

DICOM
Conformance Statement

MergeMVP™

as
an SCU

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Introduction

This DICOM conformance statement describes Merge Technologies' implementation of DICOM 3.0 output with all of its Multi-Vendor Protocol (MVP) converters. This conformance statement adheres to the specifications detailed in DICOM PS 3.2-1993.

Merge Technologies Incorporated has implemented DICOM 3.0 in its "MergeCOM-3" software. Therefore, MergeCOM-3 and DICOM 3.0 (abbreviated as DICOM) are used synonymously within this document. A MergeMVP with DICOM output is, very basically, a "black box" that converts images and related information from a proprietary data format to a format conformant to the ACR-NEMA 3.0 Standard.

1 Implementation model

A non-DICOM diagnostic imaging scanner transmits its image data to an MVP in a proprietary mode. The proprietary image data is converted to the appropriate DICOM format and transferred to a DICOM compliant server that is a Storage Service Class provider for the relevant SOP classes. The MVP system utilizes the Storage and Verification services of DICOM.

1.1 Application data flow diagram

The MergeMVP Send AE requests image storage services of a DICOM server over an association. When the MVP receives a new set of images, the MergeMVP Send AE initiates association negotiation with a storage server over the network. If the association is accepted by the server, images are then transferred from the storage client to the storage server over the association. When the transfer is completed, the MergeMVP Send AE closes the association.

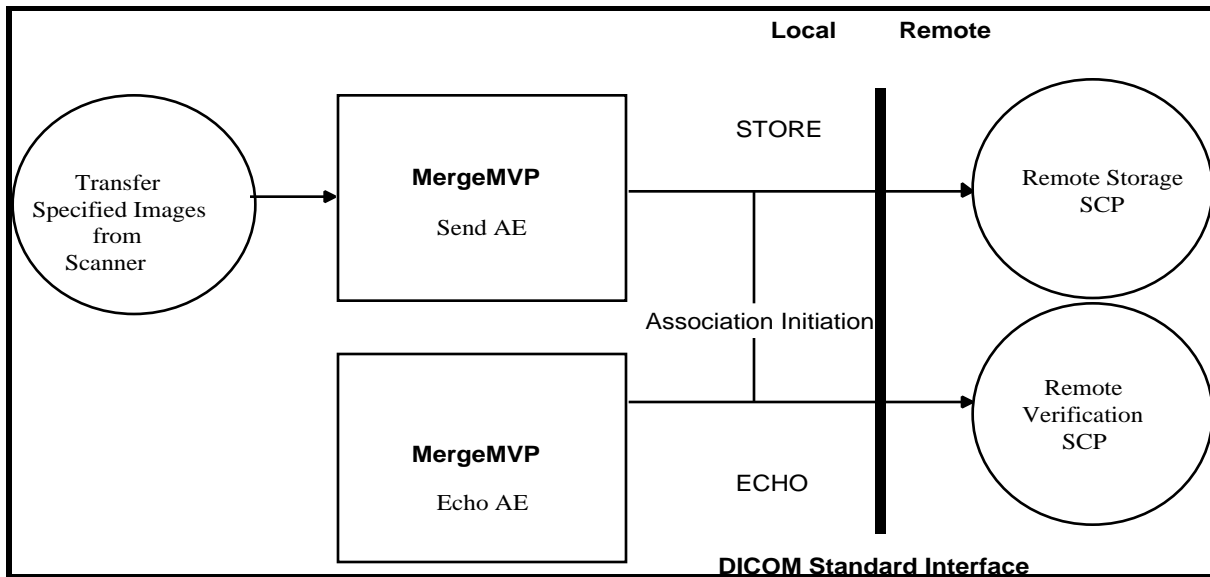


Figure 1: Application data flow diagram

1.2 Functional definition of Application Entities (AE's)

All communication with remote applications is accomplished using the DICOM protocol over a network running the TCP/IP protocol stack. The MVP initiates an association at the remote TCP/IP port number. When initiating an association with a requested DICOM network node and remote image transfer AE, the MergeMVP Send AE provides a list of SOP Class UIDs that it will send. Each MergeMVP AE that initiates an association always negotiates as an SCU for the Verification and other SOP classes.

When in transfer mode, the MergeMVP Send AE initiates a request to transfer images to a predetermined DICOM-compliant image storage device. The MergeMVP Send AE issues a Store request for selected images from the modality database to the remote AE. All valid images are converted to a common, but very specific, data format and then transferred to the remote AE.

If an Echo event is initiated, an appropriate Echo request is sent to the remote AE. If a Store is initiated, all incoming images that are conformant to the association are written to the remote AE.

1.3 Sequencing of real-world activities

Not applicable.

2 AE specifications

2.1 AE specification for MergeMVP

The MergeMVP Echo AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Service Object Pair (SOP) Class as a Service Class User (SCU).

The MergeMVP sends out an Echo request when the user initiates the Echo Check operation at the MVP.

SOP Class UID	SOP Class Name
1.2.840.10008.1.1	Verification SOP Class

Table 1 - Valid SCU Verification SOP Class for MergeMVP Echo AE

The MergeMVP Send AE, in conjunction with MergeCOM-3, provides Standard Conformance to the following DICOM V3.0 Storage Service Object Pair (SOP) Classes as a Service Class User (SCU):

SOP Class UID	SOP Class Name
1.2.840.10008.5.1.4.1.1.2	CT Image Storage
1.2.840.10008.5.1.4.1.1.4	MR Image Storage
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage
1.2.840.10008.5.1.4.1.1.12.1	XA Image Storage
1.2.840.10008.5.1.4.1.1.12.2	XR Image Storage

Table 2 - Valid SCU Storage SOP Classes for MergeMVP Send AE

Some or all of the above SOP Classes can be negotiated by the MVP. Specifics will be dependent on the capabilities of the specific MVP.

2.1.1 Association establishment policies for MergeMVP Send AE

2.1.1.1 General

The MergeMVP Send application entity will act as an SCU of Storage Services when an image transfer request to a remote DICOM network node has been negotiated. The (PDU) size proposed in an association request by the MVP will default to 4K bytes, and is configurable in the REGISTRATION_PARMS section of the MERGE.INI file to be anything from 2K bytes to 512K bytes using the parameter CLIENT_RECEIVE_BUFFER_SIZE.

2.1.1.2 Number of associations

The MergeMVP Send AE will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

2.1.1.3 Asynchronous nature

The MergeMVP Send AE does not support asynchronous communication (multiple outstanding transactions over a single association).

2.1.1.4 Implementation identifying information for MVP Send Application Entity

The Implementation Class Unique Identifier (UID) for the MergeMVP Send AE is obtained from the MERGECOM.PRO file of the MVP. The Implementation Version Name will correspond to the software revision number for the particular family of MVP. This information is obtained from the MERGECOM.PRO file of the MVP.

2.1.2 Association initiation by real-world activity for MergeMVP Send AE

The MergeMVP Send AE initiates an associate each time a new session is begun by the input module of the MVP. If a previous association is still open when a new input session is begun, that association will be closed before a new association is initiated.

