



Topcon Healthcare Solutions, Inc., Inc.

Topcon Harmony DICOM Conformance Statement

Revision C

Topcon Healthcare Solutions, Inc.

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1 INTRODUCTION

This document is the DICOM 3.0 Conformance Statement for the Topcon Harmony DICOM Connection Module. The component conforms to the DICOM 3.0 standard to allow the sharing of medical information and images with other software systems that support DICOM standards.

1.1 Product Capabilities

Below list describes Harmony DICOM capabilities.

- Acquisition Modality Importer
- DICOM Storage SCU
- Image Display
- DICOM Storage SCP
- Modality Worklist SCP
- DICOM Q/R (Query/Retrieve) SCU

1.2 Abbreviations

ASCII	American Standard Code for Information Interchange
AE	Application Entity
ANSI	American National Standards Institute
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element Composite
DIMSE-N	DICOM Message Service Element Normalized
DOD	Department Of Defense
DX	Digital Radiography
FTP	File Transfer Protocol (part of the TCP/IP protocol suite)
HL7	Health Level 7
HIS/RIS	Hospital Information System/ Radiology Information System
ID	Identifier
IE	Information Entity
IHE	Integrating the Healthcare Enterprise
HIS	Hospital Information Systems
HIMSS	Healthcare Information and Management Systems Society
IS	Information System



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IOD	Information Object Definition
ISO	International Standards Organization
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
MR	Magnetic Resonance
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
PN	Person Name
RFC	Request for Comments
RIS	Radiology Information System
RSNA	Radiological Society of North America
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VA	Department of Veterans Affairs
VL	Visible Light
VR	Value Representation
XA	X-Ray Angiography



2 NETWORKING

2.1 Implementation Model

2.1.1 ACQUISITION MODALITY IMPORTER

Acquisition Modality Importer module accommodates reading information from HIS using the DICOM Modality Worklist as a Service Class User (SCU), storing images to the hospital DICOM server using the DICOM Secondary Capture Image Storage (SC SOP class) or DICOM Ophthalmic Photography Image Storage (OP SOP Class) or DICOM Encapsulated PDF as a SCU.

Supported DICOM SOP Classes Table 1.1

SOP Class Name (see note)	SOP Class UID	Service Class Role
Verification	1.2.840.10008.1.1	SCU/SCP
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	SCU
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU
OP Ophthalmic 8-bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	SCU

2.1.1.1 Application Data Flow Diagram

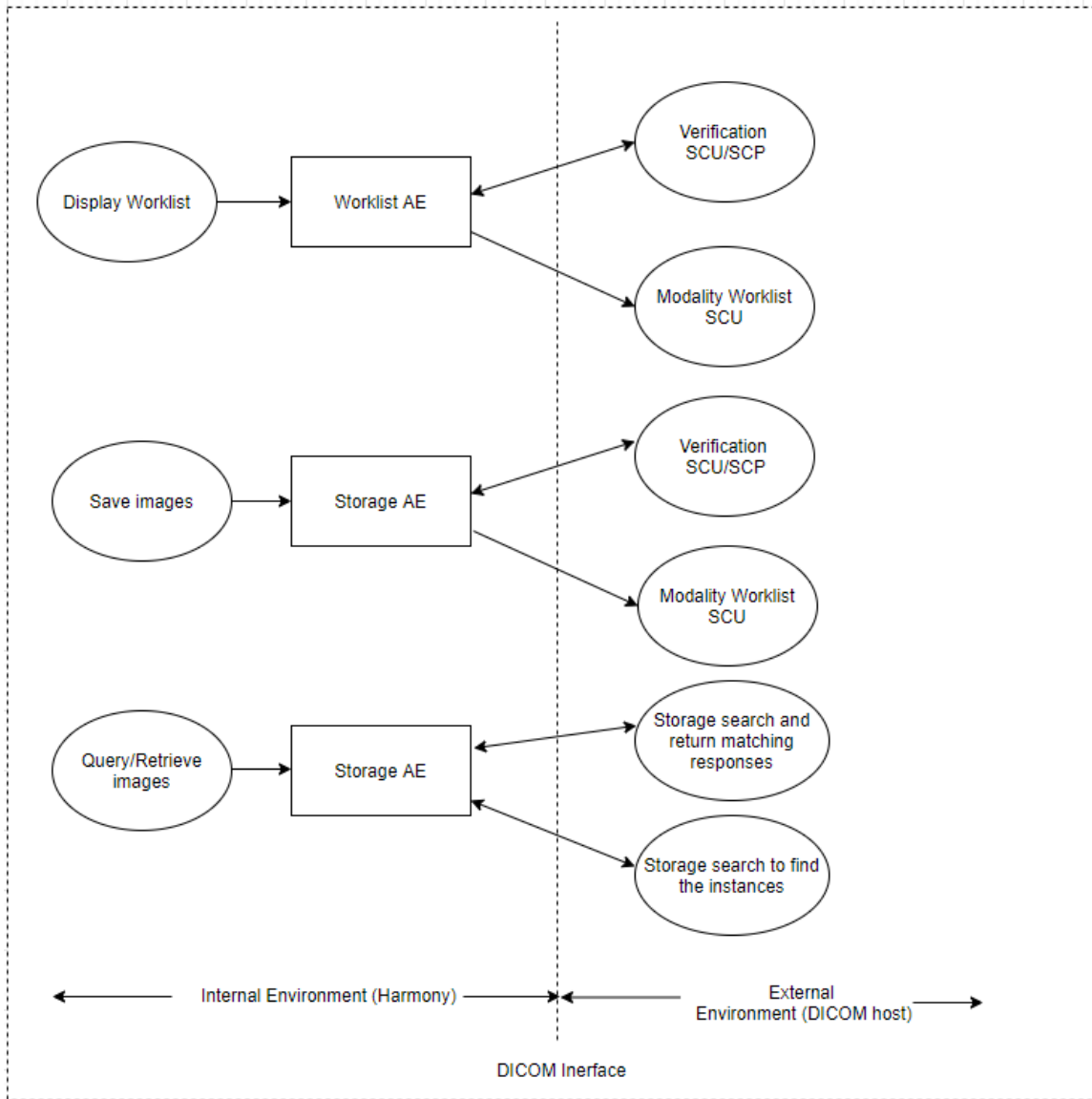


Figure 1 The Harmony DICOM Connection Module – Data Flow Model



2.1.1.2 Functional definitions of AE

- After a user requests to display worklist, the Worklist AE reads the Hospital Worklist information and hands it to the Harmony software. The Verification Service can be configured to be initiated automatically when the application is started or manually by user interface.
- After a user requests to store images to hospital System the Storage interface AE sends images to the Hospital Remote Storage using the Storage Services. The Verification Service can be configured to be initiated automatically when the application is started or manually by user interface.
- When user starts or finishes sending of images, the relevant messages are sent automatically to the Hospital MPPS. MPPS interface AE acts as SCU.
- Worklist AE and Storage Interface AE act as SCP for Verification in background.
- After images are submitted, Harmony automatically requires storage confirmation from Hospital Storage Commitment AE. Storage Commitment interface AE acts as SCP and as SCU.

