DICOM Conformance Statement for Cedara ProPlanner™ 3.1

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1. Introduction

1.1 Purpose of this Document

This document is the DICOM Conformance Statement for Cedara ProPlanner. The purpose of this document is to describe how the workstation interacts with other DICOM devices on the network.

1.2 Related Documents

The Digital Imaging and Communications in Medicine (DICOM) standard. NEMA PS 3.1-13 2003 and Supplements.

1.3 Definitions

DICOM terms are used throughout this Conformance Statement. For a description of these, consult the DICOM standard publication.

Word	Definition
dcserver	The executable name of the Cedara DICOM Image Transfer Server
hcserver	The executable name of the Cedara Hardcopy Server

1.4 Acronyms and Abbreviations

DICOM abbreviations are used throughout this Conformance Statement. For a description of these, consult the DICOM standard publication.

1.5 Important note to the reader

The use of this conformance statement by itself does not guarantee successful interoperability of Merge OEM products with equipment from other vendors. The user or integrator of Merge OEM products should keep the following issues in mind:

1. Successful interoperability of the workstation with other devices may require functions that are not specified within the scope of DICOM. It is the user's or integrator's responsibility to ensure that the proper analysis and validation is performed to verify the connection.
2. Test procedures should be used to verify that data transferred into the workstation is correct. This is often done with the aid of phantom scans using a variety of clinical protocols.
3. Test procedures should be used to verify connectivity. Issues such as full database and broken connections should be verified.
4. The DICOM standard will continually evolve to meet new user requirements. Merge OEM reserves the right to make changes to its products or to discontinue its delivery. The user or integrator should ensure that any non-Merge OEM device providers, which connect with

Merge OEM devices, should also follow the standard. Failure to do so will likely result in future connectivity problems.

2. Implementation Model

Cedara ProPlanner from Merge OEM is an orthopedaic planning application. The application uses DICOM services to:

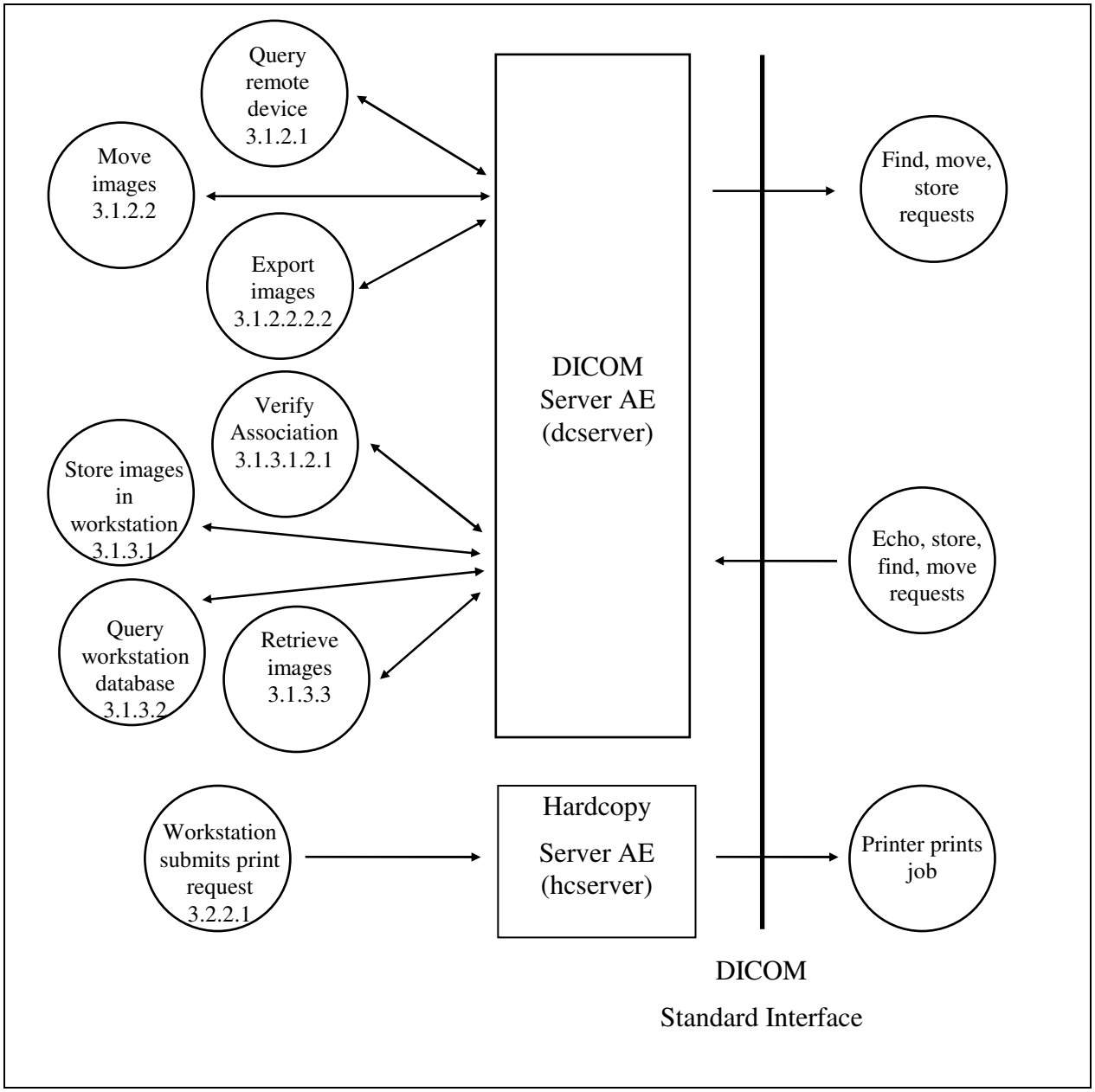
- import and export images
- query the content of other devices and initiate transfers
- print images