The definition of a new session depends on the equipment to which the input module of the MVP is connected. In some cases the input modality defines sessions directly via specific proprietary protocol messages. In other cases sessions are defined by I/O mechanisms between modality and MVP or by patient/image data tracking within an MVP.

The MVP applies a configurable time-out to determine the acceptance of the association negotiation. The time-out value is configurable the MERGE.INI file.

2.1.2.1 Real-world activity for Echo Check operation of MVP Echo AE

The MergeMVP Echo AE initiates associations for the echo service specified as STANDARD_ECHO in the MERGECOM.INI configuration file. The association is closed either when a correct response is received or when a timeout occurs. This time-out is configurable in the MERGE.INI file.

2.1.2.1.1 Associated real-world activity for Echo Check operation

An echo is performed by the MergeMVP Echo AE by using the MVP Output Diagnostic menu, selecting (C) Transport, and then selecting (A) DICOM Echo.

2.1.2.1.2 Proposed presentation contexts for Echo Check operation

The MergeMVP Echo AE, in conjunction with MergeCOM-3, supports the Verification SOP Class fully as specified in the DICOM Standard.

The presentation context proposed by the MergeMVP Echo AE for the Echo Check operation is specified in Table 3.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification Service Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 3 - Echo Check Presentation Contexts for MergeCOM-3 Client

2.1.2.1.2.1 SOP specific conformance for Verification SOP Class

No known SOP specific conformance issues.

2.1.2.2 Real-world activity for Send Image operations of MVP

The MergeMVP Send AE initiates associations for the transfer of images to a DICOM Image Storage Server. The types of images that can be transferred (SOP classes) are specified in the MERGE.INI configuration file.

2.1.2.2.1 Associated real-world activity for Send Image operations

Once the association has been established, an image store message is sent by the MergeMVP Send AE for each image to be transferred over the network.

2.1.2.2.2 Proposed presentation contexts for Send Image operations

The presentation contexts that can be proposed by the MergeMVP Send AE for the Send Image operation are specified in Table 4.

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 4 - Send Image Presentation Contexts

2.1.2.2.2.1 SOP specific conformance for all storage SOP Classes

If the MergeMVP Send AE receives a C-STORE response with a success or warning status, the AE will initiate the next C-STORE operation over the association if required, or close the association (A-RELEASE_RQ) if all images have been transferred. The MergeMVP Send AE will log any warnings to the MERGE.LOG file. (This log file resides in the same directory as the application software.) The association will be aborted (A-ABORT-RQ) if a failure is detected by the MVP during transfer. Failures can occur due to various reasons including: time-out, input failures or operator intervention.

If the application receives an unsuccessful C-STORE response status, the association is immediately closed. The MergeMVP Send AE will log the error status to the MERGE.LOG file.

Extended negotiation is not supported.

2.1.2.3 Optional Element Handling

The following is a list of optional elements which could be passed to the MergeMVP Send AE from the modality. All optional elements of IODs for each Storage SOP class are supported by the MVP. Although the MergeMVP Send AE passes on all optional elements it receives, the remote SCP should not be critically dependent on optional elements from the scanner. If a specific compliant image object cannot be created by the MVP, the image will be attempted as a secondary capture image object.

2.1.2.3.1 CT Image Storage Optional Elements

Patient Module Attributes C7.1.1

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	A sequence which provides reference to a Patient SOP Class/Instance pair.
Patient's Birth Time	(0010, 0032)	3	Birth time of the patient.
Other Patient IDs	(0010, 1000)	3	Other identification numbers (codes) used to identify the patient.
Other Patient Names	(0010, 1001)	3	Other names used to identify the patient.
Ethnic Group	(0010, 2160)	3	Ethnic group or race of the patient.
Patient Comments	(0010, 4000)	3	User-defined additional information about the patient.

General Study C7.2.1

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study.
Name of Physician(s) Reading the Study	(0008,1060)	3	Physician(s) reading the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence which provides reference to a Study SOP Class/Instance pair. Only a single reference is allowed.

Patient Study C 7.2.2

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of admitting diagnoses.
Patient's Age	(0010,1010)	3	Age of the patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about Patient's Medical History

General Series C 7.3.1

Attribute Name	Tag	Type	Attribute Description
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physician's Name	(0008,1050)	3	Name of physicians administering the Series.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which Series performed.
Series Description	(0008,103E)	3	User-provided description of the Series.

Operator's Name	(0008,1070)	3	Technologist(s) supporting the Series.
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instances to which the Series is related.
Body Part Examined	(0018,0015)	3	Text description of body part examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment.
Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.

General Equipment C 7.5.1

Attribute Name	Tag	Type	Attribute Description
Institution Name	(0008,0080)	3	Institution where equipment is located that produced the digital images.
Institution Address	(0008,0081)	3	Mailing address of institution where equipment is located.
Station Name	(0008,1010)	3	User defined name identifying machine that produced digital images.
Institutional Department Name	(0008,1040)	3	Department in the institution where equipment is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model number of equipment that produced images.
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of equipment that produced images.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of equipment.
Spatial Resolution	(0018,1050)	3	Inherent limiting resolution in mm of equipment for high contrast objects.
Date of Last Calibration	(0018,1200)	3	Date when image acquisition device calibration last changed.
Time of Last Calibration	(0018,1201)	3	Time when image acquisition device calibration last changed.
Pixel Padding Value	(0028,0120)	3	Value of pixels added to non-rectangular image to pad rectangle.

General Image C7.6.1

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Patient direction of rows and columns of the image.
Image Date	(0008,0023)	2C	Date the image pixel creation started.
Image Time	(0008,0033)	2C	Time the image pixel creation started.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data.
Acquisition Date	(0008,0022)	3	Date the acquisition of data resulting in this image started.
Acquisition Time	(0008,0032)	3	Time the acquisition of data resulting in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence which provides reference to a set of image SOPs identifying other images.
Derivation Description	(0008,2111)	3	A text description of how this image was derived.
Source Image Sequence	(0008,2112)	3	A sequence which identifies set of image SOP class pairs of images.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from the acquisition of data.
Image Comments	(0020,4000)	3	User-defined comments about the image.

Image Plane C7.6.2

Attribute Name	Tag	Type	Attribute Description
Slice Location	(0020,1041)	3	Relative position of exposure expressed in mm.

Image Pixel C7.6.3

Attribute Name	Tag	Type	Attribute Description
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in the image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in the image.

Contrast/Bolus C 7.6.4

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Route	(0018,1040)	3	Administration route of contrast agent.
Contrast/Bolus Volume	(0018,1041)	3	Volume of contrast agent in cubic centimeters.
Contrast/Bolus Start Time	(0018,1042)	3	Time of start of injection.
Contrast/Bolus Stop Time	(0018,1043)	3	Time of end of contrast injection.
Contrast/Bolus Total Dose	(0018,1044)	3	Total amount of the active ingredient in injection.

