



**Quinton Q-Stress, Mortara XScribe, HScribe,
RScribe, and Modality Manager**

DICOM Conformance Statement

 Mortara **INSTRUMENT**

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Revision History			
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1	May 15, 2012	David Lombardi	First issue of document.
2	October 24, 2012	Nicoletta Marzocchi	Modality Worklist and Modality Performed Procedure Step sections updated to DICOM Standard 2011.
3	July 10, 2014	Costantino Cavone	Added tags : <ul style="list-style-type: none"> • Physician of Record • Physician of Record Identification sequence • Verification Flag into: table 3.2.1.3.3.2 Encapsulated PDF Storage Attributes
4	Jan 13, 2016	Keith Becker Bonnie Scholten	Updated values in MPPS N-CREATE and N-SETCreated MWL query fields table 3.2.1.3.1.3-1 Created MWL returned fields table 3.2.1.2.1.3-2 Added Ventricular rate to waveform annotations in table 0. Changed Institution name from "NA" to EMPTY in table 3.2.1.3.3.2 Modified to include all supported product names including Q-Stress and revised Overview section (1 and 1.1).
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6	August 30, 2016	Keith Becker	Updated 3.2.1.3.1.3 to add Study Description to Modality Worklist. Updated 3.2.1.3.3.2 to add Study Description to Encapsulated PDF Storage.

Approvals		
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1 Conformance Statement Overview

Modality Manager is the module that provides the database functionalities for Quinton Q-Stress, Mortara XScribe, HScribe and RScribe. The conformance statements in this document support Q-Stress, XScribe, and RScribe version 6.1 and later, as well as HScribe version 5.2 and later.

Modality Manager implements, on behalf of each modality, the connectivity with DICOM services.

Modality Manager with the DICOM Connectivity Option is able to receive orders using DICOM modality worklist and store study reports as encapsulated PDFs or 12 Lead ECG (RScribe only). The table below gives a list of DICOM services supported by Modality Manager.

1.1 Network Services

Table 1.1: Modality Manager DICOM Network Services Supported

DICOM SOP Class Name	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification SOP Class	Yes	No
Transfer		
Encapsulated PDF (HScribe, Q-Stress and XScribe only)	Yes	No
12-lead ECG Waveform Storage (RScribe only)	Yes	No
Workflow Management		
Modality Worklist Information Model - FIND	Yes	No
Storage Commitment Push Model	Yes	No
Modality Performed Procedure Step	Yes	No

1.2 Media Services

Modality Manager does not support any DICOM media services.

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2 Introduction

2.1 Audience

This document is the DICOM Conformance Statement for Modality Manager having the DICOM Connectivity Option. It is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

2.2 Remarks

None

2.3 Definitions, Terms and Abbreviations

AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VR	Value Representation
MPPS	Modality Performed Procedure Step

2.4 References

None

3 Networking

3.1 Implementation Model

3.1.1 Application Dataflow Diagram

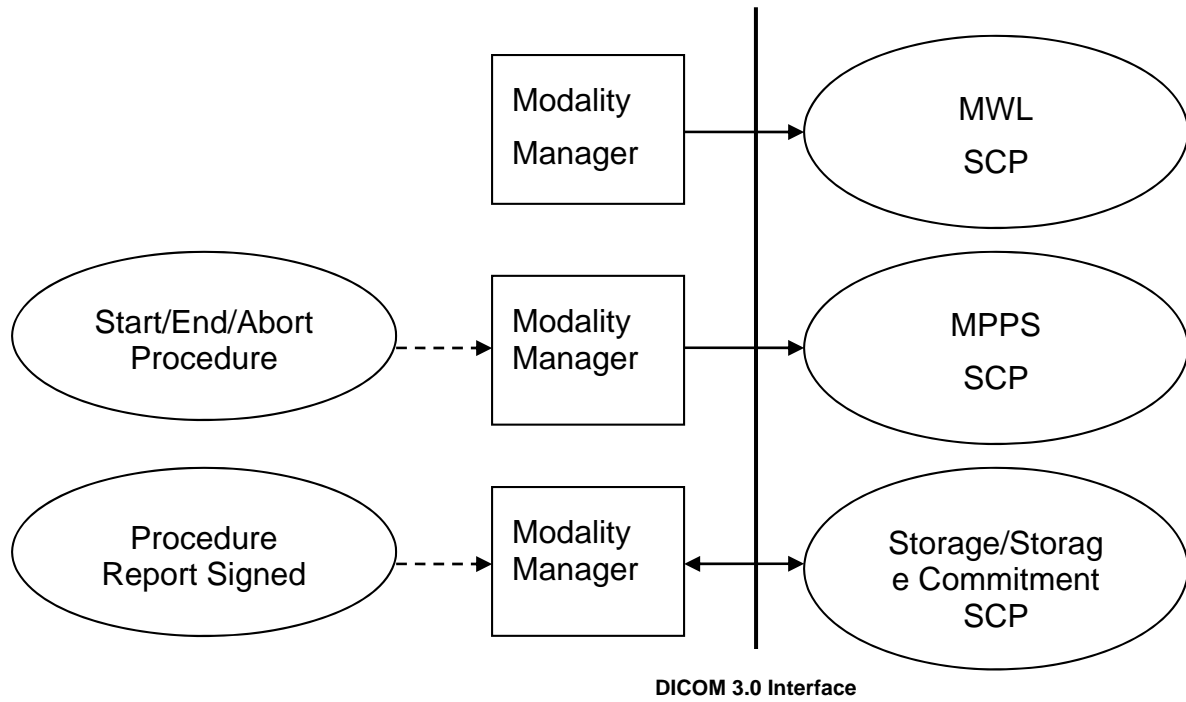
Modality Manager is implemented by a Windows service periodically querying the configured Modality Worklist SCP.