The DICOM services are implemented using two Application Entities. The DICOM SERVER AE is used for image transfers and is implemented by a Windows application called *dcserver*. The HARDCOPY SERVER AE is used for printing and is implemented by a Windows application called *hcserver*.

2.1 Application Data Flow Diagram

The diagram for the Implementation Model is shown in Figure 1.

Figure 1. Application Entity Implementation Model



The *dcserver* is expected to be running on the local workstation. A Remote Application Entity initiates an association for Storage Services. Upon notification of acceptance of the association parameters, the Remote Application Entity sends Information Objects to the *dcserver* that stores them in a local database for future use by the workstation.

The user initiates Query and Retrieve requests using the *dcserver* component, generally by interaction with a User Interface. The *dcserver* component initiates an association with the Remote Application Entity and uses the Query or Retrieve Service Classes to issue commands. The Remote Application Entity responds as a Query/Retrieve Service Class Provider (SCP) performing C-FIND and C-MOVE operations as required. The *dcserver* component passes the status responses for these commands to the workstation User Interface for interpretation and display.

The application using the *hcserver* requests printing to a print device. The *hcserver* initiates an association with a DICOM print SCP for the purpose of printing the job requested by the application. The *hcserver* can handle simultaneous associations with a number of DICOM print SCPs.

2.2 Functional Definitions of Application Entities

The *dcserver* component operates as a daemon. The startup sequence of the system initiates its execution. The *dcserver* is left running whether the workstation is operational or not.

The *dcserver* uses a configuration file that contains information used to validate association attempts from Remote Application entities. The *dcserver* then listens on the configured port for association requests.

An association request for Storage Services from a Remote Application Entity causes *dcserver* to validate the request according to the configuration parameters set at execution time. The Remote Application Entity then sends the Information Object Instance. The *dcserver* stores the received Information Object Instance in its local database if the data does not already exist. The data remains in the database until removed by some action external to this Application Entity.

An association request from a Remote Application Entity for Query or Move Services causes *dcserver* 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 *dcserver* 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 destination Application Entity specified in the C_MOVE message. Incremental responses are sent to the C_MOVE originator to indicate progress of the request.

A request from the workstation User Interface causes the *dcserver* component to initiate an association with a Remote Application Entity. The Service Classes offered are specified in the configuration file. The user can then initiate query and retrieve requests to *dcserver* that are sent to the Remote Application Entity. The workstation User Interface displays the responses from the Remote Application Entity.

The *hcserver* component operates as a daemon. The startup sequence of the system initiates its execution.

The *hcserver* uses a configuration file to determine the list of printer devices connected to the server and the properties of each printer.

Association and release requests are logged to the Windows event. Various error and warning indications are also logged to the Event Viewer.

2.3 Sequencing of Real World Activities

Cedara ProPlanner always acts as a C_FIND SCU before acting as a C_MOVE SCU. See sections 3.1.2.1.1 and 3.1.2.2.1 for details on associated real world activites.

3. Application Entity Specifications

3.1 Dcserver Application Entity Specification

The workstation DICOM Image Transfer capability consists of two logical components. The Service Class User (SCU) portion originates associations for Store, Query and Retrieve operations. The SCP portion accepts associations for Echo, Store, Query and Retrieve operations. The two components are configured with the same Application Entity Title for use in the workstation. They are treated as a single Application Entity in this description.

