Conformance Statements for MIR CTN Applications

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This document contains DICOM conformance statements for applications created for the 1996 RSNA DICOM demonstration. A separate conformance statement is recorded for each application.

/wuerlb/documentation/dicom/dicom/ctn/conformance.frm

Conformance Statement for Image Server

A Introduction

Image server is a general term that could be applied to a number of different applications that can be used to store and retrieve images. This implementation of an image server is designed specifically to be used for demonstration of the DICOM Standard. It provides the following features:

- The application serves as a short term archive for images. It accepts images from external sources and stores them for later retrieval.
- The application has no deletion mechanism. Images/studies are deleted by hand.
- The application uses a control database that allows one instantiation of the program to accept connections but take on the appearance of different image servers. This feature allows the application to segregate images if desired by the user. For example, all of the images transmitted by the Zero Corporation should be stored on the image server ZERO. All images transmitted by the ALPHA Corporation should be stored on the image server ALPHA. For demonstration purposes, we sometimes have the desire to provide different servers for retrieving the images stored by these different corporations.

The image server uses DICOM as the interface to the external world. The server accepts DICOM association requests for the purpose of storing images and for image query and retrieve. The image server will initiate DICOM association requests for the purpose of sending images to an external server. The image server does not respond to any other type of network communication.

A.1 Implementation Model

The image server provides for storage and query/retrieval of images. It runs on Unix systems as a background process that accepts association requests from external applications. For each association request, the image server *forks* a copy of itself so that the copy communicates exclusively with the requesting application. The image server will initiate a DICOM association in response to a move request from an external application.

The image server (*image_server*) is invoked from the command line. The single mandatory argument is the TCP/IP port number used to accept network connections. Optional switches are listed in *User's Guide for CTN Demonstration Applications.*

A.1.1 Application Data Flow Diagram

Figure 1 shows the relationship of the image server application to external applications. As noted above, the image server does not initiate any action except in response to requests which are received via DICOM communication.

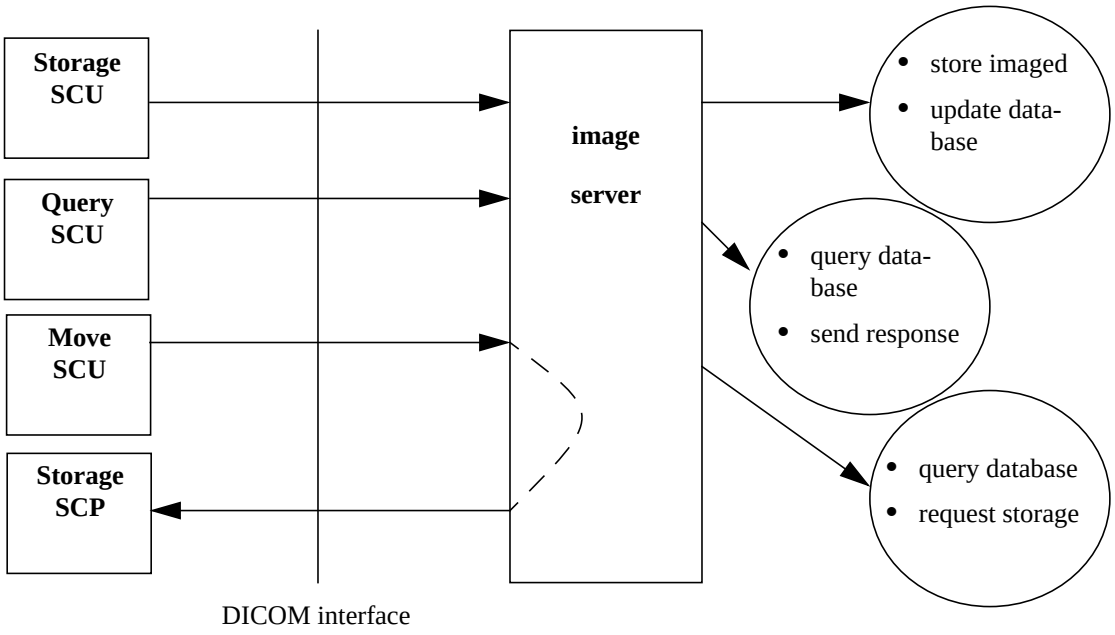

FIGURE 1. *image server* Implementation Model

A.1.2 Functional Definition of Application Entities

The image server waits for another application to connect at the TCP/IP port number specified when the application is initiated. When another application makes a DICOM association request, the image server uses a control database and logic to verify the request:

1. The image server uses a control table to verify that the Called Application Title used in the association request is defined on the node (Unix host-name) upon which the image server is running.
2. The image server uses a control table to lookup the application defined by the Calling Application Title in the association request. The image server verifies that the node from which the call originated matches the value stored in the control table.
3. The image server verifies that the calling application has access rights for the SOP classes proposed (write access for storage, read access for query retrieve).

A.1.3 Sequencing of Real-World Activities

The image server has no way of knowing when it has a complete study or what constitutes a complete study. If it receives an image query while also receiving storage requests, the query response may not include all of the images that are in the study.

A.2 AE Specifications

The image server may be invoked multiple times on a single machine and the instances may operate simultaneously. In addition, each time the image server receives an association request, it forks a copy of itself. Each invocation and each forked copy of the image server represent the same Application Entity.

A.2.1 AE Image Server - Specification

The image server provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 1. SOP Classes Supported by Image Server as an SCU

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.2
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.3
MR Image Storage	1.2.840.10008.5.1.4.1.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.6
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.7
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

The image server provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 2. SOP Classes Supported by Image Server as an SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.2
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.3
MR Image Storage	1.2.840.10008.5.1.4.1.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.6
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.7
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
Patient Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2

TABLE 2. SOP Classes Supported by Image Server as an SCP

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Info Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Info Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

A.2.1.1 Association Establishment Policies

A.2.1.1.1 General

The image server will attempt to initiate associations in response to C-MOVE requests from other Application Entities. The image server will only initiate associations in reponse to valid C-MOVE requests for images that are known to the server (stored in its database).

