



Conformance Statement for Horizon Cardiology 12

McKesson Medical Imaging Group
<http://www.mckesson.com/cardiology>

This document contains DICOM conformance statements for Horizon Cardiology 12

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1. Introduction

This document contains DICOM conformance statements for **Horizon Cardiology 12**.

NOTE The DICOM Standard is constantly evolving. This DICOM Conformance Statement describes Medcon's conformance thereto at the time of writing.

As the DICOM Standard evolves or by user's request, Medcon modifies its product accordingly. Revised versions of the DICOM Conformance Statement are issued periodically. The currently published version may not reflect all the latest modifications. Please contact Medcon in case of any question. Medcon reserves the right to make changes in its products to comply with evolving DICOM Standards and to update the DICOM Conformance Statement at reasonable intervals.

Horizon Cardiology 12 includes both **ImageManager** and **ImageDisplay** functionality. During installation, user may choose which functionality is to be installed. As an **ImageManager**, **Horizon Cardiology 12** permits the external systems to have access to data stored on the **Horizon Cardiology 12** database.

As an **ImageDisplay**, **Horizon Cardiology 12** provides an operator with options to store, query, retrieve and print DICOM data into and from DICOM compatible systems.

2. Implementation Model

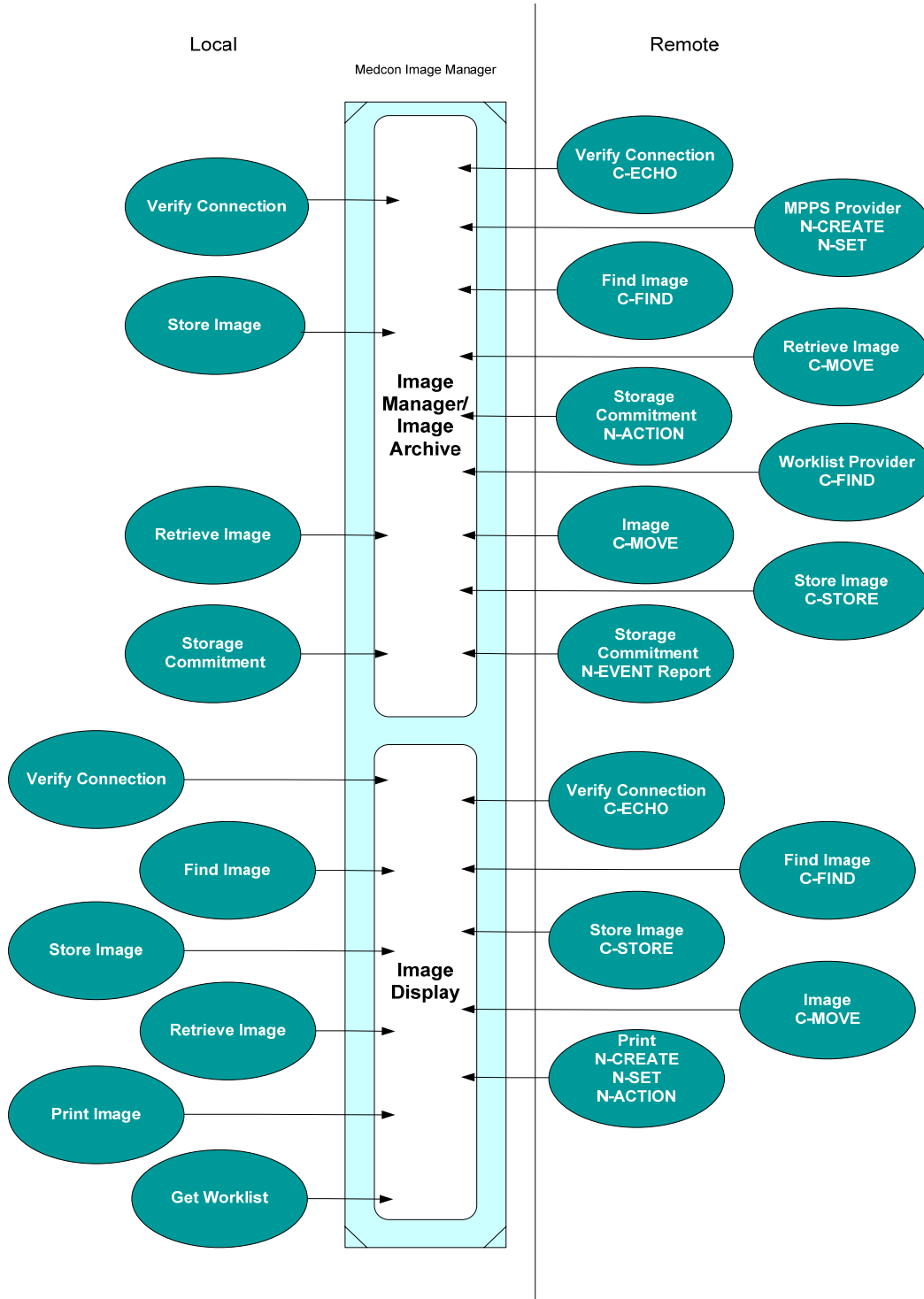
Horizon Cardiology 12 provides:

- Image storage (SCU/SCP)
- Queries on image database (SCU/SCP)
- Retrieving images (SCU/SCP)
- Commitment for the storage of data (SCU/SCP)
- Printing images (SCU)
- Getting Worklist (SCU)
- Providing Worklist (SCP)
- Modality Performed Procedure Step Management (SCP/SCU)

2.1 Application Data Flow Diagram

Figure 1 shows the relationship between **Horizon Cardiology 12** and external applications.