2.1.1.3 Sequencing of Real World Activities

Worklist AE and Storage Interface AE will contact the Hospital EMR system first for its availability using Verification Service. If successful, these AE's will continue on their main functionality – requesting worklist or storage.

2.1.2 Image Display

Harmony supports receiving DICOM image and/or Encapsulated PDF objects, and displaying these images and/or documents. Harmony provides the following functions:

- Provides DICOM 3.0 compliant storage SCP. Allow a peer DICOM node to send images and other DICOM objects for review purposes.
- Provides DICOM Query/Retrieve SCU. Allow the user to retrieve images and other DICOM objects from a peer DICOM node for review purposes.

2.1.2.1 Application Data Flow Diagram

Harmony provides echo, Query/Retrieve and storage services for DICOM 3.0 standard images using C-ECHO, C-FIND, C-MOVE and C-STORE DIMSE-C Service.

Figure 2 is the data flow diagram for the Harmony DICOM Viewer application:

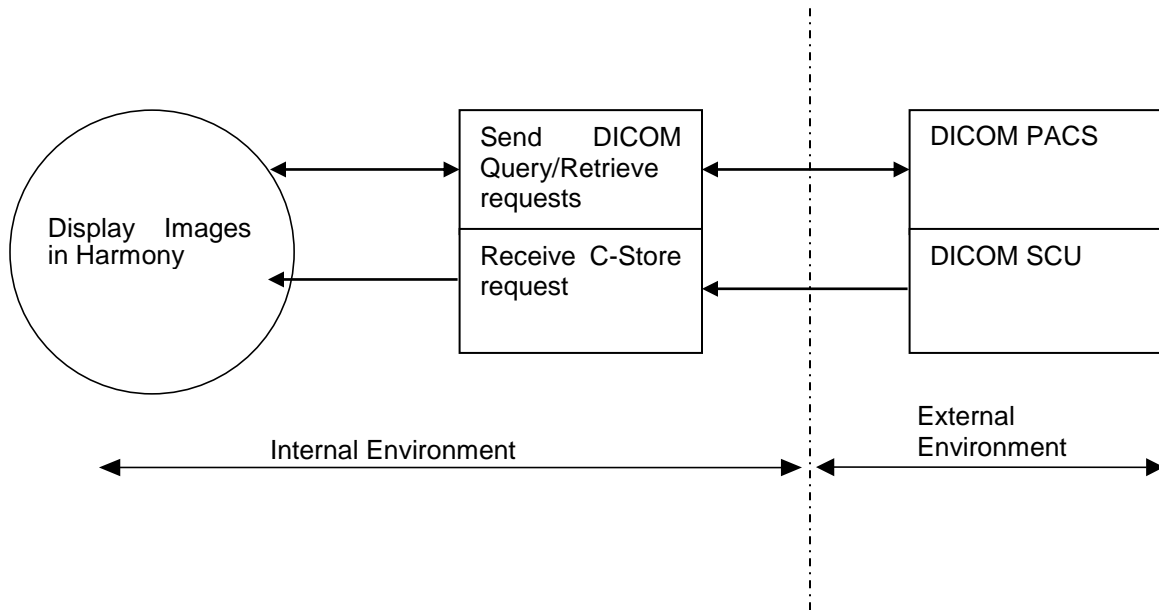


Figure 2 Harmony Image Display Application Data Flow Diagram

When the user wants to query and retrieve DICOM objects from a PACs, Harmony tries to establish a DICOM association with the peer node, and issues Query/Retrieve C-FIND and C-MOVE requests to the peer node in order to retrieve desired DICOM objects from the specific peer node. When an incoming DICOM association request is received, Harmony creates a dedicated thread to handle the association. In the association, Harmony responds to a storage request and stores the received DICOM object to a local storage media.

2.1.2.2 Functional Definition of the Harmony Application Entity

When a DICOM association request for storage service is received, the Harmony will validate the request and issue association acknowledgement to the initiator. When the association is established, the Harmony acts as C-STORE SCP and receives and stores image object.

The Harmony initiates a DICOM association request for the Query/Retrieve service in response to user's request. In the association, Harmony may issue one or more C- FIND requests to the peer node, depending upon the actual query criteria chosen by the user. Harmony may issue one or more C-MOVE requests to the peer node in order to retrieve a desired set of DICOM objects.

2.1.2.3 Sequencing of Real-World Activities

Query/Retrieve Interface AE will contact the Hospital PACS system first for its availability using Verification Service. If successful, this AE will continue on its main functionality – requesting images.

2.1.3 DICOM Storage SCP

2.1.3.1 Implementation Model

Harmony supports receiving DICOM Images and/or Encapsulated PDF objects. Harmony provides DICOM 3.0 compliant storage SCP, allows a peer DICOM node to send images and other DICOM objects for review purposes.

2.1.3.2 Application Data Flow Diagram

Figure 3 is the data flow diagram for the Harmony DICOM SCP application:

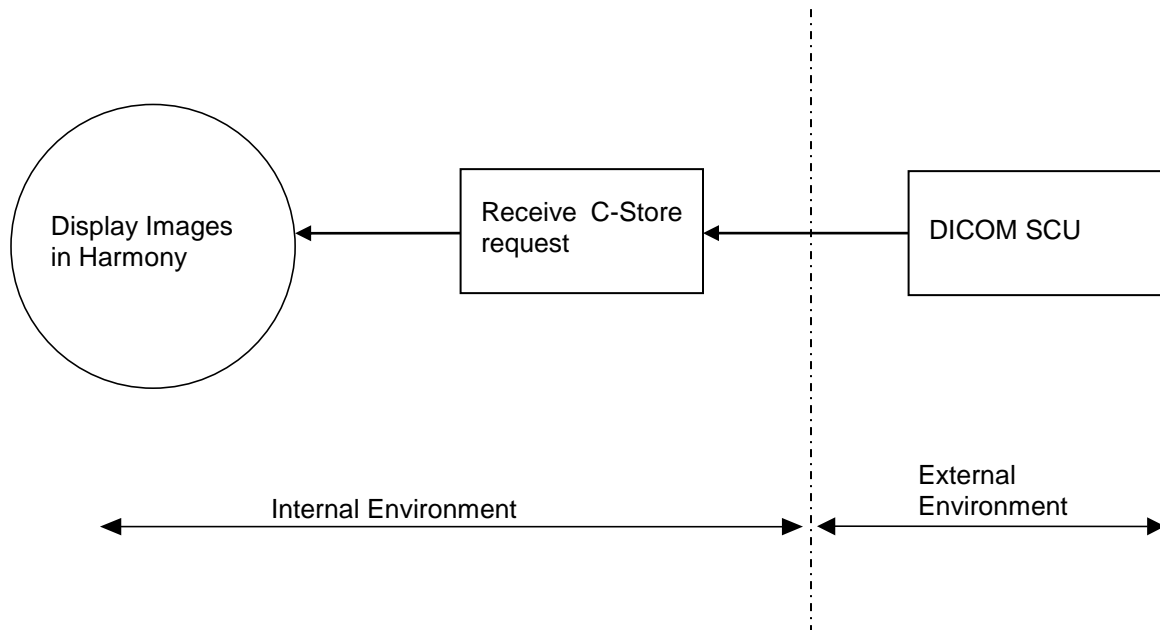


Figure 3 Harmony DICOM SCP Application Data Flow Diagram

When an incoming DICOM association request is received, Harmony creates a dedicated thread to handle the association. In the association, Harmony responds to a storage requests and stores the received DICOM object to a local storage media.