The maximum PDU size which can be transmitted by the image server is fixed at 16KB. The default maximum PDU size which can be received by the image server is configurable with a default value of 16KB and a maximum value of 32KB.

A.2.1.1.2 Number of Associations

The number of simultaneous associations which will be accepted by the image server are limited only by the kernel parameters of the underlying TCP/IP implementation. The image server will spawn a new process for each association request that it receives. Therefore, the image server can have multiple simultaneous connections, and there is no inherent limitation on the total number of simultaneous associations which the image server can maintain.

The image server does limit each external Application Entity to no more than two simultaneous associations.

A.2.1.1.3 Asynchronous Nature

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

A.2.1.1.4 Implementation Identifying Information

The image server will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The image server will provide an implementation version name of MIRCTN21NOV96.

A.2.1.2 Association Initiation Policy

The image server attempts to initiate one association in response to each C-MOVE command it receives from an external node. The image server attempts a single type of association request.

A.2.1.2.1 Real-World Activity - Move Request from an External Node

A.2.1.2.1.1 Associated Real-World Activity - Move Request from an External Node

The associated Real-World activity is a C-MOVE request from an external application. If an application successfully establishes an association with the image server and makes a valid C-MOVE request that identifies one or more images known by the image server, the image server will intiate an association with the destination specified in the C-MOVE request.

A.2.1.2.1.2 Proposed Presentation Contexts

In response to a C-MOVE request, the image server builds a complete list of images to be moved. The list includes the SOP class of each image to be moved. The image server extracts the unique SOP classes from the image lists and proposes a set of presentation contexts that includes one presentation context for each unique SOP class identified in the image list. Thus, the association request may have a single presentation context or multiple presentation contexts. Each presentation context contains the abstract syntax that identifies one image class as found in the image list.

TABLE 3. Proposed Presentation Contexts for Image Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See note	See note	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

Note: The Abstract Syntax corresponds to the value found in the database maintained by the each server. More than one presentation context can be offered, each with a different abstract syntax.

Note: The image server only supports Implicit VR Little Endian Transfer Syntax. Some images may have been stored by the image server with private elements whose encoding scheme is unknown by the image server. These elements will be transmitted by the image server exactly as they were received (in Implicit VR Little Endian Transfer Syntax), so they should be unaltered upon transmission.

A.2.1.2.2 SOP Specific Conformance Statement

All C-STORE operations are in the context of a C-MOVE request from an external node.

The image server sends one C-MOVE response message for each attempted C-STORE operation. For each response to a C-STORE request (success, warning, failure), the image server prints that response with an interpretation of the status value. The image server takes no action in response to a failure of warning status.

The image server does not attempt any extended negotiation.

The image server does not delete any elements from the files it transfers. Therefore the set of optional elements depends entirely on the contents of the files which were originally stored on the image server.

In the event that the image server receives an unsuccessful C-STORE response, the image server will continue sending the remaining images in the requested set.

A.2.1.3 Association Acceptance Policy

The image server accepts associations for the purpose of storing images in its database or for the purpose of performing query/retrieve operations on the images that have been previously stored.

The image server will only accept association requests from applications that are defined during configuration. In addition, the image server will only store images sent by nodes that have been enabled by a configuration step.

A.2.1.3.1 Real-Word Activity - Storage

The image server accepts associations from nodes that wish to store images using the C-STORE command.

A.2.1.3.1.1 Associated Real-World Activity

The associated Real-World activity associated with the C-STORE operation is the storage of the image on the disk of the system upon which the image server is running. Images are stored by writing the data set of the C-STORE command directly to disk with no further header or interpretation. After the image is stored to disk, the image server updates an image database with patient, study, series and image information; this image database can be used by the image server for query/retrieve operations.

The image server will issue a failure status if it is unable to store the image on disk, if the image does not conform to the IOD of the SOP class under which it was transmitted, or if the image server is not able to successfully update its image database.

A.2.1.3.1.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 4 are acceptable to the image server for receiving images.

TABLE 4. Acceptable Presentation Contexts for the Image Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Computed Radiography Image	1.2.840.10008.5.1.4.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
CT Image	1.2.840.10008.5.1.4.1.2	‘’	1.2.840.10008.1.2	SCP	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.3	‘’	1.2.840.10008.1.2	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.4	‘’	1.2.840.10008.1.2	SCP	None

TABLE 4. Acceptable Presentation Contexts for the Image Server

Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20	‘’	1.2.840.10008.1.2	SCP	None
Ultrasound Image	1.2.840.10008.5.1.4.1.6	‘’	1.2.840.10008.1.2	SCP	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.7	‘’	1.2.840.10008.1.2	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.1.12.1	“	1.2.840.10008.1.2	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.1.12.2	“	1.2.840.10008.1.2	SCP	None

A.2.1.3.1.2.1 SOP Specific Conformance for SOP Class Storage

The image server implements Level 2 (Full) conformance for the Storage SOP Class.

The following attributes are modified by converting all characters to upper case before data is stored in the image database. The image files themselves are not modified.

1. Patient Name
2. Patient ID
3. Accession Number
4. Study ID

In the event that an image is successfully stored by the image server, it may be accessed by requesting associations with the image server and performing query/retrieve operations. The image server is not designed to allow other access to stored images.

The image server stores images for an indefinite period. The system has no method for deleting images once they are stored.

The image server returns the following status values in response to a C-STORE request:

`0000H` Image successfully stored

`A700H` Refused - out of resources (unable to create local file)

`A900H` Error- data set does not match SOP Class

`C000H` Error - cannot understand

In the case of an error of an error storing an image, there is no documented method for recovery. Most users send reports of errors to dicom_bugs@wuerl.wustl.edu.

