NULL
MC64_Set_Next_Value... Functions
MC64_Set_Value_From_Function
MC_Set_Value_To_Empty
MC64_Set_pValue_From_Function
MC_Set_pValue_To_Empty
MC64_Stream_To_Message

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_Uhar *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*.

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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

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Return Value

One of these enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.

ERRORS:

MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_CANNOT_COMPLY	**The function fails to process the request. Check Merge DICOM Toolkit log for detail.**

See Also

MC64_Set_Value... Functions
MC64_Set_Value_From_Function
MC_Set_Value_To_NULL
MC_Set_Value_To_Empty
MC64_Set_pValue... Functions
MC64_Set_pValue_From_Function
MC_Set_pValue_To_NULL
MC_Set_pValue_To_Empty

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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
)
```

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*.
Value	The attribute should be set to this value.
ValueLength	Length of provided *Value*.

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**.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.
ERRORS:	
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode*. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table above.

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MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_Value... Functions
MC_Set_Value_To_NULL
MC64_Set_pValue_From_Function
MC_Set_pValue_To_Empty
MC64_Set_Next_pValue... Functions
MC64_Set_Value_From_Function
MC_Set_Value_To_Empty
MC_Set_pValue_To_NULL
MC64_Set_Next_Value... Functions
MC64_Stream_To_Message

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)()
)
```

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.

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ElementByte	The number identifying the private attribute within the private *Group* for this *PrivateCode*.
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_pValue_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, 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.

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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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*PrivateCode* or *YourSetFunction* was NULL.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INVALID_TAG	The message does not contain an attribute identified by *ElementByte* in *Group* for *PrivateCode.*
MC_INVALID_GROUP	*Group* was not an odd number.
MC_INVALID_PRIVATE_CODE	The message does not contain any attributes in *Group* for *PrivateCode.*
MC_INCOMPATIBLE_VR	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_PARM_ERROR	The value set by ***YourSetFunction*** in its **CBdataBufferStart* parameter was NULL and **CBisLastPtr* was not set to true(non-zero).
MC_CALLBACK_DATA_SIZE_NEGATIVE	The number of bytes of the value set by ***YourSetFunction*** was a negative number
MC_CALLBACK_DATA_SIZE_UNEVEN	The number of bytes of the value set by ***YourSetFunction*** was an odd number

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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_NULL**
MC_Set_pValue_To_Empty **MC64_Set_Value... Functions** **MC_Set_Value_To_NULL** **MC_Set_Value_To_Empty**
MC64_Set_Next_Value... Functions **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_Uchar* 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**.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_CHARS_IN_VALUE	A string-type *Value* had invalid characters for the value representation of *Tag*.
MC_INVALID_VALUE_FOR_VR	*Value* does not conform to the requirements of its value representation.

ERROR MESSAGES:

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MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
MC_INVALID_DATA_TYPE	*DataType* is not valid.
MC_TOO_MANY_VALUES	This attribute contains the most values that a standard attribute can contain (65535).
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_CANNOT_COMPLY	**The function fails to process the request. Check Merge DICOM Toolkit log for detail.**

See Also

MC64_Set_Value_From_Function
MC_Set_Value_To_Empty
MC64_Set_pValue_From_Function
MC_Set_pValue_To_Empty Functions
MC_Set_Value_To_NULL
MC64_Set_pValue... Functions
MC_Set_pValue_To_NULL
MC64_Set_Next_Value... Functions MC64_Set_Next_pValue...
MC_Enable_Unicode_Conversion

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"
```

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```
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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_TAG	The message does not contain an attribute with an ID of *Tag*. The attribute can be added with **MC_Add_Standard_Attribute**. Note: This status will not be returned if setting the value of a message object which was opened using **MC_Open_Empty_Message** or **MC_Create_Empty_File**. In that case, the attribute is automatically added to the object before setting the value.
MC_INVALID_MESSAGE_ID	*MsgFileItemID* is not a valid message object ID, file object ID or item object ID.
MC_INCOMPATIBLE_VR	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.

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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.

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SyntaxType	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_ELE 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

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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
ErrorTagPtr	If an error occurs, **ErrorTagPtr* will be set to the tag which caused the error.
Offset	The offset from the beginning of the stream to the attribute after *StopTag*.
UserInfo	Address of data which will be passed on to *YourStreamToFunction* each time it is called. This may be NULL.
YourStreamToFunction	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
)
```

CbmessageID	The identifier assigned to the message object by the **MC_Open_Message** function.
CbuserInfo	Address of data which is being passed from the **MC64_Stream_To_Message** function. This may be NULL.
CBFirstCall	This is TRUE (non-zero) the first time Merge DICOM Toolkit calls *YourStreamToFunction* to request data blocks.
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 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 *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*.

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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*YourStreamToFunction* or *ErrorTagPtr* was NULL.
MC_INVALID_MESSAGE_ID	The *MessageID* value is not a valid message object ID.
MC_INVALID_TRANSFER_SYNTAX	An invalid code was used for the *SyntaxType* parameter.
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_CALLBACK_CANNOT_COMPLY	*YourStreamToFunction* returned with a status other than MC_NORMAL_COMPLETION.
MC_CALLBACK_DATA_SIZE_UNEVEN	The number of bytes returned by the *YourStreamToFunction* was an uneven number.
MC_CALLBACK_PARM_ERROR	A callback function registered by your application returned an empty (NULL) data buffer when the buffers length was specified as being non-zero. See **MC64_Register_Callback_Function**.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	The message contains an invalid tag. The tag is placed at **ErrorTagPtr.*
MC_VALUE_TOO_LARGE	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.
MC_UNEXPECTED_EOD	*YourStreamToFunction* stopped without passing the entire value for an attribute.
MC_INVALID_LENGTH_FOR_VR	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**

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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()
)
```

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,
      void *CbdataBufferStart,
      void *CbdataBufferEnd,
      int CbisFirst,
      int CbisLast
)
```

Cbfilename	The filename associated with the file object by the **MC_Create_Empty_File** or **MC_Create_File** function.

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CbuserInfo	Address of data which is being passed from the **MC64_Write_File** function. This may be NULL.
CbdataBuffer Start	The address of the buffer containing file data from the file object.
CbdataBuffer End	The address next after the address of buffer end, that is *CbdataBufferStart +* the number of bytes of file data being provided in *CbdataBufferStart*.
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

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.

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- 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"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INVALID_APPLICATION_ID	The *ApplicationID* value is not a valid application object ID.
MC_INVALID_FILE_ID	The *FileID* value is not a valid file object ID.
MC_INVALID_PAD	The *NumBytes* parameter contained too large of a number or an odd number.
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_MESSAGE_EMPTY	The file has no attributes in it.
MC_CALLBACK_CANNOT_COMPLY	***YourToMediaFunction*** returned a value other than MC_NORMAL_COMPLETION.
MC_INVALID_TRANSFER_SYNTAX	The transfer syntax is improperly specified or is not specified in the DICOM File Meta Information attributes.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.