CT Image C 8.2.1

Attribute Name	Tag	Type	Attribute Description
Scan Options	(0018,0022)	3	Parameters of scanning sequence.
Data Collection Diameter	(0018,0090)	3	Diameter in mm of region over which data was collected.
Reconstruction Diameter	(0018,1100)	3	Diameter in mm of region from within which data was used to create reconstruction of the image.
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center.
Distance Source to Patient	(0018,1111)	3	Distance in mm from source to isocenter.
Gantry/Detector Tilt	(0018,1120)	3	Nominal angle of tilt in degrees of scanning gantry.
Table Height	(0018,1130)	3	Distance in mm of top of patient table to center of rotation.
Rotation Direction	(0018,1140)	3	Direction of rotation of source when relevant.
Exposure Time	(0018,1150)	3	Time of x-ray exposure (msec).
X-ray Tube Current	(0018,1151)	3	x-ray tube current in mA.
Exposure	(0018,1152)	3	The product of exposure time and x-ray tube current expressed in mAs.
Filter Type	(0018,1160)	3	Label for type of filter inserted into x-ray beam.
Generator Power	(0018,1170)	3	Power in kW to x-ray generator.
Focal Spot	(0018,1190)	3	Size of the focal spot in mm.
Convolution Kernel	(0018,1210)	3	A label describing the convolution kernel or algorithm to reconstruct the data.
Acquisition Device Processing Desc.	(0018,1400)	3	Describes device-specific processing associated with the image.
Acquisition Device Processing Code	(0018,1401)	3	Code representing device-specific processing .
Cassette Orientation	(0018,1402)	3	Cassette Orientation
Cassette Size	(0018,1403)	3	Cassette Size
Exposures on Plate	(0018,1404)	3	Total number of x-ray exposures made on plate identified in Plate ID.
Relative x-ray Exposure	(0018,1405)	3	Relative x-ray exposure on the plate.
Sensitivity	(0018,6000)	3	Readout sensitivity.

Overlay Data C 9.2

Attribute Name	Tag	Type	Attribute Description
ROI Area	(60xx,1301)	3	Number of pixels in ROI Area.
ROI Mean	(60xx,1302)	3	ROI Mean
ROI Standard Deviation	(60xx,1303)	3	ROI Standard Deviation

Overlay Descriptor - Gray	(60xx,1100)	3	The number of bits in each entry of (60xx,1200)
Overlay Descriptor - Red	(60xx,1101)	3	The number of bits in each entry of (60xx,1201)
Overlay Descriptor - Green	(60xx,1102)	3	The number of bits in each entry of (60xx,1202)
Overlay Descriptor - Blue	(60xx,1103)	3	The number of bits in each entry of (60xx,1203)
Overlays - Gray	(60xx,1200)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Red	(60xx,1201)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Green	(60xx,1202)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Blue	(60xx,1203)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane

VOI LUT C 11.2

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of the LUT.
Window Center	(0028,1050)	3	Window Center for display.
Window Center and Width Explanation	(0028,1055)	3	Freeform explanation of the meaning of the Window Center and Width.

SOP Common C12.1

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date SOP instance was created.
Instance Creation Time	(0008,0013)	3	Time SOP instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.

2.1.2.3.2 MR Image Storage Optional Elements

Patient Module Attributes C7.1.1

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	A sequence which provides reference to a Patient SOP Class/Instance pair.
Patient's Birth Time	(0010, 0032)	3	Birth time of the patient.
Other Patient IDs	(0010, 1000)	3	Other identification numbers (codes) used to identify the patient.
Other Patient Names	(0010, 1001)	3	Other names used to identify the patient.
Ethnic Group	(0010, 2160)	3	Ethnic group or race of the patient.
Patient Comments	(0010, 4000)	3	User-defined additional information about the patient.

General Study C7.2.1

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study.
Name of Physician(s) Reading the Study	(0008,1060)	3	Physician(s) reading the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence which provides reference to a Study SOP Class/Instance pair. Only a single reference is allowed.

Patient Study C7.2.2

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of admitting diagnoses.
Patient's Age	(0010,1010)	3	Age of the patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about Patient's Medical History

General Series C7.3.1

Attribute Name	Tag	Type	Attribute Description
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physician's Name	(0008,1050)	3	Name of physicians administering the Series.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which Series performed.
Series Description	(0008,103E)	3	User-provided description of the Series.
Operator's Name	(0008,1070)	3	Technologist(s) supporting the Series.
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instances to which the Series is related.
Body Part Examined	(0018,0015)	3	Text description of body part examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment.
Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.

General Equipment C 7.5.1

Attribute Name	Tag	Type	Attribute Description
Institution Name	(0008,0080)	3	Institution where equipment is located that produced the digital images.
Institution Address	(0008,0081)	3	Mailing address of institution where equipment is located.
Station Name	(0008,1010)	3	User defined name identifying machine that produced digital images.
Institutional Department Name	(0008,1040)	3	Department in the institution where equipment is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model number of equipment that produced images.
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of equipment that produced images.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of equipment.
Spatial Resolution	(0018,1050)	3	Inherent limiting resolution in mm of equipment for high contrast objects.
Date of Last Calibration	(0018,1200)	3	Date when image acquisition device calibration last changed.
Time of Last Calibration	(0018,1201)	3	Time when image acquisition device calibration last changed.
Pixel Padding Value	(0028,0120)	3	Value of pixels added to non-rectangular image to pad rectangle.

General Image C7.6.1

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Patient direction of rows and columns of the image.
Image Date	(0008,0023)	2C	Date the image pixel creation started.
Image Time	(0008,0033)	2C	Time the image pixel creation started.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data.
Acquisition Date	(0008,0022)	3	Date the acquisition of data resulting in this image started.
Acquisition Time	(0008,0032)	3	Time the acquisition of data resulting in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence which provides reference to a set of image SOPs identifying other images.
Derivation Description	(0008,2111)	3	A text description of how this image was derived.
Source Image Sequence	(0008,2112)	3	A sequence which identifies set of image SOP class pairs of images.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from the acquisition of data.
Image Comments	(0020,4000)	3	User-defined comments about the image.

Image Plane C7.6.2

Attribute Name	Tag	Type	Attribute Description
Slice Location	(0020,1041)	3	Relative position of exposure expressed in mm.

Image Pixel C7.6.3

Attribute Name	Tag	Type	Attribute Description
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in the image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in the image.

Contrast/Bolus C 7.6.4

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Route	(0018,1040)	3	Administration route of contrast agent.
Contrast/Bolus Volume	(0018,1041)	3	Volume of contrast agent in cubic centimeters.
Contrast/Bolus Start Time	(0018,1042)	3	Time of start of injection.
Contrast/Bolus Stop Time	(0018,1043)	3	Time of end of contrast injection.
Contrast/Bolus Total Dose	(0018,1044)	3	Total amount of the active ingredient in injection.