2.1.3.3 Functional Definition of the Harmony Application Entity

When a DICOM association request for storage service is received, the Harmony will validate the request and issue association acknowledgement to the initiator. When the association is established, the Harmony acts as C-STORE SCP and receives and stores image object.

2.1.3.4 Sequencing of Real-World Activities

DICOM SCU Interface AE may contact Harmony DICOM SCP system first for its availability using Verification Service. If successful, this SCU AE will continue sending images.

2.1.4 Modality Worklist SCP

2.1.4.1 Implementation Model

Harmony provides DICOM 3.0 compliant MWL SCP allows a peer DICOM node to query and retrieves modality worklist.

2.1.4.2 Application Data Flow Diagram

Harmony provides Echo, Query/Retrieve services for Modality Worklist using C-ECHO, C-FIND/C-MOVE service.

Figure 4 is the data flow diagram for the Harmony MWL SCP application.

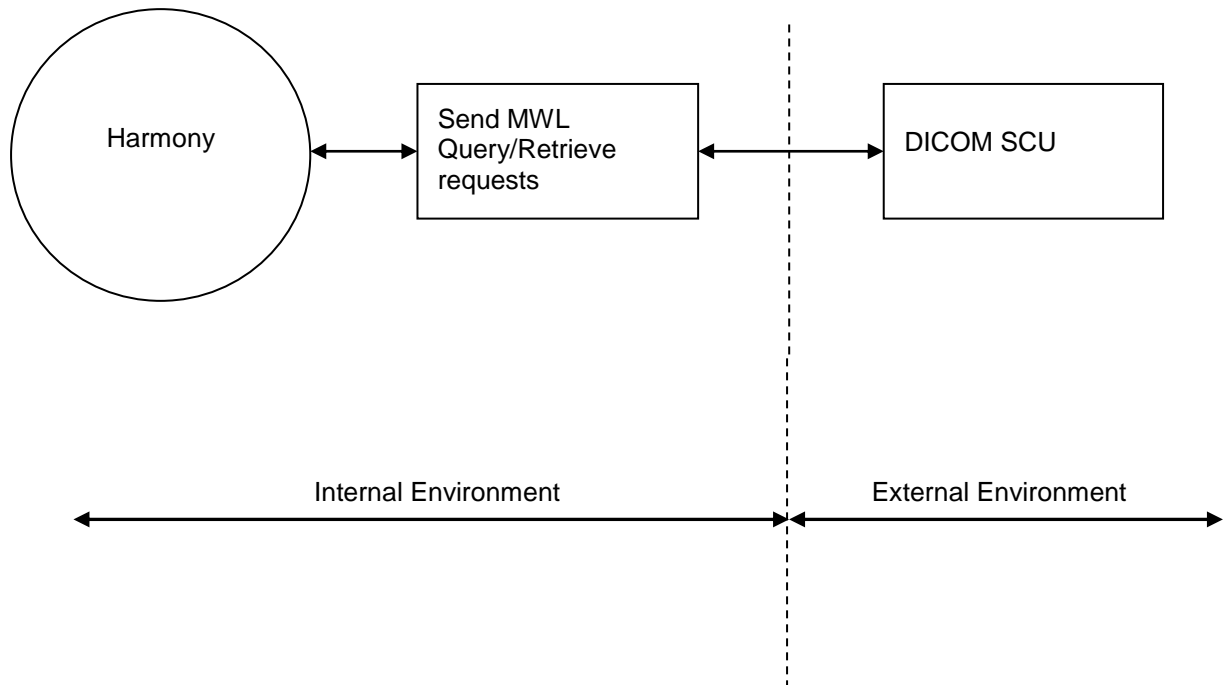


Figure 4 Harmony MWL SCP Application Data Flow Diagram



2.1.4.3 Functional Definition of the Harmony Application Entity

When a DICOM association request for Modality Worklist service is received, the Harmony will validate the request and issue acknowledgement to the initiator. When the association is established, the Harmony acts as MWL SCP and receives C-FIND request from User and send C-FIND result back to User.

2.2 AE Specifications

2.2.1 ACQUISITION MODALITY IMPORTER

2.2.1.1 Worklist AE

This AE provides standard conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	Usage
Verification	1.2.840.10008.1.1	SCU/SCP
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	SCU

2.2.1.1.1 Association Establishment Policies

2.2.1.1.1.1 General

For the Verification SOP Class the Worklist AE initiates an Association when acting as a SCU, it accepts an Association when acting as a SCP. For the Modality Worklist Information Model Find SOP Class the Worklist AE initiates an Association to the Modality Worklist Provider.

2.2.1.1.1.2 Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

2.2.1.1.1.3 Asynchronous Nature

Asynchronous operation is not supported.

2.2.1.1.1.4 Implementation Identifying Information

The Implementation Class UID is "2.16.840.1.114517.10.1.1.1".

The implementation version name is "TMS_SYNERGY_1_1".

2.2.1.1.2 Association Initiation Policy

The AE initiates an association for Modality Worklist Information Model Find SOP Class when the user requests the Modality Worklist. There are two (2) real world activities that initiate an association for Verification SOP Class:

- Manual request by the Operator



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- Automatic request at system start

2.2.1.1.2.1 Real World Activity Verify Availability of Destination

2.2.1.1.2.1.1 Associated Real-World Activity

The associated Real-World Activity is the verification of the availability of the destination. The AE use the DIMSE C-ECHO command to verify whether the receiving AE is able to negotiate an Association and respond.



2.2.1.1.2.1.2 *Proposed Presentation Contexts*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.1.2.1.2.1 Specific Conformance

The AE provides Standard Conformance to the DICOM Verification Service class.

2.2.1.1.2.1.2.2 Association length and duration

The association is released immediately after the response has been received. If the response duration exceeds the specified timeout value, the association will be terminated.

2.2.1.1.2.1.2.3 Implementation Specific Behavior

Not applicable.

2.2.1.1.2.1.2.4 Transfer Syntax Selection Policies

Not applicable.

2.2.1.1.2.1.2.5 Error and Status handling

Process will be terminated if critical error is occurred and description is displayed in information message box. Status of message processing is also displayed.

2.2.1.1.2.2 *Real World Activity Request Worklist*

2.2.1.1.2.2.1 *Associated Real-World Activity*

The associated Real-World Activity is the attempt to display a Worklist dialog box.