See Also

MC64_Open_File
MC_Create_File
MC_Create_Empty_File

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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
)
```

FilePath	Path to the DICOMDIR file (including the file name).
FileSetID	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.
TemplateFileID	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.
DirMsgIDPtr	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	*FilePath* or *DirMsgIDPtr* was NULL.
MC_INVALID_MESSAGE_ID	The *TemplateFileID* is not a valid toolkit file object identifier.
MC_INVALID_CHARS_IN_VALUE	The *FileSetID* argument contains invalid characters.
MC_INVALID_VALUE_FOR_VR	The *FileSetID* argument does not conform to the requirements of the CS value representation.
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_CALLBACK_CANNOT_COMPLY	A file read or write operation failed.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.
MC_TEMPFILE_ERROR	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 exising DICOMDIR file.

Synopsis

```
#include "mc3media.h"

MC_STATUS MC_DDH_Create (
      const char *FilePath,
      int *DirMsgIDPtr
)
```

FilePath	Path to the DICOMDIR file (including the file name).
DirMsgIDPtr	Pointer to a variable receiving the toolkit identifier of the new directory object.

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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, whithout 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 Seqyuence (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
MC_NORMAL_COMPLETION	The function completed normally.
MC_UNEXPECTED_EOD	The specified file does not contain all data necessary to decode an attribute's value.
MC_INVALID_FILE	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.
MC_INVALID_TRANSFER_SYNTAX	An invalid transfer syntax code was found within the file's DICOM File Meta Information.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	The file contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_CALLBACK_CANNOT_COMPLY	A file read operation failed.

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MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_INVALID_VALUE_FOR_VR	The *FileSetID* argument does not conform to the requirements of the CS value representation.
MC_NULL_POINTER_PARM	*FilePath* or *DirMsgIDPtr* was NULL.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
MC_UNABLE_TO_GET_ITEM_ID	The toolkit failed to read the first directory record.
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_LIBRARY_NOT_INITIALIZED	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 seqeunce 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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	*DirMsgID* is not a valid toolkit directory object identifier.
MC_INVALID_FILE	A failure occured while writing the file. The DICOMDIR file may be corrupted.
MC_CALLBACK_CANNOT_COMPLY	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 **MC_Free_File**.
MC_INVALID_DIRECTORY_RECORD_OFFSET	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.
MC_TEMPFILE_ERROR	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.
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 DICOMDIR file is in a consistent state but the directory object can not be reliably used and it should be freed using **MC_Free_File**.
MC_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_DDH_Create **MC_DDH_Open**
MC_DDH_Add_Record **MC_DDH_Delete_Record**

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)()
)
```

RootID	The object identifier of the record or directory representing the root for the traversal.
UserData	The pointer to be passed to the user's callback. The value of this argument is not interpreted by the toollkit and it can be NULL

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YourTraverseCallback	The function to be called for each record being visisted

The function must be prototyped as follows:

```
MC_TRAVERSAL_STATUS YourTraverseCallback (
      int CurrentRecID,
      void *UserData
)
```

CurrentRecID	The identifier of the directory record being traversed.
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 direcory object. The application can controll 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 occured 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_DICOMDIR_ID	The *RootID* argument does not represent a valid record or directory object identifier
MC_NULL_POINTER_PARM	The *YourTraverseCallback* argument was NULL.
MC_CALLBACK_CANNOT_COMPLY	The callback function returned MC_TS_ERROR or an invalid status or a file read operation failed.
MC_INVALID_DIRECTORY_RECORD_OFFSET	A directory record offset value is not correct.
MC_UNEXPECTED_EOD	Not enough data to decode an attribute's value.

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MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	A record item contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_VALUE_FOR_VR	The value for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	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
)
```

RecordID	The toolkit identifier of the record.
RecType	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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *RecordID* argument does not represent a valid record object identifier.
MC_NULL_POINTER_PARM	The *RecType* argument was NULL.
MC_LIBRARY_NOT_INITIALIZED	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
)
```

RecordID	The identifier of the record object for which the parent record is requested.
ParentID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *RecordID* argument does not represent a valid record object identifier.
MC_NULL_POINTER_PARM	The *ParentID* argument was NULL.
MC_CALLBACK_CANNOT_COMPLY	A file read operation failed.
MC_INVALID_DIRECTORY_RECORD_OFFSET	A directory record offset value is not correct.
MC_UNEXPECTED_EOD	Not enough data to decode an attribute's value.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	A record item contains an invalid tag.

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MC_VALUE_TOO_LARGE	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.
MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_VALUE_FOR_VR	The value for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	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
)
```

RecordID	The identifier of the record object of which the next record is requested.
ParentID	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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_RECORD_ID	The *RecordID* argument does not represent a valid record object identifier.
MC_NULL_POINTER_PARM	The *NextID* argument was NULL.
MC_CALLBACK_CANNOT_COMPLY	A file read operation failed.
MC_INVALID_DIRECTORY_RECORD_OFFSET	A directory record offset value is not correct.
MC_UNEXPECTED_EOD	Not enough data to decode an attribute's value.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	A record item contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_VALUE_FOR_VR	The value for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *ParentID* argument does not represent a valid record or DICOMDIR object identifier.
MC_NULL_POINTER_PARM	The *LowerID* argument was NULL.
MC_CALLBACK_CANNOT_COMPLY	A file read operation failed.
MC_INVALID_DIRECTORY_RECORD_OFFSET	A directory record offset value is not correct.
MC_UNEXPECTED_EOD	Not enough data to decode an attribute's value.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	A record item contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_VALUE_FOR_VR	The value for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

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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
)
```

SourceID	The ID of the source message, file, item or record object containing the values to be copied.
DestID	The ID of the destination message, file, item or record object which will receive the values.
TagList	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_MESSAGE_ID	The source or destiantion ID value is not a valid toolkit object identifier.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

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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
)
```

ParentID	The identifier of a directory object obtained using **MC_DDH_Create** or **MC_DDH_Open** functions or the identifier of a record object obtained using one of the **MC_DDH_**... record navigation functions.
RecordType	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 **MC_DDH_Update**.
RecordID	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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *ParentID* argument does not represent a valid record or DICOMDIR object identifier.
MC_NULL_POINTER_PARM	The *RecordID* argument was NULL.
MC_INVALID_LOWER_DIR_RECORD	The record type specified in the *RecordType* argument is not a valid lower level record of the parent record.
MC_BAD_DIR_RECORD_TYPE	The type of the parent record is unknown.
MC_CALLBACK_CANNOT_COMPLY	A file read operation failed.
MC_INVALID_DIRECTORY_RECORD_OFFSET	A directory record offset value is not correct.
MC_UNEXPECTED_EOD	Not enough data to decode an attribute's value.
MC_OUT_OF_ORDER_TAG	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.
MC_INVALID_TAG	A record item contains an invalid tag.
MC_VALUE_TOO_LARGE	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.
MC_INVALID_LENGTH_FOR_VR	The value length for one of the file attributes was not legal for its value representation.
MC_INVALID_VALUE_FOR_VR	The value for one of the file attributes was not legal for its value representation.
MC_INVALID_CHARS_IN_VALUE	A value for an attribute does not contain valid characters for its value representation.
MC_TEMPFILE_ERROR	A value for an attribute is stored temporarily on file and an I/O error occurred.
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_LIBRARY_NOT_INITIALIZED	The library has not been properly initialized.

See Also

MC_DDH_Create
MC_DDH_Open
MC_DDH_Update

MC_DDH_Delete_Record

Deletes a directory record.

Synopsis

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

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```
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *RecordID* argument does not represent a valid record object identifier.
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_LIBRARY_NOT_INITIALIZED	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.

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This function does not modify the directory record hierarchy.

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_RECORD_ID	The *RecordID* argument does not represent a valid record object identifier.
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_LIBRARY_NOT_INITIALIZED	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
)
```