MR Image C 8.3.1

Attribute Name	Tag	Type	Attribute Description
Repetition Time	(0018,0080)	2C	Period of time in msec between beginning of successive pulses.
Inversion Time	(0018,0082)	2C	Time in msec after middle of inverting RF pulse to mid exc. pulse.
Trigger Time	(0018,1060)	2C	Time, in msec, between peak R wave and peak echo produced.
Sequence Name	(0018,0024)	3	User defined name for Scanning Sequence and Seq. Variant combo.
Angio Flag	(0018,0025)	3	Angio image indicator.
Number of Averages	(0018,0083)	3	Number of times a pulse sequence is repeated before any parameter is changed.
Imaging Frequency	(0018,0084)	3	Precession frequency in Mhz of nucleus being addressed.
Imaged Nucleus	(0018,0085)	3	Nucleus that is resonant at imaging frequency.
Echo Number	(0018,0086)	3	Echo number used in generating this image.
Magnetic Field Strength	(0018,0087)	3	Nominal field strength of MR magnet, in Tesla.
Spacing Between Slices	(0018,0088)	3	Spacing between slices, in mm.
Number of Phase Encoding Steps	(0018,0089)	3	Total number in lines in k-space in 'y' direction collected during acq.
Percent Sampling	(0018,0093)	3	Fraction of acquisition matrix lines acquired.
Percent Phase Field of View	(0018,0094)	3	Ratio of field of view dimension in phase direction to field of view dimension in frequency direction.
Pixel Bandwidth	(0018,0095)	3	Reciprocal of total sampling period, in hertz per pixel.
Nominal Interval	(0018,1062)	3	Average R-R interval for scan, in msec.
Beat Rejection Flag	(0018,1080)	3	Beat length sorting applied (Y/N).
Low R-R Value	(0018,1081)	3	R-R interval low limit for beat rejection, in msec.
High R-R Value	(0018,1082)	3	R-R interval high limit for beat rejection, in msec.
Intervals Acquired	(0018,1083)	3	Number of R-R intervals acquired.
Intervals Rejected	(0018,1084)	3	Number of R-R intervals rejected.
PVC Rejection	(0018,1085)	3	Description of type of PVC rejection criterion used.
Skip Beats	(0018,1086)	3	Number of beats skipped after a detected arrhythmia.
Heart Rate	(0018,1088)	3	Beats per minute.
Cardiac Number of Images	(0018,1090)	3	Number of images per cardiac cycle.
Trigger Window	(0018,1094)	3	Pct of R-R interval, based on Heart Rate, prescribed as window for a valid trigger.
Reconstruction Diameter	(0018,1100)	3	Diameter in mm of region from within which data used in creating reconstruction of the image.
Receiving Coil	(0018,1250)	3	Receiving coil used.
Transmitting Coil	(0018,1251)	3	Transmitting coil used.

Acquisition Matrix	(0018,1310)	3	Dimensions of acquired freq/phase data before reconstruction.
Phase Encoding Direction	(0018,1312)	3	Axis of phase encoding with respect to the image.
Flip Angle	(0018,1314)	3	Steady state angle in degrees to which mag. vector flipped from magnetic vector of primary field.
Variable Flip Angle Flag	(0018,1315)	3	Flip angle variation applied during image acquisition (y/n).
SAR	(0018,1316)	3	Calculated whole body Specific Absorption Rate (watts/kilogram).
dB/dt	(0018,1318)	3	Rate of change of gradient coil magnetic flux density with time.
Temporal Position Identifier	(0020,0100)	3	Temporal order of a dynamic or functional set of images.
Number of Temporal Positions	(0020,0105)	3	Total number of temporal positions prescribed.
Temporal Resolution	(0020,0110)	3	Time delta between images in a dynamic or functional set of images.

Overlay Data C 9.2

Attribute Name	Tag	Type	Attribute Description
ROI Area	(60xx,1301)	3	Number of pixels in ROI Area.
ROI Mean	(60xx,1302)	3	ROI Mean
ROI Standard Deviation	(60xx,1303)	3	ROI Standard Deviation
Overlay Descriptor - Gray	(60xx,1100)	3	The number of bits in each entry of (60xx,1200)
Overlay Descriptor - Red	(60xx,1101)	3	The number of bits in each entry of (60xx,1201)
Overlay Descriptor - Green	(60xx,1102)	3	The number of bits in each entry of (60xx,1202)
Overlay Descriptor - Blue	(60xx,1103)	3	The number of bits in each entry of (60xx,1203)
Overlays - Gray	(60xx,1200)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Red	(60xx,1201)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Green	(60xx,1202)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Blue	(60xx,1203)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane

VOI LUT C 11.2

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of the LUT.
Window Center	(0028,1050)	3	Window Center for display.
Window Center and Width Explanation	(0028,1055)	3	Freeform explanation of the meaning of the Window Center and Width.

SOP Common C12.1

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date SOP instance was created.
Instance Creation Time	(0008,0013)	3	Time SOP instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.

2.1.2.3.3 Secondary Capture Image Storage Optional Elements

Patient Module Attributes C7.1.1

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	A sequence which provides reference to a Patient SOP Class/Instance pair.
Patient's Birth Time	(0010, 0032)	3	Birth time of the patient.
Other Patient IDs	(0010, 1000)	3	Other identification numbers (codes) used to identify the patient.
Other Patient Names	(0010, 1001)	3	Other names used to identify the patient.
Ethnic Group	(0010, 2160)	3	Ethnic group or race of the patient.
Patient Comments	(0010, 4000)	3	User-defined additional information about the patient.

General Study C7.2.1

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study.
Name of Physician(s) Reading the Study	(0008,1060)	3	Physician(s) reading the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence which provides reference to a Study SOP Class/Instance pair. Only a single reference is allowed.

Patient Study C7.2.2

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of admitting diagnoses.
Patient's Age	(0010,1010)	3	Age of the patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about Patient's Medical History

General Series C7.3.1

Attribute Name	Tag	Type	Attribute Description
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physician's Name	(0008,1050)	3	Name of physicians administering the Series.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which Series performed.
Series Description	(0008,103E)	3	User-provided description of the Series.
Operator's Name	(0008,1070)	3	Technologist(s) supporting the Series.
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instances to which the Series is related.
Body Part Examined	(0018,0015)	3	Text description of body part examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment.
Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.

General Equipment C 7.5.1

Attribute Name	Tag	Type	Attribute Description
Institution Name	(0008,0080)	3	Institution where equipment is located that produced the digital images.
Institution Address	(0008,0081)	3	Mailing address of institution where equipment is located.
Station Name	(0008,1010)	3	User defined name identifying machine that produced digital images.
Institutional Department Name	(0008,1040)	3	Department in the institution where equipment is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model number of equipment that produced images.
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of equipment that produced images.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of equipment.
Spatial Resolution	(0018,1050)	3	Inherent limiting resolution in mm of equipment for high contrast objects.
Date of Last Calibration	(0018,1200)	3	Date when image acquisition device calibration last changed.
Time of Last Calibration	(0018,1201)	3	Time when image acquisition device calibration last changed.
Pixel Padding Value	(0028,0120)	3	Value of pixels added to non-rectangular image to pad rectangle.

