

Philips Medical Systems

**DICOM**

CONFORMANCE STATEMENT



Mx8000-EXP V2.5

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## 1. INTRODUCTION

This chapter provides general information about the purpose, scope and contents of this Conformance Statement.

### 1.1. Mx-Series Scanners and Workstation

This conformance statement refers to a MX family of products (scanners and MxView workstation) that are based on the same communication software. This document refers to each of the above products as a *System*. Unless otherwise indicated (e.g., *Scanner Only* or *MxView Only*), all the described services refer to both the scanners and the workstation. The following table describes what features are supported by the scanners and by the workstation:

Feature	Scanner	Workstation
MPPS	✓	
MWM	✓	
Storage	✓	✓
Secondary Capture	✓	✓
ECG	✓	✓
Q/R Study Root Find	✓	✓
Q/R Study Root Move	✓	✓
Verification	✓	✓
Basic Grayscale Print Management	✓	✓
Basic Color Print Management	✓	✓
Print	✓	✓
Basic Film Session	✓	✓
Basic Film Box	✓	✓
Printer	✓	✓
Storage Commitment	✓	✓
Media CT/MR Studies on CD		✓

### 1.2. Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices. This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM].

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### 1.3. Intended Audience

This Conformance Statement is intended for:

- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

### 1.4. Contents and Structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2.

### 1.5. Used Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4. The word Philips in this document refers to Philips Medical Systems.

### 1.6. References

- [DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard (NEMA PS 3.X):  
National Electrical Manufacturers Association (NEMA)  
Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847  
Rosslyn, Va. 22209, United States of America

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## 1.7. Important Note to the Reader

This Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

### ➤ Interoperability

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.

It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

### ➤ Validation

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

### ➤ New versions of the DICOM Standard

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).



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## 1.8. General Acronyms and Abbreviations.

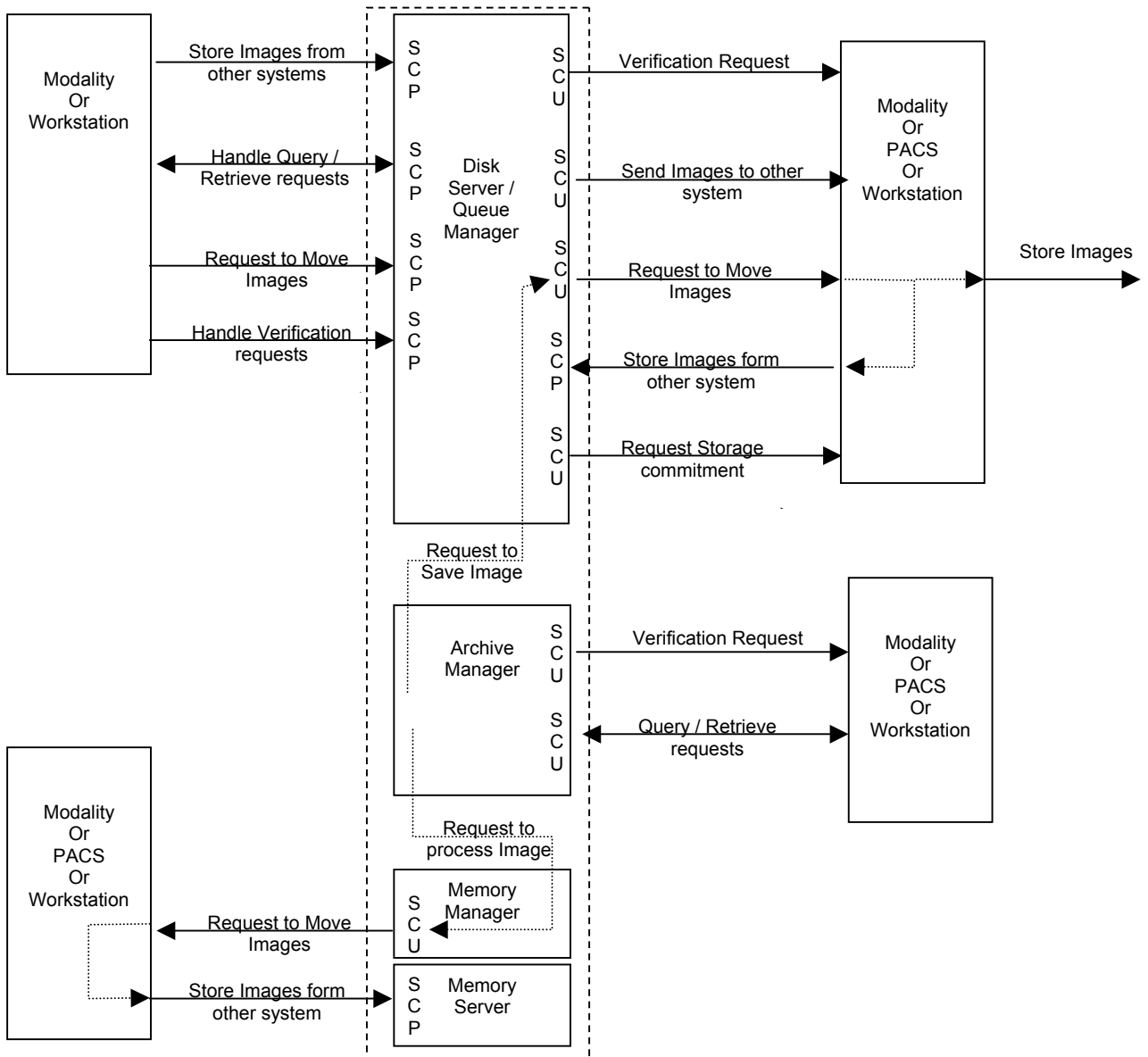
The following acronyms and abbreviations are used in the document.

- ACC American College of Cardiology
- AE Application Entity
- ACR American College of Radiology
- ANSI American National Standard Institute
- DICOM Digital Imaging and Communication in Medicine
- DIMSE DICOM Message Service Element
- ELE Explicit VR Little Endian
- EBE Explicit VR Big Endian
- ILE Implicit VR Little Endian
- IOD Information Object Definition
- NEMA National Electrical Manufacturers Association
- PDU Protocol Data Unit
- RIS Radiology Information System
- RWA Real World Activity
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet protocol
- UID Unique Identifier

## 2. IMPLEMENTATION MODEL

The *System* communication is based on the DICOM v3.0 standard. This enables the *System* to communicate with any DICOM v3.0 compliant products (e.g., scanners, workstations, HIS/RIS Mx-Views, hardcopy units). The *System* can function both as a server and as a client. Thus it can send and retrieve images from other stations, and other stations can retrieve and send images to and from the *System*. Images are transferred in the DICOM v3.0 protocol based on TCP/IP as a transport layer.

The *System* can serve as a gateway between non-DICOM equipment to the DICOM world. One such example is the *System* being used as a gateway between a DICOM Print Management Service Class user and a non-DICOM hardcopy device such as 3M-952 LMI.



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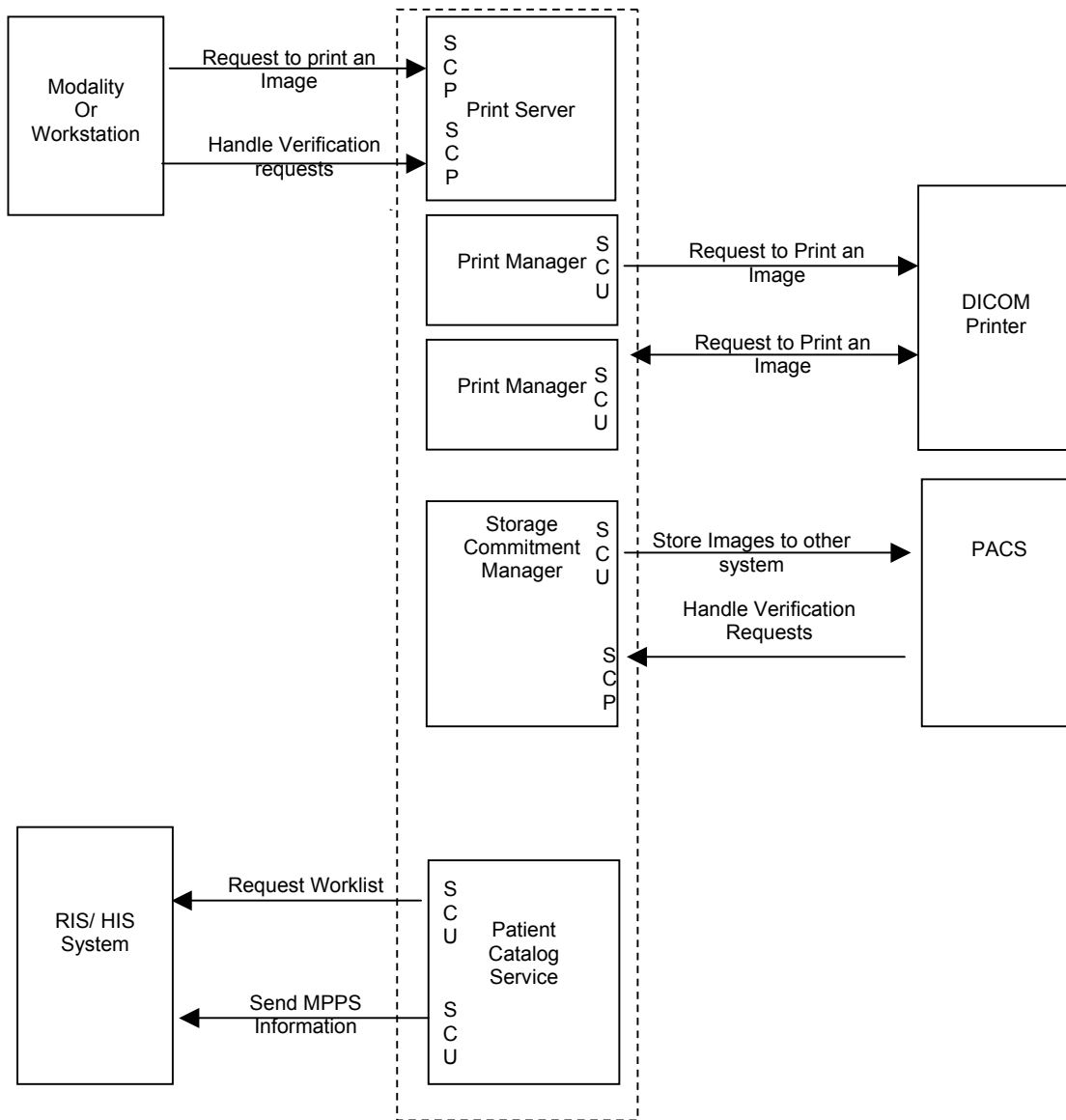


Figure 1: the system in a DICOM network.

Application Data Flow Diagram

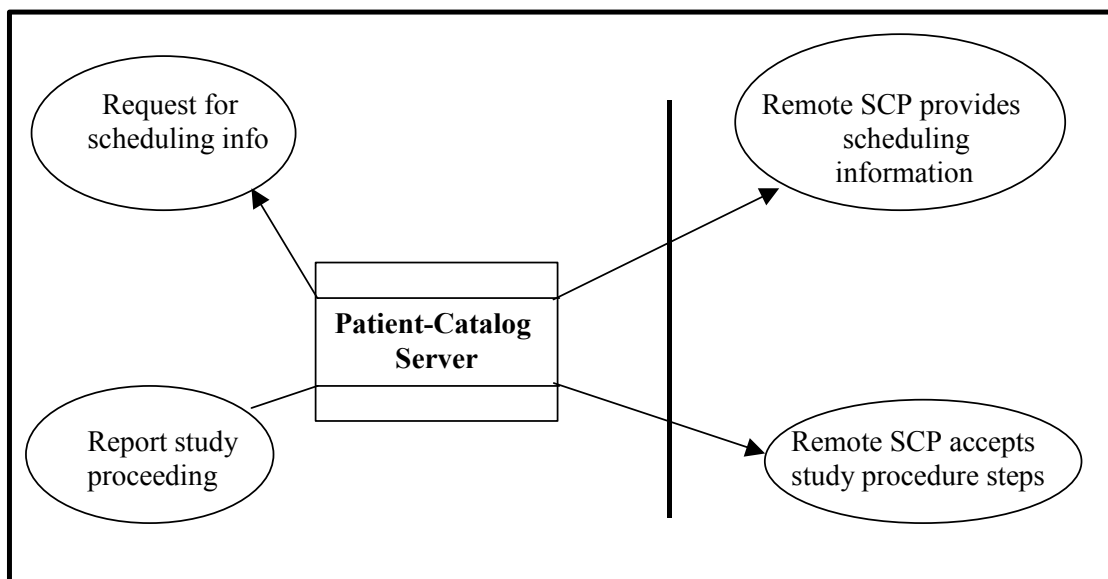
The *system* implements and provides DICOM services using the following Application Entities:

- Patient Catalog Service (*Scanner Only*)
- Disk-Server/Queue-Manager
- Archive-Manager
- Memory-Manager
- Memory-Server
- Print-Server
- Print-Manager
- DentaCT-Print
- StorageComm-Manager
- Media AE (*MxView Only*)

**2.1.1. Patient Catalog Service**

(*Scanner Only.*)

This AE is an SCU used to connect to HIS/RIS systems. With this server, the scanning software obtains the scheduled study information from the HIS/RIS system, and reports the study start/finish conditions back to HIS/RIS.



**Figure 2: Illustration of Patient catalog Activities.**

**2.1.2. Disk-Server/Queue-Manager**

Disk-Server provides the interface to the database of the images stored on the local hard disk. The same AE may be used (with a configurable different AE title) to access the local EOD (removable Erasable Optical Disk) or different local hard disk folders. Acting as an SCU Disk-Server sends images to the remote system. Acting as an SCP it provides DICOM Verification, Storage and Query/Retrieve services for remote systems.