AserviceName	The service (Sop Class) the SR uses.
AtemplateId	DICOM Template Identifier that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
Acontinuity	Enumerated value specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
AconceptNameValue	Code Value describing the concept represented by the root Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning

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AsrRootID	Pointer that receives a numeric identifer 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One of the parameters was NULL.
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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrRootID value is not a valid SR tree management object ID.
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_Add_Child

Adds a child node to the provided parent SR node.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_VALUE_NOT_ALLOWED	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_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
)
```

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AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Atext	A text value to be stored in this node.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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
)
```

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AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Atext	A text value to be stored in this node.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	Numeric handle pointing to the SR node.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
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.
AsrChildNodeID	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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.

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MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
AnumericValue	Numeric Value
AunitsCodeValue	Coded expression of measurement units.
AunitsCodingScheme	Coding Scheme Designator of the measurement units.
AunitsCodeMeaning	Code Meaning of the measurement units.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.

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MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.

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MC_TEMP_FILE_ERROR	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.
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_Set_NUM_Next_Data

Sets the next Numeric Value.

Synopsis

```
MC_STATUS MC_SRH_Set_NUM_Next_Data (
      int AsrNodeID,
      char *AnumericValue
)
```

AsrNodeID	An Identifier of the NUM SR item.
AnumericValue	Numeric Value

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Adatetime	A date time string in the DICOM format.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Adatetime	A date time string in the DICOM format.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Adate	A date string in the DICOM format.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Adate	A date string in the DICOM format.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_Add_TIME_Child

Creates a new child DATETIME node under the provided parent.

Synopsis

```
MC_STATUS MC_SRH_Add_TIME_Child (
```

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```
        int AsrNodeID,
        SR_RELATIONSHIP Arelationship,
        const char *AconceptNameValue,
        const char *AconceptNameScheme,
        const char *AconceptNameMeaning,
        const char *Atime,
        int *AsrChildNodeID
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Atime	A time string in the DICOM format.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_TIME_Node

Creates a new TIME node.

Synopsis

```
MC_STATUS MC_SRH_Create_TIME_Node (
```

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```
      const char *AconceptNameValue,
      const char *AconceptNameScheme,
      const char *AconceptNameMeaning,
      const char *Atime,
      int *AsrNodeID
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator.
AconceptNameMeaning	Code Meaning.
Atime	A time string in the DICOM format.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_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,
```

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```
      int *AsrChildNodeID
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
AuidRef	Unique Identifier (UID) of the entity identified by the Concept Name.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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
```

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```
)
```

AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
AuidRef	Unique Identifier (UID) of the entity identified by the Concept Name.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.

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AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
ApersonName	Person name of the person whose role is described by the Concept Name.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator

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AconceptNameMeaning	Code Meaning
ApersonName	Person name of the person whose role is described by the Concept Name.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
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.

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AgraphicType	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_MULTIPOINT = 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.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_SCOORD_Node

Creates a new SCOORD node.

Synopsis

```
MC_STATUS MC_SRH_Create_SCOORD_Node (
      float Acolumn,
```

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```
        float Arow,
        SR_GRAPHIC_TYPE AgraphicType,
        int *AsrNodeID
)
```

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.
AgraphicType	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_MULTIPOINT = 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.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
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_MULTIPOINT 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
AsrChildNodeID	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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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_MULTIPOINT multiple temporal points SR_TRT_SEGMENT a range between two temporal points SR_TRT_MULTISEGMENT multiple segments, each denoted by two temporal points

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	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
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the TCOORD SR item.
ArefSamplePosition	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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The *SRID* value is not a valid SR tree management object ID.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
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.
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_MULTIPOINT 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
AsrChildNodeID	Pointer to the variable receiving an identifier of the new SR node.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.
MC_TEMP_FILE_ERROR	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.
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_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.

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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_MULTIPOINT 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
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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_MULTIPOINT multiple temporal points

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	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
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_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
)
```

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.

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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_MULTIPOINT 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
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AsopClassUid	A SOP Class UID of a Composite object which is not an Image or Waveform.
AsopInstanceUid	A SOP Instance UID of a Composite object which is not an Image or Waveform.
AsrChildNodeID	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"**:

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Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_COMPOSITE_Node

Creates a new COMPOSITE node.

Synopsis

```
MC_STATUS MC_SRH_Create_COMPOSITE_Node (
      const char *AsopClassUid,
      const char *AsopInstanceUid,
      int *AsrNodeID
)
```

AsopClassUid	A SOP Class UID of a Composite object which is not an Image or Waveform.
AsopInstanceUid	A SOP Instance UID of a Composite object which is not an Image or Waveform.
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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.

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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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AsopClassUid	A SOP Class UID of an Image object.
AsopInstanceUid	A SOP Instance UID of an Image object.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_IMAGE_Node

Creates a new IMAGE node.

Synopsis

```
MC_STATUS MC_SRH_Create_IMAGE_Node (
      const char *AsopClassUid,
      const char *AsopInstanceUid,
      int *AsrNodeID
)
```

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AsopClassUid	An SOP Class UID of an Image object.
AsopInstanceUid	An SOP Instance UID of an Image object.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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
)
```

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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.

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MC_TEMP_FILE_ERROR	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.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AsopClassUid	An SOP Class UID of a Waveform object.
AsopInstanceUid	An SOP Instance UID of a Waveform object.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The Arelationship value is not valid.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	The ArefChannelsSize value is < 1.
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_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.

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AtemplateId	Template Identifer that describes the content of this Content Item and its subsidiary Content Items.
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_CONTAINER_Node

Creates a new CONTAINER node.