A.2.1.3.1.3 Presentation Context Acceptance Criterion

The image server will accept any number of storage SOP classes that are listed in Table 4 above, provided that the requesting application is known to the image server and has been enabled to store

images on the image server (via a configuration step). The image server defines no limit on the number of presentation contexts accepted. In the event that the image server runs out of resources when trying to accept multiple presentation contexts, the image server will reject the association request.

The image server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

A.2.1.3.1.4 Transfer Syntax Selection Policies

The image server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

A.2.1.3.2 Real World Activity - Query

The image server accepts associations from nodes that wish to perform query (find) and retrieve (move) operations on images that have been previously stored by the image server.

A.2.1.3.2.1 Associated Real World Activity - Query

The real-world activity associated with C-FIND and C-MOVE requests are the query and retrieval operations initiated by another application. An application other than the image server queries the image server for patient/study/series/image information that has been previously stored by the image server and can request that the image server send images to a third application.

A.2.1.3.2.2 Presentation Context Table

Table 5 shows the presentation contexts that may be accepted by the image server for query operations.

TABLE 5. Acceptable Presentation Contexts for Query Classes

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2 .1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2 .1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2 .2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2 .2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

TABLE 5. Acceptable Presentation Contexts for Query Classes

Patient StudyOnly Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2 .3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient StudyOnly Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2 .3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

A.2.1.3.2.2.1 SOP Specific Conformance for SOP Class Query/Retrieve

The image server does not support relational searches. Table 6 below indicates which keys are supported by the image server for the patient root information model. The image server also supports the patient/study only information model. The keys supported for that model are the same keys found in Table 6 with a level of “Patient” or “Study”. Table 8 indicates which keys are supported by the image server for the study root information model. These tables include the optional and required keys that are supported. Optional keys are supported like required keys. The image server does not support relational queries.

TABLE 6. Keys Supported for Patient Root Information Model

Level	Description	Tag	Type
Patient	Patient Name	0010 0010	R
Patient	Patient ID	0010 0020	U
Patient	Patient Birth Date	0010 0030	O
Patient	Patient Birth Time	0010 0032	O
Patient	Patient Sex	0010 0040	O
Study	Study Date	0008 0020	R
Study	Study Time	0008 0030	R
Study	Accession Number	0008 0050	R
Study	Study ID	0020 0010	R
Study	Study Instance UID	0020 000D	U
Study	Referring Physican Name	0008 0090	O
Study	Study Description	0008 1030	O
Study	Patient’s Age	0010 1010	O
Study	Patient’s Size	0010 1020	O
Study	Patient’s Weight	0010 1030	O
Series	Modality	0008 0060	R
Series	Series Number	0020 0011	R
Series	Series Instance UID	0020 000E	U
Series	Body Part Examined	0018 0015	O
Image	Image Number	0020 0013	R

TABLE 6. Keys Supported for Patient Root Information Model

Level	Description	Tag	Type
Image	SOP Instance UID	0008 0018	U
Image	SOP Class UID	0008 0016	O
Image	Samples Per Pixel	0028 0002	O
Image	Rows	0028 0010	O
Image	Columns	0028 0011	O
Image	Bits Allocated	0028 0100	O
Image	Bits Stored	0028 0101	O
Image	Pixel Representation	0028 0103	O

The image server supports the three MOVE SOP classes listed in Table 5. In response to a move request, the image server supports the Storage SOP classes that are listed in Table 1.

TABLE 7. Keys Supported for Study Root Information Model

Level	Description	Tag	Type
Study	Study Date	0008 0020	R
Study	Study Time	0008 0030	R
Study	Accession Number	0008 0050	R
Study	Patient Name	0010 0010	R
Study	Patient ID	0010 0020	R
Study	Study ID	0020 0010	R
Study	Study Instance UID	0020 000D	U
Study	Referring Physican Name	0008 0090	O
Study	Study Description	0008 1030	O
Study	Patient Birth Date	0010 0030	O
Study	Patient Birth Time	0010 0032	O
Study	Patient Sex	0010 0040	O
Study	Patient’s Age	0010 1010	O
Study	Patient’s Size	0010 1020	O
Study	Patient’s Weight	0010 1030	O
Series	Modality	0008 0060	R
Series	Series Number	0020 0011	R
Series	Series Instance UID	0020 000E	U
Series	Body Part Examined	0018 0015	O
Image	Image Number	0020 0013	R
Image	SOP Instance UID	0008 0018	U
Image	SOP Class UID	0008 0016	O

TABLE 7. Keys Supported for Study Root Information Model

Level	Description	Tag	Type
Image	Samples Per Pixel	0028 0002	O
Image	Rows	0028 0010	O
Image	Columns	0028 0011	O
Image	Bits Allocated	0028 0100	O
Image	Bits Stored	0028 0101	O
Image	Pixel Representation	0028 0103	O

A.2.1.3.2.3 Presentation Context Acceptance Criterion

The image server will accept any number of query SOP classes that are listed in Table 5 above, provided that the requesting application is known to the image server and has been enabled to make requests from the image server (via a configuration step). The image server defines no limit on the number of presentation contexts accepted. In the event that the image server runs out of resources when trying to accept multiple presentation contexts, the image server will reject the association request.

The image server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

A.2.1.3.2.4 Transfer Syntax Selection Policies

The image server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

A.2.1.3.3 Real World Activity - Verification

The image server accepts associations from nodes that wish to perform a verification operation on the image server.

A.2.1.3.3.1 Associated Real World Activity - Verification

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

A.2.1.3.3.2 Presentation Context Table

Table 8 shows the presentation contexts that may be accepted by the image server for verification operations..