2.2.1.1.2.2.2 *Proposed Presentation Contexts*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Worklist	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.1.2.2.2.1 SOP Specific Conformance

- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Accession Number (0008, 0050) as a Matching Key attribute.



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- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Patient's Name (0010, 0010) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using the Patient ID (0010, 0020) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the Basic Modality Worklist SCP using Scheduled Procedure Step Start Date (0040, 0002) as a Matching Key attribute.
- The Accession Number is retrieved with Single Value Matching.

2.2.1.1.2.2.2.1.1 Association length and duration

The association will be released after all data being transmitted to satisfy the actual request. If the response duration exceeds the specified timeout value, the association will be terminated.

2.2.1.1.2.2.2.1.2 Error and Status handling

Process will be terminated if critical error is occurred and description is displayed in information message box.

2.2.1.1.2.2.2.1.3 Attributes displayed for MWL

Displayed attribute	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Accession Number	(0008,0050)
Patient's Sex	(0010,0040)
Patient's Birth Date	(0010,0030)
Scheduled Procedure Step Description	(0040,0007)
Scheduled Protocol Code Sequence – Code Meaning	(0008,0104)
Scheduled Procedure Step Start Date	(0040,0002)
Requested Procedure ID	(0040,1001)
Requesting Physician	(0032,1032)
Referring Physician's Name	(0008,0090)
Other Patient IDs	(0010,1000)
Ethnic Group	(0010,2160)
Study Instance UID	(0020,000D)
Scheduled Station AE Title	(0004,0001)
Scheduled Procedure Start Time	(0040,0003)
Modality	(0008,0060)
Requested Procedure Description	(0032,1060)
Requested Procedure Code Sequence – Code Meaning	(0008,0104)

2.2.1.1.2.2.2.1.4 Transfer Syntax Selection Policies

Not applicable.



2.2.1.2 Storage AE

This Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	Usage
Verification	1.2.840.10008.1.1	SCU/SCP
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU
OP Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	SCU

2.2.1.2.1 Association Establishment Policies

2.2.1.2.1.1 General

For the Verification SOP Class the Worklist AE initiates an Association when acting as a SCU, it accepts an Association when acting as a SCP. For the SC Image Storage SOP Class or OP Photographic Image Storage or Encapsulated PDF Storage the AE acting as a SCU initiates an Association to the Hospital Storage Provider.

2.2.1.2.1.2 Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

2.2.1.2.1.3 Asynchronous Nature

Asynchronous operation is not supported.

2.2.1.2.1.4 Implementation Identifying Information

The Implementation Class UID is "2.16.840.1.114517.10.1.1.1".

The implementation version name is "TMS_SYNERGY_1_1".

2.2.1.2.2 Association Initiation Policy

The AE initiates an association as a SCU for SC Image Storage SOP Class or OP Ophthalmic 8-bit Image Storage SOP class or Encapsulated PDF Storage SOP class when the user requests to send one image or a collection of images. There are two (2) real world activities that initiate an association for Verification SOP Class: manual request by the operator, or automatic request at system start.

2.2.1.2.2.1 Real World Activity Verify Availability of Destination

2.2.1.2.2.1.1 Associated Real-World Activity

The associated Real-World Activity is the verification of the availability of the destination. The AE will attempt to use the DIMSE C-ECHO command to verify whether the receiving AE is able to negotiate an Association and respond.



2.2.1.2.2.1.2 *Proposed Presentation Contexts*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.2.1.2.2.1.2.1 Specific Conformance

The AE provides Standard Conformance to the DICOM Verification Service class.

2.2.1.2.2.1.2.2 Association length and duration

The association is released immediately after the response has been received. If the response duration exceeds the specified timeout value, the association will be terminated.

2.2.1.2.2.1.2.3 Implementation Specific Behavior

Not applicable.

2.2.1.2.2.1.2.4 Presentation Context Acceptance Criterion

The AE will always accept a Presentation Context for the Verification SOP class with the DICOM Default Transfer Syntax.

2.2.1.2.2.1.2.5 Transfer Syntax Selection Policies

Not applicable

2.2.1.2.2.2 *Real World Activity Stores Images*

2.2.1.2.2.2.1 *Associated Real-World Activity*

The associated Real-World Activity is the attempt to store images in the Hospital EMR System.

2.2.1.2.2.2.2 *Proposed Presentation Contexts*

Presentation Context Table			
Abstract Syntax	Transfer Syntax	Role	Ext.



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Name	UID	Name List	UID List		Neg.
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit Big Endian	1.2.840.10008.1.2.2	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCU	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCU	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCU	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCU	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCU	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCU	None

2.2.1.2.2.2.1 Specific Conformance

Harmony implements the standard DICOM conformance.



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2.2.1.2.2.2.1.1 Association length and duration

The association will be released after all data being transmitted to satisfy the actual request. If the response duration exceeds the specified timeout value, the association will be terminated.

2.2.1.2.2.2.1.2 Error and Status handling

Process will be terminated if critical error is occurred and description is displayed in information message box. Status of message processing is also displayed.

2.2.1.2.2.2.1.3 Presentation Context Acceptance Criterion

The Storage AE will only accept Presentation Contexts specified in the above table.

2.2.1.2.2.2.1.4 Transfer Syntax Selection Policies

User will select the syntax transfer. Default syntax transfer is Implicit Little Endian (1.2.840.10008.1.2).

2.2.2 Image Display

2.2.2.1 Harmony Image Display AE Specification

Harmony provides standard conformance to the DICOM instance storage service object as C-STORE SCP, and DICOM Query/Retrieve service classes as SCUs and SCPs.

SOP Class Name	SOP Class UID
Image Storage SOP Classes	See Table 2 for details
Verification	1.2.840.10008.1.1
Query/Retrieve SOP Classes	See Table 2 for details

2.2.2.1.1 Association Establishment Policies

2.2.2.1.1.1 General

For the Verification SOP Class the Image Display AE initiates an Association when acting as a SCU, it accepts an Association when acting as a SCP.

2.2.2.1.1.2 Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

2.2.2.1.1.3 Asynchronous Nature

Asynchronous operation is not supported.



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2.2.2.1.1.4 Implementation Identifying Information

The Implementation Class UID is "2.16.840.1.114517.10.1.1.1".

The implementation version name is "TMS_SYNERGY_1_1".

2.2.2.1.2 Association Initiation Policy

The AE initiates an association for Information Model Study Find SOP Class when the user requests the list of exams.

2.2.2.1.3 Associated Real-World Activities

2.2.2.1.3.1 Receive an Image from a Destination Node

When an association request for storage is received, the Harmony will issue the association acknowledgement. Once the associations established, Harmony will act as C-STORE SCP, receive the image and store it in a temporary local storage.

2.2.2.1.3.2 Proposed Presentation Contexts

Harmony supports the presentation context shown in Table 2.



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Table 2. Presentation Context Table Syntax

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None



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VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCP	None
VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound image storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Ultrasound image storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ultrasound image storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Ultrasound image storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57	SCP	None
Ultrasound image storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Autorefractometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Autorefractometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Autorefractometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None



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Storage					
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.2.2.1.4 SOP Specific Conformance

2.2.2.1.4.1 SOP Specific Conformance for Store SOP Class

Harmony implements the standard DICOM conformance.