Synopsis

```
MC_STATUS MC_SRH_Create_CONTAINER_Node (
      SR_CONT_CONTINUITY Acontinuity,
      const char *AtemplateId,
      int *AsrNodeID
)
```

Acontinuity	Enumerated value specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
AtemplateId	DICOM Template Identifer that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
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

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MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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
)
```

AsrNodeID	An Identifier of the parent SR item to which the child is to be added.
Arelationship	Enumerated value representing a relationship.
AconceptNameValue	Code Value describing the concept represented by this Content Item.
AconceptNameScheme	Coding Scheme Designator
AconceptNameMeaning	Code Meaning
Arows	The number of rows in this TABLE item
Acolumns	The number of columns in this TABLE item
AtableRowDefs	The concepts that define the meaning of the rows of the table
AtableRowDefsCount	The number of items in the Table Row Definition Sequence
AtableColDefs	The concepts that define the meaning of the columns of the table

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AtableColDefsCount	The number of items in the Table Column Definition Sequence
AtableCellValues	The values of each populated cell in the table, identified by row and column
AtableCellValuesCount	The number of items in the Cell Values Sequence
AsrChildNodeID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_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

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AconceptNameMeaning	Code Meaning
Arows	The number of rows in this TABLE item
Acolumns	The number of columns in this TABLE item
AtableRowDefs	The concepts that define the meaning of the rows of the table
AtableRowDefsCount	The number of items in the Table Row Definition Sequence
AtableColDefs	The concepts that define the meaning of the columns of the table
AtableColDefsCount	The number of items in the Table Column Definition Sequence
AtableCellValues	The values of each populated cell in the table, identified by row and column
AtableCellValuesCount	The number of items in the Cell Values Sequence
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
MC_NORMAL_COMPLETION	The function completed normally.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_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.

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AtableRowDef	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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
)
```

AsrNodeID	An Identifier of the TABLE SR item.
AtableColDef	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_VALUE_NOT_ALLOWED	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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_NodeType

Returns node type for the specified SR node.

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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

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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,
```

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```
        SR_RELATIONSHIP *Arelationship,
        SR_CONTENT_TYPE *AnodeType,
        int *AisLast
)
```

AsrNodeID	The identifier assigned to this SR tree item.
AsrChildNodeID	Upon successful completion, the item object identifier of the first SR tree management node in the SR tree management entity AsrChildNodeID is returned here. At a given parent *SRID* a pointer to the next record is maintained.
Arelationship	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
AnodeType	Returns an enumerated node type. See **MC_SRH_Get_NodeType** function.
AisLast	Upon successful completion, this parameter is set to true (non-zero) if the first record in the SR tree management entity AsrChildNodeID 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_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 (
```

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```
        int AsrNodeID,
        int *AsrChildNodeID,
        SR_RELATIONSHIP *Arelationship,
        SR_CONTENT_TYPE *AnodeType,
        int *AisLast
)
```

AsrNodeID	The identifier assigned to this SR tree item.
AsrChildNodeID	Upon successful completion, the item object identifier of the next SR tree management node in the SR tree management entity AsrChildNodeID is returned here. At a given parent *SRID* a pointer to the next record is maintained.
Arelationship	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
AnodeType	Returns an enumerated node type. See **MC_SRH_Get_NodeType** function.
AisLast	Upon successful completion, this parameter is set to true (non-zero) if the next record in the SR tree management entity AsrChildNodeID 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
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_Concept_Name

Returns the Concept Name values for the node.

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Synopsis

```
MC_STATUS MC_SRH_Get_Concept_Name (
      int AsrNodeID,
      char AconceptNameValue[],
      int AconceptNameValueSize,
      char AconceptNameScheme[],
      int AconceptNameSchemeSize,
      char AconceptNameMeaning[],
      int AconceptNameMeaningSize
)
```

AsrNodeID	An Identifier of the SR item.
AconceptNameValue	Returns Code Value describing the concept represented by this Content Item.
AconceptNameValueSize	Code Value buffer size
AconceptNameScheme	Returns Coding Scheme Designator
AconceptNameSchemeSize	Coding Scheme Designator buffer size
AconceptNameMeaning	Returns Code Meaning
AconceptNameMeaningSize	Code Meaning buffer size

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_TEXT_Data

Returns a TEXT node data.

Synopsis

```
MC_STATUS MC_SRH_Get_TEXT_Data (
      int AsrNodeID,
      char Atext[],
      int AtextSize
)
```

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the NUM SR item.
AnumericValue	Numeric Value
AnumericValueSize	Numeric Value buffer size
AvalueCount	Number of values stored
AunitsCodeValue	Coded expression of measurement units
AunitsCodeValueSize	AunitsCodeValue buffer size
AunitsCodingScheme	Coding Scheme Designator of the measurement units.
AunitsCodingSchemeSize	AunitsCodingScheme buffer size
AunitsCodeMeaning	Code Meaning of the measurement units.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the NUM SR item.
AqualifierCodeValue	Sets Qualification of Numeric Value
AqualifierCodeValueSize	Size of AqualifierCodeValue buffer
AqualifierCodingScheme	Coding Scheme Designator
AqualifierCodingSchemeSize	Size of AqualifierCodingScheme buffer
AqualifierCodeMeaning	Code Meaning
AqualifierCodeMeaningSize	Size of AqualifierCodeMeaning buffer

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_SCOORD_First_Data

Returns an SCOORD node data.

Synopsis

```
MC_STATUS MC_SRH_Get_SCOORD_First_Data (
      int AsrNodeID,
      float *Acolumn,
      float *Arow,
      int *AvalueCount,
      SR_GRAPHIC_TYPE *AgraphicType
)
```

AsrNodeID	An Identifier of the SCOORD SR item.

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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.
AvalueCount	Returns number of value pairs stored.
AgraphicType	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_MULTIPOINT = 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_SCOORD_Next_Data

Returns an SCOORD node data.

Synopsis

```
MC_STATUS MC_SRH_Get_SCOORD_Next_Data (
      int AsrNodeID,
```

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```
        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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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
)
```

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AsrNodeID	An Identifier of the TCOORD SR item.
AdateTimeOffset	Specifies temporal point for reference by absolute time. Data is formated as DICOM DT string.
AdateTimeOffsetSize	Specifies temporal point buffer size.
AvalueCount	Returns number of values stored.
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_MULTIPOINT 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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.

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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
)
```

AsrNodeID	An Identifier of the TCOORD SR item.
AdateTimeOffset	Specifies temporal points for reference by absolute time. Data is formatted as DICOM DT string.
AdateTimeOffsetsSize	Specifies temporal points for buffer size. Note that it is a multi-value string that can long.
AvalueCount	Returns number of values stored.
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_MULTIPOINT 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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.

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MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TCOORD SR item.
AtimeOffset	Specifies temporal points for reference by number of seconds after start of data.
AdateTimeOffsetSize	Specifies temporal point buffer size.
AvalueCount	Returns number of values stored.
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_MULTIPOINT 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

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TCOORD SR item.
AtimeOffset	Specifies temporal points for reference by number of seconds after start of data.
AdateTimeOffsetSize	Specifies temporal point buffer size.

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.

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MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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
)
```

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 first sample is 1. Only the first value returned here.
AvalueCount	Returns number of values stored.
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_MULTIPOINT 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

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	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	The attribute's value is NULL (i.e. its length is zero).

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_IMAGE_Data

Returns an IMAGE node data.

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Synopsis

```
MC_STATUS MC_SRH_Get_IMAGE_Data (
      int AsrNodeID,
      char AsopClassUid[],
      int AsopClassUidSize,
      char AsopInstanceUid[],
      int AsopInstanceUidSize,
      int *ArefFramesCount
)
```

AsrNodeID	An Identifier of the IMAGE SR item.
AsopClassUid	An SOP Class UID of a Composite object which is an Image.
AsopClassUidSize	The size of the SOP Class UID buffer.
AsopInstanceUid	An SOP Instance UID of a Composite object which is an Image.
AsopInstanceUidSize	The size of the SOP Instance UID buffer.
ArefFramesCount	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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[],
```

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```
      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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VR	The attribute's value representation cannot be derived from *Value*. See the table below.
MC_VALUE_OUT_OF_RANGE	A numeric *Value* 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).
MC_TEMP_FILE_ERROR	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.
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_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.