The *dcserver* Application Entity provides Standard Conformance to the following DICOM V3.1 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Patient Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
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
Digital Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1.1
Mammography Image Storage	1.2.840.10008.5.1.4.1.1.1.2
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
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
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
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
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
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
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
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Key Image Note	1.2.840.10008.5.1.4.1.1.88.59

The *dcserver* Application Entity provides Standard Conformance to the following DICOM V3.1 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
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
Digital Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1.1
Mammography Image Storage	1.2.840.10008.5.1.4.1.1.1.1
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4
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
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
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
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
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
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
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Key Image Note	1.2.840.10008.5.1.4.1.1.88.59

3.1.1 Association Establishment Policies

3.1.1.1 General

The Cedara ProPlanner User can select which Application Entity to associate with for Query, Storage, and Retrieve operations. The AE list is managed through the “Dicom Nodes…” option in the tools menu accessed through the Study List UI.

The maximum PDU size is 65536 bytes.

The *dcserver* Application Entity always proposes or accepts the Verification SOP Class.

3.1.1.2 Number of Associations

The *dcserver* can initiate multiple associations concurrently.

A configuration parameter is provided to limit the number of associations that can be originated. The default is 10.

Another configuration parameter is provided to limit the number of associations that *dcserver* can accept. The default is 10.

3.1.1.3 Asynchronous Nature

The application does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4 Implementation Identifying Information

The *dcserver* implementation class UID is 2.16.124.113531.1.1.

The *dcserver* implementation version name is CEDARA VR 4.0.

3.1.2 Association Initiation Policy

This section details the action of the *dcserver* SCU component as a result of user initiated activity in Cedara ProPlanner.

3.1.2.1 Query Request

3.1.2.1.1 Associated Real World Activity

In the study list UI the user will select the "Import Studies…" option under Dicom Media in the File menu. The user can specify wild card or specific information for Patient Name, Patient ID, Study ID, Modality, Accession Number and Study Date range.

The DICOM transfer utility uses the Study Root Query Model when initiating query request. Proposed Presentation Contexts

The following table describes the Presentation Contexts that may be presented for the Query request.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Patient Root Query / Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query / Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.1.1.1 SOP Specific Conformance for Patient Root Query/Retrieve Model – FIND

The *dcserver* does not use Relational Queries.

The *dcserver* does not use Extended Negotiation.

The Keys supported are listed below:

Patient Level Keys

Description	Tag	Type
Patient's Name*	(0010,0010)	R
Patient ID*	(0010,0020)	U
Patient's Birth Date	(0010,0030)	O
Patient's Birth Time	(0010,0032)	O
Patient's Sex	(0010,0040)	O
Other Patient Ids	(0010,1000)	O
Other Patient Names	(0010,1001)	O
Ethnic Group	(0010,2160)	O
Patient Comments	(0010,4000)	O

Study Level Keys

Description	Tag	Type
Study Date*	(0008,0020)	R
Study Time*	(0008,0030)	R
Accession Number	(0008,0050)	R
Study ID*	(0020,0010)	R
Study Instance UID	(0020,000D)	U
Referring Physician's Name*	(0008,0090)	O
Study Description	(0008,1030)	O
Name of Physician(s) Reading Study	(0008,1060)	O
Admitting Diagnoses Description	(0008,1080)	O
Patient's Age	(0010,1010)	O
Patient's Size	(0010,1020)	O
Patient's Weight	(0010,1030)	O
Occupation	(0010,2180)	O
Additional Patient History	(0010,21B0)	O
Other Study Numbers	(0020,1070)	O
Interpretation Author	(4008,010C)	O

Series Level Keys

Description	Tag	Type
Modality*	(0008,0060)	R
Series Number*	(0020,0011)	R
Series Instance UID	(0020,000E)	U

Image Level Keys

Description	Tag	Type
Image Number	(0020,0013)	R
SOP Instance UID	(0008,0018)	U

- The keys marked with an asterisk are displayed in the DICOM transfer utility.

3.1.2.1.1.2 SOP Specific Conformance for Study Root Query/Retrieve Model – FIND

The *dcserver* does not use Relational Queries.

The *dcserver* does not use Extended Negotiation.

The Keys supported are listed below:

Study Level Keys

Description	Tag	Type
Study Date*	(0008,0020)	R
Study Time*	(0008,0030)	R
Accession Number*	(0008,0050)	R
Patient's Name*	(0010,0010)	R
Patient ID*	(0010,0020)	R
Study ID*	(0020,0010)	R
Study Instance UID	(0020,000D)	U
Referring Physician's Name	(0008,0090)	O
Study Description	(0008,1030)	O
Name of Physician(s) Reading Study	(0008,1060)	O
Admitting Diagnoses Description	(0008,1080)	O
Patient's Birth Date	(0010,0030)	O
Patient's Birth Time	(0010,0032)	O
Patient's Sex	(0010,0040)	O
Other Patient Ids	(0010,1000)	O
Other Patient Names	(0010,1001)	O
Patient's Age	(0010,1010)	O
Patient's Size	(0010,1020)	O
Patient's Weight	(0010,1030)	O
Ethnic Group	(0010,2160)	O
Occupation	(0010,2180)	O
Additional Patient History	(0010,21B0)	O
Patient Comments	(0010,4000)	O
Other Study Numbers	(0020,1070)	O
Number of Study Related Images	(0020,1208)	O
Interpretation Author	(4008,010C)	O