TABLE 8. Acceptable Presentation Contexts for the Image Server for Verification

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

A.2.1.3.3.2.1 SOP Specific Conformance for SOP Class Verification

A.2.1.3.3.3 Presentation Context Acceptance Criterion

The image server will accept any number of verification SOP classes that are listed in Table 8 above, provided that the requesting application is known to the image server (via a configuration step). The image server defines no limit on the number of presentation contexts accepted. In the event that the image server runs out of resources when trying to accept multiple presentation contexts, the image server will reject the association request.

The image server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

A.2.1.3.3.4 Transfer Syntax Selection Policies

The image server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

A.3 Communication Profiles

A.3.1 TCP/IP Stack

The image server provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

A.3.1.1 TCP/IP API

The image server uses the TCP/IP stack from the Unix system upon which it executes. It uses a subroutine library that is based on a Berkeley socket interface.

A.3.1.2 Physical Media Support

The image server exists as a software application that can be compiled on various Unix platforms. As such, it places no restrictions on the physical network. The image server has been demonstrated using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone) and Tin-Can-Telephone-Net.

A.4 Extensions/Specializations/Privatizations

Not applicable

A.5 Configuration

The image server obtains configuration information from a “Control” database which is stored in a relational database. In this implementation, the relational database is the commercial product Sybase.

A.5.1 AE Title/Presentation Address Mapping

The control table “ApplicationEntity” is used to map between AE Titles and Presentation Addresses. The format of the table and tools to configure the table are documented in the “User’s Guide to CTN Demonstration Applications.”

A.5.2 Security Features

The image server uses three additional control tables to control access. These tables allow the image server to determine which nodes are allowed read and or write access and where images should be stored. The definition of these tables, a complete description of how they are used, and tools for modifying them are provided in the “Users’s Guide to CTN Demonstration Applications.”

A.5.3 Configurable Parameters

The following parameters may be configured for the image server:

- Application Entity Title
- Maximum PDU Size
- TCP/IP Port Number
- TCP/IP Buffer Length

Methods for setting these parameters are detailed in the “User’s Guide to CTN Demonstration Applications.”

A.5.4 Support of Extended Character Sets

The image server provides no support for extended character sets.

Conformance Statement for Print Manager

B Introduction

The Print Manager is an application which is designed to demonstrate the capabilities of basic DICOM print management. It acts as an SCU of the DICOM print management SOP classes and provides a grapical user interface that allows the user to select options and send messages to drive a DICOM print server.

B.1 Implementation Model

B.1.1 Application Data Flow Diagram

B.1.2 Functional Definition of Application Entities

B.1.3 Sequencing of Real-World Activities

B.2 AE Specifications

The Print Manager represents a single Application Entity. It acts independently of other DICOM applications that may be running on the same system. The Print Manager can be invoked multiple times on the same system and with different AE Titles; each copy of the Print Manager that is running represents the same Application Entity.

B.2.1 AE Print Manager - Specification

ThePrint Manager provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 9. SOP Class Supported by Print Manager as an SCU

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

B.2.1.1 Association Establishment Policies

B.2.1.1.1 General

The Print Manager provides a graphical user interface to control the application. One option provided by the interface presents a list of print servers. In response to the user selecting one print server, the Print Manager will attempt to initiate an association with the selected print server.

The maximum PDU size that can be accepted by the Print Manager is 32KB.

The maximum PDU size that can be offered by the Print Manager is 32 KB.

B.2.1.1.2 Number of Associations

The Print Manager will initiate no other associations while the currrent association is active. Multiple copies of the Print Manager may be invoked on the same system. In that case, each copy of the Print Manager is independent of the other copies and may invoke an association without regard to other Printer Managers (or other DICOM applications) on the same system.

B.2.1.1.3 Asynchronous Nature

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

B.2.1.1.4 Implementation Identifying Information

The Print Manager will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The Print Manager will provide an implementation version name of MIRCTN21NOV96.

B.2.1.2 Association Initiation Policy

The Print Manager maintains a list of valid print servers and can present that list to the user. When the user selects one of the listed print servers, the Printer Manager will request an association with the selected print server.

B.2.1.2.1 Real-World Activity - User Wants to Control a Print Session

B.2.1.2.1.1 Associated Real-World Activity

The associated Real-World Activity is that the user wants to establish a connection to a printer for the purpose of formatting and printing one or more films. The Print Manager allows the user to manipulate print parameters and to transmit images for the purpose of printing these images.

B.2.1.2.1.2 Proposed Presentation Contexts

The Print Manager will propose the presentation contexts listed in Table 10 below.

TABLE 10. Proposed Presentation Contexts for Print Manager

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008 .5.1.1.9	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

B.2.1.2.2 SOP Specific Conformance Statement

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

TABLE 11. Mandatory Print SOP Classes Supported by Print Manager

Name	UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.4
Printer SOP Class	1.2.840.10008.5.1.14

The Print Manager does not support any optional SOP classes.

The Print Manager supports the following optional SOP class attributes and DIMSE services.

TABLE 12. Option SOP Class Attributes/DIMSE Services Supported by Print Manager

SOP Class	Optional Attribute	Tag	DIMSE Service
Basic Film Session SOP Class	Number of Copies	(2000, 0010)	N-CREATE
	Print Priority	(2000, 0020)	N-CREATE
	Medium Type	(2000, 0030)	N-CREATE
	Film Destination	(2000, 0040)	N-CREATE
	Film Session Label	(2000, 0050)	N-CREATE
	Memory Allocation	(2000, 0060)	N-CREATE
Basic Film Box SOP Class	Film Orientation	(2010, 0040)	N-CREATE
	Film Size ID	(2010, 0050)	N-CREATE
	Magnification Type	(2010, 0060)	N-CREATE
	Max Density	(2010, 0130)	N-CREATE
	Configuration Information	(2010, 0150)	N-CREATE
	Smoothing Type	(2010, 0080)	N-CREATE
	Border Density	(2010, 0100)	N-CREATE
	Empty Image Density	(2010, 0110)	N-CREATE

TABLE 12. Option SOP Class Attributes/DIMSE Services Supported by Print Manager

SOP Class	Optional Attribute	Tag	DIMSE Service
	Min Density	(2010, 0120)	N-CREATE
	Trim	(2010, 0140)	N-CREATE
Basic Grayscale Image Box SOP Class	Polarity	(2020, 0020)	N-SET

B.2.1.3 Association Acceptance Policy

The Print Manager does not accept associations.