Figure 1



2.2 Functional Definition of Application Entities

The **Horizon Cardiology 12 ImageManager** uses a registry and configuration files that contain information used to validate association attempts from Local and Remote Application entities. The **Horizon Cardiology 12 ImageManager** then listens for association requests on the configured port.

An association request for Storage Services from a Remote Application Entity causes the **Horizon Cardiology 12 ImageManager** to validate the request according to the configuration parameters set at execution time. The Remote Application Entity then sends the Information Object Instance. The **Horizon Cardiology 12 ImageManager** stores the received Information Object Instance on its local database, if the data does not already exist, or in a predefined directory on hard disk. The data remains in that directory until removed by the **Horizon Cardiology 12 ImageManager** based on the LimitDays quota.

An association request from a Remote Application Entity for Query or Retrieve Services causes **Horizon Cardiology 12 ImageManager** to validate the request according to the configuration parameters set at execution time. The Remote Application Entity then sends the Query or Retrieve request.

The **Horizon Cardiology 12 ImageManager** searches the local database for the instance(s) specified. If the request was C-FIND, then a response is returned for each match. If the request was C-MOVE, then an association is originated to the subassociation for the C-STORE operation with the destination Application Entity specified in the C-MOVE message.

Operator defines to which DICOM server the requests are routed. In case of a print request, the system passes the request to a DICOM print provider.

Horizon Cardiology 12 ImageManager SCP is able to accept multiple associations at a time.

The number of simultaneous associations is configurable (in relation to system resources).

Horizon Cardiology 12 ImageArchive SCP transfers images to remote DICOM devices (C-STORE operation) and is able to send Store Commitment requests automatically after a transfer images request is finished. **Horizon Cardiology 12 ImageArchive SCP** receives Store Commitment N-EVENT-REPORT responses on the separate association on which the N-ACTION operation was performed.

For retrieval of images, **Horizon Cardiology 12 ImageArchive SCP** sends retrieve requests to remote DICOM devices with destination **Horizon Cardiology 12 ImageManager** Application Entity Title. Retrieved images are transferred from a predefined directory to the **Horizon Cardiology 12** database. If a communication error occurs, requests are automatically retried several times

2.3 Sequencing of Real-World Activities

Not Applicable

3. AE Specifications

Horizon Cardiology 12 initiates and accepts Associations. **Horizon Cardiology 12** is composed of a single Application Entity, MEDSERVER AE (AE title is configurable).

3.1 AE Horizon Cardiology 12 – Specification

Horizon Cardiology 12 provides Standard Conformance to the following DICOM 3.0 SOP Classes as SCP:

Table 1 - SOP Classes Supported by Horizon Cardiology 12 as SCP

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Patient Root Query/Retrieve Info Model - Find	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Info Model - Find	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query/Retrieve Info Model - Move	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - Move	1.2.840.10008.5.1.4.1.2.2.2
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

SOP Class Name	SOP Class UID
X-Ray Bi-Plane Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Radiotherapy Image	1.2.840.10008.5.1.4.1.1.481.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
High Resolution Audio Waveform Storage (Retired)	1.2.840.10008.5.1.4.1.1.9.2.2
Draft Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Basic Text Structure Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structure Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structure Report	1.2.840.10008.5.1.4.1.1.88.33
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1

Horizon Cardiology 12 provides Standard Conformance to the following DICOM 3.0 SOP Classes as SCU:

Table 2 - SOP Classes Supported by Horizon Cardiology 12 as SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Patient Root Query/Retrieve Info Model - Find	1.2.840.10008.5.1.4.1.2.1.1

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Info Model - Find	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query/Retrieve Info Model - Move	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info Model - Move	1.2.840.10008.5.1.4.1.2.2.2
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Bi-Plane Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Radiotherapy Image	1.2.840.10008.5.1.4.1.1.481.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2

SOP Class Name	SOP Class UID
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
High Resolution Audio Waveform Storage (Retired)	1.2.840.10008.5.1.4.1.1.9.2.2
Draft Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Basic Text Structure Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structure Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structure Report	1.2.840.10008.5.1.4.1.1.88.33
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1

3.1.1 Association Establishment Policies

3.1.1.1 General

PDU size is configurable for both SCU/SCP.

3.1.1.2 Number of Associations

The number of simultaneous associations is defined by configuration.

Asynchronous mode (multiple concurrent operations on one association) is not supported.

3.1.1.3 Implementation Identifying Information

Horizon Cardiology 12 will provide an implementation class UID - 2.16.376.1.1.511752891.1.

Horizon Cardiology 12 will provide an implementation version name – MEDCON01MAR2007.