The frequency of queries and the time range of requested orders can be configured via modality user interface application (System Settings function).

When a procedure has been completed, a COMPLETE MPPS message is sent to the MPPS SCP. The Holter dataflow supports sending IN PROGRESS MPPS messages to the MPPS SCP whenever a Holter recorder is prepared for a new procedure.

When a procedure report is finalized and signed, the system delivers an encapsulated PDF object or a 12 Lead ECG Waveform to the configured Storage SCP. A storage commitment request can be sent to the same SCP, and the storage commitment result can be received by Modality Manager.

Figure 3.1.1: Modality Manager DICOM Network Dataflow Diagram



3.1.2 Functional Definition of Application Entities

Modality Manager, if configured, may periodically perform MWL queries to retrieve pending orders. The filtering criteria may include scheduling time frame, modality and other configurable fields.

The MWL is retrieved for all systems, so there is no provision to filter by patient or procedure type.

The returned list is saved into a local DB and it is displayed when a user wants to start a new procedure.

Modality Manager may send “In Progress” MPPS messages when a Holter recorder is prepared with patient/exam data returned by a previous MWL query.

It does not send “In Progress” messages when a Stress or Resting procedure is started.

Upon completion of any procedure, Modality Manager sends a “Complete” MPPS message (as well as an “In Progress” message if not previously sent).

“Discontinued” MPPS messages are sent when an already started Holter procedure is later cancelled (deleted) from the system.

Modality Manager will store procedure results once the procedure is reviewed and a final report prepared and signed. The system stores an Encapsulated PDF report for Q-Stress, XScribe or HScribe procedures and a 12 Lead ECG Waveform object for RScribe procedures.

3.1.3 Sequencing of Real-World Activities

3.2 AE Specifications

3.2.1 Scribes Application Entities

3.2.1.1 SOP Classes

These Application Entities provide Standard Conformance to the following SOP Classes:

Table 3.2.1.1-1: Standard SOP Classes for Modality Manager

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Yes	No
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No

These Application Entities provide Standard Extended Conformance to the following SOP Classes:

Table 3.2.1.1-2: Standard Extended SOP Classes for Q-Stress, HScribe and XScribe

DICOM SOP Class Name	SOP Class UID	SCU	SCP
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

Table 3.2.1.1-3: Standard Extended SOP Classes for RScribe

DICOM SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No

3.2.1.2 Association Policies

3.2.1.2.1 General

The standard Application Context Name is used:

Table 3.2.1.2.1: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
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3.2.1.2.2 Number of Associations

Table 3.2.1.2.2-1: Number of Associations as an Association Initiator for Modality Manager

Maximum number of simultaneous associations	1
---------------------------------------------	---

Table 3.2.1.2.2-2: Number of Associations as an Association Acceptor for Modality Manager

Maximum number of simultaneous associations	0
---------------------------------------------	---

3.2.1.2.3 Asynchronous Nature

Table 3.2.1.2.3: Asynchronous Nature as an Association Initiator for Modality Manager

Maximum number of outstanding asynchronous transactions	1
---------------------------------------------------------	---

3.2.1.2.4 Implementation Identifying Information

Implementation Class UID	2.16.840.1
Implementation Version Name	MergeCOM3_370

3.2.1.3 Association Initiation Policy

3.2.1.3.1 Real-World Activity: Modality Worklist Query

3.2.1.3.1.1 Description and Sequencing of Activities

See section 3.1.2.1 for a description of the Modality Worklist Query.

3.2.1.3.1.2 Proposed Presentation Contexts

Table 3.2.1.3.1.2: Proposed Presentation Contexts for Modality Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.2.1.3.1.3 SOP Specific Conformance for Modality Worklist

The following table lists the elements that can be used as query fields to filter the Modality Worklist. Modality Manager will have the option to configure these fields to be used in the filtering criteria by the C-FIND SCP.

Table 3.2.1.3.1.3-1: Supported Matching Elements as SCU for MWL C-FIND

Attribute Name	Tag	Comment
Modality	(0008,0060)	
Institution Name	(0008,0080)	
Scheduled Station Name	(0040,0010)	
Scheduled Procedure Step Location	(0040,0011)	
Current Patient Location	(0038,0300)	
Requested Procedure Location	(0040,1005)	
Scheduled Procedure Step ID	(0040,0009)	
Scheduled Procedure Step Description	(0040,0007)	
Requested Procedure ID	(0040,1001)	
Scheduled Station AE Title	(0040,0001)	
Scheduled Procedure Step Start Date (past and future)	(0040,0002)	Range configurable via Modality Manager Settings
Requested Procedure Description	(0032,1060)	Modality Manager uses it to filter Scribe modality.
User Specified	(XXXX,XXXX)	Must be string type.

The following elements are used from the returned Modality Worklist.