B.3 Communication Profiles

B.3.1 TCP/IP Stack

The Print Manager provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

B.3.1.1 TCP/IP API

The Print Manager uses the TCP/IP stack from the Unix system upon which it executes. It uses a subroutine library that is based on a Berkeley socket interface.

B.3.1.2 Physical Media Support

The Print Manager exists as a software application that can be compiled on various Unix platforms. As such, it places no restrictions on the physical network. The Print Manager has been demonstrated using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone).

B.4 Extensions/Specializations/Privatizations

Not applicable

B.5 Configuration

The Print Manager obtains configuration information from a “Control” database which is stored in a relational database. In this implementation, the relational database is the commercial product Sybase.

B.5.1 AE Title/Presentation Address Mapping

The control table “ApplicationEntity” is used to map between AE Titles and Presentation Addresses. The format of the table and tools to configure the table are documented in the “User’s Guide to CTN Demonstration Applications.”

B.5.2 Definition of Target Print Servers

The Print Server uses the control tables “ApplicationEntity” and “GroupNames” to determine the set of target print servers. The method for identifying the target printers is defined in the “User’s Guide to CTN Demonstration Applications.”

B.5.3 Configurable Parameters

The following parameters may be configured for the Print Manager.

- Application Entity Title (Default PRINT_MANAGER)
- Maximum PDU Size (Default 16 KB)
- TCP/IP Buffer Length

The method for modifying these parameters is defined in the “User’s Guide to CTN Demonstration Applications.”

B.5.4 Support of Extended Character Sets

The Print Manager provides no support for extended character sets.

Conformance Statement for Print Server

C Introduction

Print server is a general term that could be applied to a number of different applications that can be used to accept print commands and print images. This implementation of a print server is designed specifically to be used for demonstration of the DICOM Standard. It provides the following features:

- The application accepts associations from authorized print clients and emulates a printer by responding to DICOM print commands.
- Print commands received from the print SCU to the standard output to allow users to examine the print dialog.
- A proprietary information stream may be placed in a print queue that will allow a separate application to display the print commands and images in a different format. Although not documented here, it is expected that this application runs on a CRT and displays print commands and the images that are sent by the print SCU.

The print server uses DICOM as the interface to print clients. The server accepts DICOM association requests for the purpose of accepting and responding to print commands. The print server does not respond to any other type of network communication.

C.1 Implementation Model

The print server serves as a sink for print requests and can optionally place print requests in a private queue (for “printing” by another application). It runs on Unix systems as a background process that accepts association requests from external applications. For each association request, the image server *forks* a copy of itself so that the copy communicates exclusively with the requesting application.

The print server (*print_server*) is invoked from the command line. Arguments are documented in *User’s Guide for CTN Demonstration Applications.*

C.1.1 Application Data Flow Diagram

C.1.2 Functional Definition of Application Entities

The print server waits for another application to connect at the TCP/IP port number specified when the application is initiated. When another application makes a DICOM association request, the print server uses a control database and logic to verify the request:

1. The print server uses a control table to verify that the Called Application Title used in the association request is defined on the node (Unix host-name) upon which the print server is running.

2. The print server uses a control table to lookup the application defined by the Calling Application Title in the association request. The print server verifies that the node from which the call originated matches the value stored in the control table.
3. The print server verifies that the calling application has the right to connect.

C.1.3 Sequencing of Real-World Activities

C.2 AE Specifications

The print server may be invoked multiple times on a single machine and the instances may operate simultaneously. In addition, each time the print server receives an association request, it forks a copy of itself. Each invocation and each forked copy of the print server represent the same Application Entity.

C.2.1 AE Print Server - Specification

The print server provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 13. SOP Classes Supported by Print Server as an SCP

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

C.2.1.1 Association Establishment Policies

C.2.1.1.1 General

The maximum PDU size which can be transmitted by the print server is fixed at 16KB. The default maximum PDU size which can be received by the print server is configurable with a default value of 16KB and a maximum value of 32KB.

C.2.1.1.2 Number of Associations

The number of simultaneous associations which will be accepted by the print server are limited only by the kernel parameters of the underlying TCP/IP implementation. The print server will spawn a new process for each association request that it receives. Therefore, the print server can have multiple simultaneous connections, and there is no inherent limitation on the total number of simultaneous associations which the Print Server can maintain.

It does not make sense to have the same print client connect to this Print Server multiple times. The Print Server is a test tool which is usually configured to send print commands to a display program via

a single queue (defined by the combination of requesting and responding applications). If the same print client makes multiple, simultaneous connections, the messages sent to the display program in the single message queue will only confuse the display program and the user trying to interpret the display.

C.2.1.1.3 Asynchronous Nature

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

C.2.1.1.4 Implementation Identifying Information

The print server will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The print server will provide an implementation version name of MIRCTN21NOV96.

C.2.1.2 Association Initiation Policy

The print server does not initiate any associations.

C.2.1.3 Association Acceptance Policy

The print server accepts associations for the purpose of serving as a test partner for print clients.

The print server will only accept association requests from applications that are defined and enabled for printing during configuration.

C.2.1.3.1 Real-Word Activity - Printing

The Print Server accepts associations from nodes .

C.2.1.3.1.1 Associated Real-World Activity

C.2.1.3.1.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 14 are acceptable to the Print Server for receiving print commands.