3.1.2 Association Initiation Policy

Horizon Cardiology 12 attempts to initiate a new association in the following cases:

- 1) To check connection to remote system
- 2) To transfer (store) a series of images on remote system
- 3) To find several images in remote system
- 4) To retrieve several images from remote system

- 5) To print several images
- 6) To get worklist
- 7) To confirm storage commitment

3.1.2.1 Real-World Activity – Verification

3.1.2.1.1 Associated Real-World Activity

The associated Real-World Activity is an attempt to check whether remote AE is ready for DICOM dialog.

3.1.2.1.2 Proposed Presentation Contexts

For this Real-World Activity, **Horizon Cardiology 12** will propose one of the Presentation Contexts listed in Table 3.

Table 3- Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.1.2.2 Real-World Activity – Storing Images

3.1.2.2.1 Associated Real-World Activity

The associated Real-World Activity is an attempt to store a series of images on a remote system. The **Horizon Cardiology 12 ImageManager** initiates an association for C-STORE if it has received a valid C-MOVE message from a Remote Application Entity. The SOP Class UID of the Information Object to be sent over the C-STORE context is used to verify that a valid Presentation Context exists prior to issuing the C-STORE message.

3.1.2.2.2 Proposed Presentation Contexts

Horizon Cardiology 12 will propose one Presentation Context, as shown in Table 4. The proposed Presentation Context will use the SOP Class UID that corresponds to the Series modality.

Table 4 - Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
See Note	See Note	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
See Note	See Note	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
See Note	See Note	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
See Note	See Note	JPEG Lossy Process 1	1.2.840.10008.1.2.4.50	SCU	None
See Note	See Note	RLE Lossless	1.2.840.10008.1.2.5	SCU	None

Note: The Abstract Syntax corresponds to the SOP Class UID for Series modality and can be one of the following:

Table 5 - Abstract Syntaxes

Abstract Syntax	
Name	UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Bi-Plane Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128

Abstract Syntax	
Name	UID
Radiotherapy Image	1.2.840.10008.5.1.4.1.1.481.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
High Resolution Audio Waveform Storage (Retired)	1.2.840.10008.5.1.4.1.1.9.2.2
Draft Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Basic Text Structure Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structure Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structure Report	1.2.840.10008.5.1.4.1.1.88.33
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1

3.1.2.3 Real-World Activity – Finding Images

3.1.2.3.1 Associated Real-World Activity

The associated Real-World Activity is an attempt to find some of the images in a remote system. The user of the Client Application selects the Query operation button on the user interface. The user can specify wild card or specific information for Patient Name, Patient ID, Patient Sex, Patient Birthdate, Study ID, Study UID, Study Accession Number, Study Date Range, Study Time Range, Referring Physician, Modalities in Study.

Wild card queries can result in an excessive number of responses. The user interface is able to restrict the number of patients displayed.

The user can cancel the current Query operation by clicking the Cancel button.

Horizon Cardiology 12 ImageManager defaults to using Patient Root Query Model when initiating query request. The query model used can be changed to Study Root Query Model by changing a configuration parameter.

3.1.2.3.2 Multiple Sources Option

Horizon Cardiology 12 ImageDisplay can be configured to access multiple **ImageManager /Image Archive** sources with a single user request.

If communication with one information source fails, **Horizon Cardiology 12 ImageDisplay** provides the information it received from other sources. In addition, the **Horizon Cardiology 12 ImageDisplay** informs the users that they are viewing potentially incomplete results.

When **Horizon Cardiology 12 ImageDisplay** performs a study-level or series-level query to multiple sources and finds the study/series referenced in multiple places, the study/series is either duplicated or the study/series is split across the systems. When the user queries of the study/series, **Horizon Cardiology 12 ImageDisplay** collates the information, determine if the information is actually duplicated or split, and presents a consolidated view of results to the user.

3.1.2.3.3 Proposed Presentation Contexts

For this Real-World Activity, **Horizon Cardiology 12** will propose one of the Presentation Contexts listed in Table 6.

Table 6 - Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model – FIND SOP Class	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model – FIND SOP Class	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model – FIND SOP Class	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model – FIND SOP Class	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
1.2.840.10008.5.1.4.1.2.1.1	Patient Root	Explicit	1.2.840.10008.1.2.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
	Query/Retrieve Information Model – FIND SOP Class	VR Big Endian			
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model – FIND SOP Class	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.4 Real-World Activity – Retrieving Images

3.1.2.4.1 Associated Real-World Activity

The associated Real-World Activity is an attempt to retrieve images from a remote system.

The user selects one or more images, series or studies within studies from a list presented as a result of a previous Query operation. Then the user selects the Retrieve operation button on the user interface to initiate the move operation.

The user can cancel the current Retrieve operation by clicking the Cancel button.

3.1.2.4.2 Multiple Sources Option

Horizon Cardiology 12 ImageDisplay can be configured to access multiple **ImageManager/ImageArchive** sources with a single user retrieval request.

When **Horizon Cardiology 12 ImageDisplay** performs a study-level or series-level query to multiple sources and finds the study/series referenced in multiple places, the study/series is either duplicated or the study/series is split across the systems. When the user requests a retrieval of the study/series, **Horizon Cardiology 12 ImageDisplay** collates the information, determines whether the information is actually duplicated or split, and presents a consolidated view of results to the user.