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AsopClassUid	An SOP Class UID of a Composite object which is a Waveform.
AsopClassUidSize	Size of the SOP Class UID buffer.
AsopInstanceUid	An SOP Instance UID of a Composite object which is a Waveform.
AsopInstanceUidSize	Size of the SOP Instance UID buffer.
ArefChannelsCount	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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.

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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 that shall be enough to fit all data.

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TABLE content item.
AvalueCount	Returning the number of items in the Cell Values Sequence

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ArefContentItemIdCount	Returning the number of values in the Referenced Content Item Identifier.
AselectorAttrValueCount	Returning the number of values in the Selector XX Value data element denoted by the Selector Attribute VR.
AselectorAttrTag	Returning the Selector XX Value data element denoted by the Selector Attribute VR.
AcellValuesID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TIME SR item.
AtableColDef	Pointer to a supplied structure in which the next Table Column Definition Sequence item is to be retrieved.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.

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MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TABLE content item.
ArefContentItemIdCount	Returning the number of values in the Referenced Content Item Identifier.
AselectorAttrValueCount	Returning the number of values in the Selector XX Value data element denoted by the Selector Attribute VR.
AselectorAttrTag	Returning the Selector XX Value data element denoted by the Selector Attribute VR.
AcellValuesID	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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.

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MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TABLE content item.
AtableColDef	Pointer to a supplied structure in which the next Table Column Definition Sequence item is to be retrieved.
AtimeSize	Time buffer size

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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.

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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
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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.

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Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.
MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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_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
)
```

AsrNodeID	An Identifier of the TIME SR item.
Acontinuity	Enumerated return value that specifies whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate items.
AtemplateId	DICOM Template Identifer that describes the content of this Content Item and its subsidiary Content Items. Can be NULL.
AtemplateIdSize	The size in bytes of the template Identifier array.

Return Value

One of the enumerated **MC_STATUS** codes defined in **"mcstatus.h"**:

Value	Meaning
MC_NORMAL_COMPLETION	The function completed normally.
MC_INVALID_SR_ID	The AsrNodeID value is not a valid SR tree management object ID.

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MC_NULL_POINTER_PARM	One or more of the pointer-type parameters was NULL.
MC_INCOMPATIBLE_VALUE	The *Acontinuity* value is not valid.
MC_EMPTY_VALUE	The attribute has no value assigned to it.
MC_NULL_VALUE	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.

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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 specifyies 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.

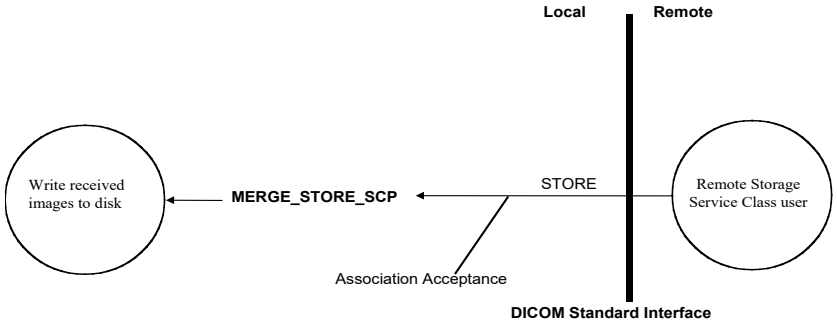

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Figure A-1: MERGE_STORE_SCP application data flow diagram

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

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        - 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.

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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 thi 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.

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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.

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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.

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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

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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 .L*nn* where *nn* is an integer number between 01 and 99. DEFAULT: OFF.

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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.

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Name	Section	Description
MERGECOM_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 *basename*.L01 to *basename*.L*XX* where *basename*.L*XX* is the latest log file. The *basename* 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.

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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.

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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 listens for connections. The commonly used port number is 104. This default value may be overridden by the `MC_Open_Association or MC_Open_Secure_Association` 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 `MC_Open_Association or MC_Open_Secure_Association` 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

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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.

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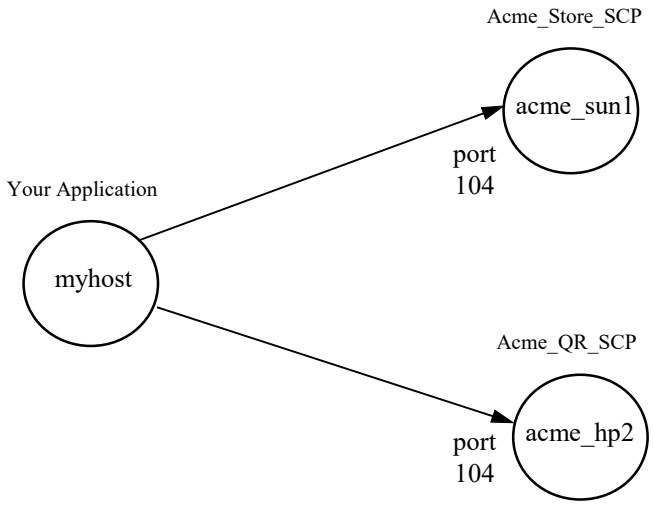

Figure B-1: A sample configuration of DICOM applications

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

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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

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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

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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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
HEIGHT_MAP_SEGMENTATION	Storage
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
LABEL_MAP_SEGMENTATION	Storage
LEGACY_CONVERTED_ENHANCED_CT_IMAGE	Storage
LEGACY_CONVERTED_ENHANCED_MR_IMAGE	Storage
LEGACY_CONVERTED_ENHANCED_PET_IMAGE	Storage
LENSOMETRY_MEASUREMENTS	Storage

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
MACULAR_GRID_THIICKNESS_VOLUME	Storage
MAMMOGRAPHY_CAD_SR	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
PERFORMED_PROCEDURE_STEP_RETRIEVE	Study Management
PHOTOACOUSTIC_IMAGE	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
ROUTINE_SCALP_ELECTROENCEPHALOGRAM_WAVEFORM	Storage
RT_BEAMS_DELIVERY_INSTRUCTION	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_BLENDING_SOFTCOPY_PS	Storage
STANDARD_COLOR_SOFTCOPY_PS	Storage
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_OPHTHALMIC_16_BIT	Storage

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_OPHTHALMIC_8_BIT	Storage
STANDARD_OVERLAY	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
STANDARD_VL_PHOTOGRAPHIC	Storage
STANDARD_VL_SLIDE_MICROSCOPIC	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
SURFACE_SCAN_POINT_CLOUD	Storage
SURFACE_SEGMENTATION	Storage
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

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Merge DICOM Toolkit Service Parameter	DICOM Service Class
WAVEFORM_PRESENTATION_STATE	Storage
WIDE_FIELD_OPHTHALMIC_PHOTO_3D_COORDINATES	Storage
WIDE_FIELD_OPHTHALMIC_PHOTO_STEREOGRAPHIC_PROJ	Storage
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
```