SC Equipment (C8.6.1)

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	3	Source equipment for the image.
Secondary Capture Device ID	(0018,1010)	3	User-defined identification of the device that converted the image.
Secondary Capture Device Manufacturer	(0018,1016)	3	Manufacturer of the Secondary Capture Device.
SC Device Manufacturer Model Name	(0018,1018)	3	Manufacturer's model number of the Secondary Capture Device.
SC Device Software Version	(0018,1019)	3	Manufacturer's designation of Software Version of SC Device.
Video Image Format Acquired	(0018,1022)	3	Original format of captured video image.
Digital Image Format Acquired	(0018,1023)	3	Additional information about digital interface used to acquire image.

General Image C7.6.1

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Patient direction of rows and columns of the image.
Image Date	(0008,0023)	2C	Date the image pixel creation started.
Image Time	(0008,0033)	2C	Time the image pixel creation started.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data.
Acquisition Date	(0008,0022)	3	Date the acquisition of data resulting in this image started.
Acquisition Time	(0008,0032)	3	Time the acquisition of data resulting in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence which provides reference to a set of image SOPs identifying other images.
Derivation Description	(0008,2111)	3	A text description of how this image was derived.
Source Image Sequence	(0008,2112)	3	A sequence which identifies set of image SOP class pairs of images.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from the acquisition of data.
Image Comments	(0020,4000)	3	User-defined comments about the image.

Image Pixel C7.6.3

Attribute Name	Tag	Type	Attribute Description
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in the image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in the image.

SC Image C8.6.2

Attribute Name	Tag	Type	Attribute Description
Date of Secondary Capture	(0018,1012)	3	Date the Secondary Capture Image was captured.
Time of Secondary Capture	(0018,1014)	3	Time the Secondary Capture Image was captured.

Overlay Data C 9.2

Attribute Name	Tag	Type	Attribute Description
ROI Area	(60xx,1301)	3	Number of pixels in ROI Area.
ROI Mean	(60xx,1302)	3	ROI Mean
ROI Standard Deviation	(60xx,1303)	3	ROI Standard Deviation
Overlay Descriptor - Gray	(60xx,1100)	3	The number of bits in each entry of (60xx,1200)
Overlay Descriptor - Red	(60xx,1101)	3	The number of bits in each entry of (60xx,1201)
Overlay Descriptor - Green	(60xx,1102)	3	The number of bits in each entry of (60xx,1202)
Overlay Descriptor - Blue	(60xx,1103)	3	The number of bits in each entry of (60xx,1203)
Overlays - Gray	(60xx,1200)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Red	(60xx,1201)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Green	(60xx,1202)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Blue	(60xx,1203)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane

Modality LUT C 11.1

Attribute Name	Tag	Type	Attribute Description
Modality LUT Sequence	(0028,3000)	3	Defines a sequence of modality LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of LUTs.

VOI LUT C 11.2

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of the LUT.
Window Center	(0028,1050)	3	Window Center for display.
Window Center and Width Explanation	(0028,1055)	3	Freeform explanation of the meaning of the Window Center and Width.

SOP Common C12.1

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date SOP instance was created.
Instance Creation Time	(0008,0013)	3	Time SOP instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.

2.1.2.3.4 X-ray Angio Image Storage Optional Elements

Patient Module Attributes C7.1.1

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	A sequence which provides reference to a Patient SOP Class/Instance pair.
Patient's Birth Time	(0010, 0032)	3	Birth time of the patient.
Other Patient IDs	(0010, 1000)	3	Other identification numbers (codes) used to identify the patient.
Other Patient Names	(0010, 1001)	3	Other names used to identify the patient.
Ethnic Group	(0010, 2160)	3	Ethnic group or race of the patient.
Patient Comments	(0010, 4000)	3	User-defined additional information about the patient.

General Study C7.2.1

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study.
Physician(s) of record	(0008,1048)	3	Physician(s) who are responsible for overall patient care at time of Study.
Name of Physician(s) Reading the Study	(0008,1060)	3	Physician(s) reading the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence which provides reference to a Study SOP Class/Instance pair. Only a single reference is allowed.

Patient Study C 7.2.2

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of admitting diagnoses.
Patient's Age	(0010,1010)	3	Age of the patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about Patient's Medical History

General Series C 7.3.1

Attribute Name	Tag	Type	Attribute Description
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physician's Name	(0008,1050)	3	Name of physicians administering the Series.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which Series performed.
Series Description	(0008,103E)	3	User-provided description of the Series.
Operator's Name	(0008,1070)	3	Technologist(s) supporting the Series.
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instances to which the Series is related.
Body Part Examined	(0018,0015)	3	Text description of body part examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment.
Laterality	(0020,0060)	2C	Laterality of (paired) body part examined.

Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.

General Equipment C 7.5.1

Attribute Name	Tag	Type	Attribute Description
Institution Name	(0008,0080)	3	Institution where equipment is located that produced the digital images.
Institution Address	(0008,0081)	3	Mailing address of institution where equipment is located.
Station Name	(0008,1010)	3	User defined name identifying machine that produced digital images.
Institutional Department Name	(0008,1040)	3	Department in the institution where equipment is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model number of equipment that produced images.
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of equipment that produced images.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of equipment.
Spatial Resolution	(0018,1050)	3	Inherent limiting resolution in mm of equipment for high contrast objects.
Date of Last Calibration	(0018,1200)	3	Date when image acquisition device calibration last changed.
Time of Last Calibration	(0018,1201)	3	Time when image acquisition device calibration last changed.
Pixel Padding Value	(0028,0120)	3	Value of pixels added to non-rectangular image to pad rectangle.

General Image C7.6.1

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Patient direction of rows and columns of the image.
Image Date	(0008,0023)	2C	Date the image pixel creation started.
Image Time	(0008,0033)	2C	Time the image pixel creation started.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data.
Acquisition Date	(0008,0022)	3	Date the acquisition of data resulting in this image started.
Acquisition Time	(0008,0032)	3	Time the acquisition of data resulting in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence which provides reference to a set of image SOPs identifying other images.
Derivation Description	(0008,2111)	3	A text description of how this image was derived.
Source Image Sequence	(0008,2112)	3	A sequence which identifies set of image SOP class pairs of images.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from the acquisition of data.
Image Comments	(0020,4000)	3	User-defined comments about the image.
Lossy Image Compression	(0028,2110)	3	Specifies whether an Image has undergone lossy compression.

Image Pixel C7.6.3

Attribute Name	Tag	Type	Attribute Description
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in the image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in the image.

Contrast/Bolus C 7.6.4

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Route	(0018,1040)	3	Administration route of contrast agent.
Contrast/Bolus Volume	(0018,1041)	3	Volume of contrast agent in cubic centimeters.
Contrast/Bolus Start Time	(0018,1042)	3	Time of start of injection.
Contrast/Bolus Stop Time	(0018,1043)	3	Time of end of contrast injection.
Contrast/Bolus Total Dose	(0018,1044)	3	Total amount of the active ingredient in injection.
Contrast Flow rate(s)	(0018,1046)	3	Rate(s) of injection(s) in milliliters/s
Contrast Flow duration(s)	(0018,1047)	3	Duration of injection(s) in seconds. Each Contrast Flow Duration shall correspond to a value of Contrast Flow Rate.
Contrast Bolus Ingredient	(0018,1048)	3	Active ingredient of the agent.
Contrast/Bolus Ingredient Concentration	(0018,1049)	3	Milligrams of active ingredient per milliliter of agent.