TABLE 14. Acceptable Presentation Contexts for the Print Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

C.2.1.3.1.2.1 SOP Specific Conformance for SOP

The Print Server maintains one “virtual” printer for each requesting application. Each requesting application is allowed at most one association at any time. The Printer Server does not place a limit on the total number of associations that can be active from separate applications.

The Print Server supports the following SOP Classes and Meta SOP Classes:

TABLE 15. SOP Classes and Meta SOP Classes Supported by Print Server

Name	UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.4
Printer SOP Class	1.2.840.10008.5.1.14

The Print Server uses an X-Terminal for print output. It supports a pixel matrix size of 1000 x 1000.

The Print Server supports the Basic Film Session SOP Class through the DIMSE services N-Create and N-Set as defined in Table 16 below. The Print Server also supports the N-Delete DIMSE service N-Delete for the Basic Film Session SOP Class.

TABLE 16. Attributes Supported by Print Server for Basic Film Session (N-Create, N-Set)

Attribute	Supported Values	Default
Copies	1 to 10	1
Priority	HIGH, MED, LOW	HIGH
Medium Type	PAPER, CLEAR FILM, BLUE FILM	PAPER
Film Destination	MAGAZINE, PROCESSOR	MAGAZINE
Film Session Label	PAPER	PAPER

The Print Server supports the Basic Film Box SOP Class through the DIMSE services N-Create and N-Set and defined in Table 17 below. The Print Server also supports the DIMSE services N-Action and N-Delete for the Basic Film Box SOP Class.

TABLE 17. Attributes Supported by Print Server for Basic Film Box (N-Create, N-Set)

Attribute	Supported Values	Default
Image Display Format	STANDARD\1,1 to STANDARD\8,8 (1 <= col <= 8, 1 <= row <= 8)	STANDARD\2.2
Film Orientation	PORTRAIT	PORTRAIT
Film Size ID	8INX10IN, 10INX12IN, 10INX14IN 11INX14IN, 14INX14IN, 14INX17IN 24CMX30CM, 24CMX30CM	8INX10IN
Magnification Type	REPLICATE, BILINEAR, CUBIC	REPLICATE
Max Density	100 to 500	500 (this is one dark printer!)
Configuration Information	ERL PRINTER	ERL PRINTER
Border Density	BLACK, WHITE	BLACK
Empty Image Density	BLACK, WHITE	BLACK
Minimum Density	10 to 500	10
TRIM	YES, NO	YES

The Print Server supports the GrayscaleImage Box SOP Class through the DIMSE service N-Set as defined in Table 18 below.

TABLE 18. Attributes Supported by Print Server for Basic Grayscale Image Box (N-Set)

Attribute	Supported Values	Default
Image Position	1 to 64	1
Polarity	NORMAL, REVERSE	NORMAL
Magnification Type	REPLICATE, BILINEAR, CUBIC	REPLICATE

The Print Server supports the Basic Printer SOP Class through the DIMSE service N-Get as defined in Table 19 below.

TABLE 19. Attributes Supported by Print Server for Basic Printer SOP Class (N-Get)

Attribute	Supported Values	Default
Status	NORMAL	NORMAL
Status Information	No specific Information	No Specific Information
Printer Name	XYZ Laser	XYZ Laser
Manufacturer	ABXY Inc.	ABXY Inc.
Manufacturer Model No.	ABXY-LPF	ABXY-LPF
Device Serial No.	pq34mn.V8	pq34mn.V8
Software Version	las-pri V3.2	las-pri v3.2

TABLE 19. Attributes Supported by Print Server for Basic Printer SOP Class (N-Get)

Attribute	Supported Values	Default
Date Last Calibrated	19930721	19930721
Time Last Calibrated	141550	141550

C.2.1.3.1.3 Presentation Context Acceptance Criterion

The Print Server will accept any number of verification or print SOP classes that are listed in Table 10 above, provided that the requesting application is known to the Print Server and has been enabled to print images on the Print Server (via a configuration step). The Print Server defines no limit on the number of presentation contexts accepted. In the event that the Print Server runs out of resources when trying to accept multiple presentation contexts, the Print Server will reject the association request.

The Print Server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

C.2.1.3.1.4 Transfer Syntax Selection Policies

The Print Server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

C.3 Communication Profiles

C.3.1 TCP/IP Stack

The Print Server provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

C.3.1.1 TCP/IP API

ThePrint Server uses the TCP/IP stack from the Unix system upon which it executes. It uses a subroutine library that is based on a Berkeley socket interface.

C.3.1.2 Physical Media Support

The Print Server exists as a software application that can be compiled on various Unix platforms. As such, it places no restrictions on the physical network. The Print Server has been demonstrated using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone).

C.4 Extensions/Specializations/Privatizations

Not applicable

C.5 Configuration

The Print Server obtains configuration information from a “Control” database which is stored in a relational database. In this implementation, the relational database is the commercial product Sybase.

C.5.1 AE Title/Presentation Address Mapping

The control table “ApplicationEntity” is used to map between AE Titles and Presentation Addresses. The format of the table and tools to configure the table are documented in the “User’s Guide to CTN Demonstration Applications.”

C.5.2 Security Features

The Print Server uses one additional control tables to control access. The “SecurityMatrix” table found in the control database defines the set of applications that are allowed to connect to the Print Server. The definition of these tables, a complete description of how they are used, and tools for modifying them are provided in the “Users’s Guide to CTN Demonstration Applications.”

C.5.3 Configurable Parameters

The following parameters may be configured for the Print Server:

- Application Entity Title
- Maximum PDU Size
- TCP/IP Port Number
- TCP/IP Buffer Length

The method for configuring these parameters is defined in the “User’s Guide to CTN Demonstration Applications.”

C.5.4 Support of Extended Character Sets

The Print Server provides no support for extended character sets.