Table 3.2.1.3.1.3-2: Elements Used from MWL C-FIND

Attribute Name	Tag	Comment
Modality	(0008,0060)	Not displayed. Included in DICOM object.
Study Instance UID	(0020,000D)	Not displayed. Included in DICOM object.
Requested Procedure ID	(0040,1001)	Not displayed. Included in DICOM object.
Scheduled Procedure Step Description	(0040,0007)	Not displayed. Included in DICOM object.
Scheduled Protocol Code Sequence	(0040,0008)	Not displayed. Included in DICOM object.
Scheduled Procedure Step ID	(0040,0009)	Not displayed. Included in DICOM object.
Accession Number	(0008,0050)	Not displayed. Included in DICOM object.
Study Description	(0008,1030)	Not displayed. Included in DICOM object.
Requesting Physician	(0032,1032)	Not displayed. Included in DICOM object.
Patient's Name	(0010,0010)	Patient fields: Last Name, First Name and Middle Name
Patient ID	(0010,0020)	Patient field: ID
Patient's Birth Date	(0010,0030)	Patient field: DOB
Patient's Sex	(0010,0040)	Patient field: Gender
Patient's Age	(0010,1010)	Patient field: Age (can change due to auto-calculation)
Ethnic Group	(0010,2160)	Patient field: Race
Patient's Size	(0010,1020)	Patient field: Height
Patient's Weight	(0010,1030)	Patient field: Weight
Other Patient IDs	(0010,1000)	Patient field: Second ID
Admission ID	(0038,0010)	Patient field: Admission ID
Patient's Address	(0010,1040)	Patient field: Address
County of Residence	(0010,2150)	Patient field: Country
Patient's Telephone Numbers	(0010,2154)	Patient field: Home Telephone
Smoking Status	(0010,21A0)	Patient field: Smoking
Referring Physician's Name	(0008,0090)	Patient field: Referring Physician
Requested Procedure Description	(0032,1060)	Patient field: Procedure type
Scheduled Procedure Step Location	(0040, 0011)	Patient field: Location
Scheduled Procedure Step Start Date	(0040,0002)	Patient field: Requested Date/Time
Scheduled Procedure Step Start Time	(0040,0003)	Patient field: Requested Date/Time

3.2.1.3.2 Real-World Activity: Start/End/Abort Procedure

HScribe, Q-Stress and XScribe can send a NCREATE (“In Progress”) Modality Performed Procedure Step message to a remote system when a procedure is started. HScribe, Q-Stress and XScribe can send an N-SET (“Completed”) Modality Performed Procedure Step message to a remote system when the procedure is run to completion. HScribe, Q-Stress and XScribe can send an N-SET (“Discontinued”) Modality Performed Procedure Step message to a remote system when the procedure is aborted.

3.2.1.3.2.1.1 Proposed Presentation Contexts

Table 3.2.1.3.2.1: Proposed Presentation Contexts for Q-Stress, HScribe and XScribe

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	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		

3.2.1.3.2.2 SOP Specific Conformance for Modality Worklist

The following keys are supported for the Modality Performed Procedure Step N-CREATE.

Table 3.2.1.3.2.2: Supported keys for Modality Performed Procedure Step N-CREATE

Module	Attribute Name	Tag	Value
N-CREATE-RQ	Affected SOP Instance UID	(0000,1000)	Generated by Modality Manager using the following : Mortara prefix: 1.3.6.1.4.1.20029 Product code: RScribe 40, XScribe: 50, HScribe: 60 Exam entry date/time
Performed Procedure Step Relationship	Referenced Patient Sequence	(0008,1120)	EMPTY
	Patient's Name	(0010,0010)	Patient Last Name, First Name and Middle Name
	Patient ID	(0010,0020)	Patient ID
	Patient's Birth Date	(0010,0030)	Patient Birth Date
	Patient's Sex	(0010,0040)	Patient Gender
	Scheduled Step Attribute Sequence	(0040,0270)	
	>Accession Number	(0008,0050)	From MWL or EMPTY

Module	Attribute Name	Tag	Value
	>Referenced Study Sequence	(0008,1110)	EMPTY
	>Study Instance UID	(0020,000D)	From MWL or generated by Modality Manager using the following : Mortara prefix: 1.3.6.1.4.1.20029 Product code: RWrite 40, XWrite: 50, HWrite: 60 Exam entry date/time
	>Requested Procedure Description	(0032,1060)	From MWL or EMPTY
	>Scheduled Procedure Step Description	(0040,0007)	From MWL or EMPTY
	> Scheduled Protocol Code Sequence	(0040,0008)	From MWL or EMPTY
	>>Code Value	(0008,0100)	From MWL or EMPTY
	>>Coding Scheme Designator	(0008,0102)	From MWL or EMPTY
	>>Code Meaning	(0008,0104)	From MWL or EMPTY
	>Scheduled Procedure Step ID	(0040,0009)	From MWL or EMPTY
	>Requested Procedure ID	(0040,1001)	From MWL or EMPTY
Performed Procedure Step Information	Procedure Code Sequence	(0008,1032)	From MWL (Requested Procedure Code Sequence) or EMPTY
	>Code Value	(0008,0100)	From MWL or EMPTY
	>Coding Scheme Designator	(0008,0102)	From MWL or EMPTY
	>Code Meaning	(0008,0104)	From MWL or EMPTY
	Performed Station AE Title	(0040,0241)	Modality Manager configured AE Title
	Performed Station Name	(0040,0242)	EMPTY
	Performed Location	(0040,0243)	EMPTY
	Performed Procedure Step Start Date	(0040,0244)	Exam Start Date
	Performed Procedure Step Start Time	(0040,0245)	Exam Start Time
	Performed Procedure Step End Date	(0040,0250)	EMPTY
Performed Procedure Step End Time	(0040,0251)	EMPTY	

Module	Attribute Name	Tag	Value
	Performed Procedure Step Status	(0040,0252)	IN PROGRESS For Holter this message is sent when recorder is prepared.
	Performed Procedure Step ID	(0040,0253)	From MWL (Scheduled Procedure Step ID)
	Performed Procedure Step Description	(0040,0254)	EMPTY
	Performed Procedure Type Description	(0040,0255)	EMPTY
	Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	EMPTY
Image Acquisition Results	Modality	(0008,0060)	From MWL or ECG
	Study ID	(0020,0010)	From MWL (Requested Procedure ID)
	Performed Protocol Code Sequence	(0040,0260)	From MWL (Scheduled Protocol Code Sequence)
	>Code Value	(0008,0100)	From MWL or EMPTY
	>Coding Scheme Designator	(0008,0102)	From MWL or EMPTY
	>Code Meaning	(0008,0104)	From MWL or EMPTY
	Protocol Context Sequence	(0040,0440)	EMPTY
	Performed Series Sequence	(0040,0340)	EMPTY