2.2.2.1.4.2 SOP Specific Conformance for Query/Retrieve SOP Class

- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Accession Number (0008, 0050) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Patient's Name (0010, 0010) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Patient ID (0010, 0020) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using Study Date (0008, 0020) as a Matching Key attribute.
- The Accession Number is retrieved with Single Value Matching.



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- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Study Instance UID (0020, 000D) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Study ID (0020, 0010) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Referring Physician Name (0008, 0090) as a Matching Key attribute.
- The AE is able to issue a C-FIND Request to the DICOM PACS SCP using the Modalities in Study (0008, 0061) as a Matching Key attribute.

2.2.2.1.4.3 Attributes displayed for Query/Retrieve

Tag	Attribute Name	Level
0010, 0010	Patient Name	Patient
0010, 0020	Patient ID	Patient
0010, 0030	Patient Date of Birth	Patient
0010, 0040	Patient Sex	Patient
0008, 0020	Study Date	Study
0008, 0030	Study Time	Study
0008, 0050	Accession Number	Study
0008, 1030	Study Description	Study
0020, 000D	Study Instance UID	Study
0020, 0010	Study ID	Study
0008, 0090	Referring Physician Name	Study
0008, 0060	Modality	Series
0020, 00E0	Series Instance UID	Series
0020, 0011	Series Number	Series
0008, 103E	Series Description	Image
0008, 0018	SOP Instance UID	Image
0020, 0062	Eye	Image
0008, 0022	Acquisition Date	Image
0008, 0032	Acquisition Time	Image
0020, 0013	Image Number	Image



2.2.3 DICOM Storage SCP

2.2.3.1 Harmony DICOM Storage SCP AE Specification

Harmony provides standard conformance to the DICOM instance storage service object as C_STORE SCP as listed in Table 3.

Table 3. Conformance to SCP Class as an SCP and SCU

SOP Class Name	SOP Class UID
Image Storage SOP Classes	See Table 2 for details
Verification	1.2.840.10008.1.1

2.2.3.1.1 Association Establishment Policies

2.2.3.1.1.1 General

Harmony DICOM Storage SCP accepts an Association.

2.2.3.1.1.2 Number of Associations

The default maximum number of established associations is 5.

2.2.3.1.1.3 Asynchronous Nature

Asynchronous operation is not supported.

2.2.3.1.2 Association Initiation Policy

Harmony DICOM Storage SCP doesn't initiate associations.

2.2.3.1.3 Associated Real-World Activities

2.2.3.1.3.1 Receive an Image from a Destination Node

When an association request for storage is received, the Harmony will issue the association acknowledgement. Once the associations established, Harmony will acts as C-STORE SCP, receive the image and store it in a local storage.

2.2.3.1.3.2 Proposed Presentation Contexts

Harmony supports the presentation context shown in Table 4.



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Table 4. Presentation Context Table Syntax

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.70	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.70	SCP	None
Ophthalmic Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
Encapsulated PDF storage	1.2.840.10008.5.1.4.1.1.104.1	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None
VL Photography image storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
VL Photography	1.2.840.10008.5.1.4.1.1.77.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None



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image storage					
VL Photography image storage	1.2.840.10008.5.1. 4.1.1. 77.1.4	Explicit Big Endian	1.2.840.10008.1.2.2	SCP	None
VL Photography image storage	1.2.840.10008.5.1. 4.1.1. 77.1.4	JPEG lossless, Non-Hierarchical	1.2.840.10008.1.2.4.70	SCP	None
VL Photography image storage	1.2.840.10008.5.1. 4.1.1. 77.1.4	JPEG Baseline Lossy Compression	1.2.840.10008.1.2.4.50	SCP	None

2.2.3.1.4 SOP Specific Conformance

2.2.3.1.4.1 SOP Specific Conformance for Store SOP Class

Harmony implements the standard DICOM conformance.

2.2.4 MWL SCP

2.2.4.1 Harmony MWL SCP AE Specification

Harmony provides standard conformance to the C-FIND service class as modality worklist SCP.

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Modality Worklist Find Class	1.2.840.10008.5.1.4.31

2.2.4.1.1 Association Establishment Policies

2.2.4.1.1.1 General

For the verification SOP class the MWL SCP AE accepts an association.

2.2.4.1.1.2 Number of Associations

The AE will attempt only one association establishment at a time for each SOP Class.

2.2.4.1.1.3 Asynchronous Nature

Asynchronous operation is not supported.

2.2.4.1.2 Associated Real-World Activities

When an association request for modality worklist is received, the Harmony will issue the association acknowledgement. Once the associations are established, Harmony will act as C-FIND SCP, receive request and send result for modality worklist query.



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2.2.4.1.3 SOP Specific Conformance

2.2.4.1.3.1 SOP Specific Conformance for MWL SCP

Harmony implements the standard DICOM conformance. The following tables contain detailed information on matching keys.

Description	Tag	Matching Type
Accession Number	(0008, 0050)	U S *
Modality	(0008, 0061)	S
Referring Physician Name	(0008,0090)	U S *
Patient's Name	(0010, 0010)	U S *
Patient ID	(0010, 0020)	S
Patient's Birth Date	(0010, 0030)	S
Patient's Gender	(0010, 0040)	S
Study Instance UID	(0020, 000D)	S L
Requesting Physician	(0032, 1032)	U S *
Requested Procedure Description	(0032, 1060)	U S *
Scheduled Station AE Title	(0040, 0001)	U S
Scheduled Procedure Step Start Date	(0040, 0002)	S
Scheduled Performing Physician Name	(0040, 0006)	U S *
Scheduled Procedure Step Description	(0040, 0007)	U S *
Scheduled Procedure Step ID	(0040, 0009)	S
Requested Procedure ID	(0040, 1001)	S

Matching Types:

U – Universal Matching

S – Single Value Matching

* – Wildcard Matching

L – List Matching



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The following table contains attributes available in result.

Description	Tag
Accession Number	(0008, 0050)
Modality	(0008, 0061)
Referring Physician Name	(0008,0090)
Patient's Name	(0010, 0010)
Patient ID	(0010, 0020)
Patient's Birth Date	(0010, 0030)
Patient's Gender	(0010, 0040)
Study Instance UID	(0020, 000D)
Requesting Physician	(0032, 1032)
Requested Procedure Description	(0032, 1060)
Requested Procedure ID	(0040, 1001)
Scheduled Station AE Title	(0040, 0001)
Scheduled Procedure Step Start Date Time	(0040, 0005)
Scheduled Performing Physician Name	(0040, 0006)
Scheduled Procedure Step Description	(0040, 0007)
Scheduled Procedure Step ID	(0040, 0009)
Ethnic Group	(0010, 2160)
Other Patient IDs	(0010, 1000)
Scheduled Protocol Code Sequence	(0040, 0008)
Requested Procedure Code Sequence	(0032, 1064)
Referenced Study Sequence	(0008, 1110)
Referenced Patient Sequence	(0008, 1120)
Admission ID	(0038, 0010)
Current Patient Location	(0038, 0300)

2.3 Networking Interfaces

2.3.1 Supported Communication Stacks

The TCP/IP stack is the only supported protocol.