Queue-Manager is an SCU used to initiate moving of images between databases. To initiate move from a local database it invokes the appropriate Disk-Server. The Queue-Manager is also allows the operator to control transfer requests status.

The following figure provides an illustration of the Disk-Server and Queue-Manager activities:

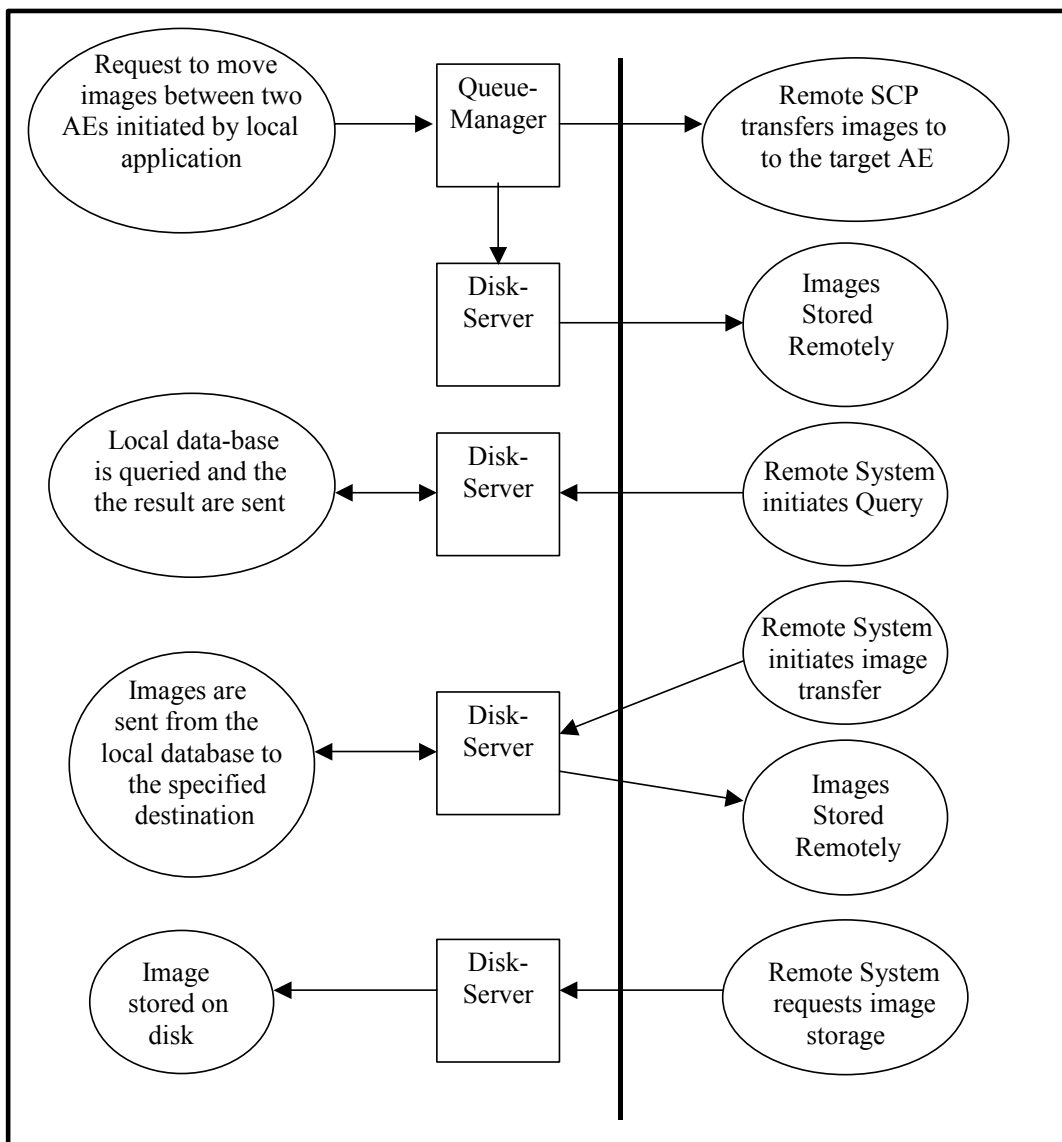


Figure 3: Illustration of Disk-Server Activities.

### 2.1.3. Archive-Manager

This AE is an SCU used to query the contents of remote databases. The results are presented to the user on the screen. The following figure provides an illustration of Archive-Manager activities:

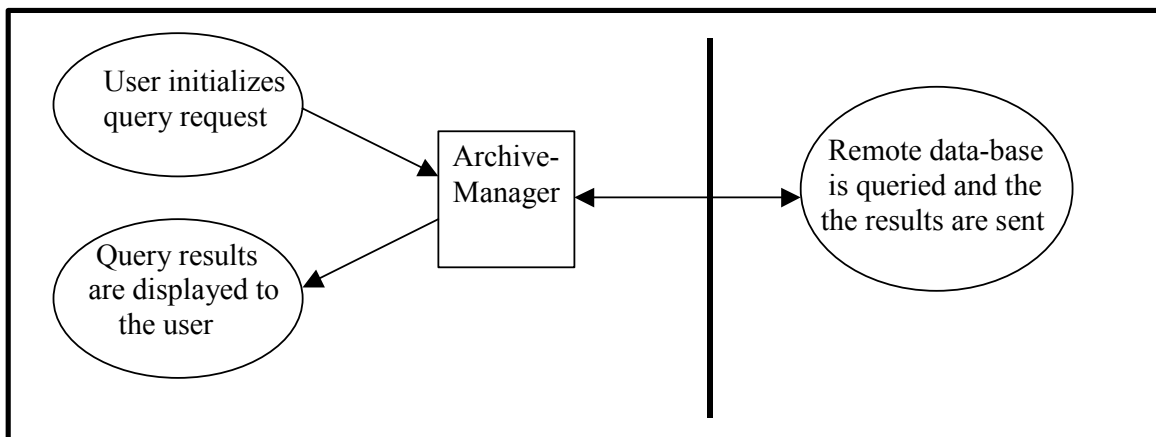


Figure 4: Illustration of Archive-Manager Activities.

### 2.1.4. Memory-Manager

This AE is an SCU used to request from the remote system to load images to the local system memory. The following figure provides an illustration of Memory-Manager activities:

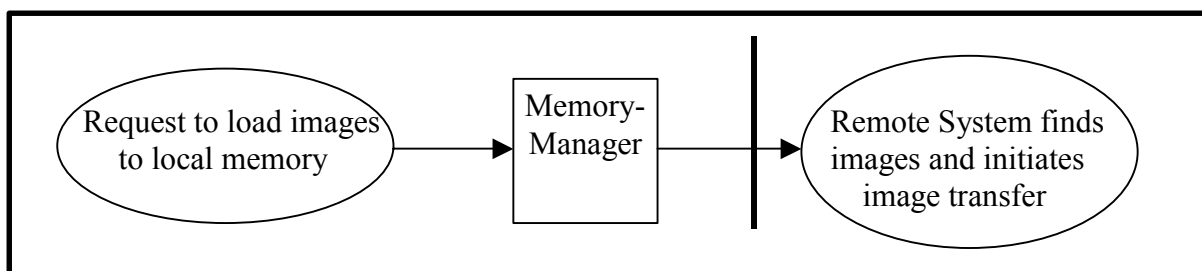
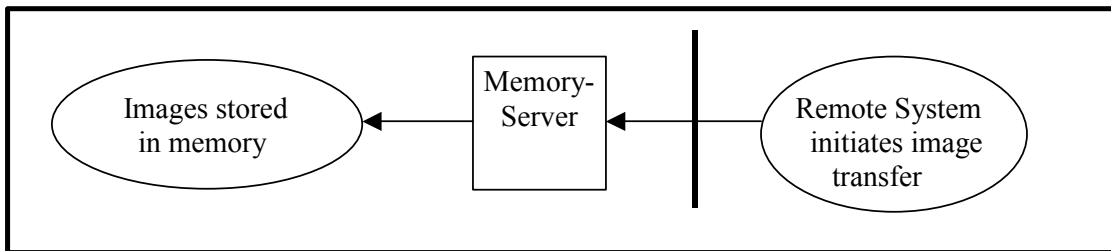


Figure 5: Illustration of Memory-Manager Activities.

**2.1.5. Memory-Server**

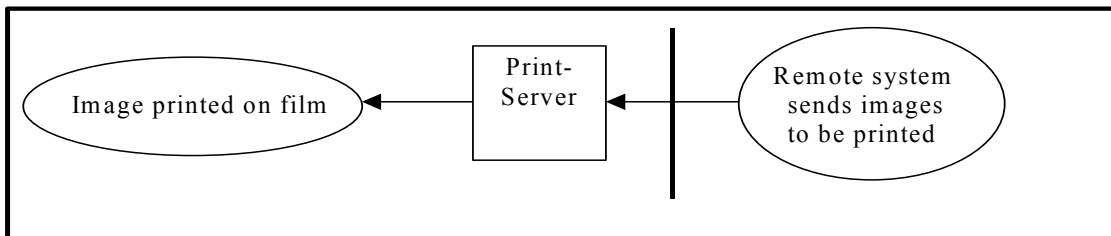
This AE serves as the interface to the *system's* memory by providing the DICOM Storage service. It is used by the *system* to load images to its own memory. The *system* assigns this AE as the target AE of C-MOVE requests it issues when loading images from remote systems. The following figure provides an illustration of Memory-Server activities:



**Figure 6: Illustration of Memory-Server Activities.**

**2.1.6. Print-Server**

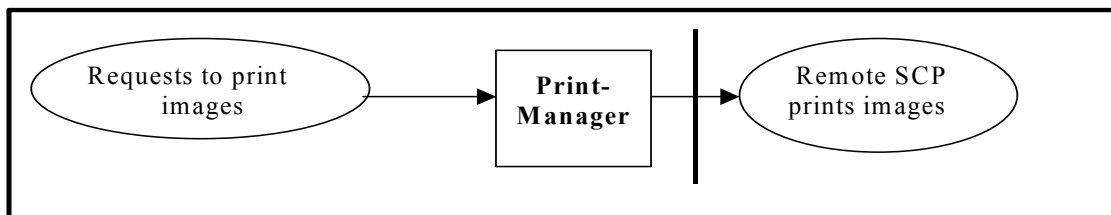
This AE enables an SCU to print on a non-DICOM printer by providing it the services of a DICOM Print Management service class. The following figure provides an illustration of Print-Server activities:



**Figure 7: Illustration of Print-Server Activities.**

**2.1.7. Print-Manager**

Print-Manager is an SCU used to film the images (from MasterFilm application). The following figure provides an illustration of Print-Manager activities:



**Figure 8: Illustration of Print-Manager Activities.**

**2.1.8. DentaCT-Print**

This AE is an SCU used to print images from the DentaCT application on imagers. The following figure provides an illustration of DentaCT-Print activities:

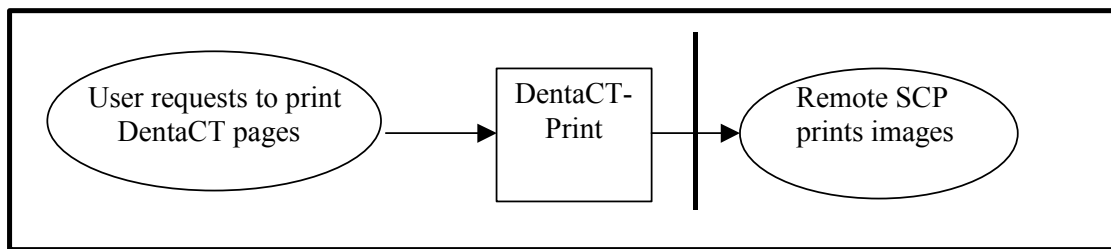


Figure 9: Illustration of DenatCT-Print Activities.

**2.1.9. StorageComm-Manager**

StorageComm-Manager is used to support Storage Commitment Service Class both as SCU and SCP. The following figure provides an illustration of StorageComm-Manager:

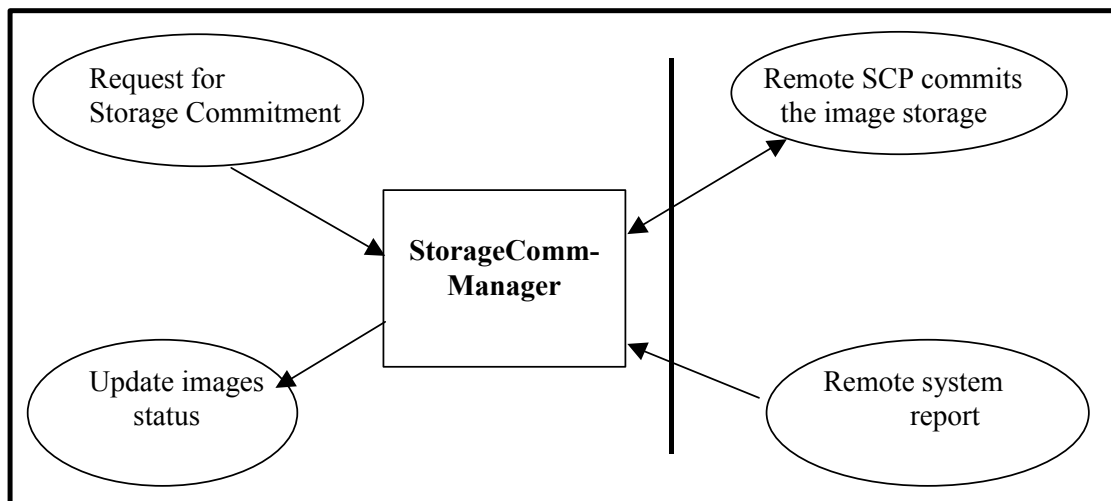


Figure 10: Illustration of StorageComm-Manager Activities

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**2.1.10. Media AE**

*(MxView Only)*

The Media AE can create DICOM Media CD according the CT/MR media profile.