Table 3.2.1.3.2.3: Supported keys for Modality Performed Procedure Step N-SET

Module	Attribute Name	Tag	Value
N-SET-RQ	Requested SOP Instance UID	(0000,1001)	Affected SOP Instance UID
Performed Procedure Step Information	Performed Procedure Step End Date	(0040,0250)	Exam End Date
	Performed Procedure Step End Time	(0040,0251)	Exam End Time
	Performed Procedure Step Status	(0040,0252)	COMPLETED or DISCONTINUED For Holter COMPLETED message is sent after data is acquired. DISCONTINUED message is sent after exam is deleted from the system.
	Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	Only if DISCONTINUED (not sent otherwise)

Module	Attribute Name	Tag	Value
	>Code Value	(0008,0100)	110513
	>Coding Scheme Designator	(0008,0102)	DCM
	>Code Meaning	(0008,0104)	Discontinued for unspecified reason
Image Acquisition Results	Performed Series Sequence	(0040,0340)	
	>Retrieve AE Title	(0008,0054)	EMPTY
	>Series Description	(0008,103E)	EMPTY
	>Performing Physician's Name	(0008,1050)	EMPTY
	>Operator's Name	(0008,1050)	Technician field
	>Referenced Image Sequence	(0008,1140)	EMPTY
	>Protocol Name	(0018,1030)	From MWL (Scheduled Procedure Step Description) or Holter/Stress/Resting
	>Series Instance UID	(0020,000E)	From MWL or generated by Modality Manager using the following : Mortara prefix: 1.3.6.1.4.1.20029 Product code: RWrite 40, XWrite: 50, HWrite: 60 Exam entry date/time .1
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	EMPTY	

3.2.1.3.3 *Real-World Activity: Store Procedure Results*

After a procedure report has been finalized and signed, Modality Manager will store the report into the configured Storage SCP.

Q-Stress, XWrite and HWrite reports are stored as encapsulated PDF objects, and RWrite results as 12-lead ECG Waveform objects. If the storage fails, the transaction will be queued for retry after a configurable amount of time.

3.2.1.3.3.1 Proposed Presentation Contexts

Table 3.2.1.3.3.1: Proposed Presentation Contexts for Modality Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Encapsulated PDF Storage (Q-Stress, XScribe and HScribe only)	1.2.840.10008.5.1.4.1.1.104.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.2.1.3.3.2 SOP Specific Conformance for Encapsulated PDF Storage

Modality Manager creates encapsulated PDF objects with the following DICOM attributes. All attributes conform to the encapsulated PDF Storage SOP class specification.

Table 3.2.1.3.3.2 Encapsulated PDF Storage Attributes

Module	Attribute Name	Tag	Value
Patient	Patient's Name	(0010,0010)	From MWL or Last Name, First Name and Middle Name fields
	Patient ID	(0010,0020)	From MWL or ID field
	Patient's Birth Date	(0010,0030)	From MWL or DOB field (yyyymmdd)
	Patient's Age	(0010,1010)	From MWL or Age field (3 char with units of Y,W,M or D)
	Patient's Sex	(0010,0040)	From MWL or Gender field (M,F or O)
	Ethnic Group	(0010,2160)	From MWL or Race field
	Patient's Size	(0010,1020)	Not provided.
	Patient's Weight	(0010,1030)	Not provided.
	Other Patient IDs	(0010,1000)	Not provided.
	Admission ID	(0038,0010)	Not provided.
	Patient's Address	(0010,1040)	Not provided.
	County of Residence	(0010,2150)	Not provided.

	Patient's Telephone Numbers	(0010,2154)	Not provided.
General Study	Study Instance UID	(0020,000D)	From MWL or generated by Modality Manager using the following : Mortara prefix: 1.3.6.1.4.1.20029 Product code: XScribe: 50, HScribe: 60 Exam entry date/time
	Study ID	(0020,0010)	Transmission date (yyyymmddhhmm)
	Study Date	(0008,0020)	Acquisition Date
	Study Time	(0008,0030)	Acquisition Time
	Accession Number	(0008,0050)	From MWL or EMPTY
	Study Description	(0008,1030)	From MWL or the following: Stress
	Reason for Study	(0032,1030)	Indications field
	Referring Physician's Name	(0008,0090)	From MWL or Referring Physician field
	Requesting Physician	(0032,1032)	From MWL or EMPTY
	Patient's Comments	(0010,4000)	Notes field
	Operator's Name	(0008,1070)	Technician field
	Physician(s) of Record	(0008,1048)	Depending on Legal Signature Yes: User account Display Name. If Display Name not configured, uses Username. No: Approved by
	Physician(s) of Record identification Sequence	(0008,1049)	
	>Person Identification Code Sequence	(0040,1101)	
>>Code value	(0008,0100)	Depending on Legal Signature Yes: Username No: Code associated to the Personnel list if available. Otherwise Empty	

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	>>Coding Scheme Designator	(0008,0102)	Mortara
	>>Code Meaning	(0008,0104)	Physician ID
	Institution Name	(0008,0080)	From Modality Manager Otherwise EMPTY.
	Private Tags	(1455,00FF) to (1455,FF37)	Reserved block of data for Mortara specific data and definitions
Encapsulated Document Series	Modality	(0008,0060)	From Modality Manager settings Otherwise Default is ECG if not configured
	Series Instance UID	(0020,000E)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: XScribe: 50, HScribe: 60 Acquisition date/time .1 Transmission time (hours, minutes, seconds, milliseconds) only when New Series set in Modality Manager
	Series Number	(0020,0011)	Transmission time
	Referenced Performed Procedure Step Sequence	(0008,1111)	
	>Referenced SOP Class UID	(0008,1150)	1.2.840.10008.3.1.2.3.3
	> Referenced SOP Instance UID	(0008,1155)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: XScribe: 50, HScribe: 60 Transmission date/time
	Request Attributes Sequence	(0040,0275)	
	>Requested Procedure ID	(0040,1001)	From MWL or EMPTY
	>Scheduled Procedure Step ID	(0040,0009)	From MWL or EMPTY