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```
    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

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Merge DICOM Toolkit Transfer Syntax Parameter	Description
IMPLICIT_LITTLE_ENDIAN	Implicit VR Little Endian: Default Transfer Syntax for DICOM
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
DEFLATED_IMAGE_FRAME_COMPRESSION	Deflated Image Frame Compression
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)

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Merge DICOM Toolkit Transfer Syntax Parameter	Description
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)
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)
JPEG_XL	JPEG XL
JPEG_XL_LOSSLESS_SYNTAX	JPEG XL Lossless
JPEG_XL_JPEG_RECOMPRESSION	JPEG XL JPEG Recompression
JPIP_HTJ2K_REFERENCED	JPIP High-Throughput JPEG 2000 Referenced
JPIP_HTJ2K_REFERENCED_DEFLATE	JPIP High-Throughput JPEG 2000 Referenced Deflate

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Merge DICOM Toolkit Transfer Syntax Parameter	Description
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
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]
```

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```
    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.

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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
```

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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
```

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```
[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 `MERGECOM_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.

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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 simmultaneous 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
```

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```
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 accessesed, 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

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`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
ACCEPT_ANY_APPLICATION_TITLE †	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
ACCEPT_ANY_CONTEXT_NAME †	If set to YES, the remote system need not specify the LOCAL_APPL_CONTEXT_NAME when requesting an association. If set to NO, the correct context name must be used. DEFAULT: NO
ACCEPT_ANY_HOSTNAME	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
ACCEPT_ANY_PRESENTATION_CONTEXT †	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
ACCEPT_DIFFERENT_IC_UID †	If set to NO, the remote system must specify the local IMPLEMENTATION_CLASS_UID when requesting an association. If set to YES, a different implementation class UID may be used. DEFAULT: YES
ACCEPT_DIFFERENT_VERSION †	If set to NO, the remote system must specify the local IMPLEMENTATION_VERSION when requesting an association. If set to YES, a different implementation version may be used. DEFAULT: YES

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Name	Description
ACCEPT_LIST_OF_APPLICATION_TITLES	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. Example: ACCEPT_LIST_OF_APPLICATION_TITLES = MERGE_STORE_SCP/MERGE_STORE_SCU/MERGE_STORE_RQ DEFAULT: <none>
ACCEPT_MULTIPLE_PRES_CONTEXTS	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. DEFAULT:YES
ACCEPT_RELATED_GENERAL_SERVICES	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. DEFAULT: NO
ACCEPT_STORAGE_SERVICE_CONTEXTS	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. DEFAULT: NO
ALLOW_EMPTY_PDV_LENGTH	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. DEFAULT: YES
AUTO_ECHO_SUPPORT	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. DEFAULT: YES
DEFLATED_EXPLICIT_LITTLE_ENDIAN_SYNTAX	This value defines the UID of the Deflated Explicit VR Little Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.1.99

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Name	Description
ENCAPSULATED_UNCOMPRESSED_ELE_SYNTAX	This value defines the UID of the Encapsulated Uncompressed Explicit VR Little Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.1.98
EXPLICIT_BIG_ENDIAN_SYNTAX	This value defines the UID of the Explicit VR Big Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.2
EXPLICIT_LITTLE_ENDIAN_SYNTAX	This value defines the UID of the Explicit VR Little Endian transfer syntax. DEFAULT: 1.2.840.10008.1.2.1
HTJ2K_SYNTAX	This value defines the UID of the High-Throughput JPEG 2000 Image Compression transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.203
HTJ2K_LOSSLESS_ONLY_SYNTAX	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
HTJ2K_LOSSLESS_RPCL_SYNTAX	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
JPIP_HTJ2K_REFERENCED_SYNTAX	This value defines the UID of the JPIP High-Throughput JPEG 2000 Referenced transfer syntax (Explicit VR). DEFAULT: 1.2.840.10008.1.2.4.204
JPIP_HTJ2K_REFERENCED_DEFLATE_SYNTAX	This value defines the UID of the JPIP High-Throughput JPEG 2000 Referenced Deflate transfer syntax (Explicit VR). DEFAULT: 1.2.840.10008.1.2.4.205
JPEG_XL_LOSSLESS_SYNTAX	This value defines the UID of the JPEG XL Lossless transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.110
JPEG_XL_JPEG_RECOMPRESSION_SYNTAX	This value defines the UID of the JPEG XL JPEG Recompression transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.111
JPEG_XL_SYNTAX	This value defines the UID of the JPEG XL transfer syntax. DEFAULT: 1.2.840.10008.1.2.4.112

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Name	Description
DEFLATED_IMAGE_FRAME_COMPRESSION_SYNTAX	This value defines the UID of the Deflated Image Frame Compression transfer syntax. DEFAULT: 1.2.840.10008.1.2.8.1
HARD_CLOSE_TCP_IP_CONNECTION	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
IMPLEMENTATION_CLASS_UID	The DICOM Implementation Class UID (as specified in your DICOM conformance statement).
IMPLEMENTATION_VERSION	The Implementation Version Number (as specified in your DICOM conformance statement).
IMPLICIT_BIG_ENDIAN_SYNTAX	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>
IMPLICIT_LITTLE_ENDIAN_SYNTAX	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
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

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Name	Description
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
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

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Name	Description
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
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

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Name	Description
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_SYTAX	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
PDU_MAXIMUM_LENGTH *	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. Note also to see the TCPIP_SEND_BUFFER_SIZE and TCPIP_RECEIVE_BUFFER_SIZE configuration values for improving performance. Example: (1460*44)-6 = 64234 PDU Size DEFAULT: 64234 MINIMUM: 4K MAXIMUM: NONE

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Name	Description
PRIVATE_SYNTAX_1_ENCAPSULATED	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. DEFAULT: NO
PRIVATE_SYNTAX_1_EXPLICIT_VR	When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 1 as being encoded in explicit VR format. DEFAULT: YES
PRIVATE_SYNTAX_1_LITTLE_ENDIAN	When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 1 as being encoded in little endian format. DEFAULT: YES
PRIVATE_SYNTAX_1_SYNTAX	The unique identifier (UID) Merge DICOM Toolkit will use to identify private transfer syntax 1. When this value is set to “<none>”, private transfer syntax support is shut off. DEFAULT: <none>
PRIVATE_SYNTAX_2_ENCAPSULATED	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. DEFAULT: NO
PRIVATE_SYNTAX_2_EXPLICIT_VR	When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 2 as being encoded in explicit VR format. DEFAULT: YES
PRIVATE_SYNTAX_2_LITTLE_ENDIAN	When set to YES, Merge DICOM Toolkit will interpret private transfer syntax 2 as being encoded in little endian format. DEFAULT: YES
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

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Name	Description
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_PARMS] 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
SEND_LENGTH_TO_END †	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
SEND_MSG_ID_RESPONSE †	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
SEND_RECOGNITION_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