Series Level Keys

Description	Tag	Type
Modality*	(0008,0060)	R

Description	Tag	Type
Series Number*	(0020,0011)	R
Series Instance UID	(0020,000E)	U

Image Level Keys

Description	Tag	Type
Image Number	(0020,0013)	R
SOP Instance UID	(0008,0018)	U

The keys marked with an asterisk are displayed in the DICOM transfer utility.

3.1.2.2 Move Request

3.1.2.2.1 Associated Real World Activity

The import UI is accessed through the Study List page by selecting the "Import Studies…" item in the DICOM media option in the File menu. The user selects a remote AE and performs a query operation (3.1.2.1.1). The studies displayed as a result of the query can be moved over to the local database by pressing the Import button. In this case a C_MOVE association is initialized by Cedara ProPlanner acting as the SCU. This will cause Cedara ProPlanner to accept a C-STORE association when the data requested in the C_MOVE is sent over from the remote AE.

3.1.2.2.2 Proposed Presentation Contexts

The following table describes the Presentation Contexts that may be presented for the Move request. The configuration file contains 1 of the listed Abstract Syntax's.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.2.2.1 SOP Specific Conformance for Patient Root Query/Retrieve Model – MOVE

This implementation supports transfers against the Patient Query/Retrieve Information Model described in Section C.6.1.1 of NEMA PS3.4 (1996) Annex C using the C-MOVE SCU behavior described in Section C.4.2.2 of NEMA PS3.4 (1996) Annex C.

3.1.2.2.2.2 SOP Specific Conformance for Study Root Query/Retrieve Model – MOVE

This implementation supports transfers against the Study Query/Retrieve Information Model described in Section C.6.2.1 of NEMA PS3.4 (1994) Annex C using the C-MOVE SCU behavior described in Section C.4.2.2 of NEMA PS3.4 (1994) Annex C.

3.1.2.3 Store Request

3.1.2.3.1 Associated Real World Activity

One way in which Cedara ProPlanner can initiate a connection for the C_STORE operation is by using the Export UI. The export UI is accessed through the study list by selecting the "Export Studies…" item in the DICOM Media option in the file menu. In this dialog a target AE is selected and one of the listed data sets is selected for export. Pressing the Export button intialises a C_STORE association with the target AE where Cedara ProPlanner is the SCU.

A second scenario is when Cedara ProPlanner accepts a C_MOVE association from another AE. This triggers a C_STORE association initialization using the data specified in the C_MOVE command back to the AE which initialized the C_MOVE association. Unlike the previous scenario this one is transparent to the user.

Note that 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. A mismatch results in no message being sent but the association remains active.

3.1.2.3.2 Proposed Presentation Contexts

The following table describes the Presentation Contexts that may be presented for the Store request. The configuration file contains 1 or more of the listed Abstract Syntax's.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Digital Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Mammography Image Storage	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	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	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Key Image Note	1.2.840.10008.5.1.4.1.1.88.59	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

3.1.2.3.2.1 SOP Specific Conformance for Image Storage SOP Classes

This implementation supports transfers as an SCU as described in NEMA PS3.4 Annex B.

The status returned by the accepting Application Entity is used to indicate success or failures of the C_MOVE sub-operation that initiated the transfer. In no case is the Information Object deleted from the local database.

Extended negotiation is not used by *dcserver* for this SOP Class.

3.1.3 Association Acceptance Policy

Parameters in the *dcserver* configuration file determine association acceptance. Association acceptance can be controlled on the basis of Called Application Entity Title, Calling Application Entity Title and SOP Class UID matching. Acceptance control ranges from no limitations to very specific acceptance policies.

3.1.3.1 Storage Association Request

3.1.3.1.1 Associated Real-World Activity

There are two scenarios in which Cedara ProPlanner acts as a C_STORE SCP. In both cases Cedara ProPlanner stores image Information Object Instances received on the accepted association into the local Cedara ProPlanner database.

The first scenario is when a remote AE independently initiates a C_STORE Association with Cedara ProPlanner. This process is transparent to the user of the local AE.

The second scenario is when Cedara ProPlanner initiates a C_MOVE association with a remote AE (see section 3.1.2.2.1). The remote AE will respond to the C_MOVE by sending the requested data over the C_STORE association with the local AE.