Conformance Statement for Fake Information System

D Introduction

The Fake Information System (FIS) is a system that emulates features of a HIS or RIS and provides a set of applications and services designed to allow other applications to demonstrate (HIS/RIS) features of the DICOM Standard.

FIS uses DICOM as the interface to systems that wish to communicate with an information system. FIS initiates associations to send event notifications that have been generated explicitly by someone using FIS. FIS accepts associations from external nodes that wish to send information to FIS (N-CREATE, N-SET) or wish to retrieve information from FIS (N-GET) FIS does not respond to any other type of network communication.

D.1 Implementation Model

D.1.1 Application Data Flow Diagram

D.1.2 Functional Definition of Application Entities

FIS consists of three distinct application entities. The Work List Management Application (WLMA) is used to generate work lists (for a modality) and to send event reports (to the modality) indicating that studies have been scheduled. The Results Storage Application (RSA) is used to review and edit results and interpretations for existing studies; RSA sends event reports to systems indicating that studies have been completed. Both WLMA and RSA only initiate associations. The third application entity defined for FIS is the FIS Server. This application accepts associations from other nodes and services N-CREATE, N-SET and N-GET requests for the HIS/RIS management classes detailed below.

D.1.3 Sequencing of Real-World Activities

D.2 AE Specifications

The FIS may be invoked multiple times on a single machine and the instances may operate simultaneously. In addition, each time the FIS server receives an association request, it forks a copy of itself. Each invocation and each forked copy of the FIS server represent the same Application Entity.

D.2.1 AE Work List Management Application - Specification

The WLMA provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 20. WLMA SOP Classes Supported as an SCP

SOP Class Name	SOP Class UID
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1

The WLMA supports no DICOM 3.0 SOP Classes as an SCU.

D.2.1.1 Association Establishment Policies

D.2.1.1.1 General

The WLMA provides a graphical user interface which allows the user to review and modify a list of studies. The WLMA user interface contains buttons that the user activates to initiate specific event notifications. When the user selects such an event notification, the WLMA will attempt to initiate one association to deliver the requested event notification.

The maximum PDU size which can be transmitted by the WLMA is fixed at 16KB. The default maximum PDU size which can be received by the WLMA is configurable with a default value of 16KB and a maximum value of 32KB.

D.2.1.1.2 Number of Associations

The WLMA will only attempt to initiate one association at a time. Multiple copies of the WLMA can run on the same node. Each copy of the WLMA can initiate associations independent of the other copies that are running. The number of simultaneous associations supported by a set of WLMAs running in parallel is limited only by the underlying kernel parameters of the UNIX system on which the WLMA is running.

D.2.1.1.3 Asynchronous Nature

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

D.2.1.1.4 Implementation Identifying Information

The WLMA will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The WLMA will provide an implementation version name of MIRCTN21NOV96.

D.2.1.2 Association Initiation Policy

The WLMA attempts to initiate an association for each type of Study event notification that is generated.

D.2.1.2.1 Real-World Activity - Change of State of Patient Study

D.2.1.2.1.1 Associated Real-World Activity - User Requests Change in State of Patient Study

The associated Real-World activity is the user of the graphical user interface requests a change in state of a patient study. The user can request the study be placed in one of the following states: SCHEDULED, READ. When the state change is requested, the WLMA initiates an association to send an event notification detailing the study event.

D.2.1.2.1.2 Proposed Presentation Contexts

The WLMA always proposes the set of presentation contexts listed in Table 21.

TABLE 21. Proposed Presentation Contexts for WLMA

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Detached Patient Management SOP Class	1.2.840.10008.3.1.2.1.4	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Results Management SOP Class	1.2.840.10008.3.1.2.3.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Interpretaton Management SOP Class	1.2.840.10008.3.1.2.6.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

D.2.1.2.2 SOP Specific Conformance Statement

The WLMA invokes the following notifications:

1. Study Scheduled
2. Study Read

The WLMA does not perform any operations.

The WLMA does not include any optional attributes in the standard notifications.

D.2.1.3 Association Acceptance Policy

The WLMA does not accept associations.

D.2.2 AE Results StorageApplication - Specification

The RSA provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 22. WLMA SOP Classes Supported as an SCP

SOP Class Name	SOP Class UID
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1

The RSA supports no DICOM 3.0 SOP Classes as an SCU.

D.2.2.1 Association Establishment Policies

D.2.2.1.1 General

The RSA provides a graphical user interface which allows the user to review and modify a list of results and interpretations. The RSA user interface contains buttons that the user activates to initiate specific event notifications. When the user selects such an event notification, the RSA will attempt to initiate one association to deliver the requested event notification.

The maximum PDU size which can be transmitted by the RSAA is fixed at 16KB. The default maximum PDU size which can be received by the RSA is configurable with a default value of 16KB and a maximum value of 32KB.

D.2.2.1.2 Number of Associations

The RSA will only attempt to initiate one association at a time. Multiple copies of the RSA can run on the same node. Each copy of the RSA can initiate associations independently of the other copies that are running. The number of simultaneous associations supported by a set of RSAs running in parallel is limited only by the underlying kernel parameters of the UNIX system on which the RSA is running.

D.2.2.1.3 Asynchronous Nature

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

D.2.2.1.4 Implementation Identifying Information

The RSA will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The RSA will provide an implementation version name of MIRCTN21NOV96.

D.2.2.2 Association Initiation Policy

The RSA attempts to initiate an association for each type of Study event notification that is generated.

D.2.2.2.1 Real-World Activity - Change of State of Patient Study

D.2.2.2.1.1 Associated Real-World Activity - User Requests Change in State of Patient Study

The associated Real-World activity is the user of the graphical user interface requests a change in state of a patient study. The user can request the study be placed in one of the following states: SCHEDULED, READ. When the state change is requested, the RSA initiates an association to send an event notification detailing the study event.

D.2.2.2.1.2 Proposed Presentation Contexts

The WLMA always proposes the set of presentation contexts listed in Table 23.