Cine Module C.7.6.5

Attribute Name	Tag	Type	Attribute Description
Start Trim	(0008,2142)	3	The frame number of the first frame of a Multi-frame image to be displayed.
Stop Trim	(0008,2143)	3	The frame number of the last frame of a Multi-frame image to be displayed.
Recommended Display Frame Rate	(0008,2144)	3	Recommended rate at which the frames of a Multi-frame image should be displayed in frames/second.
Cine Rate	(0018,0040)	3	Number of frames per second.
Frame Delay	(0018,1066)	3	Time (in msec) from Image Time to the start of the first frame in a Multi-Frame image.
Effective Duration	(0018,0072)	3	Total time in seconds that the data was actually taken for the entire Multi-frame image.
Actual Frame Duration	(0018,1242)	3	Elapsed time of data acquisition in msec per each frame.

Frame Pointers Module C.7.6.9

Attribute Name	Tag	Type	Attribute Description
Representative Frame Number	(0028,6010)	3	The frame number selected for use as a pictorial representation of the Multi-frame Image.
Frame Numbers of Interest	(0028,6020)	3	Frame Number(s) selected as frames of interest.
Frame of Interest Description	(0028,6022)	3	Description of each one of the Frames(s) of Interest selected in (0028,6020). If multiple Frames of Interest are selected and this Attribute is used, it shall contain the same number of values as are in the Frame Numbers of Interest.(0028,6020).

Mask Module C.7.6.10

Attribute Name	Tag	Type	Attribute Description
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Applicable Frame Range	(0028,6102)	3	Each pair of numbers in this multi-values attribute specify a beginning and ending fram number inclusive of a range where this particular mask operation is valid.
Mask Frame Numbers	(0028,6110)	3	Specifies the frame numbers of the pixel data used to generate this mask.
Contrast frame Averaing	(0028,6112)	3	Specifies the number of contrast frames to average together before performing the mask operation. If the attribute is missing no averaging is performed.
Mask Sub-pixel Shift	(0028,6114)	3	A pair of floating point numbers specifying the fractional vertical [adjacent row spacing] and horizontal [adjacent column spacing] pixel shift applied to the mask before subtracting it from the contract frame.
TID Offset	(0028,6120)	3	Specifies the offset to be subtracted from the current frame number in order to locate the mask frame in TID mode.
Mask Operation Explained	(0028,6190)	3	Free form explanation of this particular mask operation.

X-ray Image Module C.8.7.1

Attribute Name	Tag	Type	Attribute Description
Scan Options	(0018,0022)	3	Parameters of scanning sequence.

X-ray Acquisition Module C.8.7.2

Attribute Name	Tag	Type	Attribute Description
Grid	(0018,1166)	3	Identify the grid. Defined terms are: IN= A grid is positioned NONE= No grid is used.
Average Pulse Width	(0018,1154)	3	Average width of X-ray pulse in msec.
Radiation Mode	(0018,115A)	3	Specifies X-ray radiation mode. Defined terms CONTINUOUS, PULSED.
Type of filters	(0018,1161)	3	Type of filter(s) inserted into the X-ray beam.
Intensifier Size	(0018,1162)	3	Diameter of X-ray intensifier in mm.
Field of view Shape	(0018,1147)	3	Shape of the Image Intensifier Field of View. Defined terms ROUND, RECTAGLE.
Field of View Dimensions	(0018,1149)	3	Dimensions of the Image Intensifier Field of View in mm. If rectangle row dimension followed by column dimension .
Image pixel Spacing	(0018,1164)	3	Physical distance measured at the front plane of the Image Receptor housing between the center of each pixel specified by a numeric pair row spacing \ column spacing.
Focal Spot	(0018,1190)	3	Nominal focal spot size in mm used to acquire this image.
Image Area Dose Product	(0018,115E)	3	X-ray dose measured in dGy*cm*cm to which the patient was exposed for the acquisition of this image plus any non-digitally recorded fluroscopy which may have been performed to prepare for this acquisition of this image.

X-ray Table Module C.8.7.4

Attribute Name	Tag	Type	Attribute Description
Table angle	(0018,1138)	3	Angle of the table plane in degrees relative to the horizontal plane [Gravity Plane]. Positive values indicate that the head of the table is upwards.

XA Positioner C.8.7.5

Attribute Name	Tag	Type	Attribute Description
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Detector Primary Angle	(0018,1530)	3	Angle of the X-ray beam in the row direction in degrees relative to the normal detector plane. Positive values indicate that the X-ray beam points toward higher number columns.
Detector Secondary Angle	(0018,1531)	3	Angle of the X-ray beam in the col direction in degrees relative to the normal detector plane. Positive values indicate that the X-ray beam points toward lower number rows.

Overlay Plane Module C 9.2

Attribute Name	Tag	Type	Attribute Description
ROI Area	(60xx,1301)	3	Number of pixels in ROI Area.
ROI Mean	(60xx,1302)	3	ROI Mean
ROI Standard Deviation	(60xx,1303)	3	ROI Standard Deviation
Overlay Descriptor - Gray	(60xx,1100)	3	The number of bits in each entry of (60xx,1200)
Overlay Descriptor - Red	(60xx,1101)	3	The number of bits in each entry of (60xx,1201)
Overlay Descriptor - Green	(60xx,1102)	3	The number of bits in each entry of (60xx,1202)
Overlay Descriptor - Blue	(60xx,1103)	3	The number of bits in each entry of (60xx,1203)
Overlays - Gray	(60xx,1200)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Red	(60xx,1201)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Green	(60xx,1202)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Blue	(60xx,1203)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane

Multi-Frame Overlay Module C.9.3

Attribute Name	Tag	Type	Attribute Description
Image Frame Origin	(60xx,0051)	3	frame number of Multi-frame Image to which this overlay applies; frames are numbered from 1.

Curve Module C.10.2

Attribute Name	Tag	Type	Attribute Description
Curve description	(50xx,0022)	3	User defined comments about the Curve
Axis Units	(50xx,0030)	3	Units of measure for each axis
Axis Labels	(50xx,0040)	3	Text Labels for each axis
Minimum Coordinate Value	(50xx,0104)	3	The minimum value in the set of data. One value for each dimension.
Maximum Coordinate Value	(50xx,0104)	3	The maximum value in the set of data. One value for each dimension.
Curve Range	(50xx,0106)	3	A minimum-maximum pair for each dimension for defining the range of the Curve representation, in the same units as the Axis units.

VOI LUT C 11.2

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of the LUT.
Window Center	(0028,1050)	3	Window Center for display.
Window Center and Width Explanation	(0028,1055)	3	Freeform explanation of the meaning of the Window Center and Width.

SOP Common C12.1

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date SOP instance was created.
Instance Creation Time	(0008,0013)	3	Time SOP instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.