3.1.3.1.2 Presentation Context Table

The following table lists the possible Presentation Contexts. The Application Entity configuration file specifies which of these Presentation Contexts are actually used in a specific configuration.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Computed Tomography	1.2.840.10008.5.1.4.1.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Image Storage		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Digital Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Mammography Image Storage	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	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
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Ultrasound Multi-frame	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Image Storage		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG extended	1.2.840.10008.1.2.4.51	SCP	None
		JPEG lossless	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Loseless	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless/lossy	1.2.840.10008.1.2.4.91	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
Key Image Note	1.2.840.10008.5.1.4.1.1.88.59	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

3.1.3.1.2.1 SOP Specific Conformance for SOP Class Verification

The *dcserver* Application Entity conforms to the DICOM Verification Service Class as an SCP.

3.1.3.1.2.2 SOP Specific Conformance for SOP Class Storage

The *dcserver* Application Entity conforms to the DICOM Storage Service Class as an SCP for the Abstract Syntax's listed in the table in section 3.1.3.1.2 at conformance level 2.

When a C-STORE operation is successful, the data has been stored in the database. The data is accessed through the workstation. The operator of the workstation determines the storage duration of the data.

In the case where the database is full, a status of 0xC001 is returned to the Storage SCU and the Information Object is discarded. The recovery action is to provide more storage space.

In the case where the image already exists in the workstation database (same Image instance UID), a status of 0xD000 is returned to the Storage SCU and the Information Object is discarded. A different returned value can be specified in a configuration file. The behavior can apply to all associations or to specific Application Entities.

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

The *dcserver* performs some validation before storing the image. Failure of a validation results in the return of status 0xC001 in the C-STORE response message. The following validations are performed:

- Invalid or missing orientation vector values (0020,0037) results in rejection of MR and CT Information Objects.
- A missing Photo Interpretation attribute (0028,0004) results in rejection of any modality Information Object.
- Missing Bits Allocated, Bits Used and High Bit attributes result in rejection of any modality Information Object.
- Any attributes with a value longer than what DICOM specifies are rejected.

The storage implementation performs the following coercions:

- If Pixel Padding Value (0028,0120) is present, the pixel values are adjusted accordingly.

The workstation supports a subset of the features that the Grayscale Softcopy Presentation State IOD supports. Namely, it supports the Presentation State, Display Shutter, Overlay Plane, Displayed Area, Graphic Annotation, Spatial Transformation, Graphic Layer, Modality LUT, and Softcopy VOI LUT modules.

3.1.3.1.3 Presentation Context Acceptance Criterion

The *dcserver* accepts Storage SOP Class Presentation Contexts if they are configured in the Application Entity configuration file. The possible Presentation Contexts are listed in section 3.1.3.1.2.

3.1.3.1.4 Transfer Syntax Selection Policies

The *dcserver* presently supports the default DICOM Little-endian Transfer Syntax.

3.1.3.2 Query Association Request

3.1.3.2.1 Associated Real-World Activity

Cedara ProPlanner searches the attached database for the requested Information Objects described in the C_FIND identifier and returns a response for each match to the AE which initialized the C_FIND association. This operation is transparent to the user.

3.1.3.2.2 Presentation Context Table

The following table lists the possible Presentation Contexts. The Application Entity configuration file specifies which of these Presentation Contexts are actually used in a specific configuration.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query / Retrieve Model C-FIND	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 Model C–FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

3.1.3.2.2.1 SOP Specific Conformance for Patient Root Query/Retrieve Model - FIND

The *dcserver* Application Entity conforms to the DICOM Patient Root Query/Retrieve Service Class as an SCP for the Abstract Syntax's listed in the table in section 3.1.3.2.2. The table in section 3.1.2.1.1.1 defines the accepted search keys.

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

Possible response status values are:

Refused	Out of resources	A700
Failed	Identifier does not match SOP Class	A900
	Unable to Process	C000
Cancel	Terminated due to Cancel Request	FE00
Success	Matching completed	0000
Pending	Matches are continuing	FF00

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

3.1.3.2.2.2 SOP Specific Conformance for Study Root Query/Retrieve Model - FIND

The *dcserver* Application Entity conforms to the DICOM Study Root Query/Retrieve Service Class as an SCP for the Abstract Syntax's listed in the table in section 3.1.3.2.2. The table in section 3.1.2.1.1.2 defines the accepted search keys.

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

Possible response status values are:

Refused	Out of resources	A700
Failed	Identifier does not match SOP Class	A900
	Unable to Process	C000
Cancel	Terminated due to Cancel Request	FE00

Success	Matching completed	0000
Pending	Matches are continuing	FF00

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

3.1.3.2.3 Presentation Context Acceptance Criterion

The *dcserver* accepts SOP Class contexts if they are configured in the Application Entity configuration file. The possible Presentation Contexts are listed in section 3.1.3.1.2.