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Name	Description
SEND_RESPONSE_PRIORITY †	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
SEND_SOP_CLASS_UID †	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
SEND_SOP_INSTANCE_UID †	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
ARTIM_TIMEOUT	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
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 `MC_Read_Message()` and `MC_Read_To_Stream` 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

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Name	Description
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 `MC_Write_File()` and `MC_Write_File_By_Callback()`. DEFAULT: YES
EXPORT_PRIVATE_ATTRIBUTES_TO_MEDIA	When set to NO, disable the exporting of private attributes in files written with the `MC_Write_File()` and `MC_Write_File_By_Callback()` functions. DEFAULT: YES
EXPORT_UN_VR_TO_MEDIA	When set to NO, disable the exporting of attributes with a VR of UN in files written with the `MC_Write_File()` and `MC_Write_File_By_Callback()` functions. DEFAULT: YES
EXPORT_UNDEFINED_LENGTH_SQ_IN_DICOMDIR *	When set to NO, DICOMDIRs written with `MC_Write_File()` 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_PARMS] section of system profile parameters

Name	Description
ALLOW_COMMA_IN_DS_FL_FD_STRINGS	When set to Yes, a comma or a period will be allowed in the value passed to `MC_Set_Value_From_String()` 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

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Name	Description
	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
ALLOW_INVALID_LENGTH_FOR_VR	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 MC_INVALID_LENGTH_FOR_VR error on DICOM data reading. DEFAULT: YES
ALLOW_INVALID_PRIVATE_ATTRIBUTES	When reading messages or file objects, this parameter specifies if private attributes encoded in an invalid format should be ignored or parsed. DEFAULT: NO
ALLOW_INVALID_PRIVATE_CREATOR_CODES	When reading messages or file objects, this parameter specifies if private creator codes encoded with invalid characters should be ignored or parsed. DEFAULT: NO
ALLOW_OUT_OF_RANGE_BITS_JPEG_LOSSLESS	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. 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. DEFAULT: NO
ATT_00081190_USE_UT_VR	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. DEFAULT: NO
ATT_00287FE0_USE_UT_VR	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.

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Name	Description
	DEFAULT: NO
ATT_0040E010_USE_UT_VR	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. DEFAULT: NO
ATT_0074100A_USE_ST_VR	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. DEFAULT: NO
CALCULATE_DEFINED_LENGTH_FOR_CB	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. DEFAULT: NO
CALLBACK_MIN_DATA_SIZE	When using the `MC_Register_Callback_Function()` 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 so pixel data contained in icons are not managed with a callback function. DEFAULT: 1
COMPRESSION_ALLOW_FRAGS	Configuration Parameter for `MC_Standard_Compressor`. 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
COMPRESSION_CHROM_FACTOR	Configuration Parameter for `MC_Standard_Compressor`. Values 0 through 255. The chrominance compression factor is used to adjust the default chrominance quantization table values. When ChromFactor is 32, the default chrominance quantization table values are used as is. A value of 255 corresponds to high compression, low quality. DEFAULT: 32

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Name	Description
COMPRESSION_J2K_LOSSY_QUALITY	Configuration Parameter for `MC_Standard_Compressor`. When JPEG_2000 with COMPRESSION_WHEN_J2K_USE_LOSSY = Yes, and COMPRESSION_J2K_LOSSY_USE_QUALITY = Yes, a quality can be specified. Valid values are 1 to 10, 1 being highest quality image. DEFAULT: 1
COMPRESSION_J2K_LOSSY_RATIO	Configuration Parameter for `MC_Standard_Compressor`. When JPEG_2000 with COMPRESSION_WHEN_J2K_USE_LOSSY = Yes, and COMPRESSION_J2K_LOSSY_USE_QUALITY = No, a ratio can be specified. The compressor attempts to reduce the image size to 1/COMPRESSION_J2K_LOSSY_RATIO. DEFAULT: 10
COMPRESSION_J2K_LOSSY_USE_QUALITY	Configuration Parameter for `MC_Standard_Compressor`. When JPEG_2000 with COMPRESSION_WHEN_J2K_USE_LOSSY = Yes, this indicates which metric should be used for lossy compression, ratio or quality. DEFAULT: YES
COMPRESSION_LUM_FACTOR	Configuration Parameter for `MC_Standard_Compressor`. 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. DEFAULT: 32
COMPRESSION_RGB_TRANSFORM_FORMAT	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 specifiy what photometric interpretion Merge DICOM Toolkit should compress into when compressing RGB images. DEFAULT: YBR_FULL_422
COMPRESSION_USE_HEADER_QUERY	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. DEFAULT: NO
COMPRESSION_WHEN_J2K_USE_LOSSY	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.

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Name	Description
	DEFAULT: NO
CREATE_OFFSET_TABLE	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. DEFAULT: YES
DECODER_TAG_FILTER	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: • Single tag, e.g.: 00080020 • Tag range, e.g.: 00080020-000800FF • Single group, e.g.: G0020 • Group range, e.g.: G0020-G0022 • All private as: PRIVATE All ranges are inclusive, meaning that G0020-G0022 will filter groups 20 and 22. DEFAULT: (empty)
DECODER_PRIVATE_TAG_WHITELIST	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: • Single tag, e.g.: 00090001 • Tag range, e.g.: 00090000-000900FF • Single group, e.g.: G0021 • Group range, e.g.: G0021-G0025 All ranges are inclusive, meaning that G0021-G0025 will allow all private groups in the range including 21 and 25. DEFAULT: (empty)
DEFLATE_ALLOW_FLUSH	Allows deflate to flush data occasionally to limit buffering. DEFAULT: YES
DEFLATE_COMPRESSION_LEVEL	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. DEFAULT: -1
DESIRED_LAST_PDU_SIZE	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. Note: Starting with release 3.5.1, this configuration option has a limited effect.

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Name	Description
DICTIONARY_ACCESS	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. 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. DEFAULT: MEM
DICTIONARY_FILE	This parameter specifies the name (path) of the DICOM dictionary. 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 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. Note: This parameter is ignored if the dictionary has been pre-compiled. DEFAULT: ../mc3msg/mrgcom3.dct
DUPLICATE_ENCAPSULATED_ICON	When duplicating to an encapsulated transfer syntax, this configuration value specifies whether an ICON IMAGE SEQUENCE should also be encapsulated. DEFAULT: NO
ELIMINATE_ITEM_REFERENCES *	This parameter specifies the behavior of the message/item/file handling functions `MC_Free_Message()`, `MC_Empty_Message()`, `MC_Free_Item()`, `MC_Empty_Item()`, `MC_Free_File()` and `MC_Empty_File()`. 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.
EMPTY_PRIVATE_CREATOR_CODES	If set to NO, private creator codes contained in messages are not emptied when the `MC_Empty_Message()` or `MC_Empty_File()` function calls are made. DEFAULT: YES
EXPLICIT_VR_TO_UN_FOR_LENGTH_GT_64K	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 date elements will result in an `MC_INVALID_LENGTH_FOR_VR` error.