Avoiding redundant retrieval is managed by checking whether a definite IOD has already been retrieved in the current session.

3.1.2.4.3 Proposed Presentation Contexts

For this Real-World Activity, **Horizon Cardiology 12** will propose one of the Presentation Contexts listed in Table 7.

Table 7- Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root	1.2.840.10008.5.1.4	Implicit	1.2.840.10008.1.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Query/Retrieve Information Model – MOVE SOP Class	.1.2.1.2	VR Little Endian			
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4 .1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4 .1.2.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4 .1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Patient Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4 .1.2.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4 .1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

3.1.2.5 Real-World Activity – Printing Images

3.1.2.5.1 Associated Real-World Activity

The associated Real-World Activity is a request to print one or more images.

The Print Module represents a single Application Entity. It acts independently of other DICOM applications that may be running on the same system. The Print Module can support printing to multiple DICOM printers at the same time, each printer being uniquely identified by an Application Entity Title and port.

3.1.2.5.2 Proposed Presentation Contexts

Horizon Cardiology 12 will propose one of the Presentation Contexts listed in Table 8.

Table 8 - Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	JPEG Lossy Process 1	1.2.840.10008.1.2.4.50	SCU	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	RLE Lossless	1.2.840.10008.1.2.4.5	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	JPEG Lossy Process 1	1.2.840.10008.1.2.4.50	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	RLE Lossless	1.2.840.10008.1.2.4.5	SCU	None

3.1.2.6 Real-World Activity – Getting Storage Commitment from Remote System

Horizon Cardiology 12 DICOM Archive requests Storage Commitment from the remote DICOM Archive solution after sending images to the remote DICOM Archive and receiving a response confirming the images were archived.

Table 9- Proposed Presentation Contexts

Presentation Context Table				
Abstract Syntax		Transfer Syntax		Role
Name	UID	Name	UID	
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU

3.1.2.7 Real-World Activity – Getting Modality Worklist from Remote System

Horizon Cardiology 12 user requests Modality Worklist from the remote information system. The associated Real-World activity is requested by the user to perform a Worklist query based on user-

specified criteria. The association is closed when all data have been received from the remote DICOM network node. The client is also able to abort the association through an operator requested abort or when an error occurs.

Table 10- Proposed Presentation Contexts

Presentation Context Table				
Abstract Syntax		Transfer Syntax		Role
Name	UID	Name	UID	
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU

Depending on user requested search type, C-FIND request will contain elements of the following sets of matching key attributes:

Find by Accession number

Matching Key Attribute	Matching Key Type
(0008,0050) Accession Number	O

Find by Patient ID and Name

Matching Key Attribute	Matching Key Type
(0010,0020) Patient ID	R
(0010,0010) Patient's Name	R

Find by Scheduled Date, Station and Physician

Matching Key Attribute	Matching Key Type
(0040,0002) Scheduled Procedure Step Start Date	R
(0040,0006) Scheduled Performing Physician's Name	R
(0040,0010) Scheduled Station Name	R
(0040,0001) Scheduled Station AE Title	R

Find by Modality

Matching Key Attribute	Matching Key Type
(0008,0060) Modality	R

3.1.3 Association Acceptance Policy

Horizon Cardiology 12 accepts an association for storing, finding and retrieving images.

3.1.3.1 Real World Activity – Verification

Horizon Cardiology 12 accepts associations from nodes that wish to perform a verification operation on Horizon Cardiology 12.

3.1.3.1.1 Associated Real World Activity – Verification

The Real World Activity associated with the C-ECHO request is that an external node wishes to verify network or server operation without initiating any actual work.

3.1.3.1.2 Presentation Context Table

Table 11 shows the Presentation Contexts that may be accepted by Horizon Cardiology 12 for verification operations.

Table 11 - Acceptable Presentation Contexts for Horizon Cardiology 12 for Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.1.3.1.2.1 SOP Specific Conformance for SOP Class Verification

Not Applicable.

3.1.3.1.3 Presentation Context Acceptance Criterion

Horizon Cardiology 12 will accept the verification SOP classes listed in Table 1 above. Horizon Cardiology 12 defines no limit on the number of presentation contexts accepted. If Horizon Cardiology 12 runs out of resources when trying to accept multiple presentation contexts, Horizon Cardiology 12 will reject the association request.

3.1.3.1.4 Transfer Syntax Selection Policies

Horizon Cardiology 12 prefers Explicit Little Endian Transfer Syntax.

If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

- 1) Explicit Little Endian Transfer Syntax
- 2) Implicit Little Endian Transfer Syntax
- 3) Explicit Big Endian Transfer Syntax

3.1.3.2 Real-World Activity – Storing Images

The Real-World Activity associated with the C-STORE operation is the storage of the image in the Medcon system. **Horizon Cardiology 12** will issue a failure status response if it is unable to store the image.

When **Horizon Cardiology 12** receives the association request, it will allow the follow activities to be performed during that association:

- Verification - Allow a remote DICOM device to verify that **Horizon Cardiology 12 ImageManager** is active on the DICOM network
- Storage Commitment - Receive the request for storage commitment. No manual operation is needed.