2.3.1.1 TCP/IP Stack

The AE's inherit the TCP/IP stack from the MS-WINDOWS system upon which they execute.

2.3.2 Physical Media Support

The AE's are only software components, therefore they are indifferent to the physical medium over which TCP/IP executes. The AE's can use any network adapters that MS-WINDOWS can bind the TCP/IP protocol.



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2.4 Configuration

2.4.1 AE Title/Presentation Address Mapping

- The AE titles for SCP and SCU are configurable
- Node IP address, subnet mask, hostname, hostname aliases are configured by the local system administrator
- TCP/IP port is configurable.



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3 SUPPORT OF EXTENDED CHARACTER SETS

No extended character sets are supported.



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4 EXENTIONS/SPECIALIZATIONS/PRIVATIZATIONS

Not applicable.



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5 IOD CONTENTS

5.1 Acquisition Modality Importer - IOD DESCRIPTION

5.1.1 Secondary Capture IOD

Attribute Tag	Description	T	Length	A	B	C	Remarks
Patient IE							
(0010,0010)	Patient Name	2	32	X	X		
(0010,0020)	Patient ID	2	64	X	X		
(0010,0030)	Patient's Birth Date	2	-	X		X	
(0010,0040)	Patient's Sex	2	1	X	X		
(0010,1000)	Other Patient ID's	3	64	X		X	
(0010,2160)	Ethnic Group	3	16	X		X	
(0010,21B0)	Additional Patient History	nd	10240	X			
(0010,4000)	Patient Comments	3	10240	X		X	
(0008,1120)	Referenced Patient Sequence	3	-	X			
Study IE							
(0020,000D)	Study Instance UID	1	-	X			If MWL missing generated by modality
(0020,0010)	Study ID	2	16	-	-	-	Generated by modality
(0008,0020)	Study Date	2	-	-	-	-	
(0008,0030)	Study Time	2	-	-	-	-	
(0008,0050)	Accession Number	2	16	X	X		
(0008,0090)	Referring Physician's Name	2	64	X	X		
(0008,1030)	Study Description	3	64			X	
(0008,1048)	Physician(s) of Record	3	64	X		X	
(0008,1032)	Procedure Code Sequence	R+	-	X			used in case of MWL
(0008,1110)	Referenced Study Sequence	R+	-	X			used in case of MWL
Series IE							
(0020,000E)	Series Instance UID	1	-	-	-	-	generated by modality
(0020,0011)	Series Number	2	12	-	-	-	generated by modality
(0008,103E)	Series Description	3	64	-	-	-	generated by modality
(0008,0060)	Modality	1	-	-	-	-	set to "SC"
(0040,0007)	Scheduled Procedure Step Description	3	64	X			used in case of MWL
(0040,0009)	Scheduled Procedure Step ID	1C	16	X			used in case of MWL



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(0040,0007)	Requested Procedure ID	1C	15	X			used in case of MWL
(0040,0008)	Scheduled Protocol Code Sequence	R+	-	X			used in case of MWL
(0032,1060)	Requested Procedure Description	R+	64	X			used in case of MWL
(0018,1030)	Protocol Name	R+	64	X			used in case of MWL
(0040,0253)	Performed Procedure Step ID	R+	16	X			used in case of MWL
(0040,0244)	Performed Procedure Step Start Date	R+	-	-	-	-	
(0040,0245)	Performed Procedure Step Start Time	R+	-	-	-	-	
(0040,0254)	Performed Procedure Step Description	R+	64	X			used in case of MWL
General Equipment IE							
(0008,0070)	Manufacturer	2	-	-	-	-	
(0008,0080)	Institution Name	3	64	-	-	-	
(0008,1010)	Station Name	3	16	-	-	-	
(0008,1040)	Institutional Department Name	3	64	-	-	-	
(0018,1020)	Software Version(s)	3	64	-	-	-	
(0008,1090)	Manufacturer Model Name	3	-	-	-	-	Model name of device
SC Equipment IE							
(0008,0064)	Conversion Type	1	-	-	-	-	DI
(0018,1016)	Secondary Capture Device Manufacturer	3	64	-	-	-	Topcon
(0018,1018)	Secondary Capture Device Manufacturer's Model Name	3	64	-	-	-	Harmony
Image IE							
(0008,0016)	SOP Class UID	1	-	-	-	-	
(0008,0018)	SOP Instance UID	1	-	-	-	-	Created by Application
(0008,0023)	Content Date	3	-	-	-	-	Date of Capture
(0008,0033)	Content Time	3					Time of Capture
(0008,0022)	Acquisition Date	3	-	-	-	-	Same as content date
(0008,0032)	Acquisition Time	3	-	-	-	-	Same as content time
(0008,0008)	Image Type	1	-	-	-	-	
(0020,0013)	Instance Number	1	12	-	-	-	generated for each image
(0028,2110)	Lossy Image Compression	1	2	-	-	-	Defined for JPEG compressed images
(0028, 2112)	Lossy Image Compression Ratio	1	-	-	-	-	Defined for JPEG compressed images



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(0028,0002)	Samples per Pixel	1	-	-	-	-	1 (BW) or 3 (color)
(0028,0004)	Photometric Interpretation	1	-	-	-	-	MONOCHROME2, PALETTE_COLOR or RGB
(0028,0006)	Planar Configuration	1C	-	-	-	-	
(0028,0010)	Rows	1	-	-	-	-	
(0028,0011)	Columns	1	-	-	-	-	
(0028,0100)	Bits Allocated	1	-	-	-	-	8
(0028,0101)	Bits Stored	1	-	-	-	-	8
(0028,0102)	High Bit	1	-	-	-	-	7
(0028,0103)	Pixel Representation	1	-	-	-	-	0
(0040,0555)	Acquisition Context		-	-	-	-	TID2
(7FE0,0010)	Pixel Data	1	-	-	-	-	

Legend:

Column 3 (T):	Type of Tag
Column 4 (Length):	Maximum Length of Data in Character
Column 5 (A):	X: value is taken from MWL if present
Column 6 (B):	X: must be entered by user if MWL missing
Column 7 (C):	X: can be entered by user – if not filled out tag will not be sent
- :	not applicable
nd :	not defined
R+	The requirement is IHE extension of the DICOM requirements.