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	>Scheduled Procedure Step Description	(0040,0007)	From MWL or EMPTY
	>Scheduled Protocol Code Sequence	(0040,0008)	From MWL or EMPTY
	>>Code Value	(0008,0100)	From MWL or EMPTY
	>>Coding Scheme Designator	(0008,0102)	From MWL or EMPTY
	>>Code Meaning	(0008,0104)	From MWL or EMPTY
General Equipment	Manufacturer	(0008,0070)	Mortara Instrument, Inc.
	Institution Name	(0008,0080)	Institution Name (Modality Manager settings)
	Station Name	(0008,1010)	From Local Settings (Modality) or Computer Name
SC Equipment	Conversion Type	(0008,0064)	SYN
Encapsulated Document	Concept Name Code Sequence	(0040,A043)	
	>Code Value	(0008,0100)	Product code: XScribe: 50, HScribe: 60
	>Coding Scheme Designator	(0008,0102)	LN
	>Code Meaning	(0008,0104)	Resting ECG Report, Stress ECG Report or Holter ECG Report
	Instance Number	(0020,0013)	1
	Content Date	(0008,0023)	Transmission Date
	Content Time	(0008,0033)	Transmission Time
	Acquisition Date/time	(0008,002A)	Start date/time
	Burned In Annotation	(0028,0301)	YES
	Document Title	(0042,0010)	PDF Report
	Verification Flag	(0040,A493)	VERIFIED (whenever exam is signed with the legal signature option) UNVERIFIED all the other cases (including delivery prior signature)

	MIME Type of Encapsulated Document	(0042,0012)	application/pdf
	Encapsulated Document	(0042,0011)	The PDF file
	Affected SOP Instance UID	(0000,1000)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: XScribe: 50, HScribe: 60 Transmission date/time
SOP Common	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.104.1
	SOP Instance UID	(0008,0018)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: XScribe: 50, HScribe: 60 Transmission date/time
	Specific Character Set	(0008,0005)	User configurable. Default is ISO_IR 192

3.2.1.3.4 Real-World Activity: Transmit Resting ECG Reports

After completion of a resting ECG procedure, Modality Manager will store the finalized and signed ECG as a 12 Lead ECG Waveform object into the configured Storage SCP.

3.2.1.3.4.1 Proposed Presentation Contexts

Table 3.2.1.3.4.1: Proposed Presentation Contexts for Modality Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
12-lead ECG Waveform Storage (RScribe only)	1.2.840.10008.5.1.4.1.1.9.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.2.1.3.4.2 SOP Specific Conformance for 12-lead ECG Waveform Storage

Modality Manager creates 12-lead ECG Waveform objects with the following DICOM attributes. All attributes conform to the 12-lead ECG Waveform Storage SOP class specification. A private attribute block is included for the VERITAS interpretation vector, Attending Physician and Notes.

Table 3.2.1.3.4.2 12-lead ECG Waveform Storage Attributes

Module	Attribute Name	Tag	Value
Patient	Patient's Name	(0010,0010)	From MWL or Last Name, First Name and Middle Name fields
	Patient ID	(0010,0020)	From MWL or ID field
	Patient's Birth Date	(0010,0030)	From MWL or DOB field (yyyymmdd)
	Patient's Sex	(0010,0040)	From MWL or Gender field (M,F or O)
	Other Patient IDs	(0010,1000)	From MWL or Second ID field
	Ethnic Group	(0010,2160)	From MWL or Race field Caucasian, Black, Oriental, Hispanic, American Indian, Aleut/Eskimo, Hawaiian, Pacific Islander, Mongolian, Asian, Unknown. Note: This tag will not be present if the custom ID does not contain the Race field.
General Study	Study Instance UID	(0020,000D)	From MWL or generated by Modality Manager using the following : Mortara prefix: 1.3.6.1.4.1.20029 Product code for RScript: 40 Exam entry date/time
	Study Date	(0008,0020)	Acquisition Date
	Study Time	(0008,0030)	Acquisition Time
	Referring Physician's Name	(0008,0090)	From MWL or Referring Physician field
	Study ID	(0020,0010)	EMPTY
	Requesting Physician	(0032,1032)	From MWL
	Name of Physician(s) Reading Study	(0008,1060)	Reviewed By field
	Accession Number	(0008,0050)	From MWL or EMPTY

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Module	Attribute Name	Tag	Value
	Study Description	(0008,1030)	From MWL or one of the following: Resting 12-lead ECG Resting 15-lead ECG
	Station Name	(0008,1010)	Configuration (Modality Manager settings)
	Affected SOP Instance UID	(0000,1000)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: 40 for RSCRIBE Transmission date/time
Patient Study	Patient's Age	(0010,1010)	From MWL or Age field (3 char with units of Y,W,M or D)
	Patient's Size	(0010,1020)	Height field
	Patient's Weight	(0010,1030)	Weight field
General Series	Modality	(0008,0060)	Configurable (Modality Manager settings). Default is ECG if not configured
	Series Instance UID	(0020,000E)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code for RSCRIBE: 40 ECG acquisition date/time .1
	Series Number	(0020,0011)	EMPTY
	Laterality	(0020,0060)	EMPTY
	Operator's Name	(0008,1070)	Technician field
General Equipment	Manufacturer	(0008,0070)	Mortara Instrument, Inc.
	Manufacturer's Model Name	(0008,1090)	RSCRIBE
	Device Serial Number	(0018,1000)	EMPTY
	Software Version(s)	(0018,1020)	EMPTY
	Institution Name	(0008,0080)	Configuration (Modality Manager settings)