3.1.3.2.4 Transfer Syntax Selection Policies

The *dcserver* presently supports the default DICOM Implicit Little-endian Transfer Syntax.

3.1.3.3 Move Association Request

3.1.3.3.1 Associated Real-World Activity

Cedara ProPlanner accepts a C_MOVE association and then initializes a C_STORE association according to 3.1.2.3.1 scenario 2.

3.1.3.3.2 Presentation Context Table

The following table lists the possible Presentation Contexts. The Application Entity configuration file specifies which of these Presentation Contexts are actually used in a specific configuration.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Patient Root Query / Retrieve Model - MOVE	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 Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

3.1.3.3.2.1 SOP Specific Conformance for Patient Root Query/Retrieve Model - MOVE

The *dcserver* Application Entity conforms to the DICOM Patient Root Query/Retrieve Service Class as an SCP for the Abstract Syntax's listed in the table in section 3.1.3.3.2.

A response is returned for each Information Object sent to the destination Application Entity.

Possible response status values are:

Refused	Out of resources	A700
	Unable to perform sub-operations	A702
	Move Destination Unknown	A801
Failed	Identifier does not match SOP Class	A900

	Unable to Process	C000
Cancel	Terminated due to Cancel Request	FE00
Success	sub-operations completed	0000
Warning	sub-operations completed, 1 or more failures	B000
Pending	Matches are continuing	FF00

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

3.1.3.3.2.2 SOP Specific Conformance for Study Root Query/Retrieve Model - MOVE

The *dcserver* Application Entity conforms to the DICOM Study Root Query/Retrieve Service Class as an SCP for the Abstract Syntax's listed in the table in section 3.1.3.3.2.

A response is returned for each Information Object sent to the destination Application Entity.

Possible response status values are:

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

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

3.1.3.3.3 Presentation Context Acceptance Criterion

The *dcserver* accepts SOP Class contexts if they are configured in the Application Entity configuration file. The possible Presentation Contexts are listed in section 3.1.3.3.2.

3.1.3.3.4 Transfer Syntax Selection Policies

The *dcserver* presently supports the default DICOM Implicit Little-endian Transfer Syntax.

3.2 Hcserver Application Entity Specification

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

The *hcserver* provides standard conformance to the following DICOM 3.1 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18

3.2.1 Association Establishment Policies

3.2.1.1 General

The *hcserver* maintains a separate association with each DICOM SCP. It releases the association with the DICOM SCP if no operation is done on the association in a selected time period.

3.2.1.2 Number of Associations

There is no limit on the number of associations maintained simultaneously with one or different DICOM SCPs.

3.2.1.3 Asynchronous Nature

The application does not support asynchronous operations and will not perform asynchronous window negotiation.

3.2.1.4 Implementation Identifying Information

The *hcserver* implementation class UID is 2.16.124.113531.1.1.1.

The *hcserver* implementation version name is ISG_HCS_V1.0.96.

3.2.2 Association Initiation Policy

The *hcserver* maintains a list of valid print devices and can present that list to the applications upon request. When the application submits a print job designated for a listed print device to the *hcserver*, the *hcserver* will request an association with the selected print device. The print option is accessible in the Cedara ProPlanner review page through both the toolbar and the file menu.

3.2.2.1 Print to remote printer

3.2.2.1.1 Associated Real World Activity

Cedara ProPlanner issues Print requests through the Print dialog. This is accessed through the “Print Images …” option in the file menu. Printing to a DICOM printer in the dialog will cause Cedara ProPlanner to act as an SCU of the supported Presentation Context. Both Grayscale and Colour printing are supported.

3.2.2.1.2 Proposed Presentation Contexts

The *hcserver* will propose one of the presentation contexts listed in the Presentation Context Table.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Basic GrayScale Print Management	1.2.840.10008.5.1.1.9	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

3.2.2.1.2.1 SOP Specific Conformance to Basic GrayScale Print Management Meta SOP Class

The hcserver supports the following mandatory SOP classes that are defined under the Basic Grayscale Print Management Meta SOP Class:

SOP Class Name	SOP Class UID
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4
Printer	1.2.840.10008.5.1.1.16

The *hcserver* supports the following optional SOP class attributes and DIMSE services for the Basic Grayscale Print Management Meta SOP Class.