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5.1.2 Ophthalmic Photography IOD

Attribute Tag	Description	T	Length	A	B	C	Remarks
Patient IE							
(0010,0010)	Patient Name	2	32	X	X		
(0010,0020)	Patient ID	2	64	X	X		
(0010,0030)	Patient's Birth Date	2	-	X		X	
(0010,0040)	Patient's Sex	2	1	X	X		
(0010,1000)	Other Patient ID's	3	64	X		X	
(0010,2160)	Ethnic Group	3	16	X		X	
(0010,21B0)	Additional Patient History	nd	10240	X			
(0010,4000)	Patient Comments	3	10240	X		X	
(0008,1120)	Referenced Patient Sequence	3	-	X			
Study IE							
(0020,000D)	Study Instance UID	1	-	X			If MWL missing generated by modality
(0020,0010)	Study ID	2	16	-	-	-	Generated by modality
(0008,0020)	Study Date	2	-	-	-	-	
(0008,0030)	Study Time	2	-	-	-	-	
(0008,0050)	Accession Number	2	16	X	X		
(0008,0090)	Referring Physician's Name	2	64	X	X		
(0008,1030)	Study Description	3	64			X	
(0008,1048)	Physician(s) of Record	3	64	X		X	
(0008,1032)	Procedure Code Sequence	R+	-	X			used in case of MWL
(0008,1110)	Referenced Study Sequence	R+	-	X			used in case of MWL
Series IE							
(0020,000E)	Series Instance UID	1	-	-	-	-	generated by modality
(0020,0011)	Series Number	2	12	-	-	-	generated by modality
(0008,103E)	Series Description	3	64	-	-	-	generated by modality
(0008,0060)	Modality	1	-	-	-	-	Set to "OP"
(0040,0007)	Scheduled Procedure Step Description	3	64	X			used in case of MWL
(0040,0009)	Scheduled Procedure Step ID	1C	16	X			used in case of MWL
(0020,0060)	Laterality	2C	-	-	-	-	Parsed from associated FDA file.
(0040,0007)	Requested Procedure	1C	16	X			used in case of MWL



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	ID						
(0040,0008)	Scheduled Protocol Code Sequence	R+	-	X			used in case of MWL
(0032,1060)	Requested Procedure Description	R+	64	X			used in case of MWL
(0008,1111)	Referenced Performed Procedure Step Sequence	R+	-				Used in case of MPPS
(0018,1030)	Protocol Name	R+	64	X			used in case of MWL
(0040,0253)	Performed Procedure Step ID	R+	16	X			used in case of MWL
(0040,0244)	Performed Procedure Step Start Date	R+	-	-	-	-	
(0040,0245)	Performed Procedure Step Start Time	R+	-	-	-	-	
(0040,0254)	Performed Procedure Step Description	R+	64	X			used in case of MWL
Equipment IE							
(0008,0070)	Manufacturer	2	-	-	-	-	
(0008,0080)	Institution Name	3	64	-	-	-	
(0008,1010)	Station Name	3	16	-	-	-	
(0008,1040)	Institutional Department Name	3	64	-	-	-	
(0018,1020)	Software Version(s)	3	64	-	-	-	
(0008,1090)	Manufacturer Model Name	3	-	-	-	-	
Image IE							
(0008,0016)	SOP Class UID	1	-	-	-	-	
(0008,0018)	SOP Instance UID	1	-	-	-	-	Generated by Application.
(0008,0023)	Content Date	1	-	-	-	-	
(0008,0033)	Content Time	1	-	-	-	-	
(0008,0022)	Acquisition Date	3	-	-	-	-	
(0008,0032)	Acquisition Time	3	-	-	-	-	
(0008,002A)	Acquisition DateTime	1	-	-	-	-	
(0008,0008)	Image Type	1	-	-	-	-	
(0020,0013)	Instance Number	1	12	-	-	-	generated for each image
(0028,2110)	Lossy Image Compression	1	2	-	-	-	Defined for JPEG compressed images
(0028, 2112)	Lossy Image Compression Ratio	1C	-	-	-	-	Defined for JPEG compressed images
(0028, 2114)	Lossy Image Compression Method	1C	-	-	-	-	Defined for JPEG compressed images
(0028,0002)	Samples per Pixel	1	-	-	-	-	1 (BW) or 3 (color)



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(0028,0004)	Photometric Interpretation	1	-	-	-	-	MONOCHROME2, PALETTE_COLOR or RGB
(0028,0006)	Planar Configuration	1C	-	-	-	-	
(0028,0010)	Rows	1	-	-	-	-	
(0028,0011)	Columns	1	-	-	-	-	
(0028,0100)	Bits Allocated	1	-	-	-	-	8
(0028,0101)	Bits Stored	1	-	-	-	-	8
(0028,0102)	High Bit	1	-	-	-	-	7
(0028,0103)	Pixel Representation	1	-	-	-	-	0
(0028,0030)	Pixel Spacing	1C	-	-	-	-	
(7FE0,0010)	Pixel Data	1	-	-	-	-	
(0028,0301)	Burned In Annotation	1	-	-	-	-	Enum("Yes") or Enum("No")
Ocular Region Imaged							
(0020,0062)	Image Laterality	1	1	-	-	-	Parsed from associated FDA file.
(0008,2218)	Anatomic Region Sequence	1	-	-	-	-	
Ophthalmic Photography acquisition parameters							
(0022,000C)	Horizontal Field of View	2	-	-	-	-	
(0022,000A)	Emmetropic Magnification	2	-	-	-	-	
(0022,000D)	Pupil Dilated	2	-	-	-	-	
(0022,000E)	Degree of Dilation	2C	-	-	-	-	
(0022,001B)	Refractive State Sequence	2	-	-	-	-	Empty
(0022,000B)	Intra Ocular Pressure	2	-	-	-	-	Empty
(0022,001C)	Mydriatic Agent Code Sequence	2C	-	-	-	-	
(0022,0005)	Patient Eye Movement Commanded	2	-	-	-	-	Empty
Synchronization							
(0018,106A)	Synchronization Trigger	1	-	-	-	-	Enum("NO TRIGGER")
(0018,1800)	Acquisition Time Synchronized	1	-	-	-	-	Enum("N")
(0020,0200)	Synchronization Frame of Reference UID	1	-	-	-	-	
Ophthalmic Photographic Parameters							
(0018,7004)	Detector type	2	-	-	-	-	CCD
(0022,0015)	Acquisition Device Type Code Sequence	1	-	-	-	-	
(0022,0016)	Illumination Type Code Sequence	2	-	-	-	-	Empty



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(0022,0018)	Image Path Filter Type Stack Code Sequence	2	-	-	-	-	Empty
(0022,0019)	Lenses Code Sequence	2	-	-	-	-	Empty
(0022,0017)	Light Path Filter Type Stack Code Sequence	2	-	-	-	-	Empty
Cine							
(0018,1063)	Frame Time	1C	-	-	-	-	0
Multi-frame							
(0028,0009)	Frame Increment Pointer	1	-	-	-	-	Points To Frame Time

Legend:

- Column 3 (T): Type of Tag
- Column 4 (Length): Maximum Length of Data in Character
- Column 5 (A): X: value is taken from MWL if present
- Column 6 (B): X: must be entered by user if MWL missing
- Column 7 (C): X: can be entered by user – if not filled out tag will not be sent
- : not applicable
- nd : not defined
- R+ The requirement is IHE extension of the DICOM requirements.