2.1.2.3.5 X-ray Radiofluoroscopic Image Storage Optional Elements

Patient Module Attributes C7.1.1

Attribute Name	Tag	Type	Attribute Description
Referenced Patient Sequence	(0008,1120)	3	A sequence which provides reference to a Patient SOP Class/Instance pair.
Patient's Birth Time	(0010, 0032)	3	Birth time of the patient.
Other Patient IDs	(0010, 1000)	3	Other identification numbers (codes) used to identify the patient.
Other Patient Names	(0010, 1001)	3	Other names used to identify the patient.
Ethnic Group	(0010, 2160)	3	Ethnic group or race of the patient.
Patient Comments	(0010, 4000)	3	User-defined additional information about the patient.

General Study C7.2.1

Attribute Name	Tag	Type	Attribute Description
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study.
Physician(s) of record	(0008,1048)	3	Physician(s) who are responsible for overall patient care at time of Study.
Name of Physician(s) Reading the Study	(0008,1060)	3	Physician(s) reading the Study.
Referenced Study Sequence	(0008,1110)	3	A sequence which provides reference to a Study SOP Class/Instance pair. Only a single reference is allowed.

Patient Study C 7.2.2

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of admitting diagnoses.
Patient's Age	(0010,1010)	3	Age of the patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about Patient's Medical History

General Series C 7.3.1

Attribute Name	Tag	Type	Attribute Description
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physician's Name	(0008,1050)	3	Name of physicians administering the Series.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which Series performed.
Series Description	(0008,103E)	3	User-provided description of the Series.
Operator's Name	(0008,1070)	3	Technologist(s) supporting the Series.
Referenced Study Component Sequence	(0008,1111)	3	Uniquely identifies the Study Component SOP Instances to which the Series is related.
Body Part Examined	(0018,0015)	3	Text description of body part examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment.
Laterality	(0020,0060)	2C	Laterality of (paired) body part examined.

Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.

General Equipment C 7.5.1

Attribute Name	Tag	Type	Attribute Description
Institution Name	(0008,0080)	3	Institution where equipment is located that produced the digital images.
Institution Address	(0008,0081)	3	Mailing address of institution where equipment is located.
Station Name	(0008,1010)	3	User defined name identifying machine that produced digital images.
Institutional Department Name	(0008,1040)	3	Department in the institution where equipment is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer's model number of equipment that produced images.
Device Serial Number	(0018,1000)	3	Manufacturer's serial number of equipment that produced images.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of equipment.
Spatial Resolution	(0018,1050)	3	Inherent limiting resolution in mm of equipment for high contrast objects.
Date of Last Calibration	(0018,1200)	3	Date when image acquisition device calibration last changed.
Time of Last Calibration	(0018,1201)	3	Time when image acquisition device calibration last changed.
Pixel Padding Value	(0028,0120)	3	Value of pixels added to non-rectangular image to pad rectangle.

General Image C7.6.1

Attribute Name	Tag	Type	Attribute Description
Patient Orientation	(0020,0020)	2C	Patient direction of rows and columns of the image.
Image Date	(0008,0023)	2C	Date the image pixel creation started.
Image Time	(0008,0033)	2C	Time the image pixel creation started.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data.
Acquisition Date	(0008,0022)	3	Date the acquisition of data resulting in this image started.
Acquisition Time	(0008,0032)	3	Time the acquisition of data resulting in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence which provides reference to a set of image SOPs identifying other images.
Derivation Description	(0008,2111)	3	A text description of how this image was derived.
Source Image Sequence	(0008,2112)	3	A sequence which identifies set of image SOP class pairs of images.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from the acquisition of data.
Image Comments	(0020,4000)	3	User-defined comments about the image.
Lossy Image Compression	(0028,2110)	3	Specifies whether an Image has undergone lossy compression.

Image Pixel C7.6.3

Attribute Name	Tag	Type	Attribute Description
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in the image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in the image.

Contrast/Bolus C 7.6.4

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Route	(0018,1040)	3	Administration route of contrast agent.

Contrast/Bolus Volume	(0018,1041)	3	Volume of contrast agent in cubic centimeters.
Contrast/Bolus Start Time	(0018,1042)	3	Time of start of injection.
Contrast/Bolus Stop Time	(0018,1043)	3	Time of end of contrast injection.
Contrast/Bolus Total Dose	(0018,1044)	3	Total amount of the active ingredient in injection.
Contrast Flow rate(s)	(0018,1046)	3	Rate(s) of injection(s) in milliliters/s
Contrast Flow duration(s)	(0018,1047)	3	Duration of injection(s) in seconds. Each Contrast Flow Duration shall correspond to a value of Contrast Flow Rate.
Contrast Bolus Ingredient	(0018,1048)	3	Active ingredient of the agent.
Contrast/Bolus Ingredient Concentration	(0018,1049)	3	Milligrams of active ingredient per milliliter of agent.

Cine Module C.7.6.5

Attribute Name	Tag	Type	Attribute Description
Start Trim	(0008,2142)	3	The frame number of the first frame of a Multi-frame image to be displayed.
Stop Trim	(0008,2143)	3	The frame number of the last frame of a Multi-frame image to be displayed.
Recommended Display Frame Rate	(0008,2144)	3	Recommended rate at which the frames of a Multi-frame image should be displayed in frames/second.
Cine Rate	(0018,0040)	3	Number of frames per second.
Frame Delay	(0018,1066)	3	Time (in msec) from Image Time to the start of the first frame in a Multi-Frame image.
Effective Duration	(0018,0072)	3	Total time in seconds that the data was actually taken for the entire Multi-frame image.
Actual Frame Duration	(0018,1242)	3	Elapsed time of data acquisition in msec per each frame.

Frame Pointers Module C.7.6.9

Attribute Name	Tag	Type	Attribute Description
Representative Frame Number	(0028,6010)	3	The frame number selected for use as a pictorial representation of the Multi-frame Image.
Frame Numbers of Interest	(0028,6020)	3	Frame Number(s) selected as frames of interest.
Frame of Interest Description	(0028,6022)	3	Description of each one of the Frames(s) of Interest selected in (0028,6020). If multiple Frames of Interest are selected and this Attribute is used, it shall contain the same number of values as are in the Frame Numbers of Interest.(0028,6020).

Mask Module C.7.6.10

Attribute Name	Tag	Type	Attribute Description
Applicable Frame Range	(0028,6102)	3	Each pair of numbers in this multi-values attribute specify a beginning and ending frame number inclusive of a range where this particular mask operation is valid.
Mask Frame Numbers	(0028,6110)	3	Specifies the frame numbers of the pixel data used to generate this mask.
Contrast frame Averaging	(0028,6112)	3	Specifies the number of contrast frames to average together before performing the mask operation. If the attribute is missing no averaging is performed.
Mask Sub-pixel Shift	(0028,6114)	3	A pair of floating point numbers specifying the fractional vertical [adjacent row spacing] and horizontal [adjacent column spacing] pixel shift applied to the mask before subtracting it from the contrast frame.
TID Offset	(0028,6120)	3	Specifies the offset to be subtracted from the current frame number in order to locate the mask frame in TID mode.