SOP Class	DIMSE Service	Optional Attribute	Tag
Basic Film Session SOP Class	N-CREATE	Number of Copies	(2000,0010)
		Print Priority	(2000,0020)
		Medium Type	(2000,0030)
		Film Destination	(2000,0040)
		Film Session Label	(2000,0050)
		Memory Allocation	(2000,0060)
Basic Film Box SOP Class	N-CREATE	Image Display Format	(2010,0010)
		Film Orientation	(2010,0040)
		Film Size ID	(2010,0050)
		Magnification Type	(2010,0060)

SOP Class	DIMSE Service	Optional Attribute	Tag
		Max Density	(2010,0130)
		Configuration Information	(2010,0150)
		Smoothing Type	(2010,0080)
		Border Density	(2010,0100)
		Empty Image Density	(2010,0110)
		Min Density	(2010,0120)
		Trim	(2010,0140)
	N-DELETE		
Basic Grayscale Image Box SOP Class	N-SET	Image Position	(2020,0010)
		Polarity	(2020,0020)
		Magnification type	(2010,0060)
		Smoothing type	(2010,0080)
		Requested Image Size	(2020,0030)
		Preformatted Grayscale Image Sequence	(2020,0110)
		>Samples per Pixel	(0028,0002)
		>Photometric Interpretation	(0028,0004)
		>Planar configuration	(0028,0006)
		>Rows	(0028,0010)
		>Columns	(0028,0011)
		>Pixel Aspect Ratio	(0028,0034)
		>Bits Allocated	(0028,0100)
		>Bits Stored	(0028,0101)
		>High Bit	(0028,0102)
		>Pixel Representation	(0028,0103)
		>Pixel Data	(7FE0,0010)
Printer SOP Class	N-GET	Printer Status	(2110,0010)
		Printer Status Info	(2110,0020)
		Printer Name	(2110,0030)
		Manufacturer	(0008,0070)
		Manufacturer Model Name	(0008,1090)
		Device Serial Number	(0018,1000)
		Software Versions	(0018,1020)

3.2.2.1.2.1.1 Basic Film Session SOP Class attributes

The hcserver supports the following mandatory and optional attribute values in this SOP class:

Attribute Name	Tag	Supported values

Attribute Name	Tag	Supported values
Number of Copies	(2000,0010)	Integer string
Print Priority	(2000,0020)	HIGH,MED,LOW
Medium Type	(2000,0030)	PAPER,CLEAR FILM,BLUE FILM
Film Destination	(2000,0040)	MAGAZINE, PROCESSOR
Film Session Label	(2000,0050)	Long string
Memory Allocation	(2000,0060)	Integer string

3.2.2.1.2.1.2 Basic Film Box SOP Class attributes

The hcserver supports the following mandatory and optional attribute values in this SOP class:

Attribute Name	Tag	Supported values
Image Display Format	(2010,0010)	STANDARD, ROW, COL, SLIDE, SUPERSLIDE, CUSTOM
Film Orientation	(2010,0040)	PORTRAIT, LANDSCAPE
Film Size ID	(2010,0050)	8INX10IN, 10INX14IN, 14INX14IN, 24CMX24CM, 10INX12IN, 11INX14IN, 14INX17IN, 24CMX30CM
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC, NONE
Smoothing Type	(2010,0080)	SCP specific
Border Density	(2010,0100)	BLACK, WHITE, i where i represents the desired density in hundredths of OD
Empty Image Density	(2010,0110)	BLACK, WHITE, i where i represents the desired density in hundredths of OD
Min Density	(2010,0120)	Unsigned short
Max Density	(2010,0130)	Unsigned short
Trim	(2010,0140)	YES, NO
Configuration Information	(2010,0150)	SCP specific

3.2.2.1.2.1.3 Basic Grayscale Image Box SOP Class attributes

The hcserver supports the following mandatory and optional attribute values in this SOP class:

Attribute Name	Tag	Supported values
Image Position	(2020,0010)	Unsigned short
Polarity	(2020,0020)	NORMAL, REVERSE
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC, NONE
Smoothing Type	(2010,0080)	SCP specific
Requested Image Size	(2020,0030)	Unsigned short
Preformatted Grayscale Image	(2020,0110)	

Attribute Name	Tag	Supported values
Sequence		
>Samples per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME1, MONOCHROME2
>Planar configuration	(0028,0006)	1
>Rows	(0028,0010)	Unsigned short
>Columns	(0028,0011)	Unsigned short
>Pixel Aspect Ratio	(0028,0034)	1:1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	000H(unsigned integer)
>Pixel Data	(7FE0,0010)	Other Byte String

3.2.2.1.2.1.4 Printer SOP Class attributes

The hcserver makes use of the following attributes and attributes values in this SOP class:

Attribute Name	Tag	Supported values
Printer Status	(2110,0010)	NORMAL, WARNING FAILURE
Printer Status Info	(2110,0020)	SUPPLY EMPTY, SUPPLY LOW, RECEIVER FULL, FILM JAM
Printer Name	(2110,0030)	Long string
Manufacturer	(0008,0070)	Long string
Manufacturer Model Name	(0008,1090)	Long string
Device Serial Number	(0018,1000)	Long string
Software Versions	(0018,1020)	Long string(s)

3.2.2.1.2.2 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The hcserver supports the following mandatory SOP classes which are defined under the Basic Color Print Management Meta SOP Class.