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Name	Description
	DEFAULT: NO
EXPORT_EMPTY_PRIVATE_CREATOR_CODES	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
EXPORT_GROUP_LENGTHS_TO_NETWORK *	When set to NO, do not export group length attributes when using the `MC_Send_Request_Message()`, `MC_Send_Request()`, `MC_Send_Response_Message()` and `MC_Send_Response()` functions DEFAULT: YES
EXPORT_PRIVATE_ATTRIBUTES_TO_NETWORK	When set to NO, disable the exporting of private attributes in messages written to the network with the `MC_Send_Request_Message()`, `MC_Send_Request()`, `MC_Send_Response_Message()` and `MC_Send_Response()` functions. DEFAULT: YES
EXPORT_UN_VR_TO_NETWORK	When set to NO, disable the exporting of attributes with a VR of UN in messages written to the network with the `MC_Send_Request_Message()`, `MC_Send_Request()`, `MC_Send_Response_Message()` and `MC_Send_Response()` functions. DEFAULT: YES
EXPORT_UNDEFINED_LENGTH_SQ *	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. DEFAULT: NO
FLATE_GROW_OUTPUT_BUF_SIZE *	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. DEFAULT: 1024
FORCE_OPEN_EMPTY_ITEM *	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. DEFAULT: NO
IGNORE_JPEG_BAD_SUFFIX	Configuration Parameter for `MC_Standard_Decompressor` to deal with lossless JPEG images whose suffix have been invalidly written according to

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Name	Description
	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: -1 = Default, fail on these images 0 = Ignore when user detects such images 1 = Let the toolkit detect and ignore automatically
LARGE_DATA_SIZE	Defines “Large Data” to the toolkit. “Large Data” is defined as an attribute value which has a length of LARGE_DATA_SIZE or more. DEFAULT: 200.
LARGE_DATA_STORE	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. Note: Embedded systems should ignore this parameter and always use MEM. DEFAULT: MEM
LIST_SQ_DEPTH_LIMIT	Limit the depth of sequences listing. This parameter should be set to the maximum number of levels any sequence should be listed. DEFAULT: is 0 - means do not limit the listing of sequences
LIST_UN_ATTRIBUTES	If No, attributes with Unknown VR will not be listed by `MC_List_Message()` and T2 logging option. DEFAULT: YES
LIST_VALUE_LIMIT	Limit the size of listed values by `MC_List_Message()` 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.
MSG_FILE_ITEM_OBJ_TRACE	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
MSG_INFO_FILE	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 MC3INIDIR which does not need to be set as the toolkit will

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Name	Description
	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
NULL_TYPE3_VALIDATION	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
OBOW_BUFFER_SIZE	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 LARGE_DATA_STORE is set to FILE. DEFAULT: 4096
PEGASUS_DISP_REG_NAME	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.
PEGASUS_DISP_REGISTRATION	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.
PEGASUS_NUMBER_OF_THREADS	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
PEGASUS_OP_*_NAME	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.
PEGASUS_OP_*_REGISTRATION	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.
PEGASUS_OPCODE_PATH	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)

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Name	Description
RELEASE_SQ_ITEMS	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
REJECT_INVALID_VR	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
REMOVE_PADDING_CHARS	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
REMOVE_SINGLE_TRAILING_SPACE	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. DEFAULT: YES
RETURN_COMMA_IN_DS_FL_FD_STRINGS	When set to Yes, Merge DICOM Toolkit will return a comma character as a decimal separator in a value when `MC_Get_Value_To_String()` 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. DEFAULT: NO
TEMP_FILE_DIRECTORY	This parameter specifies the directory in which temporary files should be created. This parameter is used only if LARGE_DATA_STORE = FILE. An absolute or relative path may be specified. The path to the directory 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). Unicode paths can now be specified through the environment variables. Both Windows style (%) and Unix style ($) notations for the environment variables are accepted. DEFAULT: ./
TOLERATE_INVALID_IN_DEFAULT_CHARSET	This parameter specifies if non-ASCII characters are to be tolerated in the default repertoire. When set to Yes, the

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Name	Description
	validation of the attribute/message will not be enforced, but a warning message will still be logged. DEFAULT: YES
UN_VR_CODE	VR Code to use for attributes with unknown VRs. This may be set to 'OB' if an implementation does not understand 'UN'. DEFAULT: UN VALID VALUES: UN, OB
UPDATE_GROUP_0028_ON_DUPLICATE	When set to Yes, the group 0028 attributes within a message will be updated when duplicating a message or file with `MC_Duplicate_Message()` 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. DEFAULT: NO
USE_FREE_DATA_CALLBACK	When set to Yes, all registered callback functions registered with `MC_Register_Callback_Function` are called with the FREE_DATA callback type when the memory associated with the callback is to be freed, because the enclosing message, file, or item is being freed. DEFAULT: NO
WORK_BUFFER_SIZE *	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 `MC_Message_To_Stream()`, `MC_Stream_To_Message()`, `MC_Send_Request_Message()`, `MC_Send_Request()`, `MC_Send_Response_Message()`, `MC_Send_Response()`, `MC_Read_Message()`, `MC_Read_To_Stream()`, `MC_Open_File()`, `MC_Open_File_Bypass_OBOW()`, `MC_Open_File_Upto_Tag()`, `MC_Write_File()` and `MC_Write_File_By_Callback()` functions. 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. DEFAULT: 28K

* Performance tuning.

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Table B-12: [TRANSPORT_PARMS] section of system profile parameters

Name	Description
CAPTURE_FILE	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) DEFAULT: merge.cap (in the current directory) **Note:** Use of this parameter is deprecated.
CAPTURE_FILE_SIZE	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. DEFAULT: 0 **Note:** Use of this parameter is deprecated.
IP_TYPE	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. DEFAULT: AVAILABLE VALID VALUES: AVAILABLE, IPV4, IPV6
MAX_PENDING_CONNECTIONS	This parameter specifies the maximum number of open listen channels. Its value is used as the second argument of a TCP `listen()` call. DEFAULT: 5
NETWORK_CAPTURE	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: CAPTURE_FILE CAPTURE_FILE_SIZE NUMBER_OF_CAP_FILES REWRITE_CAPTURE_FILES DEFAULT: NO **Note:** Use of this parameter is deprecated.

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Name	Description
NUMBER_OF_CAP_FILES	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. DEFAULT: 1 **Note:** Use of this parameter is deprecated.
REWRITE_CAPTURE_FILES	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. DEFAULT: YES **Note:** Use of this parameter is deprecated.
TCPIP_DISABLE_NAGLE	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. DEFAULT: NO
TCPIP_LISTEN_PORT	This parameter specifies the TCP/IP port on which server applications are to listen for associate requests. DEFAULT: 104
TCPIP_RECEIVE_BUFFER_SIZE *	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. 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. 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. 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. DEFAULT: 131400 MAXIMUM: Operating System dependent

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Name	Description
TCPIP_SEND_BUFFER_SIZE *	This parameter specifies the TCP/IP send buffer size for each connection. Note that the maximum values for this constant and TCPIP_RECEIVE_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. 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. 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. 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. DEFAULT: 131400 MAXIMUM: Operating System dependent

* 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 `MERGECOM_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:

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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).

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