3.1.3.2.1 Associated Real-World Activity

The Real-World activity associated with the C-STORE operation is the storage of the image on the disk of the system upon which **Horizon Cardiology 12** is running. Images are stored by writing the data set of the C-STORE command to disk and adding the PS 3.10 header.

Horizon Cardiology 12 will issue a failure status response if it is unable to store the image on disk or if the image does not conform to the IOD of the SOP class under which it was transmitted.

3.1.3.2.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 12 are acceptable to **Horizon Cardiology 12** for receiving images.

Table 12 - Acceptable Presentation Contexts for Horizon Cardiology 12

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Note	See Note	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
See Note	See Note	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
See Note	See Note	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
See Note	See Note	JPEG Lossless, Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Note	See Note	JPEG Lossy Process 1	1.2.840.10008.1.2.4.50	SCP	None
See Note	See Note	RLE Lossless	1.2.840.10008.1.2.4.5	SCP	None

Note: The Abstract Syntax corresponds to the SOP Class UID for Series modality and can be one of the following:

Table 13 - Abstract Syntaxes

Abstract Syntax	
Name	UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Multi-Frame Single bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Bi-Plane Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Radiotherapy Image	1.2.840.10008.5.1.4.1.1.481.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3

Abstract Syntax	
Name	UID
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
High Resolution Audio Waveform Storage (Retired)	1.2.840.10008.5.1.4.1.1.9.2.2
Draft Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
Basic Text Structure Report	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structure Report	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structure Report	1.2.840.10008.5.1.4.1.1.88.33
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1

3.1.3.2.2.1 SOP Specific Conformance

3.1.3.2.2.1.1 SOP Specific Conformance to Storage SOP Classes

Horizon Cardiology 12 conforms to the SOPs of the Storage Service Class at Level 2 (Full). No elements are discarded or coerced by **Horizon Cardiology 12**. In the event of a successful C-STORE operation, the Images have successfully been written to Medcon system. They may be accessed by Medcon applications or through DICOM Query/Retrieve Model.

If **Horizon Cardiology 12** returns one of the following status codes, then the C-STORE was unsuccessful:

A700	Refused	Out of resources	Indicates that there was not enough space to store the images
A800		SOP Class Not Supported	Indicates that the SOP Class of the Image in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context. This indicates a problem with the SCU of the Service Class.
A900	Failed	Data Set does not match SOP Class	Indicates that the Data Set does not encode an instance of the SOP Class specified. This indicates a problem with SCU of the Service Class.
C000	Unable to Process	Cannot understand	Indicates that Horizon Cardiology 12 cannot parse the Data Set into elements. This indicates a problem with the SCU.

3.1.3.2.3 Presentation Context Acceptance Criterion

Horizon Cardiology 12 defines no limit on the number of presentation contexts accepted.

If **Horizon Cardiology 12** runs out of resources when trying to accept multiple presentation contexts, **Horizon Cardiology 12** will reject the association request. **Horizon Cardiology 12** does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

3.1.3.2.4 Transfer Syntax Selection Policies

Horizon Cardiology 12 prefers explicit Little Endian Transfer Syntax with compressed pixel data.

If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

1. JPEG Lossless, Hierarchical, First-Order Prediction Transfer Syntax
2. Explicit Little Endian Transfer Syntax
3. Implicit Little Endian Transfer Syntax
4. Explicit Big Endian Transfer Syntax

3.1.3.3 Real World Activity – Finding Images

3.1.3.3.1 Associated Real World Activity

The Associated Real-World Activity associated with the C-FIND operation is the finding of the image in the Medcon system. **Horizon Cardiology 12** will issue a failure status response if it is unable to find the image. The search is performed by comparing the keys specified in request with corresponding keys of

images in system.

3.1.3.3.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 14 are acceptable to **Horizon Cardiology 12** for finding images.

Table 14 - Acceptable Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Information Model – FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.1.3.3.2.1 SOP Specific Conformance for FIND SOP Classes

Horizon Cardiology 12 conforms to the SOPs of the Find Service Class at Level 2 (Full).

The **Horizon Cardiology 12 ImageManager** searches the Medcon database for the requested Information Objects described in the C-FIND identifier and returns a response for each match.

Possible response status values are:

A700	Refused	Out of resources	Indicates that there was not enough space to store the images
A900	Failed	Data Set does not match SOP Class	Indicates that the Data Set does not encode an instance of the SOP Class specified. This indicates a problem with SCU of the Service Class.
C000	Unable to Process	Cannot understand	Indicates that Horizon Cardiology 12 cannot parse the Data Set into elements. This indicates a problem with the SCU.
FE00	Cancel		Terminated due to Cancel Request
0000	Success		Matching completed
FF00	Pending		Matches are continuing

The attribute (0000,0902) contains a descriptive message to explain error returns.

3.1.3.3.3 Presentation Context Acceptance Criterion

Horizon Cardiology 12 defines no limit on the number of presentation contexts accepted.