Mask Operation Explained	(0028,6190)	3	Free form explanation of this particular mask operation.
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X-ray Image Module C.8.7.1

Attribute Name	Tag	Type	Attribute Description
Scan Options	(0018,0022)	3	Parameters of scanning sequence.

X-ray Acquisition Module C.8.7.2

Attribute Name	Tag	Type	Attribute Description
Grid	(0018,1166)	3	Identify the grid. Defined terms are: IN= A grid is positioned NONE= No grid is used.
Average Pulse Width	(0018,1154)	3	Average width of X-ray pulse in msec.
Radiation Mode	(0018,115A)	3	Specifies X-ray radiation mode. Defined terms CONTINUOUS, PULSED.
Type of filters	(0018,1161)	3	Type of filter(s) inserted into the X-ray beam.
Intensifier Size	(0018,1162)	3	Diameter of X-ray intensifier in mm.
Field of view Shape	(0018,1147)	3	Shape of the Image Intensifier Field of View. Defined terms ROUND, RECTANGLE.
Field of View Dimensions	(0018,1149)	3	Dimensions of the Image Intensifier Field of View in mm. If rectangle row dimension followed by column dimension .
Image pixel Spacing	(0018,1164)	3	Physical distance measured at the front plane of the Image Receptor housing between the center of each pixel specified by a numeric pair row spacing \ column spacing.
Focal Spot	(0018,1190)	3	Nominal focal spot size in mm used to acquire this image.
Image Area Dose Product	(0018,115E)	3	X-ray dose measured in dGy*cm*cm to which the patient was exposed for the acquisition of this image plus any non-digitally recorded fluoroscopy which may have been performed to prepare for this acquisition of this image.

X-ray Table Module C.8.7.8.1

Attribute Name	Tag	Type	Attribute Description
Distance Source to Detector	(0018,1110)	3	Distance in mm from source to detector center.
Distance Source to Patient	(0018,1111)	3	Distance in mm from source to isocenter (center of field of view)
Estimated Radiographic Magnification Factor	(0018,1114)	3	Ratio of SID (Source Image Distance) over SOD (Source object Distance).
Column Angulation	(0018,1450)	3	Angle of the X-ray beam in degree relative to an orthogonal axis to the detector plane. Positive values indicate that the tilt is toward the head of the table.

XRF Tomography Acquisition Module C 8.7.7

Attribute Name	Tag	Type	Attribute Description
Tomo Angle	(0018,1470)	3	Angle span in degrees of rotation of X-ray source during X-ray acquisition.
Tomo Time	(0018,1480)	3	Time in seconds the source has taken to rotate the Tomo Angle during the X-ray acquisition.

Overlay Plane Module C 9.2

Attribute Name	Tag	Type	Attribute Description
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ROI Area	(60xx,1301)	3	Number of pixels in ROI Area.
ROI Mean	(60xx,1302)	3	ROI Mean
ROI Standard Deviation	(60xx,1303)	3	ROI Standard Deviation
Overlay Descriptor - Gray	(60xx,1100)	3	The number of bits in each entry of (60xx,1200)
Overlay Descriptor - Red	(60xx,1101)	3	The number of bits in each entry of (60xx,1201)
Overlay Descriptor - Green	(60xx,1102)	3	The number of bits in each entry of (60xx,1202)
Overlay Descriptor - Blue	(60xx,1103)	3	The number of bits in each entry of (60xx,1203)
Overlays - Gray	(60xx,1200)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Red	(60xx,1201)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Green	(60xx,1202)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane
Overlays - Blue	(60xx,1203)	3	Overlay bits. Value of 1 indicated that pixel is part of overlay plane

Multi-Frame Overlay Module C.9.3

Attribute Name	Tag	Type	Attribute Description
Image Frame Origin	(60xx,0051)	3	frame number of Multi-frame Image to which this overlay applies; frames are numbered from 1.

Curve Module C.10.2

Attribute Name	Tag	Type	Attribute Description
Curve description	(50xx,0022)	3	User defined comments about the Curve
Axis Units	(50xx,0030)	3	Units of measure for each axis
Axis Labels	(50xx,0040)	3	Text Labels for each axis
Minimum Coordinate Value	(50xx,0104)	3	The minimum value in the set of data. One value for each dimension.
Maximum Coordinate Value	(50xx,0104)	3	The maximum value in the set of data. One value for each dimension.
Curve Range	(50xx,0106)	3	A minimum-maximum pair for each dimension for defining the range of the Curve representation, in the same units as the Axis units.

VOI LUT C 11.2

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	3	Defines a sequence of VOI LUTs.
LUT Explanation	(0028,3003)	3	Freeform text explanation of meaning of the LUT.
Window Center	(0028,1050)	3	Window Center for display.
Window Center and Width Explanation	(0028,1055)	3	Freeform explanation of the meaning of the Window Center and Width.

SOP Common C12.1

Attribute Name	Tag	Type	Attribute Description
Instance Creation Date	(0008,0012)	3	Date SOP instance was created.
Instance Creation Time	(0008,0013)	3	Time SOP instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.

2.1.3 Association acceptance policy for MergeMVP Send AE

The MergeMVP Send AE does not accept associations.

3 Communication profiles

The MergeMVP application entities, in conjunction with MergeCOM-3, run over the TCP/IP protocol stack on any physical interconnection media supporting the TCP/IP stack.

4 Extensions/specializations/privatizations

4.1 Standard extended/specialized/private SOPs

None supported.

4.2 Private transfer syntaxes

None supported.

5 Configuration

The MergeMVP AE's reference two or three configuration files which are present in the directory from which they run. They are as follows:

MERGE.INI	Specifies the DICOM association parameters for the client.
MERGECOM.PRO	Specifies characteristics of the DICOM communications session.
TARGET.MC3	Specifies the Application Entity and Port to use for the specific association.

Note: TARGET.MC3 exist only on MVPs that support “multi-targeting”. The values in TARGET.MC3 override the values specified in MERGE.INI.

5.1 AE title/presentation address mapping

Presentation address mapping is configured in the MERGE.INI file, where the client and server role parameters are specified. The REMOTE_HOST_NAME, REMOTE_SCP_PORT_NUMBER, and REMOTE_SCP_APPLICATION_TITLE map an Application Entity (AE) Title to a Presentation Address in TCP/IP for the server the client wishes to connect to.

The Host Name maps to an IP address as specified by the local host table. In general, the well defined listen port for a DICOM SCP is 104.

For systems supporting “multi-targeting” the Presentation address mapping is controlled through the TARGET.MC3 file. This file is a layout sensitive file that is controlled through the configuration utilities supplied with the MVP. The values specified in this file override those defined in the MERGE.INI .

5.2 Configurable parameters

The MERGECOM.PRO configuration file can be used to set or modify other lower-level communication parameters, such as timeout limits.. This includes time-outs and other parameters. Some information about supported SOP classes is also stored in this file. **Most parameters in this file should NEVER be changed. Doing so could break DICOM conformance.** Before modifying any parameters, such as time-out, it is recommended that a backup be made. Also, before modifying other parameters, you should consider contacting Merge Technologies for advice.

6 Support of extended character sets

Not supported.