SOP Class Name	SOP Class UID
Basic Film Session	1.2.840.10008.5.1.1.1
Basic Film Box	1.2.840.10008.5.1.1.2
Basic Color Image Box	1.2.840.10008.5.1.1.4.1
Printer	1.2.840.10008.5.1.1.16

The SOP class attributes and DIMSE services for the Basic Film Session, Basic Film Box and Printer SOP Classes are listed in section 3.2.2.1.2.1. The hcserver supports the following SOP class attributes and DIMSE services for the Basic Color Image Box SOP Class.

SOP Class	DIMSE Service	Optional Attribute	Tag
Basic Color Image Box SOP Class	N-SET	Polarity	(2020,0020)
		Magnification type	(2010,0060)
		Smoothing type	(2010,0080)
		Requested Image Size	(2020,0030)
		Preformatted Color Image Sequence	(2020,0111)
		>Samples Per Pixel	(0028,0002)
		>Photometric Interpretation	(0028,0004)
		>Planar Configuration	(0028,0006)
		>Rows	(0028,0010)
		>Columns	(0028,0011)
		>Pixel Aspect Ratio	(0028,0030)
		>Bits Allocated	(0028,0100)
		>Bits Stored	(0028,0101)
		>High Bit	(0028,0102)
		>Pixel Representation	(0028,0103)
		>Pixel Data	(7FE0,0010)

3.2.2.1.2.2.1 Basic Color Image Box SOP Class attributes

The hcserver supports the following mandatory and optional attribute values in this SOP class:

Attribute Name	Tag	Supported values
Image Position	(2020,0010)	Unsigned Short
Polarity	(2020,0020)	NORMAL, REVERSE
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC, NONE
Smoothing Type	(2010,0080)	SCP specific
Requested Image Size	(2020,0030)	Unsigned Short
Preformatted Color Image Sequence	(2020,0111)	Sequence of Items
>Samples Per Pixel	(0028,0002)	3
>Photometric Interpretation	(0028,0004)	RGB

Attribute Name	Tag	Supported values
>Planar Configuration	(0028,0006)	0001 (Unsigned Short)
>Rows	(0028,0010)	Unsigned Short
>Columns	(0028,0011)	Unsigned Short
>Pixel Aspect Ratio	(0028,0034)	1/1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0000H (Unsigned Integer)
>Pixel Data	(7FE0,0010)	Other Byte String

3.2.3 Association Acceptance Policy

The *hcserver* does not accept associations.

4. Communication Profiles

4.1 Supported Communication Stacks (Parts 8,9)

The workstation DICOM services provide DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

4.1.1 TCP/IP Stack

The workstation DICOM services inherit its TCP/IP stack from the Windows OS system upon which they execute.

4.1.1.1 API

The implementation uses Berkeley style sockets.

4.1.1.2 Physical Media Support

The implementation is not dependent on the physical medium used for the TCP/IP network.

5. Extensions/Specialization's/Privatization's

5.1 Standard/Extended/Specialized/Private SOPs

Not applicable

5.2 Private Transfer Syntax's

No Private Transfer Syntax's are used.

6. Configuration

6.1 Dcserver Application Entity Configuration

The Query/Retrieve and Storage SOP Classes to accept are configurable, globally or Application Entity Title specific.

The Query/Retrieve and Storage SOP Classes to propose are configurable, globally or Application Entity Title specific.

The Transfer Syntax's are configurable for each SOP Class, globally or SOP Class specific.

A configuration parameter is supplied to control matching of Calling Application Entity Title to a value in the configuration file.

A configuration parameter is supplied to control matching of Called Application Entity Title to a value in the configuration file.

A configuration parameter is supplied to allow Application Entity Title specific association related tracing output to be created for connection troubleshooting.

A configuration parameter is supplied to allow Application Entity Title specific DIMSE tracing output to be created for message troubleshooting.

Application entity host names can be specified as either IP address or host name.

The number of associations that can be initiated is configurable.

The number of associations that can be accepted is configurable.

The port number to listen on for association requests is configurable.

6.2 Hcserver Application Entity Configuration

Application entity host names can be specified as either IP address or host name.

The destination printer host name and port number is configurable. Multiple printers can be configured.

The film layout formats supported per printer are configurable.

The association timeout per printer is configurable.

7. Support of Extended Character Sets

This implementation supports the following extended character set:

ISO-IR 100 = Latin alphabet No. 1, supplementary set.