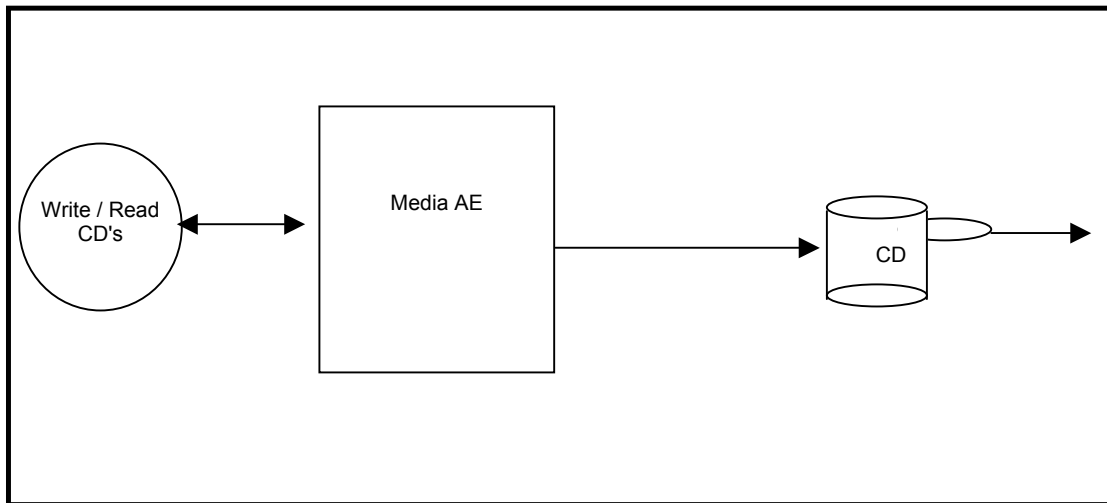


Figure 11: Illustration of Media AE Activities

## 2.2. Functional definition of Application Entities

### 2.2.1. Patient-Catalog Server

*(Scanner Only.)*

The **Patient-Catalog Server** allows scanner software to communicate with a remote HIS/RIS system. The Patient-Catalog Server gets requests from the Study program responsible for carrying out the whole scanning procedure (using non-DICOM protocol).

The server translates these internal requests into DICOM Modality Worklist Management and MPPS Services Class commands. The Patient-Catalog Server can perform the following activities:

- Establish an association with a remote AE.
- Release an association with a remote AE.
- Issue a C-Find request to get Modality Worklist Management scheduling information.
- Issue a N-Create and N-Set requests to notify HIS/RIS by means of MPPS Service Class

### 2.2.2. Disk-Server/Queue-Manager

**Disk-Server** waits for another application to connect at the presentation address configured for its AE title. **Disk-Server** will accept associations with Presentation Contexts for Service Object Pair (SOP) classes of the Storage, Query-Retrieve (C-MOVE and C-FIND only) and Verification Service Classes.

When performing a Storage Service Class, **Disk-Server** will receive images and store them into the *system's* local database.

When performing Query-Retrieve Service Class (C-FIND), **Disk-Server** will query its local database according to the request's parameters, and will send the results to the issuer.

When performing Query-Retrieve Service Class (C-MOVE), **Disk-Server** will issue a C-STORE (to the target AE) for every image found according to the request.

The **Queue-Manager** is responsible for transferring images between devices in batch mode. The **Queue-Manager** gets transfer requests from the **Memory-Manager** and the **Archive-Manager** (using a proprietary non-DICOM protocol). It performs these requests using the Query-Retrieve Service Class (C-MOVE). The **Queue-Manager** can perform the following activities:

- Establish an association with a remote AE.
- Release an association with a remote AE.
- Issue a C-MOVE request (using the Study Root model) for any desired target AE.

### 2.2.3. Archive-Manager

The **Archive-Manager** is a GUI (Graphical User-Interface) based application. It enables the user to perform queries using the DICOM protocol. The **Archive-Manager** lets the user select from a list of devices. It uses a configuration file to associate each device with a DICOM Application Entity. Using the GUI, the user can initiate the following activities:

- Establish an association with a remote AE.

- Release an association with a remote AE.
- Query for studies (using the Study Root model).
- Query for series (using the Study Root model).
- Query for images (using the Study Root model).
- Verify connection to a remote AE

#### 2.2.4. Memory-Manager

The **Memory-Manager** is responsible for loading images into memory. The **Memory-Manager** gets requests from local image processing and display applications to load images to the memory. It performs these requests using the Query-Retrieve Service Class (C-MOVE only). The **Memory-Manager** can perform the following activities:

- Establish an association with a remote AE.
- Release an association with a remote AE.
- Issue a C-MOVE request (using the Study Root model) where the target AE is **Memory-Server**.

#### 2.2.5. Memory-Server

**Memory-Server** waits for another application to connect at the presentation address configured for its AE title. **Memory-Server** will accept associations with Presentation Contexts for SOP classes of the Storage and Verification Service Classes. It will receive images on these Presentation Contexts and load them into the *system's* memory.

#### 2.2.6. Print-Server

**Print-Server** waits for another application to connect at the presentation address configured for its AE title. **Print-Server** will accept associations with Presentation Context for the Print Management and Verification Service Classes. It may receive images from one or more SCUs.

#### 2.2.7. Print-Manager

The **Print-Manager** is a Graphical User Interface (GUI) based application. It enables the user to print predefined images using the DICOM protocol. The user can specify as a printing destination one of several predefined printers. The user can also modify some of the printing parameters such as the film size and format.

#### 2.2.8. DenatCT-Print

The **DentaCT-Print** is a part of the DenatCT application. It enables the user to print the images generated by this application using the DICOM protocol. The user can specify as a printing destination one of several predefined printers. The user can also modify some of the printing parameters such as the film size and format.

#### 2.2.9. StorageComm-Manager

**StorageComm Manager** is responsible to issue and support the storage commitment service both as SCU. When some storage device server is configured as supports this service, **StorageComm Manager** establishes association with the specified AE title and sends storage commitment (N-ACTION) request using push model. After that, it may accept storage commitment (N-EVENT-REPORT) request on the same association or by establishing another association.

---

### 2.2.10. Media AE

*(MxView Only)*

The Media AE is responsible for the reading, updating and recording of DICOM Media. The system can read, update and record DICOM Media CD-R's.

## 2.3. Sequencing of Real World Activities

Real world activities of the **Print-Server** and the **Print-Manager** are sequenced as required to meet the definition of the Print-Management Service Class. SCUs can modify and/or delete previously defined film boxes (i.e., not only the currently open one).

## 3. AE SPECIFICATIONS

### 3.1. Patient Catalog Sever Specifications

*(Scanner Only)*

**Patient Catalog Server** provides Standard Conformance to the following DICOM V3.0 SOP Classes as both an SCU.

**Table 1. SOP classes supported as SCU**

SOP Class Name	SOP Class UID
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31

#### 3.1.1. Association Establishment Policies

##### 3.1.1.1. General

The maximum Protocol Data Unit (PDU) size that the Disk-Server will use is configurable, with a minimum of 2K bytes.

##### 3.1.1.2. Number of Associations

**Patient-Catalog** can have maximum two simultaneous connections. **Patient-Catalog** initiates one association when Modality Worklist and MPPS services are configured on the same SCP and two associations otherwise.

##### 3.1.1.3. Asynchronous Nature

**Patient-Catalog** will only allow a single outstanding operation on an association. Therefore **Patient-Catalog** will not perform asynchronous operations window negotiation.

##### 3.1.1.4. Implementation Identifying Information

**Patient Catalog Server** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

#### 3.1.2. Association Initiation by Real-World Activity

##### 3.1.2.1. User Clicks on HIS/RIS Icon

###### 3.1.2.1.1. Associated Real World Activity

**Patient-Catalog** initiates an association when the user clicks on the HIS/RIS icon in the Toolbar.

###### 3.1.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2 are proposed by the **Patient-Catalog**.

**Table 2. Proposed Presentation Contexts for Patient-Catalog**

Name	Abstract Syntax		Name	Transfer Syntax		Role	Ext. Neg.
	UID	UID		UID	UID		
Worklist	1.2.840.10008.5.1.4.31		ILE	1.2.840.10008.1.2		SCU	None
Information Model			ELE	1.2.840.10008.1.2.1			
			EBE	1.2.840.10008.1.2.2			

**3.1.2.1.3. SOP Specific Conformance Statement for Modality Worklist Information Model FIND**

The following tables list the supported attributes by the Patient Catalog server.

**Table 3. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Identification Module**

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Other Patient IDs	0010,1000	
Patient's Weight	0010,1030	
Patient's Birth Name	0010,1005	

**Table 4. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Demographic Module**

Attribute Name	Tag	Note
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Patient's Age	0010,1010	
Ethnic Group	0010,2160	
Patient Comments	0010,4000	
Confidentially Constrain On Patient Data	0040,3001	

**Table 5. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Patient Medical Module**

Attribute Name	Tag	Note
Medical Alerts	0010,2000	
Constant Allergies	0010,2110	
Additional Patient History	0010,21B0	
Special Needs	0038,0050	

**Table 6. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Visit Status Module**

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	
Admission ID	0038,0100	
Patient State	0038,0500	
Current Patient Location	0038,0300	

**Table 7. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Scheduled Procedure Step Module**

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Attribute Name	Tag	Note
Scheduled Procedure Step Sequence	0040,0100	
>Modality	0008,0060	
>Scheduled Station AE Title	0040,0001	
>Scheduled Procedure Step Start Date	0040,0002	
>Scheduled Procedure Step Start Time	0040,0003	
>Scheduled Performing Physician's Name	0040,0006	
>Scheduled Procedure Step Description	0040,0007	
>Scheduled Action Item Code Sequence	0040,0008	
>>Code Value	0008,0100	
>>Coding Scheme Designator	0008,0102	
>>Code Meaning	0008,0104	
>Scheduled Procedure Step ID	0040,0009	
>Scheduled Procedure Step Location	0040,0011	

**Table 8. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Requested Procedure Module**

Attribute Name	Tag	Note
Study Instance UID	0020,000D	
Requested Procedure Description	0032,1060	
Requesting Service	0032,1033	
Requested Procedure Code Sequence	0032,1064	
>Code Value	0008,0100	
>Coding Scheme Designator	0008,0102	
>Code Meaning	0008,0104	
Requested Procedure ID	0040,1001	
Names of Intended Recipients of Results	0040,1010	
Requested Procedure Comments	0040,1400	

**Table 9. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Imaging Service Request Module**

Attribute Name	Tag	Note
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Referenced Study Sequence	0008,1110	
Requesting Physician	0032,1032	
Requesting Service	0032,1033	
Imaging Service Request Comments	0040,2400	

**Table 10. Modality Worklist Information Model - FIND SOP Class - C-FIND-RQ - Sop Common Module**

Attribute Name	Tag	Note
Specific Character Set	0008,0005	

**3.1.2.2. Request from Study**

**3.1.2.2.1. Associated Real World Activity**

**Patient-Catalog** initiates an association when it receives a request from the Study program to notify HIS/RIS about procedure execution/completion.

**3.1.2.2.2. Proposed Presentation Contexts**

All the Presentation Contexts shown in Table 2.19 are proposed by the **Patient-Catalog**.

**Table 11. Proposed Presentation Contexts**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Modality Performed	1.2.840.10008.3.1.2.3.3	ILE	1.2.840.10008.1.2	SCU	None
Procedure Step		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

**3.1.2.2.3. SOP Specific Conformance Statement for MPPS N-CREATE**

**Patient-Catalog** provides standard conformance to the DICOM V3.0 MPPS Service Class as an SCU for the following SOP Class: UID = 1.2.840.10008.3.1.2.3.3.

**Table 12. Modality Performed Procedure Step SOP Class - N-SET-RQ - Image Acquisition Results Module**

Attribute Name	Tag	Note
Performed Series Sequence	0040,0340	
>Retrieve AE Title	0008,0054	
>Series Description	0008,103E	
>Performing Physician's Name	0008,1050	
>Operator's Name	0008,1070	
>Referenced Image Sequence	0008,1140	
>>Referenced SOP Class UID	0008,1150	
>>Referenced SOP Instance UID	0008,1155	
>Protocol Name	0018,1030	
>Series Instance UID	0020,000E	

**Table 13. Modality Performed Procedure Step SOP Class - N-SET-RQ - Performed Procedure Step Information Module**

Attribute Name	Tag	Note
Performed Procedure Step End Date	0040,0250	
Performed Procedure Step End Time	0040,0251	
Performed Procedure Step Status	0040,0252	

**Table 14. Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Sop Common Module**

Attribute Name	Tag	Note
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Attribute Name	Tag	Note
Specific Character Set	0008,0005	

**Table 15. Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Image Acquisition Results Module**

Attribute Name	Tag	Note
Modality	0008,0060	
Study ID	0020,0010	
Performed Action Item Code Sequence	0040,0260	
>Code Value	0008,0100	
>Coding Scheme Designator	0008,0102	
>Code Meaning	0008,0104	
Performed Series Sequence	0040,0340	

**Table 16. Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Performed Procedure Step Information Module**

Attribute Name	Tag	Note
Procedure Code Sequence	0008,1032	
Performed Station AE Title	0040,0241	
Performed Station Name	0040,0242	
Performed Location	0040,0243	
Performed Procedure Step Start Date	0040,0244	
Performed Procedure Step Start Time	0040,0245	
Performed Procedure Step End Date	0040,0250	
Performed Procedure Step End Time	0040,0251	
Performed Procedure Step Status	0040,0252	
Performed Procedure Step ID	0040,0253	
Performed Procedure Step Description	0040,0254	
Performed Procedure Type Description	0040,0255	

**Table 17. Modality Performed Procedure Step SOP Class - N-CREATE-RQ - Performed Procedure Step Relationship Module**

Attribute Name	Tag	Note
Referenced Patient Sequence	0008,1120	
>Referenced SOP Class UID	0008,1150	Applied Value(s): 1.2.840.10008.3.1.2.1.1
>Referenced SOP Instance UID	0008,1155	
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	
Scheduled Step Attribute Sequence	0040,0270	
>Accession Number	0008,0050	
>Referenced Study Sequence	0008,1110	
>>Referenced SOP Class UID	0008,1150	Applied Value(s): 1.2.840.10008.3.1.2.3.1
>>Referenced SOP Instance UID	0008,1155	
>Study Instance UID	0020,000D	

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Attribute Name	Tag	Note
>Requested Procedure Description	0032,1060	
>Scheduled Procedure Step Description	0040,0007	
>Scheduled Action Item Code Sequence	0040,0008	
>>Code Value	0008,0100	
>>Coding Scheme Designator	0008,0102	
>>Code Meaning	0008,0104	
>Scheduled Procedure Step ID	0040,0009	
>Requested Procedure ID	0040,1001	

### 3.1.3. Association Acceptance Policy

**Patient-Catalog** never accepts an association.

## 3.2. Disk-Server/Queue-Manager Specifications

**Disk-Server** and **Queue-Manager** work closely together and can be configured to act as a single Application Entity (i.e., having the same AE Title) or as different Application Entities. In order to simplify the description they are described in this document as a single Application Entity. Depending on configuration, multiple copies of **Disk-Server** may be running simultaneously, each representing the same Application Entity.