If **Horizon Cardiology 12** runs out of resources when trying to accept multiple presentation contexts, **Horizon Cardiology 12** will reject the association request. **Horizon Cardiology 12** does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

3.1.3.3.4 Transfer Syntax Selection Policy

The **Horizon Cardiology 12** Application Entity conforms to the DICOM Patient Root Query/Retrieve and DICOM Study Root Query/Retrieve Service Class as an SCP for the Abstract Syntaxes listed in the table in section 3.1.3.2.2.

Horizon Cardiology 12 prefers explicit Little Endian Transfer Syntax.

If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

- 1) Explicit Little Endian Transfer Syntax
- 2) Implicit Little Endian Transfer Syntax
- 3) Explicit Big Endian Transfer Syntax

3.1.3.4 Real World Activity – Retrieving

3.1.3.4.1 Associated Real World Activity

The Real-World Activity associated with the C-MOVE operation is the retrieving of the image from the Medcon system. **Horizon Cardiology 12** will issue a failure status response if it is unable to retrieve the image.

3.1.3.4.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 15 are acceptable to **Horizon Cardiology 12** for retrieving images.

Table 15 - Acceptable Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Query/Retrieve Information Model – MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

A response is returned for each match found in the attached database.

3.1.3.4.2.1 SOP Specific Conformance for MOVE SOP Classes

Horizon Cardiology 12 conforms to the SOPs of the Move Service Class at Level 2 (Full).

Possible response status values are:

A700	Refused	Out of resources
A702		Unable to perform sub-operations
A801		Move Destination Unknown
A900	Failed	Identifier does not match SOP Class
C000		Unable to Process
FE00	Cancel	Terminated due to Cancel Request
0000	Success	Sub-operations completed
B000	Warning	Sub-operations completed, 1 or more failures
FF00	Pending	Matches are continuing

The attribute (0000,0902) contains a descriptive message to explain error returns.

3.1.3.4.3 Presentation Context Acceptance Criterion

Horizon Cardiology 12 defines no limit on the number of presentation contexts accepted.

If **Horizon Cardiology 12** runs out of resources when trying to accept multiple presentation contexts, **Horizon Cardiology 12** will reject the association request. **Horizon Cardiology 12** does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

3.1.3.4.4 Transfer Syntax Selection Policy

Horizon Cardiology 12 prefers Explicit Little Endian Transfer Syntax.

If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

1. Explicit Little Endian Transfer Syntax
2. Implicit Little Endian Transfer Syntax
3. Explicit Big Endian Transfer Syntax

3.1.3.5 Real-World Activity – Storage Commitment

The associated Real-World Activity is an attempt to make the commitment for the safekeeping of the SOP instances. **Horizon Cardiology 12** uses Storage Commitment SOP Class Push Model implementation in order to guarantee the safe storage of SOP instances.

Horizon Cardiology 12 always returns the N-EVENT-REPORT on a separate association. This association is opened with reverse role negotiation, that is, the Calling AE is the SCP and the Called AE is the SCU.

After an N-ACTION request containing the Study Component Sequence has been received, the Storage Commitment N-EVENT-REPORT is built and returned.

3.1.3.5.1 Proposed Presentation Contexts

For this Real-World Activity, **Horizon Cardiology 12** will propose the Presentation Contexts listed in Table 16.

Table 16 - Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

3.1.3.6 Real-World Activity – Providing Modality Worklist

Horizon Cardiology 12 Worklist SCP application will wait for an association as an SCP for the Modality Worklist Service Class. When a C-FIND request is received, a search is done in **TCS** database for the data with the requested attributes, and a list of found attributes is returned to the remote requester. The **Horizon Cardiology 12** Worklist Service accepts a number of associations, which is configured at the time of system initialization.

Asynchronous mode is not supported.

Table 17 - Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role
Name	UID	Name	UID	
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCP
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP
Modality Worklist Information Model -FIND	1.2.840.10008.5.1.4.31	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP

3.1.3.6.1.1 SOP Specific Conformance for Modality Worklist SOP Class

The supported Return Key Attributes are as follows:

Description	Tag	Matching Key Type	Return Key Type
Scheduled Procedure Step			
Scheduled Procedure Step Sequence	0040,0100	R	1
>Scheduled Station AE Title	0040,0001	R	1
>Scheduled Procedure Step Start Date	0040,0002	R	1
>Scheduled Procedure Step Start Time	0040,0003	R	1
>Modality	0008,0060	R	1
>Scheduled Performing Physician's Name	0040,0006	R	2
>Scheduled Procedure Step Description	0040,0007	O	1C
>Scheduled Station Name	0040,0010	O	2
>Scheduled Procedure Step ID	0040,0009	O	1
>Scheduled Procedure Step Location	0040,0011	O	2
>Scheduled Action Item Code Sequence	0040,0008	O	1C
>>Code Value	0008,0100	O	1C
>>Coding Scheme Designator	0040,0102	O	1C
>>Pre-Medication	0040,0012	O	2C
>Scheduled Procedure Step Status	0040,0020	O	3