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5.1.3 Encapsulated PDF IOD

Attribute Tag	Description	T	Length	A	B	C	Remarks
Patient IE							
(0010,0010)	Patient Name	2	32	X	X		
(0010,0020)	Patient ID	2	64	X	X		
(0010,0030)	Patient's Birth Date	2	-	X		X	
(0010,0040)	Patient's Sex	2	1	X	X		
(0010,1000)	Other Patient ID's	3	64	X		X	
(0010,2160)	Ethnic Group	3	16	X		X	
(0010,21B0)	Additional Patient History	nd	10240	X			
(0010,4000)	Patient Comments	3	10240	X		X	
(0008,1120)	Referenced Patient Sequence	3	-	X			
Study IE							
(0020,000D)	Study Instance UID	1	-	X			If MWL missing generated by modality
(0020,0010)	Study ID	2	16	-	-	-	Generated by modality
(0008,0020)	Study Date	2	-	-	-	-	
(0008,0030)	Study Time	2	-	-	-	-	
(0008,0050)	Accession Number	2	16	X	X		
(0008,0090)	Referring Physician's Name	2	64	X	X		
(0008,1030)	Study Description	3	64			X	
(0008,1048)	Physician(s) of Record	3	64	X		X	
(0008,1032)	Procedure Code Sequence	R+	-	X			used in case of MWL
(0008,1110)	Referenced Study Sequence	R+	-	X			used in case of MWL
Series IE							
(0020,000E)	Series Instance UID	1	-	-	-	-	generated by modality
(0020,0011)	Series Number	2	12	-	-	-	generated by modality
(0008,103E)	Series Description	3	64	-	-	-	generated by modality
(0008,0060)	Modality	1	-	-	-	-	set to "SC"
(0040,0007)	Scheduled Procedure Step Description	3	64	X			used in case of MWL
(0040,0009)	Scheduled Procedure Step ID	1C	16	X			used in case of MWL
(0040,0007)	Requested Procedure ID	1C	15	X			used in case of MWL
(0040,0008)	Scheduled Protocol Code Sequence	R+	-	X			used in case of MWL
(0032,1060)	Requested Procedure	R+	64	X			used in case of MWL



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	Description						
(0018,1030)	Protocol Name	R+	64	X			used in case of MWL
(0040,0253)	Performed Procedure Step ID	R+	16	X			used in case of MWL
(0040,0244)	Performed Procedure Step Start Date	R+	-	-	-	-	
(0040,0245)	Performed Procedure Step Start Time	R+	-	-	-	-	
(0040,0254)	Performed Procedure Step Description	R+	64	X			used in case of MWL
General Equipment IE							
(0008,0070)	Manufacturer	2	-	-	-	-	
(0008,0080)	Institution Name	3	64	-	-	-	
(0008,1010)	Station Name	3	16	-	-	-	
(0008,1040)	Institutional Department Name	3	64	-	-	-	
(0018,1020)	Software Version(s)	3	64	-	-	-	
(0008,1090)	Manufacturer Model Name	3	-	-	-	-	
SC Equipment IE							
(0008,0064)	Conversion Type	1	-	-	-	-	DI
(0018,1016)	Secondary Capture Device Manufacturer	3	64	-	-	-	Topcon
(0018,1018)	Secondary Capture Device Manufacturer's Model Name	3	64	-	-	-	Harmony
Document IE							
(0008,0016)	SOP Class UID	1	-	-	-	-	
(0008,0018)	SOP Instance UID	1	-	-	-	-	
(0008,0023)	Content Date	2	-	-	-	-	
(0008,0033)	Content Time	2					
(0008,002A)	Acquisition DateTime	2	-	-	-	-	
(0020,0013)	Instance Number	1	12	-	-	-	generated for each image
(0042,0011)	Encapsulated Document	1	-	-	-	-	
(0000,006A)	Burned In Annotation	1	-	-	-	-	"YES" or "NO"
(0040,A493)	Verification Flag	3	-	-	-	-	"UNVERIFIED"
(0042,0010)	Document Title	2	64	-	-	-	Source PDF file name
(0042,0012)	MIME Type of Encapsulated Document	1	64	-	-	-	



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(0042,0014)	List of MIME Types	1C	64	-	-	-	"image/jpeg\0application/pdf"
(0040,A043)	Concept Name Code Sequence	2	-	-	-	-	

Legend:

Column 3 (T): Type of Tag
 Column 4 (Length): Maximum Length of Data in Character
 Column 5 (A): X: value is taken from MWL if present
 Column 6 (B): X: must be entered by user if MWL missing
 Column 7 (C): X: can be entered by user – if not filled out tag will not be sent
 - : not applicable
 nd : not defined
 R+ The requirement is IHE extension of the DICOM requirements.

5.1.4 Attribute Mapping from Modality Worklist to Image Header

Modality Worklist Attribute		Image Header Attribute	
DICOM Name	Tag	DICOM Name	Tag
Patient Information			
Patient's Name	(0010,0010)	Patient's Name	(0010,0010)
Patient's Birth Date	(0010,0030)	Patient's Birth Date	(0010,0030)
Patient ID	(0010,0020)	Patient ID	(0010,0020)
Patient's Sex	(0010,0040)	Patient Sex	(0010,0040)
Ethnic Group	(0010,2160)	Ethnic Group	(0010,2160)
Other Patient ID's	(0010,1000)	Other Patient ID's	(0010,1000)
Additional Patient History	(0010,21B0)	Additional Patient History	(0010,21B0)
Patient Comments	(0010,4000)	Patient Comments	(0010,4000)
Referenced Patient Sequence	(0008,1120)	Referenced Patient Sequence	(0008,1120)
Visit Information			
Referring Physician's Name	(0008,0090)	Referring Physician's Name	(0008,0090)
Image Service Request			
Accession Number	(0008,0050)	Accession Number	(0008,0050)
Requested Procedure			
Requested Procedure ID	(0040,1001)	Requested Procedure ID	(0040,1001)
Requested Procedure Description	(0032,1060)	Requested Procedure Description	(0032,1060)
Names of Intended Recipients of Results	(0040,1010)	Physician(s) of Record	(0008,1048)



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Study Instance UID	(0020,000D)	Study Instance UID	(0020,000D)
Requested Procedure Code Sequence	(0032,1064)	Procedure Code Sequence	(0008,1032)
Referenced Study Sequence	(0008,1110)	Referenced Study Sequence	(0008,1110)
Scheduled Procedure Step			
Modality	(0008,0060)	Modality	(0008,0060)
Scheduled Procedure Step ID	(0040,0009)	Scheduled Procedure Step ID	(0040,0009)
Scheduled Procedure Step description	(0040,0007)	Scheduled Procedure Step description	(0040,0007)
Scheduled Performing Physician's Name	(0040,0006)	Operators' Name	(0008,1070)
Scheduled Procedure Step Location	(0040,0011)	Performed Procedure Step ID	(0040,0253)
Scheduled Protocol Code Sequence	(0040,0008)	Scheduled Protocol Code Sequence	(0040,0008)