Module	Attribute Name	Tag	Value
Waveform Identification	Instance Number	(0020,0013)	1
	Content Date	(0008,0023)	Acquisition Date
	Content Time	(0008,0033)	Acquisition Time
	Acquisition Datetime	(0008,002A)	Acquisition Date/Time
Waveform	Waveform Sequence	(5400,0100)	Has 2 items, a multiplex group for rhythm data, and another for the median beat.
	> Multiplex Group Time Offset	(0018,1068)	0
	> Trigger Time Offset	(0018,1069)	0
	> Trigger Sample Position	(0018,106E)	Rhythm: not included Median: sample of "maximum power" between QRS onset and offset
	> Waveform Originality	(003A,0004)	Rhythm: ORIGINAL Median: DERIVED
	> Number of Waveform Channels	(003A,0005)	12 or 15
	> Number of Waveform Samples	(003A,0010)	Rhythm: 5000 or 10000 Median: up to 1200
	> Sampling Frequency	(003A,001A)	500 or 1000
	> Multiplex Group Label	(003A,0020)	Rhythm: RHYTHM Median: MEDIAN_BEAT
	> Channel Definition Sequence	(003A,0200)	Has 12 or 15 items, one for each lead
	>> Channel Source Sequence	(003A,0208)	

Module	Attribute Name	Tag	Value	
	>>> Code Value	(0008,0100)	Lead I	5.6.3-9-1
			Lead II	5.6.3-9-2
			Lead III	5.6.3-9-61
			Lead aVR	5.6.3-9-62
			Lead aVL	5.6.3-9-63
			Lead aVF	5.6.3-9-64
			Lead V1	5.6.3-9-3
			Lead V2	5.6.3-9-4
			Lead V3	5.6.3-9-5
			Lead V4	5.6.3-9-6
			Lead V5	5.6.3-9-7
			Lead V6	5.6.3-9-8
			Lead V7	5.6.3-9-9
			Lead V8	5.6.3-9-66
			Lead V9	5.6.3-9-67
			Lead V3R	5.6.3-9-11
			Lead V4R	5.6.3-9-12
			Lead E1	5.6.3-9-75
			Lead E2	5.6.3-9-76
			Lead E3	5.6.3-9-77
	>>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>>> Code Scheme Version	(0008,0103)	1.3	

Module	Attribute Name	Tag	Value	
	>>> Code Meaning	(0008,0104)	Lead I	Lead I
			Lead II	Lead II
			Lead III	Lead III
			Lead aVR	Lead aVR
			Lead aVL	Lead aVL
			Lead aVF	Lead aVF
			Lead V1	Lead V1
			Lead V2	Lead V2
			Lead V3	Lead V3
			Lead V4	Lead V4
			Lead V5	Lead V5
			Lead V6	Lead V6
			Lead V7	Lead V7
			Lead V8	Lead V8
			Lead V9	Lead V9
			Lead V3R	Lead V3R
			Lead V4R	Lead V4R
			Lead E1	Lead E1
			Lead E2	Lead E2
			Lead E3	Lead E3
	>> Channel Sensitivity	(003A,0210)	ECG sensitivity, e.g. .25	
	>> Channel Sensitivity Units	(003A,0211)		
	>>> Code Value	(0008,0100)	uV	
	>>> Coding Scheme Designator	(0008,0102)	UCUM	
	>>> Code Scheme Version	(0008,0103)	1.4	
	>>> Code Meaning	(0008,0104)	microvolt	
	>> Channel Sensitivity Correction Factor	(003A,0212)	1	
	>> Channel Baseline	(003A,0213)	0	
	>> Channel Sample Skew	(003A,0215)	0	

Module	Attribute Name	Tag	Value
	>> Waveform Bits Stored	(003A,021A)	16
	>> Filter Low Frequency	(003A,0220)	Cutoff frequency of the high-pass baseline roll filter in Hertz, e.g. 0.05.
	>> Filter High Frequency	(003A,0221)	Cutoff frequency of the low pass filter in Hertz, e.g. 300.
	>> Notch Filter Frequency	(003A,0222)	ECG AC filter, e.g. 60 in United States.
	> Waveform Bits Allocated	(5400,1004)	16
	> Waveform Sample Interpretation	(5400,1006)	SS
	> Waveform Data	(5400,1010)	ECG multiplexed samples
Acquisition Context	Acquisition Context Sequence	(0040,0555)	
	> Concept Code Name Sequence	(0040,A043)	
	>> Code Value	(0008,0100)	5.4.5-33-1
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	Electrode Placement
	> Concept Code Sequence	(0040,A168)	
	>> Code Value	(0008,0100)	5.4.5-33-1-1, 5.4.5-33-1-6 or 5.4.5-33-1-2
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	Standard 12-lead positions: limb leads placed at extremities, 12-lead ECG derived from non-standard leads (pediatric) or Mason-Likar positions: limb leads placed on the torso
	>Measurement Units Code Sequence	(0040,08EA)	Present if systolic blood pressure is included in the custom ID

Module	Attribute Name	Tag	Value
	>>Code Value	(0008,0100)	mmHg
	>>Coding Scheme Designator	(0008,0102)	UCUM
	>>Code Meaning	(0008,0104)	Millimeters Hg
	>>Coding Scheme Version	(0008,0103)	1.4
	>Concept Name Code Sequence	(0040,A043)	
	>>Code Value	(0008,0100)	F-008EC
	>>Coding Scheme Designator	(0008,0102)	SRT
	>>Code Meaning	(0008,0104)	Systolic Blood Pressure
	>Numeric Value	(0040,A30A)	Systolic Blood Pressure Value
	>Value Type	(0040,A040)	NUM
	>Measurement Units Code Sequence	(0040,08EA)	Present if diastolic blood pressure is included in the custom ID
	>>Code Value	(0008,0100)	mmHg
	>>Coding Scheme Designator	(0008,0102)	UCUM
	>>Code Meaning	(0008,0104)	millimeters Hg
	>>Coding Scheme Version	(0008,0103)	1.4
	>Concept Name Code Sequence	(0040,A043)	
	>>Code Value	(0008,0100)	F-008ED
	>>Coding Scheme Designator	(0008,0102)	SRT
	>>Code Meaning	(0008,0104)	Diastolic Blood Pressure
	>Numeric Value	(0040,A30A)	Diastolic Blood Pressure Value
	>Value Type	(0040,A040)	NUM