**Disk-Server** and **Queue-Manager** provide Standard Conformance to the following DICOM V3.0 SOP Classes as both an SCU and an SCP:

**Table 18. SOP classes supported as SCU and SCP**

SOP Class Name	SOP Class UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR 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
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscapy Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2

The following DICOM V3.0 SOP Classes as an SCP only:

**Table 19. SOP classes supported as SCP**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1

*Note:* XA (X-Ray Angiographic) images are supported for storage only (not for viewing)

### 3.2.1. Association Establishment Policies

#### 3.2.1.1. General

The maximum Protocol Data Unit (PDU) size that the **Disk-Server** will use is configurable, with a minimum of 2K bytes and a maximum of 16K.bytes.

There is default timeout of 60 sec before Dicom association release during Copy operation (when issuing C-Store and C-Move Dicom requests).

#### 3.2.1.2. Number of Associations

The number of simultaneous associations that will be accepted by **Disk-Server** is limited only by the kernel parameters of the underlying TCP/IP implementation. **Disk-Server** will spawn a new process for each connection request it receives. Therefore, **Disk-Server** can have multiple simultaneous connections, and there are

no inherent limitations on the number of simultaneous associations that the Application Entity represented by **Disk-Server** can maintain.

**Disk-Server/Queue-Manager** can initiate multiple simultaneous connections. The maximal number of simultaneous associations is limited by the configuration of the *system*. **Disk-Server/Queue-Manager** will not initiate more than one association per each remote AE configured as an SCP in *the system*.

### 3.2.1.3. Asynchronous Nature

**Disk-Server/Queue-Manager** will only allow a single outstanding operation on an association. Therefore **Disk-Server/Queue-Manager** will not perform asynchronous operations window negotiation.

### 3.2.1.4. Implementation Identifying Information

**Disk-Server/Queue-Manager** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

## 3.2.2. Association Initiation by Real-World Activity

**Disk-Server** will attempt to initiate a new association when requested to send images to the remote system, as part of a C-MOVE Command. **Queue-Manager** will attempt to initiate a new association when requested to perform image transfer (Move) from the remote system.

### 3.2.2.1. Image Transfer to the Remote system

#### 3.2.2.1.1. Associated Real-World Activity

The associated Real-World Activity is a request for retrieval of images from the disk and storage of the images to a remote system using a C-STORE command.

#### 3.2.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.1 are proposed by **Disk-Server** (Explicit VR Transfer Syntaxes for a specific AE target may be restricted using the configuration utility):

**Table 20. Proposed Presentation Contexts for Disk-Server**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
CT Image	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
MR Image	1.2.840.10008.5.1.4.1.1.4	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
CR Image	1.2.840.10008.5.1.4.1.1.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
NM Image	1.2.840.10008.5.1.4.1.1.20	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
SC Image	1.2.840.10008.5.1.4.1.1.7	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

Name	Abstract Syntax UID	Name	Transfer Syntax UID	Role	Ext. Neg.
EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
XA Image	1.2.840.10008.5.1.4.1.1.12.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
RF Image	1.2.840.10008.5.1.4.1.1.12.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

### 3.2.2.1.2.1. SOP Specific Conformance Statement for Storage SOP Class

**Disk-Server** provides standard conformance to the DICOM V3.0 Storage Service Class as an SCU for the following SOP Classes:

- CT Image Storage, UID = 1.2.840.10008.5.1.4.1.1.2.
- MR Image Storage, UID = 1.2.840.10008.5.1.4.1.1.4.
- CR Image Storage, UID = 1.2.840.10008.5.1.4.1.1.1
- NM Image Storage, UID = 1.2.840.10008.5.1.4.1.1.20
- SC Image Storage, UID = 1.2.840.10008.5.1.4.1.1.7.
- XA Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.1
- RF Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.2
- General ECG Waveform Storage, UID = 1.2.840.10008.5.1.4.1.1.9.1.2

Multiple C-STORE operations can be performed over a single association. Upon receiving a C-STORE confirmation containing a successful status, this implementation will perform the next C-STORE operation (if this operation is the result of the Series Level Move request). The association will be kept open if possible.

Any unsuccessful status, returned in the C-STORE confirmation, results in termination of the sending further C-Store requests (if any in the queue), reporting of error to the *system* log file, and returning of a status code of **A702** ("Refused") in the C-MOVE confirmation.

There are no timeouts implemented in this process.

The Mx8000 systems create CT Images, in annex 1 a detailed description of the created object is defined. The Mx8000 systems create the following private attributes as defined in Annex 3.

### 3.2.2.2. Image Transfer from the Remote System

#### 3.2.2.2.1. Associated Real World Activity

**Queue-Manager** initiates an association when some application asks for image transfer from a specified source device to a specified target device. If **Queue-Manager** fails to move all the required images, it waits for some configurable duration and then retries to initiate the association.

### 3.2.2.2.2. Proposed Presentation Contexts

The following Presentation Contexts are proposed by **Queue-Manager** (Explicit VR Transfer Syntaxes for a specific AE target may be restricted using the configuration utility):

**Table 21. Proposed Presentation Contexts for Queue-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

#### 3.2.2.2.2.1. SOP Specific Conformance Statement for Study Root MOVE

**Queue-Manager** provides standard conformance to the DICOM V3.0 Query/Retrieve Service Class as an SCU for the following SOP Class: Study Root Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.2.2.

### 3.2.3. Association Acceptance Policy

**Disk-Server** places no limitations on the number of simultaneous connections it will support. However, it is possible to control that may connect to **Disk-Server** during the *system* configuration process.

#### 3.2.3.1. Remote System Requests Verification

A remote system requests verification from **Disk-Server** using the C-ECHO command.

##### 3.2.3.1.1. Associated Real World Activity

**Disk-Server** performs the Verification Service Class by responding with C-ECHO-RSP.

##### 3.2.3.1.2. Presentation Context Table

The following Presentation Contexts are acceptable to the **Disk-Server**.

**Table 2.3: Acceptable Presentation Contexts for Disk-Server**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

##### 3.2.3.1.2.1. SOP Specific Conformance to Verification SOP Class

**Disk-Server** provides standard conformance to the DICOM V3.0 Verification Service Class as an SCP for the Verification SOP Class, UID=1.2.840.10008.1.1.

##### 3.2.3.1.3. Presentation Context Acceptance Criterion

**Disk-Server** will accept any Presentation Context from Table 2.3.

##### 3.2.3.1.4. Transfer Syntax Selection Policies

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**Disk-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.2.3.2. Remote System Requests Image Storage

A remote *system* requests image storage from **Disk-Server** using the C-STORE command.

#### 3.2.3.2.1. Associated Real World Activity

The Real World activity associated with the C-STORE operation is the storage of the image in the disk. **Disk-Server** will issue a failure status if it is unable to store the image in the disk.

#### 3.2.3.2.2. Presentation Context Table

Any of the Presentation Contexts shown in Table 2.3 is acceptable to the **Disk-Server**:

##### 3.2.3.2.2.1. SOP Specific Conformance to Storage SOP Class

**Disk-Server** provides standard conformance to the DICOM V3.0 Storage Service Class as an SCP for the following SOP Classes:

- CT Image Storage, UID=1.2.840.10008.5.1.4.1.1.2.
- MR Image Storage, UID=1.2.840.10008.5.1.4.1.1.4.
- CR Image Storage, UID = 1.2.840.10008.5.1.4.1.1.1
- NM Image Storage, UID = 1.2.840.10008.5.1.4.1.1.20
- SC Image Storage, UID=1.2.840.10008.5.1.4.1.1.7.
- XA Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.1
- RF Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.2
- General ECG Waveform Storage, UID = 1.2.840.10008.5.1.4.1.1.9.1.2

**Disk-Server** conforms to the SOPs of the Storage Service Class at Level 2 (Full). In case of a successful C-STORE, the stored image may be accessed by the **Disk-Server**.

The user of the *system*, who can delete any image using the Archive Manager application, determines the duration of the storage. An auto-delete mechanism can be utilized to remove the least recently accessed images in order to make room for new ones. This mechanism is optional and is controlled by user configurable parameters.

**Disk-Server** will not coerce any attribute except for the following: pixel data (0x7FE0, 0x0010) of type OW is converted to OB when bits allocated (0x0028, 0x0100) equal 8.

All our viewing applications can support only canonical form of CT images as follows:

- Rescale slope: 1
- Rescale intercept: -1000
- Bits Allocated: 16
- Bits Stored: 12
- High Bit: 11

All other CT images that are not in the canonical form will be translated to it.

If **Disk-Server** returns one of the following status codes, it means that the C-STORE has been unsuccessful:

- **A700** - General refusal status.
- **A701** - Out of disk space.
- **B000** - General warning status.
- **C000** - General failure status.

Recovery from this condition is the responsibility of the **Disk-Server**.

**3.2.3.2.3. Presentation Context Acceptance Criterion**

**Disk-Server** will accept any Presentation Context from Table 2.4.

**Table 22. Acceptable Presentation Contexts for Disk-Server**

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	UID	Name	UID	Name		
CT Image	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2	SCP	None	
CT Image	1.2.840.10008.5.1.4.1.1.2	ELE	1.2.840.10008.1.2.1	SCP	None	
CT Image	1.2.840.10008.5.1.4.1.1.2	EBE	1.2.840.10008.1.2.2	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	ILE	1.2.840.10008.1.2	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	ELE	1.2.840.10008.1.2.1	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	EBE	1.2.840.10008.1.2.2	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	ILE	1.2.840.10008.1.2	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	ELE	1.2.840.10008.1.2.1	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	EBE	1.2.840.10008.1.2.2	SCP	None	
EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	ILE	1.2.840.10008.1.2	SCP	None	
EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	ELE	1.2.840.10008.1.2.1	SCP	None	
EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	EBE	1.2.840.10008.1.2.2	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	ILE	1.2.840.10008.1.2	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	ELE	1.2.840.10008.1.2.1	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	EBE	1.2.840.10008.1.2.2	SCP	None	
SC Image	1.2.840.10008.5.1.4.1.1.7	ILE	1.2.840.10008.1.2	SCP	None	
SC Image	1.2.840.10008.5.1.4.1.1.7	ELE	1.2.840.10008.1.2.1	SCP	None	
SC Image	1.2.840.10008.5.1.4.1.1.7	EBE	1.2.840.10008.1.2.2	SCP	None	
XA Image	1.2.840.10008.5.1.4.1.1.12.1	ILE	1.2.840.10008.1.2	SCP	None	
XA Image	1.2.840.10008.5.1.4.1.1.12.1	ELE	1.2.840.10008.1.2.1	SCP	None	
XA Image	1.2.840.10008.5.1.4.1.1.12.1	EBE	1.2.840.10008.1.2.2	SCP	None	
RF Image	1.2.840.10008.5.1.4.1.1.12.2	ILE	1.2.840.10008.1.2	SCP	None	
RF Image	1.2.840.10008.5.1.4.1.1.12.2	ELE	1.2.840.10008.1.2.1	SCP	None	
RF Image	1.2.840.10008.5.1.4.1.1.12.2	EBE	1.2.840.10008.1.2.2	SCP	None	

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### 3.2.3.2.4. *Transfer Syntax Selection Policies*

**Disk-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.2.3.3. *Remote System Requests Image Transfer*

A remote system requests image transfer from **Disk-Server** using the C-MOVE command.

#### 3.2.3.3.1. *Associated Real World Activity*

The Real World activity associated with the C-MOVE command is retrieval of images from the disk and storage of the images to a remote system using a C-STORE command.

**Disk-Server** will issue a failure status if it is unable to process the transfer request.

#### 3.2.3.3.2. *Presentation Context Table*

Any of the Presentation Contexts shown in Table 2.4 is acceptable to the **Disk-Server**:

**Table 23. Acceptable Presentation Contexts for Disk-Server**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	ILE	1.2.840.10008.1.2	SCP	None
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	ELE	1.2.840.10008.1.2.1	SCP	None
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	EBE	1.2.840.10008.1.2.2	SCP	None

#### 3.2.3.3.2.1. *SOP Specific Conformance to Study Root MOVE*

**Disk-Server** provides standard conformance to the DICOM V3.0 Query/Retrieve Service Class as an SCP for the following SOP Class: Study Root Query/Retrieve Information Model - MOVE, UID=1.2.840.10008.5.1.4.1.2.2.2. Prioritization of C-MOVE requests is not supported.

**Disk-Server** does not support relational C-MOVE requests.

All images requested in the C-MOVE will be sent over a single association (the association will not be established and torn down for each image).