Description	Tag	Matching Key Type	Return Key Type
Requested Procedure			
Requested Procedure ID	0040,1001	O	1
Requested Procedure Description	0032,1060	O	1C
Requested Procedure Code Sequence	0032,1064	O	1C
>Code Value	0008,0100	O	1C
>Coding Scheme Designator	0008,0102	O	1C
Study Instance UID	0020,000D	O	1
Referenced Study Sequence	0008,1110	O	2
>Referenced SOP Class UID	0008,1150	O	1C
>Referenced SOP Instance UID	0008,1155	O	1C
Requested Procedure Priority	0040,1003	O	2
Imaging Service Request			
Accession Number	0008,0050	O	2
Requesting Physician	0032,1032	O	2
Referring Physician's Name	0008,0090	O	2
Visit Identification			
Admission ID	0038,0010	O	2
Current Patient Location	0038,0300	O	2
Patient Identification			
Patient's Name	0010,0010	R	1
Patient ID	0010,0020	R	1
Patient Demographic			
Patients Birth Date	0010,0030	O	2
Patient's Sex	0010,0040	O	2
Patient's Weight	0010,1030	O	2
Confidentiality constraint on patient data	0040,3001	O	2
Patient Medical			
Patient State	0038,0500	O	2
Pregnancy Status	0010,21C0	O	2
Medical Alerts	0010,2000	O	2
Contrast Allergies	0010,2110	O	2
Special Needs	0038,0050	O	2
All other Attributes from the Patient Medical Module		O	3

3.1.3.7 Real-World Activity – Providing Modality Performed Procedure Step (MPPS)

Horizon Cardiology 12 MPPS SCP application will wait for an association as an SCP for the MPPS Service Class. When N-CREATE/N-SET events are received, a search for the data with the received attributes is performed on the **Horizon Cardiology** database and the required data are stored on the **Horizon Cardiology** database.

The **Horizon Cardiology 12 MPPS SCP** can also serve as MPPS SCU in order to transfer an entire data set, as is, to another MPPS SCP, if configured to do so.

Table 18 - Proposed Presentation Contexts

Abstract Syntax		Transfer Syntax		Role
Name	UID	Name	UID	
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP

3.1.3.7.1.1 SOP Specific Conformance for MPPS SOP Class

The supported Return Key Attributes are as follows:

Description	Tag	Return Key Type N-CREATE	Return Key Type N-SET	Requirement Type Final State
SOP Common				
Specific Character Set	0008,0005	1C (Required if an extended or replacement character set is used)	Not allowed	
Performed Procedure Step Information				
Performed Station AE Title	0040,0241	1	Not allowed	
Performed Station Name	0040,0242	2	Not allowed	
Performed Location	0040,0243	2	Not allowed	

Description	Tag	Return Key Type N-CREATE	Return Key Type N-SET	Requirement Type Final State
Performed Procedure Step ID	0040,0253	1	Not allowed	
Performed Procedure Step Start Date	0040,0244	1	Not allowed	
Performed Procedure Step Start Time	0040,0245	1	Not allowed	
Performed Procedure Step Status	0040,0252	1	1	
Performed Procedure Step End Date	0040,0250	1	1	1
Performed Procedure Step End Time	0040,0251	1	1	1
Performed Procedure Step Description	0040,0254	2	2	
Performed Procedure Type Description	0040,0255	2	2	
Procedure Code Sequence	0008,1032	2	2	
>Code Value	0008,0100	1C (Required if Sequence Item is present)	1C (Required if Sequence Item is present)	
>Coding Scheme Designator	0008,0102	1C (Required if Sequence Item is present)	1C (Required if Sequence Item is present)	
>Coding Scheme Version	0008,0103	3	3	
>Code Meaning	0008,0104	3	3	
Comments on the Performed Procedure Step	0040,0280	1	3	
Performed Procedure Step Relationship				
Scheduled Step Attribute Sequence	0040,0270	1	Not allowed	
>Study Instance UID	0020,000D	1	Not allowed	
>Referenced Study Sequence	0008,1110	2	Not allowed	
>>Referenced SOP Class UID	0008,1150	1C (Required if Sequence Item is	Not allowed	

Description	Tag	Return Key Type N-CREATE	Return Key Type N-SET	Requirement Type Final State
		present)		
>>Referenced SOP Instance UID	0008,1155	1C (Required if Sequence Item is present)	Not allowed	
>Accession Number	0008,0050	2	Not allowed	
>Place Order Number/Imaging Service Request	0040,2016	3	Not allowed	
>Filler Order Number/Imaging Service Request	0040,2017	3	Not allowed	
>Requested Procedure ID	0040,1001	2	Not allowed	
>Requested Procedure Step Description	0032,1060	2	Not allowed	
>Scheduled Procedure Step ID	0040,0009	2	Not allowed	
>Scheduled Procedure Step Description	0040,0007	2	Not allowed	
>Scheduled Protocol Code Sequence	0040,0008	2	Not allowed	
>>Code Value	0008,0100	1C (Required if Sequence Item is present)	Not allowed	
>>Coding Scheme designator	0008,0102	1C (Required if Sequence Item is present)	Not allowed	
>>Coding Scheme Version	0008,0103	3	Not allowed	
>>Code Meaning	0008,0104	3	Not allowed	
Patient's Name	0010,0010	2	Not allowed	
Patient's ID	0010,0020	2	Not allowed	
Patient's Birth Date	0010,0020	2	Not allowed	
Patient's Sex	0010,0040	2	Not allowed	