Module	Attribute Name	Tag	Value
	>Concept Name Code Sequence	(0040,A043)	Present if medication is included in the custom ID. One item for each medication.
	>>Code Value	(0008,0100)	G-02D0
	>>Coding Scheme Designator	(0008,0102)	SRT
	>>Code Meaning	(0008,0104)	Regular Medication
	>Text Value	(0040,A160)	Text description 0012 of medication.
Waveform Annotation	Waveform Annotation Sequence	(0040,B020)	
	<i>Machine Interpretation Statements</i> Annotation Group Number = 0 One item per interpretation statement		
	> Unformatted Text Value	(0070,0006)	Interpretation statement text
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000
	> Annotation Group Number	(0040,A180)	0
	<i>Machine Global Measurements</i> Annotation Group Number = 1 One item per measurement		
	> Concept Code Name Sequence	(0040,A043)	

Module	Attribute Name	Tag	Value	
	>> Code Value	(0008,0100)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis Ventricular Heart Rate	5.10.2.1-3 5.10.2.1-5 5.13.5-7 5.13.5-9 5.13.5-11 5.10.2.5-5 5.10.3-11 5.10.3-13 5.10.3-15 5.10.2.5-1
	>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>> Code Scheme Version	(0008,0103)	1.3	
	>> Code Meaning	(0008,0104)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis Ventricular Heart Rate	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis Ventricular Heart Rate
	> Numeric Value	(0040,A30A)	Measurement value	
	> Measurement Units Code Sequence	(0040,08EA)		

Module	Attribute Name	Tag	Value	
	>> Code Value	(0008,0100)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis Ventricular Heart Rate	ms ms ms ms ms ms deg deg deg BPM
	>> Coding Scheme Designator	(0008,0102)	UCUM	
	>> Code Scheme Version	(0008,0103)	1.4	
	>> Code Meaning	(0008,0104)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis Ventricular Heart Rate	millisecond millisecond millisecond millisecond millisecond millisecond degree degree degree beats/min
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000	
	> Annotation Group Number	(0040,A180)	1	
	<i>Machine Median Beat Fiducial Markers</i> Annotation Group Number = 2 One item per marker			
	> Concept Code Name Sequence	(0040,A043)		

Module	Attribute Name	Tag	Value	
	>> Code Value	(0008,0100)	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset	5.10.3-1 5.10.3-2 5.10.3-3 5.7.1-3 5.10.3-4 5.10.3-5
	>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>> Code Scheme Version	(0008,0103)	1.3	
	>> Code Meaning	(0008,0104)	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset
	> Referenced Sample Positions	(0040,A132)	Sample position of fiducial marker	
	>Temporal Range Type	(0040,A130)	POINT	
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000	
	> Annotation Group Number	(0040,A180)	2	
	<i>Pacemaker Spike Markers</i> Annotation Group Number = 3 One item per marker			
	> Concept Code Name Sequence	(0040,A043)		
	>> Code Value	(0008,0100)	5.10.1.2	
	>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>> Code Scheme Version	(0008,0103)	1.3	
	>> Code Meaning	(0008,0104)	Pacemaker spike	

Module	Attribute Name	Tag	Value
	> Referenced Sample Positions	(0040,A132)	Sample position of detected pacemaker spike
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000
	> Annotation Group Number	(0040,A180)	3
<i>Manual Global Measurements</i> Annotation Group Number = 4 One item per measurement			
	> Concept Code Name Sequence	(0040,A043)	
	>> Code Value	(0008,0100)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis
	> Numeric Value	(0040,A30A)	Measurement value

Module	Attribute Name	Tag	Value
	> Measurement Units Code Sequence	(0040,08EA)	
	>> Code Value	(0008,0100)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis
	>> Coding Scheme Designator	(0008,0102)	UCUM
	>> Code Scheme Version	(0008,0103)	1.4
	>> Code Value	(0008,0100)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis
	>> Coding Scheme Designator	(0008,0102)	UCUM
	>> Code Scheme Version	(0008,0103)	1.4

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Module	Attribute Name	Tag	Value
	>> Code Meaning	(0008,0104)	RR Interval PP Interval PR Interval QRS Duration QT Interval QTc Interval P Axis QRS Axis T Axis
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000
	> Annotation Group Number	(0040,A180)	4
	<i>Manual Median Beat Fiducial Markers</i> Annotation Group Number = 5 One item per marker		
	> Concept Code Name Sequence	(0040,A043)	
	>> Code Value	(0008,0100)	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset
	>> Coding Scheme Designator	(0008,0102)	SCPECG
	>> Code Scheme Version	(0008,0103)	1.3
	>> Code Meaning	(0008,0104)	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset

Module	Attribute Name	Tag	Value	
	> Referenced Sample Positions	(0040,A132)	Sample position of fiducial marker	
	>Temporal Range Type	(0040,A130)	POINT	
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000	
	> Annotation Group Number	(0040,A180)	5	
	<i>Manual Interpretation Statements</i> Annotation Group Number = 6 One item per interpretation statement			
	> Unformatted Text Value	(0070,0006)	Interpretation statement text	
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000	
	> Annotation Group Number	(0040,A180)	6	
	<i>Rhythm Beat Fiducial Markers</i> Annotation Group Number = 100 through 163, one for each beat up to 64 beats One item per marker			
	> Concept Code Name Sequence	(0040,A043)		
	>> Code Value	(0008,0100)	P Onset	5.10.3-1
			P Offset	5.10.3-2
			QRS Onset	5.10.3-3
			Fiducial Point	5.7.1-3
			QRS Offset	5.10.3-4
			T Offset	5.10.3-5
	>> Coding Scheme Designator	(0008,0102)	SCPECG	
	>> Code Scheme Version	(0008,0103)	1.3	