TABLE 23. Proposed Presentation Contexts for RSA

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Detached Patient Management SOP Class	1.2.840.10008.3.1.2.1.4	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Results Management SOP Class	1.2.840.10008.3.1.2.3.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Detached Interpretaton Management SOP Class	1.2.840.10008.3.1.2.6.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

D.2.2.2.2 SOP Specific Conformance Statement

The RSA invokes the following notifications:

1. Study Scheduled
2. Study Read

The RSA does not perform any operations.

The RSA does not include any optional attributes in the standard notifications.

D.2.2.3 Association Acceptance Policy

The RSA does not accept associations

D.2.3 AE FIS Server - Specification

The FIS Server does not provide conformance to any DICOM 3.0 SOP Classes as an SCU.:

The FIS Server provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 24. SOP Classes Supported by FIS Server as an SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Detached Patient Management SOP Class	1.2.840.10008.3.1.2.1.4
Detached Visit Management SOP Class	1.2.840.10008.3.1.2.2.1
Detached Study Management SOP Class	1.2.840.10008.3.1.2.3.1
Detached Results Management SOP Class	1.2.840.10008.3.1.2.5.1
Detached Interpretation Management SOP Class	1.2.840.10008.3.1.2.6.1
Study Component Management SOP Class	1.2.840.10008.3.1.2.3.2

D.2.3.1 Association Establishment Policies

D.2.3.1.1 General

The FIS Server does not initiate associations. The FIS server will receive associations from applications that wish to access (N-CREATE, N-SET, N-GET) some of the data maintained by the FIS..

The maximum PDU size which can be transmitted by the FIS Server is fixed at 16KB. The default maximum PDU size which can be received by the FIS Server is configurable with a default value of 16KB and a maximum value of 32KB.

D.2.3.1.2 Number of Associations

The number of simultaneous associations which will be accepted by the FIS Server is limited only by the kernel parameters of the underlying TCP/IP implementation. The FIS Server will spawn a new process for each association request that it receives. Therefore, the FIS Server can have multiple simultaneous connections, and there is no inherent limitation on the total number of simultaneous associations which the FIS Server can maintain.

The FIS Server does limit each external Application Entity to no more than two simultaneous associations.

D.2.3.1.3 Asynchronous Nature

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

D.2.3.1.4 Implementation Identifying Information

The FIS Server will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5. The FIS Server will provide an implementation version name of MIRCTN21NOV96.

D.2.3.2 Association Initiation Policy

The FIS Server does not initiate any associations.

D.2.3.3 Association Acceptance Policy

The FIS Server accepts associations for the purpose of allowing other applications to access the data maintained by the FIS. This includes creating records in the FIS (N-CREATE), updating values in the FIS (N-SET) and retrieving values from the FIS (N-GET).

The FIS Server will only accept association requests from applications that are defined during configuration.

D.2.3.3.1 Real-Word Activity - Creating New Records in the FIS

The FIS Server accepts associations from nodes that wish to create (specific) new records in the database maintained by the FIS..

D.2.3.3.1.1 Associated Real-World Activity

The associated Real-World activity is the creation of a new record in the database maintained by the FIS. Applications (like modalities) may wish to create a record in the database which contains information about the images in a study. The application requesting the creation of the record may supply the data as part of the request to create a record. The FIS Server creates the requested record in its database and fills it with the data supplied by the external application. This step will allow other applications to retrieve the data which describes the images in a study.

This data is referred to as the study component.

D.2.3.3.1.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 23 are acceptable to the FIS Server for the study component..

TABLE 25. Acceptable Presentation Contexts for the FIS Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		

TABLE 25. Acceptable Presentation Contexts for the FIS Server

Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

D.2.3.3.1.2.1 SOP Specific Conformance for SOP Class

D.2.3.3.1.3 Presentation Context Acceptance Criterion

The FIS server will accept any number of verification of storage SOP classes that are listed in Table 25 above, provided that the requesting application is known to the FIS server (via a configuration step). The FIS server defines no limit on the number of presentation contexts accepted. In the event that the FIS server runs out of resources when trying to accept multiple presentation contexts, the FIS server will reject the association request.

The FIS server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

D.2.3.3.1.4 Transfer Syntax Selection Policies

The FIS server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

D.3 Communication Profiles

D.3.1 TCP/IP Stack

The FIS provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

D.3.1.1 TCP/IP API

The FIS uses the TCP/IP stack from the Unix system upon which it executes. It uses a subroutine library that is based on a Berkeley socket interface.

D.3.1.2 Physical Media Support

The FIS exists as a software application that can be compiled on various Unix platforms. As such, it places no restrictions on the physical network. The FIS has been demonstrated using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone).

D.4 Extensions/Specializations/Privatizations

Not applicable

D.5 Configuration

The FIS obtains configuration information from a “Control” database which is stored in a relational database. In this implementation, the relational database is the commercial product Sybase.

D.5.1 AE Title/Presentation Address Mapping

The control table “ApplicationEntity” is used to map between AE Titles and Presentation Addresses. The format of the table and tools to configure the table are documented in the “User’s Guide to CTN Demonstration Applications.”

D.5.2 Security Features

The FIS Server uses one additional control tables to control access. The “SecurityMatrix” table found in the control database defines the set of applications that are allowed to connect to the FIS Server. The definition of these tables, a complete description of how they are used, and tools for modifying them are provided in the “Users’s Guide to CTN Demonstration Applications.”

D.5.3 Configurable Parameters

The following parameters may be configured for the image server:

- Application Entity Title
- Maximum PDU Size
- TCP/IP Port Number
- TCP/IP Buffer Length

The method for configuring these parameters is defined in the “User’s Guide to CTN Demonstration Applications.”

D.5.4 Support of Extended Character Sets

The FIS Server provides no support for extended character sets.