If **Disk-Server** returns one of the following status codes, it means that the C-MOVE has been unsuccessful:

- **A702** - Refused. Unable to perform sub operation (due to failure of a C-STORE).
- **A802** - Refused. Move destination unknown.
- **A700** - General refusal status.
- **B000** - General warning status.
- **C000** - General failure status.

#### 3.2.3.3.3. *Presentation Context Acceptance Criterion*

**Disk-Server** will accept any Presentation Context from Table 2.4.

### 3.2.3.3.4. *Transfer Syntax Selection Policies*

**Disk-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.2.3.4. **Remote System Initiates Query Request**

A remote system initiates query request using the C-FIND command.

#### 3.2.3.4.1. *Associated Real World Activity*

The Real World activity associated with the C-FIND command is an examination of the disk content. **Disk-Server** will issue a failure status if it is unable to process the query request.

#### 3.2.3.4.2. *Presentation Context Table*

Any of the Presentation Contexts shown in Table 2.5 is acceptable to the **Disk-Server**:

**Table 24. Acceptable Presentation Contexts for Disk-Server**

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	UID	UID	Name	UID		
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	ILE	1.2.840.10008.1.2	SCP	None	
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	ELE	1.2.840.10008.1.2.1	SCP	None	
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	EBE	1.2.840.10008.1.2.2	SCP	None	

#### 3.2.3.4.2.1. **SOP Specific Conformance to Study Root FIND**

**Disk-Server** provides standard conformance to the DICOM V3.0 Query/Retrieve Service Class as an SCP for the following SOP Class: Study Root Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.2.1.

**Disk-Server** does not support Relational Search.

All Required (R) and Unique (U) Study, Series and Image level keys for the Study Root Query/Retrieve Information Model are supported. **Disk-Server** supports the following optional keys:

- Image Type (0008,0008)
- Instance Creation Date (0008,0012)
- Instance Creation Time (0008,0013)
- SOP Class UID (0008,0016)
- Series Date (0008,0021)
- Image Date (0008,0023)
- Series Time (0008,0031)
- Image Time (0008,0033)
- Contrast Bolus Agent (0018,0010)
- Scan Options (0018,0022)
- Slice Thickness (0018,0050)
- Gantry/Detector Tilt (0018,1120)
- Acquisition Number (0020,0012)
- Image Position (0020,0032)

- 
- Image Number (0020, 0033)
  - Image Orientation (0020,0037)
  - Frame Of Reference UID (0020,0052)
  - Slice Location (0020,1041)
  - Rows (0028,0010)
  - Columns (0028,0011)
  - Samples Per Pixel (0028, 0002)
  - Pixel Spacing (0028,0030)
  - Bits Allocated (0028, 0100)

Unsupported fields will not be returned in the C-FIND response.

C-FIND-CANCEL is supported. However, some C-FIND responses may be forwarded before the C-FIND-CANCEL takes effect.

If **Disk-Server** returns one of the following status codes, it means that the C-FIND has been unsuccessful:

- **A700** - General refusal status.
- **B000** - General warning status.
- **C000** - General failure status.

#### **3.2.3.4.3. Presentation Context Acceptance Criterion**

**Disk-Server** will accept any Presentation Context from Table 2.5.

#### **3.2.3.4.4. Transfer Syntax Selection Policies**

**Disk-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.3. Archive-Manager Specifications

**Archive-Manager** provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

**Table 25. SOP Classes supported as SCU**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1

#### 3.3.1. Association Establishment Policies

##### 3.3.1.1. General

The maximum PDU size that the **Archive-Manager** will use is configurable, with a minimum of 2K byte.

##### 3.3.1.2. Number of Associations

**Archive-Manager** can have multiple simultaneous connections. The maximal number of simultaneous associations that will be initiated by **Archive-Manager** is limited by the configuration of the *system*. **Archive-Manager** will not initiate more than one association per each AE configured as an SCP in the *system*.

##### 3.3.1.3. Asynchronous Nature

**Archive-Manager** will only allow a single outstanding operation on an association. Therefore **Archive-Manager** will not perform asynchronous operations window negotiation.

##### 3.3.1.4. Implementation Identifying Information

**Archive-Manager** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

#### 3.3.2. Association Initiation by Real-World Activity

##### 3.3.2.1. User Clicks on a Device Icon

###### 3.3.2.1.1. Associated Real World Activity

**Archive-Manager** initiates an association when the user clicks on one of the icons in the devices tool-bar.

###### 3.3.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.14 are proposed by **Archive-Manager**:

**Table 26. Proposed Presentation Contexts for Archive-Manager**

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	Name	UID	Name	UID		
Study Root FIND		1.2.840.10008.5.1.4.1.2.2.1	ILE	1.2.840.10008.1.2	SCU	None
Study Root FIND		1.2.840.10008.5.1.4.1.2.2.1	ELE	1.2.840.10008.1.2.1		
Study Root FIND		1.2.840.10008.5.1.4.1.2.2.1	EBE	1.2.840.10008.1.2.2		

### 3.3.2.1.2.1. SOP Specific Conformance Statement for Study Root FIND

**Archive-Manager** provides standard conformance to the DICOM V3.0 Query/Retrieve Service Class as an SCU for the following SOP Class: Study Root Query/Retrieve Information Model - FIND, UID = 1.2.840.10008.5.1.4.1.2.2.1.

**Archive-Manager** supports the following **Study Level** keys:

**Table 27. Study Level Keys**

Name	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
Modalities In Study	(0008, 0061)	O
Patient's Birth Date	(0010, 0030)	O
Patient's Sex	(0010, 0040)	O
Number Of Study Related Series	(0020, 1206)	O
Number Of Study Related Images	(0020, 1208)	O

**Archive-Manager** supports the following **Series Level** keys:

**Table 28. Series level Keys**

Name	Tag	Type
Modality	(0008, 0060)	R
Series Number	(0020, 0011)	R
Series Instance UID	(0020, 000E)	U
Number Of Series Related Instances	(0020, 1209)	O
Series Description	(0020, 103E)	O
Series Date	(0008, 0021)	O
Series Time	(0008, 0031)	O
Protocol Name	(0018, 1030)	O
Body Part Examined	(0018, 0015)	O
Performed Proc Step Start Date	(0040, 0244)	O
Performed Proc Step Start Time	(0040, 0245)	O

**Archive-Manager** supports the following **Image Level** keys:

**Table 29. Image Level Keys**

Name	Tag	Type
Image Number	(0020, 0013)	R
SOP Instance UID	(0008, 0018)	U
SOP Class UID	(0008, 0016)	O
Image Date	(0008, 0023)	O
Image Time	(0008, 0033)	O

Name	Tag	Type
Image Type	(0008, 0008)	O
Slice Location	(0020, 1041)	O
Rows	(0028, 0010)	O
Columns	(0028, 0011)	O
Contrast Bolus Agent	(0018, 0010)	O
Instance Creation Date	(0008, 0012)	O
Instance Creation Time	(0008, 0013)	O
Gantry/Detector Tilt	(0018, 1120)	O
Sequence Name	(0018, 0024)	O
Echo Number	(0018, 0086)	O
Trigger Time	(0018, 1060)	O

**3.3.2.2. Verify Connection**

**3.3.2.2.1. Associated Real World Activity**

**Archive-Manager** initiates an association when the user points to one of the icons in the devices tool-bar, clicks the right mouse button and selects “Verify Connection” operation.

**3.3.2.2.2. Proposed Presentation Contexts**

All the Presentation Contexts shown in Table 2.15 are proposed by **Archive-Manager**:

**Table 30. Proposed Presentation Contexts for Archive-Manager**

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	UID	Name	UID			
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCU	None	
Verification	1.2.840.10008.1.1	ELE	1.2.840.10008.1.2.1			
Verification	1.2.840.10008.1.1	EBE	1.2.840.10008.1.2.2			

**3.3.2.2.2.1. SOP Specific Conformance Statement for Verification**

**Archive-Manager** provides standard conformance to the DICOM V3.0 Verification Service Class as an SCU for the Verification SOP Class, UID=1.2.840.10008.1.1.

**3.3.3. Association Acceptance Policy**

**Archive-Manager** never accepts an association.

### 3.4. Memory-Manager Specifications

**Memory-Manager** provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

**Table 31. SOP Classes supported as SCU**

SOP Class Name	SOP Class UID
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

#### 3.4.1. Association Establishment Policies

##### 3.4.1.1. General

The maximum PDU size that the Memory-Manager will use is configurable, with a minimum of 2KBytes.

##### 3.4.1.2. Number of Associations

**Memory-Manager** can have multiple simultaneous connections. The maximal number of simultaneous associations that will be initiated by **Memory-Manager** is limited by the configuration of the *system*. **Memory-Manager** will not initiate more than one association per each AE configured as an SCP in the *system*.

##### 3.4.1.3. Asynchronous Nature

**Memory-Manager** will only allow a single outstanding operation on an association. Therefore **Memory-Manager** will not perform asynchronous operations window negotiation.

##### 3.4.1.4. Implementation Identifying Information

**Memory-Manager** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

#### 3.4.2. Association Initiation by Real-World Activity

##### 3.4.2.1. Application Asks for Image Loading

###### 3.4.2.1.1. Associated Real World Activity

**Memory-Manager** initiates an association when an image processing application asks for image loading from a specified source device using a proprietary IPC protocol.

###### 3.4.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.15 are proposed by **Memory-Manager**:

**Table 32. Proposed Presentation Contexts for Archive-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.1	ILE	1.2.840.10008.1.2	SCU	None
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.1	ELE	1.2.840.10008.1.2.1		
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.1	EBE	1.2.840.10008.1.2.2		

**3.4.2.1.2.1. SOP Specific Conformance Statement for Study Root MOVE**

**Memory-Manager** provides standard conformance to the DICOM V3.0 Query/Retrieve Service Class as an SCU for the following SOP Class: Study Root Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.2.2.

**3.4.3. Association Acceptance Policy**

**Memory-Manager** never accepts an association.



## 3.5. Memory-Server Specifications

**Memory-Server** provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCP:

**Table 33. Supported SOP Classes as SCP**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.7.12.1
X-Ray Radiofluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.7.12.2

Note: XA (X-Ray Angiographic) images are supported for storage only (not for viewing)

### 3.5.1. Association Establishment Policies

#### 3.5.1.1. General

The maximum PDU size that the **Memory-Server** will use is configurable, with a minimum of 2K byte.

#### 3.5.1.2. Number of Associations

The number of simultaneous associations that will be accepted by **Memory-Server** is limited only by the kernel parameters of the underlying TCP/IP implementation. **Memory-Server** will spawn a new process for each connection request it receives. Therefore, **Memory-Server** can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations that the Application Entity represented by **Memory-Server** can maintain.

#### 3.5.1.3. Asynchronous Nature

**Memory-Server** will only allow a single outstanding operation on an association. Therefore **Memory-Server** will not perform asynchronous operations window negotiation.

#### 3.5.1.4. Implementation Identifying Information

**Memory-Server** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

### 3.5.2. Association Initiation by Real-World Activity

**Memory-Server** never initiates an association.

### 3.5.3. Association Acceptance Policy

**Memory-Server** places no limitations on the number of simultaneous connections it will support. However, it is possible to control that may connect to **Memory-Server** during the *system's* configuration process.

### 3.5.3.1. Remote System Requests Verification

A remote system requests verification from **Memory-Server** using the C-ECHO command.

#### 3.5.3.1.1. Associated Real World Activity

**Memory-Server** performs the Verification Service Class by responding with C-ECHO-RSP.

#### 3.5.3.1.2. Presentation Context Table

Any of the Presentation Contexts shown in Table 2.10 is acceptable to **Memory-Server**:

**Table 34. Acceptable Presentation Contexts for Memory-Server**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	ELE	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	EBE	1.2.840.10008.1.2.2	SCP	None

#### 3.5.3.1.2.1. SOP Specific Conformance to Verification SOP Class

**Memory-Server** provides standard conformance to the DICOM V3.0 Verification Service Class as an SCP for the Verification SOP Class, UID=1.2.840.10008.1.1.

#### 3.5.3.1.3. Presentation Context Acceptance Criterion

**Memory-Server** will accept any Presentation Context from Table 2.10.

#### 3.5.3.1.4. Transfer Syntax Selection Policies

**Memory-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.5.3.2. Remote System Requests Image Transfer

A remote System may request image transfer from **Memory-Server**, as a result of a C-MOVE command issued by the **Memory-Manager**.

#### 3.5.3.2.1. Associated Real World Activity

The Real World activity associated with the C-STORE operation is the storage of the image in the memory of the *system* upon which **Memory-Server** is running. **Memory-Server** will issue a failure status if it is unable to store the image in the memory.

#### 3.5.3.2.2. Presentation Context Table

Any of the Presentation Contexts shown in table 2.11 is acceptable to the **Memory-Server**:

### 3.5.3.2.2.1. SOP Specific Conformance to Verification SOP Class

**Memory-Server** provides standard conformance to the DICOM V3.0 Storage Service Class as an SCP for the following SOP Classes:

- CT Image Storage, UID=1.2.840.10008.5.1.4.1.1.2.
- MR Image Storage, UID=1.2.840.10008.5.1.4.1.1.4.
- CR Image Storage, UID = 1.2.840.10008.5.1.4.1.1.1
- NM Image Storage, UID = 1.2.840.10008.5.1.4.1.1.20
- SC Image Storage, UID=1.2.840.10008.5.1.4.1.1.7.
- XA Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.1
- RF Image Storage, UID = 1.2.840.10008.5.1.4.1.1.12.2
- General ECG Waveform Storage, UID = 1.2.840.10008.5.1.4.1.1.9.1.2

**Memory-Server** conforms to the SOPs of the Storage Service Class at Level 2 (Full). In case of a successful C-STORE, the stored image may be accessed by the **Memory-Manager**.