Module	Attribute Name	Tag	Value	
	>> Code Meaning	(0008,0104)	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset	P Onset P Offset QRS Onset Fiducial Point QRS Offset T Offset
	> Referenced Sample Positions	(0040,A132)	Sample position of fiducial marker	
	> Referenced Waveform Channels	(0040,A0B0)	0001 0000	
	> Annotation Group Number	(0040,A180)	100 for 1 st beat 101 for 2 nd beat ... 163 for 64 th beat	
SOP Common	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.9.1.1	
	SOP Instance UID	(0008,0018)	Created using the following: Mortara prefix: 1.3.6.1.4.1.20029 Product code: 40 for RScripte Transmission date/time	
	Specific Character Set	(0008,0005)	ISO_IR 192	
	Instance Creation Date	(0008,0012)	Date ECG was transmitted	
	Instance Creation Time	(0008,0013)	Time ECG was transmitted	
	Additional Attributes	Current Patient Location	(0038,0300)	Location field
Patient's Institution Residence		(0038,0400)	EMPTY	
Visit Comments		(0038,4000)	EMPTY	
Admission ID		(0038,0010)	From MWL or EMPTY	
Reason for the Requested Procedure		(0040,1002)	EMPTY	
Reason for Study		(0032,1030)	EMPTY	
Private Block Mortara_Inc				

Module	Attribute Name	Tag	Value
	Manufacturer Name	(1455,0010)	Mortara Instrument, Inc.
	ELI Interpretation Vector	(1455,1000)	ELI interpretation vector
	Social Security Number	(1455,1003)	EMPTY
	Attending Physician	(1455,1004)	Attending Physician field
	Note1	(1455,1006)	Notes field
	Note2	(1455,1007)	EMPTY
	Order Number	(1455,1008)	EMPTY
	Print Filter	(1455,000F)	EMPTY

All communications exceptions are reported to the Modality Manager logs database.

3.2.1.3.5 Verify Committed Storage of Data on a Remote System

3.2.1.3.5.1 Real-World Activity: Export Study Data

When Modality Manager completes a transmission of a report object, it can optionally verify whether the object has been stored successfully (committed) at the remote system.

3.2.1.3.5.2 Proposed Presentation Contexts

Table 3.2.1.3.5.2: Proposed Presentation Contexts for Modality Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	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		

3.2.1.3.5.3 SOP Specific Conformance Statement for SOP Class Storage Commitment Push Model

Modality Manager provides standard conformance. After the data and the storage commitment request have been sent, Modality Manager will immediately close the association and will not wait for a reply from the SCP. The SCP must open a new association in order to transmit the response. Thus the N-EVENT-REPORT must occur on a different association than the N-ACTION operation.

3.2.1.3.5.4 Operations

Modality Manager can request storage commitment for the Encapsulated PDF object or the 12 Lead ECG Waveform object. Modality Manager will request storage commitment on a separate association after the report object has been sent.

3.2.1.3.5.5 Notifications

When an N-EVENT-REPORT message is received, a success or error indication is written to the log file. No indication is posted to the User Interface.

3.2.1.4 Association Acceptance Policy

Modality Manager can accept associations to receive N-EVENT-REPORT notifications for the Storage Commitment Push Model SOP Class. The Modality Manager can also accept associations for the verification of DICOM communication between a remote system and the Modality Manager server.

3.2.1.4.1 Verify Communication with a Remote System

3.2.1.4.1.1 Real-World Activity: DICOM ECHO

Modality Manager will respond to verification requests made by remote systems.

3.2.1.4.1.2 Accepted Presentation Contexts

Table 3.2.1.3.1.2: Proposed Presentation Contexts for Modality Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	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		

3.2.1.4.1.3 SOP Specific Conformance Statement for SOP Class Verification

Modality Manager provides standard conformance.

3.3 Network Interfaces

3.3.1.1 Physical Network Interface

The Modality Manager uses 100/1000 Mbps Ethernet.

3.3.1.2 Additional Protocols

None.

3.4 Configuration

Modality Manager supports the following configuration parameters:

Table 3.4-1: Configuration Parameters

Parameter	Configurable	Default Value
General		
The number of seconds to use as a timeout waiting for association request or waiting for the peer to shut down an association.	No	30
The number of seconds to wait for reply to associate request.	No	15
The number of seconds to wait for reply to associate release.	No	15
The number of seconds to wait for a network write to be accepted.	No	15
The number of seconds to wait for a network connect to be accepted.	No	15
The number of seconds to wait for data between TCP/IP packets on a call to	No	15
Modality Worklist		
Modality Worklist SCU AE Title (AE Title of HSubscribe or XSubscribe as seen by MWL SCP)	Yes	(none)
Modality Worklist SCP AE Title (AE Title of MWL SCP as seen by Modality Manager)	Yes	(none)
Modality Worklist SCP IP Address	Yes	(none)
Modality Worklist SCP Port Number	Yes	(none)
Encapsulated PDF/12 Lead ECG Waveform Storage		
Storage SCU AE Title	Yes	(none)

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(AE Title of Modality Manageras seen by Storage SCP)		
Storage SCP AE Title (AE Title of Storage SCP as seen by Modality Manager)	Yes	(none)
Storage SCP IP Address	Yes	(none)
Storage SCP Port Number	Yes	(none)