Description	Tag	Return Key Type N-CREATE	Return Key Type N-SET	Requirement Type Final State
Referenced Patient Sequence	0008,1120	2	Not allowed	
>Referenced SOP Class UID	0008,1150	1C (Required if Sequence Item is present)	Not allowed	
>Referenced SOP Instance UID	0008,1155	1C (Required if Sequence Item is present)	Not allowed	
Performed Procedure Discontinuation Reason Code Sequence	0040,0281	3	3	
>Code Value	0008,0100	1	1	
>Coding SchemeDesignator	0008,0102	1	1	
>Coding SchemeVersion	0008,0103	3	3	
>Code Meaning	0008,0104	3	3	
Image Acquisition Results				
Modality	0008,0060	1	Not allowed	
Study ID	0020,0010	2	Not allowed	
Performed Protocol Code Sequence	0040,0260	2	2	
>Code Value	0008,0100	1	1	
>Coding Scheme Designator	0008,0102	1	1	
>Coding Scheme Version	0008,0103	3	3	
>Code Meaning	0008,0104	3	3	
Performed Series Sequence	0040,0340	2	1	1
>Performed Physician's Name	0008,1050	2	2	2
>Protocol Name	0018,1030	1	1	1
>Operator's Name	0008,1070	2	2	2

Description	Tag	Return Key Type N-CREATE	Return Key Type N-SET	Requirement Type Final State
>Series Instance UID	0020,000E	1	1	1
>Series Description	0008,103E	2	2	2
>Retreive AE Title	0008,0054	2	2	2
>Referenced Image Sequence	0008,1140	2	2	
>>Referenced SOP Class UID	0008,1150	1	1	
>>Referenced SOP InstanceUID	0008,1155	1	1	
>Referenced Non-Image Composite SOP Image Sequence	0040,0220	2	2	
>>Referenced SOP Class UID	0008,1150	1	1	
>>Referenced SOP InstanceUID	0008,1155	1	1	
>All other attributes from Performed Series Sequence		3	3	
All other attributes from Radiation Dose Module and Billing and Material Code Module		3	3	

Possible response status values are:

A7xx	Refused	Out of resources
A9xx	Failed	Identifier does not match SOP Class
Cxxx		Unable to process
0110		Unable to update data
0000	Success	Sub-operations completed

4. Communication Profiles

4.1 TCP/IP Stack

Horizon Cardiology 12 provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.1.1 TCP/IP API

Horizon Cardiology 12 ImageManager inherits its TCP/IP stack from the computer system upon which

it executes.

5. Extensions/Specializations/Privatization

Horizon Cardiology 12 supports all the private tags on level 2. Medcon private tags are listed in Table 19.

Table 19 - Medcon Private Attributes

Data Element Tag	Name	Remark
(000D,0010)	Private Attributes Identification Code	
(000D,1000)	Patient TCS Location ID	
(000D,1001)	Study TCS Location ID	
(000D,1002)	Instance TCS Location ID	
(000D,1003)	Instance TCS ID	
(000D,1004)	Instance TCS Location ID	
(000D,1005)	Patient TCS ID	
(000D,1006)	Related File	
(000D,1007)	Additional Patient ID	
(000D,1021)	Patient Creation Date	
(000D,1022)	Patient Creation Time	
(000D,1038)	Instance Description	
(000D,1062)	TCS Document File	
(000D,1063)	Annotation Note	
(000D,1076)	Annotation Creation Date	
(000D,1077)	Annotation Creation Time	
(000D,1082)	Instance Creation Date	
(000D,1083)	Instance Creation Time	
(000D,1090)	TCS Document Type	
(000D,0011)	Private Attributes Identification Code	
(000D,1101)	Patient Name	
(000D,1102)	Patient ID	
(000D,1103)	Patient Additional ID	
(000D,1104)	Patient Optional ID	
(000D,1105)	Series Description	
(000D,1106)	Series Optional ID	
(000D,1107)	Referring Physicians Name	
(000D,1108)	Performing Physicians Name	Names are

Data Element Tag	Name	Remark
		Delimited by “\”
(000D,1109)	Instance Name	
(000D,1110)	Instance Description	
(000D,0012)	Private Attributes Identification Code	
(000D,1202)	MMI Type	
(000D,1203)	Encapsulated Document Sequence	
(000D,1204)	Encapsulated Document	
(000D,0013)	Private Attributes Identification Code	
(000D,1301)	Hostname	
(000D,1302)	Changing Information Sequence	
(000D,1303)	Calling AE Title	

Elements from (000D,1101) – (000D,1110) are used for recording the UNICODE version of the relevant standard and private elements (if required).

Elements from (000D,1202) – (000D,1204) are used to encapsulate non-DICOM files .

Element (000D, 1302) is used to save sequence of elements changed when a DICOM file is updated.

All elements represent internal information used for media exchange between Medcon Systems.

6. Configuration

Horizon Cardiology 12 maintains configuration data in Registry and Configuration files. All parameters of DICOM services (including AE Title and TCP Listen Port) are configurable. Configuration may be performed by **Horizon Cardiology 12** Administration utility or manually.