The user determines the duration of the storage.

Recovery from this condition is the responsibility of the Memory-Manager.

If Memory-Server returns one of the following status codes, it means that the C-STORE has been unsuccessful:

- **A700** -General refusal status.
- **B000** - General warning status.
- **C000** - General failure status.

### 3.5.3.2.3. Presentation Context Acceptance Criterion

**Memory-Server** will accept any Presentation Context from Table 2.11.

**Table 35. Acceptable Presentation Contexts for Memory-Server**

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	UID	Name	UID	Name		
CT Image	1.2.840.10008.5.1.4.1.1.2	ILE	1.2.840.10008.1.2	SCP	None	
CT Image	1.2.840.10008.5.1.4.1.1.2	ELE	1.2.840.10008.1.2.1	SCP	None	
CT Image	1.2.840.10008.5.1.4.1.1.2	EBE	1.2.840.10008.1.2.2	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	ILE	1.2.840.10008.1.2	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	ELE	1.2.840.10008.1.2.1	SCP	None	
MR Image	1.2.840.10008.5.1.4.1.1.4	EBE	1.2.840.10008.1.2.2	SCP	None	
ECG Image	1.2.840.10008.5.1.4.1.1.9.1.2	ILE	1.2.840.10008.1.2	SCP	None	
ECG Image	1.2.840.10008.5.1.4.1.1.9.1.2	ELE	1.2.840.10008.1.2.1	SCP	None	
ECG Image	1.2.840.10008.5.1.4.1.1.9.1.2	EBE	1.2.840.10008.1.2.2	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	ILE	1.2.840.10008.1.2	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	ELE	1.2.840.10008.1.2.1	SCP	None	
NM Image	1.2.840.10008.5.1.4.1.1.20	EBE	1.2.840.10008.1.2.2	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	ILE	1.2.840.10008.1.2	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	ELE	1.2.840.10008.1.2.1	SCP	None	
CR Image	1.2.840.10008.5.1.4.1.1.1	EBE	1.2.840.10008.1.2.2	SCP	None	
SC Image	1.2.840.10008.5.1.4.1.1.7	ILE	1.2.840.10008.1.2	SCP	None	

Name	Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
	UID		Name	UID		
SC Image	1.2.840.10008.5.1.4.1.1.7		ELE	1.2.840.10008.1.2.1	SCP	None
SC Image	1.2.840.10008.5.1.4.1.1.7		EBE	1.2.840.10008.1.2.2	SCP	None
XA Image	1.2.840.10008.5.1.4.1.1.12.1		ILE	1.2.840.10008.1.2	SCP	None
XA Image	1.2.840.10008.5.1.4.1.1.12.1		ELE	1.2.840.10008.1.2.1	SCP	None
XA Image	1.2.840.10008.5.1.4.1.1.12.1		EBE	1.2.840.10008.1.2.2	SCP	None
RF Image	1.2.840.10008.5.1.4.1.1.12.2		ILE	1.2.840.10008.1.2	SCP	None
RF Image	1.2.840.10008.5.1.4.1.1.12.2		ELE	1.2.840.10008.1.2.1	SCP	None
RF Image	1.2.840.10008.5.1.4.1.1.12.2		EBE	1.2.840.10008.1.2.2	SCP	None

#### 3.5.3.2.4. *Transfer Syntax Selection Policies*

**Memory-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

## 3.6. Print-Server Specifications

**Print-Server** provides Standard Conformance to the following DICOM V3.0 Meta SOP Classes and DICOM V3.0 SOP Classes as an SCP:

**Table 36. Supported SOP Classes as SCP**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Basic Grayscale Print Management	1.2.840.10008.5.1.1.9
Print Job	1.2.840.10008.5.1.1.14

Support for the Basic Grayscale Print Management Meta SOP Class as an SCP also implies support for the following SOP Classes as an SCP. However, the **Print-Server** shall not accept individual Presentation Contexts for these SOP Classes.

**Table 37. Supported SOP Classes in the Meta Basic Grayscale 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

### 3.6.1. Association Establishment Policies

#### 3.6.1.1. General

The maximum PDU size that the Print-Server will use is configurable, with a minimum of 2K byte.

#### 3.6.1.2. Number of Associations

The number of simultaneous associations that will be accepted by Print-Server is limited only by the kernel parameters of the underlying TCP/IP implementation. **Print-Server** will spawn a new process for each connection request it receives. Therefore, **Print-Server** can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations, which the Application Entity represented, by **Print-Server** can maintain.

#### 3.6.1.3. Asynchronous Nature

**Print-Server** will only allow a single outstanding operation on an association. Therefore **Print-Server** will not perform asynchronous operations window negotiation.

#### 3.6.1.4. Implementation Identifying Information

**Print-Server** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

### 3.6.2. Association Initiation by Real-World Activity

**Print-Server** never initiates an association.

### 3.6.3. Association Acceptance Policy

**Print-Server** places no limitations on the number of simultaneous connections it will support. However, it is possible to control that may connect to **Print-Server** during the *system's* configuration process.

#### 3.6.3.1. Remote System Requests Verification

A remote system requests verification from the **Print-Server** by sending a C-ECHO command.

##### 3.6.3.1.1. Associated Real World Activity

**Print-Server** performs the Verification Service Class by responding with C-ECHO-RSP.

##### 3.6.3.1.2. Presentation Context Table

Any of the Presentation Contexts shown in Table 2.12 is acceptable to the **Print-Server**:

**Table 38. Acceptable Presentation Contexts for Print-Server**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	ELE	1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	EBE	1.2.840.10008.1.2.2	SCP	None

##### 3.6.3.1.2.1. SOP Specific Conformance to Verification SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Verification Service Class as an SCU for the Verification SOP Class, UID=1.2.840.10008.1.1.

##### 3.6.3.1.3. Presentation Context Acceptance Criterion

**Print-Server** will accept any Presentation Context from Table 2.12.

##### 3.6.3.1.4. Transfer Syntax Selection Policies

**Print-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

#### 3.6.3.2. Remote System Requests Image Print

A remote system requests image print from **Print-Server** by creating film sessions, film boxes and image boxes, changing their attributes and requesting the film boxes (or sessions) to be printed as defined in Part 4 of the standard.

### 3.6.3.2.1. Associated Real World Activity

The Real World activity associated with the image printing request is the printing of the images on the printer that is associated with the current **Print-Server** instance. **Print-Server** does not support attributes values that are not supported by the associated printer. The valid attributes values as well as the default values used for the associated printer are defined in a printer capabilities configuration file. **Print-Server** will issue a failure status if it is unable to handle the printing request properly.

### 3.6.3.2.2. Presentation Context Table

Any of the Presentation Contexts shown in Table 2.13 is acceptable to the **Print-Server**:

**Table 39. Acceptable Presentation Contexts for Print-Server**

Name	Abstract Syntax		Name	Transfer Syntax		Role	Ext. Neg.
	UID	UID		UID	UID		
Basic Grayscale Print Mgt.	1.2.840.10008.5.1.1.9		ILE	1.2.840.10008.1.2		SCP	None
Basic Grayscale Print Mgt.	1.2.840.10008.5.1.1.9		ELE	1.2.840.10008.1.2.1		SCP	None
Basic Grayscale Print Mgt.	1.2.840.10008.5.1.1.9		EBE	1.2.840.10008.1.2.2		SCP	None
Print Job	1.2.840.10008.5.1.1.14		ILE	1.2.840.10008.1.2		SCP	None
Print Job	1.2.840.10008.5.1.1.14		ELE	1.2.840.10008.1.2.1		SCP	None
Print Job	1.2.840.10008.5.1.1.14		EBE	1.2.840.10008.1.2.2		SCP	None

#### 3.6.3.2.2.1. SOP Specific Conformance to Basic Grayscale Print Management Meta SOP Class

**Print-Server** provides standard conformance as an SCP to the DICOM V3.0 Basic Grayscale Print Management Meta SOP Class, UID=1.2.840.10008.5.1.1.9, which consists of the following SOP Classes:

- Basic Film Session, UID=1.2.840.10008.5.1.1.1.
- Basic Film Box, UID=1.2.840.10008.5.1.1.2.
- Basic Grayscale Image Box, UID=1.2.840.10008.5.1.1.4.
- Printer, UID=1.2.840.10008.5.1.1.16.

The Specific Conformance Statement for each of these SOP Classes is described in the subsequent sections.

#### 3.6.3.2.2.2. SOP Specific Conformance to Basic Film Session SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Basic Film Session SOP Class, UID=1.2.840.10008.5.1.1.1, as an SCP.

**N-CREATE** - is sent by the SCU to create a Basic Film Session instance before the Basic Film Boxes are created.

#### Supported Attributes:

- **Number of Copies** - (2000,0010). Supported values are: 1 to 99. Default value is: 1.

- 
- **Print Priority** - (2000,0020). Supported values are: LOW, MEDIUM and HIGH. Default value is: LOW. Prioritization is supported by **Print-Server** regardless of the actual printer capabilities.
  - **Medium Type** - (2000,0030). Supported and default value is the one supported by the printer.
  - **Film Destination** - (2000,0040). Supported and default value is the one supported by the printer.
  - **Film Session Label** - (2000,0050). Any value is accepted but has no effect on the actual printing.
  - **Memory Allocation** - (2000,0060). Any value is accepted but has no effect on the actual printing.

If **Print-Server** returns one of the following status codes, it means that the N-CREATE has been unsuccessful.

- **0106** - Failure. Invalid attribute value. A list of invalid values is included in the response.
- **0210** - Failure. The previous film session has not been deleted.
- **B600** - Warning. Memory allocation is not supported.

**N-SET** - is used to update any attribute of the Basic Film Session instance subject to the limitations mentioned for N-CREATE.

If **Print-Server** returns one of the following status codes, it means that the N-SET has been unsuccessful:

- **0106** - Failure. Invalid attribute value. A list of invalid values is included in the response.
- **0210** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **B600** - Warning. Memory allocation is not supported.
- **C610** - Failure. Film Session has not been created.

**N-DELETE** - is used to delete all information describing the Basic Film Session. A status code **0112** is returned when the Film Session SOP Instance UID given is not in use, which results in a failure.

**N-ACTION** - is used to print a Film Session. The Film Boxes are printed in the order they were created. A Print Job SOP Instance is also created by the N-ACTION operation of the Film Session SOP Class.

If **Print-Server** returns one of the following status codes, it means that the N-ACTION has been unsuccessful:

- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **0211** - Failure. Unrecognized operation: the action type name is not PRINT.
- **0213** - Failure. Resource limitation.
- **B602** - Warning. Film session contains an empty film.
- **C600** - Failure. Film Session SOP instance hierarchy does not contain Film Box SOP Instances.
- **C610** - Failure. Film Session has not been created.



### 3.6.3.2.2.3. SOP Specific Conformance to Basic Film Box SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Basic Film Box SOP Class, UID=1.2.840.10008.5.1.1.2, as an SCP.

**N-CREATE** - is sent by the SCU to create a Basic Film Box once a Film Session has been successfully created. The Basic Film Box contains the presentation parameters common for all images on a given sheet of film.

The 'SLIDE' 'SUPERSLIDE' and 'CUSTOM' Image Display Format attribute (2010,0010) values are not supported. All other attributes are supported according to the actual printer capabilities. Default values are also taken from the printer capabilities configuration file.

If **Print-Server** returns one of the following status codes, it means that the N-CREATE was unsuccessful.

- **0106** - Failure. Invalid attribute value. A list of invalid values is included in the response.
- **0111** - Failure. Film Box UID given is already in use.
- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **0120** - Failure. Mandatory attributes are missing. A list of missing tags is included in the response.
- **C610** - Failure. Film Session has not been created.

**N-SET** - is used to update the Basic Film Box instance. Any Film Box in the current Film Session may be updated.

If **Print-Server** returns one of the following status codes, it means that the N-SET has been unsuccessful:

- **0106** - Failure. Invalid attribute value. A list of invalid values is included in the response.
- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **C600** - Failure. Film Session SOP Instance hierarchy does not contain Film Box SOP Instances.
- **C610** - Failure. Film Session has not been created.

**N-DELETE** - is used to delete the Basic Film Box. Any Film Box in the current Film Session may be deleted.

If **Print-Server** returns one of the following status codes, it means that the N-DELETE was unsuccessful:

- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **C600** - Failure. Film Session SOP instance hierarchy does not contain Film Box SOP Instances.

**N-ACTION** - is used to print one or more copies of a single film of the Film Box. A Print Job SOP Instance is also created by the N-ACTION operation of the Film Box SOP Class.

If **Print-Server** returns one of the following status codes, it means that the N-ACTION has been unsuccessful:

- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **0211** - Failure. Unrecognized operation: the action type name is not PRINT.
- **0213** - Failure. Resource limitation.
- **B603** - Failure. Film Box is empty.
- **C600** - Failure. Film Session SOP instance hierarchy does not contain Film Box SOP Instances.
- **C610** - Failure. Film Session has not been created.

#### 3.6.3.2.2.4. SOP Specific Conformance to Basic Grayscale Image Box SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Basic Grayscale Image Box SOP Class, UID=1.2.840.10008.5.1.1.4, as an SCP.

The Basic Grayscale Image Box contains the presentation parameters and image pixel data that apply to a single image of a sheet of film. The N-SET DIMSE service is used to update the Basic Grayscale Image Box instance. Any Grayscale Image Box in the current Film Box may be updated.

If **Print-Server** returns one of the following status codes, it means that the N-SET has been unsuccessful:

- **0106** - Failure. Invalid attribute value. A list of invalid values is included in the response.
- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.
- **0120** - Failure. Mandatory attributes are missing. A list of missing tags is included in the response.
- **0213** - Failure. Resource limitation.
- **C600** - Failure. Film Session SOP instance hierarchy does not contain Film Box SOP Instances.
- **C610** - Failure. Film Session has not been created.

#### 3.6.3.2.2.5. SOP Specific Conformance to Printer SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Printer SOP Class, UID=1.2.840.10008.5.1.1.16, as an SCP.

The Printer SOP Class is implemented using the N-EVENT-REPORT and N-GET DIMSE services. N-EVENT-REPORT is used to report the changes of the printer status to the SCU in an asynchronous way. If **Print-Server** returns one of the following status codes, it means that the N-GET has been unsuccessful:

- **0117** - Failure. Invalid printer instance UID.
- **0110** - Failure. Processing failure - Can't read Printer Info File.

#### 3.6.3.2.2.6. SOP Specific Conformance to Printer Job SOP Class

**Print-Server** provides standard conformance to the DICOM V3.0 Print Job SOP Class, UID=1.2.840.10008.5.1.1.14, as an SCP.

The Print Job SOP Class is created by a N-ACTION of the Film Session SOP Class or a N-ACTION of the Film Box SOP Class. The Print Job Instance is deleted after the films are printed or after a failure.

The number of printed jobs is limited only by the *system's* resources (mainly disk space).

The Print Job SOP Class is implemented using the N-EVENT-REPORT and N-GET DIMSE services. N-EVENT-REPORT is used to report execution status changes to the SCU in an asynchronous way. If **Print-Server** returns one of the following status codes, it means that the N-GET has been unsuccessful:

- **0112** - Failure. No such object instance: the Film Session SOP Instance UID given is not in use.

#### 3.6.3.2.3. Presentation Context Acceptance Criterion

**Print-Server** will accept any Presentation Context from Table 2.13.

#### 3.6.3.2.4. Transfer Syntax Selection Policies

**Print-Server** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.7. Print-Manager Specifications

**Print-Manager** provides Standard Conformance to the following DICOM V3.0 Meta SOP Classes and DICOM V3.0 SOP as an SCU:

**Table 40. Supported SOP Classes as SCU**

SOP Class Name	SOP Class UID
Basic Grayscale Print Manager	1.2.840.10008.5.1.1.9
Basic Color Print Management	1.2.840.10008.5.1.1.18
Print Job	1.2.840.10008.5.1.4.1.1.14

#### 3.7.1. Association Establishment Policies

##### 3.7.1.1. General

The maximum PDU size that the Print-Manager will use is configurable, with a minimum of 2K byte.

##### 3.7.1.2. Number of Associations

**Print-Manager** can have only one open connection at a given time.

##### 3.7.1.3. Asynchronous Nature

**Print-Manager** will only allow a single outstanding operation on an association. Therefore **Print-Manager** will not perform asynchronous operations window negotiation.

##### 3.7.1.4. Implementation Identifying Information

**Print-Manager** provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

#### 3.7.2. Association Initiation by Real-World Activity

##### 3.7.2.1. User Selects a Printer

###### 3.7.2.1.1. Associated Real World Activity

Print-Manager initiates an association when the user selects a new printer or when the film previewer is initialized. In case of printer selection, the previous association is closed.

###### 3.7.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.17 are proposed by **Print-Manager**.

**Table 41. Proposed Presentation Contexts for Print-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Basic Grayscale Print Mgt.	1.2.840.10008.5.1.1.9	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
Basic Color Print Mgt.	1.2.840.10008.5.1.1.8	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
Print Job	1.2.840.10008.5.1.1.14	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

### 3.7.2.1.2.1. SOP Specific Conformance Statement for Basic Grayscale Print Management Meta SOP Class

**Print-Manager** provides standard conformance as an SCU to the DICOM V3.0 Basic Grayscale Print Management Meta SOP Class, UID=1.2.840.10008.5.1.1.9, which consists of the following SOP Classes:

- Basic Film Session, UID=1.2.840.10008.5.1.1.1.
- Basic Film Box, UID=1.2.840.10008.5.1.1.2.
- Basic Grayscale Image Box, UID=1.2.840.10008.5.1.1.4.
- Printer, UID=1.2.840.10008.5.1.1.16.

### 3.7.2.1.2.2. SOP Specific Conformance Statement for Basic Colour Print Management Meta SOP Class

**Print-Manager** provides standard conformance as an SCU to the DICOM V3.0 Basic Color Print Management Meta SOP Class, UID=1.2.840.10008.5.1.1.18, which consists of the following SOP Classes:

- Basic Film Session, UID=1.2.840.10008.5.1.1.1.
- Basic Film Box, UID=1.2.840.10008.5.1.1.2.
- Basic ColorImage Box, UID=1.2.840.10008.5.1.1.4.1.
- Printer, UID=1.2.840.10008.5.1.1.16.

### 3.7.2.1.2.3. SOP Specific Conformance Statement for Print Job SOP Class

**Print-Manager** provides standard conformance as an SCU to the DICOM V3.0 Print Job SOP Class, UID=1.2.840.10008.5.1.1.14.

## 3.7.3. Association Acceptance Policy

**Print-Manager** never accepts an association.

### 3.8. DentaCT-Print Specifications

DentaCT-Print provides Standard Conformance to the following DICOM V3.0 Meta SOP Classes and DICOM V3.0 SOP as an SCU:

**Table 42. Supported SOP Classes as SCU**

SOP Class Name	SOP Class UID
Basic Grayscale Print Manager	1.2.840.10008.5.1.1.9
Print Job	1.2.840.10008.5.1.4.1.1.14

#### 3.8.1. Association Establishment Policies

##### 3.8.1.1. General

The maximum PDU size that the DentaCT-Print will use is configurable, with a minimum of 2K byte.

##### 3.8.1.2. Number of Associations

DentaCT-Print can have only one open connection at a given time.

##### 3.8.1.3. Asynchronous Nature

DentaCT-Print will only allow a single outstanding operation on an association. Therefore DentaCT-Print will not perform asynchronous operations window negotiation.

##### 3.8.1.4. Implementation Identifying Information

DentaCT-Print provides a single Implementation Class UID that is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.

#### 3.8.2. Association Initiation by Real-World Activity

##### 3.8.2.1. User Selects a Printer

###### 3.8.2.1.1. Associated Real World Activity

DentaCT-Print initiates an association when the user selects to print from the DentaCT application.

###### 3.8.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.18 are proposed by DentaCT-Print.

**Table 2.18 Proposed Presentation Contexts for DentaCT-Print**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Basic Grayscale Print Mgt.	1.2.840.10008.5.1.1.9	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
Print Job	1.2.840.10008.5.1.1.14	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

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#### **3.8.2.1.2.1. SOP Specific Conformance Statement for Basic Grayscale Print Management Meta SOP Class**

**DentaCT-Print** provides standard conformance as an SCU to the DICOM V3.0 Basic Grayscale Print Management Meta SOP Class, UID=1.2.840.10008.5.1.1.9, which consists of the following SOP Classes:

- Basic Film Session, UID=1.2.840.10008.5.1.1.1.
- Basic Film Box, UID=1.2.840.10008.5.1.1.2.
- Basic Grayscale Image Box, UID=1.2.840.10008.5.1.1.4.
- Printer, UID=1.2.840.10008.5.1.1.16.

#### **3.8.2.1.2.2. SOP Specific Conformance Statement for Print Job SOP Class**

**DentaCT-Print** provides standard conformance as an SCU to the DICOM V3.0 Print Job SOP Class, UID=1.2.840.10008.5.1.1.14.

### **3.8.3. Association Acceptance Policy**

**DentaCT-Print** never accepts an association.

### 3.9. StorageComm-Manager Specifications

StorageComm-Manager provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

**Table 43. SOP Classes supported as SCU**

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

Te following DICOM V3.0 SOP Classes as an SCP only:

**Table 44. SOP Classes supported as SCU**

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

#### 3.9.1. Association Establishment Policies

##### 3.9.1.1. General

The maximum PDU size, which the **StorageComm-Manager** will use, is configurable, with a minimum of 2K byte.

##### 3.9.1.2. Number of Associations

The number of simultaneous associations that will be accepted by **StorageComm-Manager** is limited only by the kernel parameters of the underlying TCP/IP implementation. **StorageComm-Manager** will spawn a new process for each connection request it receives. Therefore, **StorageComm-Manager** can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations that the Application Entity represented by **StorageComm-Manager** can maintain.

##### 3.9.1.3. Asynchronous Nature

**StorageComm-Manager** will only allow a single outstanding operation on an association. Therefore **StorageComm-Manager** will not perform asynchronous operations window negotiation.

##### 3.9.1.4. Implementation Identifying Information

**StorageComm-Manager** provides a single Implementation Class UID, which is 1.2.840.113704.7.0.2. The Application Context Name is 1.2.840.10008.3.1.1.1.



### 3.9.2. Association Initiation by Real-World Activity

**StorageComm-Manager** will attempt to initiate a new association when requested to commit the images that were stored on the remote device, which support the Storage Commitment Service.

#### 3.9.2.1. Image was Stored on the Remote Device with Storage Commitment

##### 3.9.2.1.1. Associated Real World Activity

The associated Real-Word Activity is a response about successful completion of storage request from the remote storage device.

##### 3.9.2.1.2. Proposed Presentation Contexts

All the Presentation Contexts shown in Table 2.16 are proposed by **StorageComm-Manager**:

**Table 45. Proposed Presentation Contexts for StorageComm-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

##### 3.9.2.1.2.1. SOP Specific Conformance Statement for Storage Commitment Push Model

**StorageComm-Manager** provides standard conformance to the DICOM V3.0 Storage Commitment Service Class using Push Model as an SCU for the following SOP Class UID: 1.2.840.10008.1.20.1 and SOP Instance UID: 1.2.840.10008.1.20.1.1.

Multiple N-ACTION requests can be performed over a single association. Multiple N-EVENT-REPORT requests can be accepted over a single association. After all N-ACTION requests that are waiting in the stack are issued, association will be closed with the timeout of 60 sec.

### 3.9.3. Association Acceptance Policy

**StorageComm-Manager** places no limitations on the number of simultaneous connections it will support.

#### 3.9.3.1. Remote System Requests Verification

A remote system requests verification from **StorageComm-Manager** using the C-ECHO command.

##### 3.9.3.1.1. Associated Real World Activity

**StorageComm-Manager** performs the Verification Service Class by responding with C-ECHO-RSP.

**3.9.3.1.2. Presentation Context Table**

The following Presentation Contexts are acceptable to the **StorageComm-Manager**.

**Table 46. Acceptable Presentation Contexts for StorageComm-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

**3.9.3.1.2.1. SOP Specific Conformance to Verification SOP Class**

**StorageComm-Manager** provides standard conformance to the DICOM V3.0 Verification Service Class as an SCP for the Verification SOP Class, UID=1.2.840.10008.1.1.

**3.9.3.1.3. Presentation Context Acceptance Criterion**

**StorageComm-Manager** will accept any Presentation Context from Table 2.3.

**3.9.3.1.4. Transfer Syntax Selection Policies**

**StorageComm-Manager** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

**3.9.3.2. Remote System Storage Commitment Report**

A remote system reports about storage commitment completion using the N-EVENT-REORT command.

**3.9.3.2.1. Associated Real World Activity**

The Real World activity associated with the N-EVENT-REORT operation is the completion of the storage commitment by the remote device. **StorageComm-Manager** will issue a failure status if it is unable to handle in proper way the storage commitment report event.

**3.9.3.2.2. Presentation Context Table**

The following Presentation Contexts are acceptable to the **StorageComm-Manager**.

**Table 47. Acceptable Presentation Contexts for StorageComm-Manager**

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

**3.9.3.2.2.1. SOP Specific Conformance to Storage Commitment Push Model**

**StorageComm-Manager** provides standard conformance to the DICOM V3.0 Storage Commitment Service Class using Push Model as an SCP for the SOP Class UID: 1.2.840.10008.1.20.1

**3.9.3.2.3. Presentation Context Acceptance Criterion**

**StorageComm-Manager** will accept any Presentation Context from Table 2.4.

**3.9.3.2.4. Transfer Syntax Selection Policies**

**StorageComm-Manager** prefers an explicit Transfer Syntax encoding. If offered a choice of Transfer Syntax's in a Presentation Context, it will apply the following priorities to the choice of Transfer Syntax:

- DICOM Explicit VR Big Endian.
- DICOM Explicit VR Little Endian.
- DICOM Implicit VR Little Endian (Default).

### 3.10. Media AE Specification

*(MxView Only)*

AE provides Standard Conformance to the DICOM Media Storage Service and File Format (PS 3.10) and the Media Storage Application Profiles (PS 3.11).

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in the following table.

**Table 48. Supported Application Profiles**

Application Profile	Identifier	Real World Activity	Role	SC Option
CT/MR Studies on CD-R	STD-CTMR-CD	Write Images(s) on CD-R disk	FSC	Interchange
		Read Images(s) from CD-R disk	FSR	Interchange

#### 3.10.1. Create file

##### 3.10.1.1. Application Entity Title

The Application Entity title is registered into the DICOM File Meta Information header and is supported by the CD-writer (CD write option) acting as a FSC.

**Application Entity Title:** "MXVCDR" (configurable)

##### 3.10.1.2. Real World activity

The SOP instances provided by the RWA are written to the CD-R media and a corresponding DICOMDIR is created.

##### 3.10.1.3. Application Profiles

The following Table gives an overview of the supported SOP Classes for each Application Profiles.

**Table 49. Conformance supported Application Profiles**

Application Profile Identifier	Supp. SOP Classes Name	UID	Supported Transfer Syntaxes Name	UID
CT/MR Studies on CD-R	CT Image	1.2.840.10008.5.1.4.1.1.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	MR Image	1.2.840.10008.5.1.4.1.1.4	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	NM Image	1.2.840.10008.5.1.4.1.1.20	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	CR Image	1.2.840.10008.5.1.4.1.1.1	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	RF Image	1.2.840.10008.5.1.4.1.1.12.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	SC Image	1.2.840.10008.5.1.4.1.1.7	ELE	1.2.840.10008.1.2.1

### 3.10.1.4. DICOMDIR keys

**Table 50. Supported attributes in the DICOMDIR**

Dicom Tag	Description
0002:0001	File Meta Information Version
0002:0002	UI Media Storage Sop Class UID
0002:0003	UI Media Storage Sop Instance UID
0002:0010	UI Transfer Syntax UID
0002:0012	UI Implementation Class UID
0004:1130	File Set ID
0004:1200	First Directory Record Offset
0004:1202	Last Directory Record Offset
0004:1212	File Set Consistency Flag
0004:1220	Directory Record Sequence
0004:1400	Offset Of The Next Dir Record
0004:1410	Record In Use Flag
0004:1420	Offset Of Ref Lower Level Dir Ent
0004:1430	Directory Record Type
0010:0010	Patient's Name
0010:0020	Patient ID
0004:1400	Offset Of The Next Dir Record
0004:1410	Record In Use Flag
0004:1420	Offset Of Ref Lower Level Dir Ent
0004:1430	Directory Record Type
0004:1500	Referenced File ID
0008:0020	Study Date
0008:0030	Study Time
0008:0050	Accession Number
0008:1030	Study Description
0010:0010	Patient's Name
0010:0020	Patient ID
0020:000D	Study Instance UID
0020:0010	Study ID
0020:1206	Number Of Study Related Series
0020:1208	Number Of Study Related Images
07A1:0010	Implementor ID
07A1: 1001	Number Of Series In Study
07A1: 1003	Last Update Time
07A1: 1004	Last Update Date
07A1: 1014	Protection Flag
0004:1400	Offset Of The Next Dir Record
0004:1410	Record In Use Flag
0004:1420	Offset Of Ref Lower Level Dir Ent
0004:1430	Directory Record Type

Dicom Tag	Description
0004:1500	Referenced File ID
0008:0060	Modality
0018:1030	Protocol Name
0020:000E	Series Instance UID
0020:0011	Series Number
0020:1209	
07A1:0010	Implementor ID
07A1: 1002	Number Of Images In Series
07A1: 1003	Last Update Time
07A1: 1004	Last Update Date
0004:1400	Offset Of The Next Dir Record
0004:1410	Record In Use Flag
0004:1420	Offset Of Ref Lower Level Dir Ent
0004:1430	Directory Record Type
0004:1500	Referenced File ID
0004:1510	Referenced Sop Class UID In File
0004:1511	Ref Sop Instance UID In File
0004:1512	
0008:0008	Image Type
0008:0012	Instance Creation Date
0008:0013	Instance Creation Time
0008:0016	SOP Class UID
0008:0018	SOP Instance UID
0008:0023	Image Date
0008:0033	Image Time
0018:0010	Contrast/Bolus Agent
0018:1120	Gantry/Detector Tilt
0020:0013	Image Number
0020:0052	Frame of Reference UID
0020:1041	Slice Location
0028:0002	Samples per Pixels
0028:0010	Rows
0028:0011	Columns
0028:0100	Bits Allocated
07A1:0010	Implementor ID
00E1: 1040	Image Label

**3.10.2. Read file**

**3.10.2.1. Application Entity Title**

The Application Entity title is registered into the DICOM File Meta Information header and is supported by the CD-writer (CD write option) acting as a FSR.

**Application Entity Title:** "MXVCDR" (configurable)

**3.10.2.2. Real World activity**

The SOP instances provided by the RWA are read from the CD-R media.

**3.10.2.3. Application Profiles**

The following Table gives an overview of the supported SOP Classes for each Application Profiles.

**Table 51. Conformance supported Application Profiles**

Application Profile Identifier	Supp. SOP Classes Name	UID	Supported Transfer Syntaxes Name	UID
CT/MR Studies on CD-R	CT Image	1.2.840.10008.5.1.4.1.1.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	MR Image	1.2.840.10008.5.1.4.1.1.4	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	NM Image	1.2.840.10008.5.1.4.1.1.20	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	CR Image	1.2.840.10008.5.1.4.1.1.1	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	RF Image	1.2.840.10008.5.1.4.1.1.12.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	EGC Image	1.2.840.10008.5.1.4.1.1.9.1.2	ELE	1.2.840.10008.1.2.1
CT/MR Studies on CD-R	SC Image	1.2.840.10008.5.1.4.1.1.7	ELE	1.2.840.10008.1.2.1

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## 4. COMMUNICATION PROFILES

### 4.1. Supported Communications Stacks (Parts 8,9)

The *System* provides DICOM v3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

### 4.2. TCP/IP Stack

All the Application Entities in the *System* inherit their TCP/IP stack from the UNIX System upon which they operate.

#### 4.2.1. Physical Media Support

- The *System* is indifferent to the physical medium over which TCP/IP operates.



## 5. EXTENSIONS/SPECIALIZATIONS/PRIVATISATIONS

### 5.1. Transfer syntax conversion

The *system* supports transfer syntax conversion according to the following table:

**Table 52. Transfer Syntax Conversion**

Source Syntax	Destination Syntax		
	ILE	ELE	EBE
ILE	+	+	+
ELE	+	+	+
EBE	+	+	+

### 5.2. Mapping between UI elements and DICOM attributes

**Table 53. Mapping between UI elements and DICOM attributes**

DICOM Attribute name	Tag	UI Element	Note
Patient Name	(0008,0012)	Patient	
Scheduled Procedure Step ID	(0040,0201)	Examination ID	

### 5.3. Extended CT Image Storage SOP Class

The following table gives an overview of the extended attributes for the CT Image Storage SOP Class. These attributes will send out only, if the information is received from a RIS/HIS before.

**Table 54. Extended Attributes of CT Image Storage SOP Class**

Attribute Name	Tag	Note
Medical Alerts	0010,2000	
Additional Patient History	0010,21B0	
Contrast Allergies	0010,2110	
Special Needs	0038,0050	
Pregnancy Status	0010,21C0	
Patient State	0038,0500	

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## 6. CONFIGURATION

### 6.1. AE Title/Presentation Address Mapping

This mapping (including IP and port numbers) is defined during the *system* Network Configuration procedure.

### 6.2. Configurable Parameters

- Calling AE Titles
- Called AE Titles
- Maximum PDU size.
- Disable arbitrary Transfer Syntaxes to be proposed at the Association negotiation
- Disable generation of Icon Image sequence
- Disable generation of DICOM overlays (“burn-in” instead)

### 6.3. Un-Configurable Parameters

- There is not support for dots removal from Dicom Date attributes.
- Configurable option to remove private tags from the received images isn't supported.

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## 7. SUPPORT OF EXTENDED CHARACTER SETS

### 7.1. Extended Character sets

The following extended character sets are supported (for Storage, Modality Worklist requests and MPPS Set):

1. Latin ISO\_IR 100 ISO 8859-1 Latin Alphabet No. 1 Supplementary Set

## ANNEX 1. Created CT Image

**Table 55. CT Image Storage SOP Class - C-STORE-RQ - Patient Module**

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Other Patient IDs	0010,1000	
Patient's Birth Date	0010,0030	
Referenced Patient Sequence	0008,1120	
Patient's Sex	0010,0040	

**Table 56. CT Image Storage SOP Class - C-STORE-RQ - General Study Module**

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Study Description	0008,1030	
Study Instance UID	0020,000D	
Referenced Study Sequence	0008,1110	
Procedure Code Sequence	0008,1032	
Study ID	0020,0010	

**Table 57. CT Image Storage SOP Class - C-STORE-RQ - Patient Study Module**

Attribute Name	Tag	Note
Patient's Weight	0010,1030	
Patient's Age	0010,1010	

**Table 58. CT Image Storage SOP Class - C-STORE-RQ - General Series Module**

Attribute Name	Tag	Note
Modality	0008,0060	Applied Value(s): CT
Operator's Name	0008,1070	
Protocol Name	0018,1030	
Patient Position	0018,5100	
Series Instance UID	0020,000E	
Series Number	0020,0011	
Series Description	0008,103E	
Performed Procedure Step Description	0040,0254	
Laterality	0020,0060	

**Table 59. CT Image Storage SOP Class - C-STORE-RQ - Frame of Reference Module**

Attribute Name	Tag	Note
Frame of Reference UID	0020,0052	

Attribute Name	Tag	Note
Position Reference Indicator	0020,1040	

**Table 60. CT Image Storage SOP Class - C-STORE-RQ - General Equipment Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips
Institution Name	0008,0080	
Institution Address	0008,0081	Applied Value(s): Haifa, MATAM
Station Name	0008,1010	
Institutional Department Name	0008,1040	
Manufacturer's Model Name	0008,1090	Applied Value(s): Mx8000
Software Version(s)	0018,1020	

**Table 61. CT Image Storage SOP Class - C-STORE-RQ - General Image Module**

Attribute Name	Tag	Note
Image type	0008,0008	
Acquisition Date	0008,0022	
Content Date	0008,0023	
Acquisition Time	0008,0032	
Content Time	0008,0033	
Instance Number	0020,0013	
Image Comments	0020,4000	
Referenced Image Sequence	0008,1140	
Icon Image Sequence	0088,0200	Optional
>Samples per Pixel	0028,0002	1
>Photometric Interpretation	0028,0004	MONOCHROME2
>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	

**Table 62. CT Image Storage SOP Class - C-STORE-RQ - Image Plane Module**

Attribute Name	Tag	Note
Slice Thickness	0018,0050	
Image Position (Patient)	0020,0032	
Image Orientation (Patient)	0020,0037	
Slice Location	0020,1041	
Pixel Spacing	0028,0030	

**Table 63. CT Image Storage SOP Class - C-STORE-RQ - Image Pixel Module**

Attribute Name	Tag	Note
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Attribute Name	Tag	Note
Rows	0028,0010	
Columns	0028,0011	
Pixel Representation	0028,0103	
Pixel Data	7FE0, 0010	

**Table 64. CT Image Storage SOP Class - C-STORE-RQ - Contrast/bolus Module**

Attribute Name	Tag	Note
Contrast/Bolus Agent	0018,0010	
Contrast/Bolus Route	0018,1040	
Contrast Flow Duration(s)	0018,1047	
Contrast Flow Rate(s)	0018,1046	
Contrast/Bolus Ingredient	0018,1049	
Contrast/Bolus Volume	0018,1041	

**Table 65. CT Image Storage SOP Class - C-STORE-RQ - Ct Image Module**

Attribute Name	Tag	Note
Image Type	0008,0008	Applied Value(s): ORIGINALPRIMARYAXIAL
Scan Options	0018,0022	
KVP	0018,0060	
Data Collection Diameter	0018,0090	
Reconstruction Diameter	0018,1100	
Gantry/Detector Tilt	0018,1120	
Table Height	0018,1130	
Rotation Direction	0018,1140	
Exposure Time	0018,1150	
X-Ray Tube Current	0018,1151	
Exposure	0018,1152	
Filter Type	0018,1160	
Convolution Kernel	0018,1210	
Acquisition Number	0020,0012	
Samples per Pixel	0028,0002	
Photometric Interpretation	0028,0004	
Bits Allocated	0028,0100	Applied Value(s): 16
Bits Stored	0028,0101	Applied Value(s): 12, 13, 14, 15, 16
High Bit	0028,0102	
Rescale Intercept	0028,1052	
Rescale Slope	0028,1053	

**Table 66. CT Image Storage SOP Class - C-STORE-RQ - Voi Lut Module**

Attribute Name	Tag	Note
Window Center	0028,1050	
Window Width	0028,1051	

Philips Medical Systems 455019003021

**Table 67. CT Image Storage SOP Class - C-STORE-RQ - Sop Common Module**

Attribute Name	Tag	Note
Instance Creation Date	0008,0012	
Instance Creation Time	0008,0013	
Specific Character Set	0008,0005	
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	

## ANNEX 2. Created General EGC Image

**Table 68. General EGC Image - Patient Module**

Attribute Name	Tag	Note
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	
Patient's Sex	0010,0040	

**Table 69. General EGC - General Study Module**

Attribute Name	Tag	Note
Study Date	0008,0020	
Study Time	0008,0030	
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	
Study Instance UID	0020,000D	
Study ID	0020,0010	

**Table 70. General EGC - General Series Module**

Attribute Name	Tag	Note
Series Instance UID	0020,000E	
Series Number	0020,0011	
Modality	0008,0060	Applied Value(s): EGC

**Table 71. General EGC – Synchronization Module**

Attribute Name	Tag	Note
Synchronization Frame of Reference UID	0020,0200	
Synchronization Trigger	0018,106A	
Synchronization Channel	0018,106C	
Acquisition Time Synchronized	0018,1800	

**Table 72. General EGC - General Equipment Module**

Attribute Name	Tag	Note
Manufacturer	0008,0070	Applied Value(s): Philips

**Table 73. General EGC – Waveform Identification**

Attribute Name	Tag	Note
Instance Number	0020,0013	
Content Date	0008,0023	
Content Time	0008,0033	
Acquisition Datetime	0008,002A	



**Table 74. General EGC – Waveform**

Attribute Name	Tag	Note
Waveform Sequence	5400,0100	
> Multiplex Group Time Offset	0018,1068	
> Waveform Originality	003A, 0004	
> Number of Waveform Channels	003A, 0005	
>Number of Waveform Samples	003A, 0010	
> Sampling Frequency	003A, 001A	
> Channel Definition Sequence	003A, 0200	
>> Channel Source Sequence	003A, 0208	
>>Channel Sample Skew	003A, 0215	
>> Waveform Bits Stored	003A, 021A	
> Waveform Bits Allocated	5400,1004	
> Waveform Sample Interpretation	5400,1006	
> Waveform Data	5400,1010	

**Table 75. General EGC – Acquisition Context**

Attribute Name	Tag	Note
Acquisition Context Sequence	0040,0555	

**Table 76. General EGC– Sop Common Module**

Attribute Name	Tag	Note
SOP Class UID	0008,0016	
SOP Instance UID	0008,0018	