XPert P&R Software Version 5.5 and Acquisition software Version 6.0

DICOM Conformance Statement

Elgems Ltd.

December 13, 2002

Direction # 2289763-100

INTRODUCTION **4**

OVERVIEW 4
OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE 4
INTENDED AUDIENCE 6
SCOPE AND FIELD OF APPLICATION 7
IMPORTANT REMARKS 7
REFERENCES 8
DEFINITIONS 8
SYMBOLS AND ABBREVIATIONS 8

SECTION 1 - IMPLEMENTATION MODEL **9**

1.1 APPLICATION DATA FLOW DIAGRAM 9
1.2 FUNCTIONAL DEFINITIONS OF AE'S 10
1.2 FUNCTIONAL DEFINITIONS OF AE'S 11
1.2 FUNCTIONAL DEFINITIONS OF AE'S 12
1.3 SEQUENCING OF REAL WORLD ACTIVITIES 12

SECTION 2 - AE SPECIFICATIONS **13**

2.1 XPERT - SPECIFICATION 13
2.1.1 Association Establishment Policies *14*
2.1.1.1 General 14
2.1.1.2 Number of Associations 14
2.1.1.3 Asynchronous Nature 14
2.1.1.4 Implementation Identifying Information 14
2.1.2 Association Initiation Policy *14*
2.1.2.1 Local system requests verification 14
2.1.2.2 User clicks on remote system icon, User Selects a Study 15
2.1.2.3 Image sent to remote system 16
2.1.2.4 Application Request for Image Transfer 18
2.1.2.5 Remote system Request Image Transfer 19
2.1.2.6 Local system requests to print image 20
2.1.2.7 User clicks on Worklist button 20
2.1.3 Association Acceptance Policy *21*
2.1.3.1 Remote System Request Verification 21
2.1.3.2 Remote System Request Image Storage 22
2.1.3.3 Remote System Request Image Transfer 22
2.1.3.4 Remote System Initiate Query Request 23
2.1.3.4.1 Associated Read-World Activity 23

SECTION 3 - COMMUNICATION PROFILES **25**

3.1 SUPPORTED COMMUNICATION STACKS (PARTS 8,9) 25
3.2 TCP/IP STACK 25
3.2.1 Physical Media Support *25*

SECTION 4 - SPECIALIZATION **25**

SECTION 5 - CONFIGURATION **25**

5.1 AE TITLE/PRESENTATION ADDRESS MAPPING 25
5.2 CONFIGURABLE PARAMETERS 25

SECTION 6 - SUPPORT OF EXTENDED CHARACTER SETS **25**

SECTION 7 – STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL DEFINITION **26**

7.1 INTRODUCTION 26
7.2 STUDY ROOT INFORMATION MODEL DESCRIPTION 26
7.3 STUDY ROOT INFORMATION MODEL ENTITY-RELATIONSHIP MODEL 26
7.3.1 Entity Description *27*
7.3.1.1 Study Entity Description 27
7.3.1.2 Series Entity Description 27
7.3.1.3 Image Entity Description 27

7.3.2 Xpert/VG Mapping of DICOM Entities *28*
7.4 INFORMATION MODEL KEYS 28
7.4.1 Supported Filtering *28*
7.4.2 Study Level *28*
7.4.3 Series Level *29*
7.4.4 Image Level *29*
7.5 PRIVATE DATA DICTIONARY 30

SECTION 8 – MODALITY WORKLIST INFORMATION MODEL DEFINITION 30

8.1 INTRODUCTION 30
8.2 MODALITY WORKLIST INFORMATION MODEL ENTITY-RELATIONDHIP MODEL 30
8.2.1 Entity Descriptions *31*
8.2.2 XPERT Mapping of DICOM entities *32*
8.3 INFORMATION MODEL MODULE TABLE 32
8.4 INFORMATION MODEL KEYS 33
8.4.1 Supported Matching *33*
8.4.2 Sheduled Procedure Step Entity *33*
8.4.2.1 Scheduled Procedure Step Module 33
8.4.3 Requested Procedure Entity *34*
8.4.3.1 Requested Procedure Module 34
8.4.4 Imaging Service Request Entity *34*
8.4.4.1 Imaging Service Request Module 34
8.4.5 Patient Entity *35*
8.4.5.1 Patient Identification 35
8.4.5.2 Patient Demographic 35
8.5 PRIVATE DATA DICTIONARY 35

SECTION 9 – PRINT MANAGEMENT SOP CLASS DEFINITION 35

9.1 INTRODUCTION 35
9.2 PRINT MANAGEMENT SOP CLASS DEFINITIONS 36
9.2.1 Basic Film Session SOP Class *36*
9.2.1.1 IOD Description 36
9.2.1.2 DIMSE Service Group 36
9.2.2 Basic Film Box SOP Class *37*
9.2.2.1 IOD Description 37
9.2.2.2 DIMSE Service Group 39
9.2.3 Image Box SOP Classes : Basic Grayscale Image Box SOP Class, Basic Color Image Box SOP Class *41*
9.2.3.1 IOD description 41
9.2.3.2 DIMSE Service Group 44

APPENDIX A – PRIVATE DATA DICTIONARY 45

Introduction

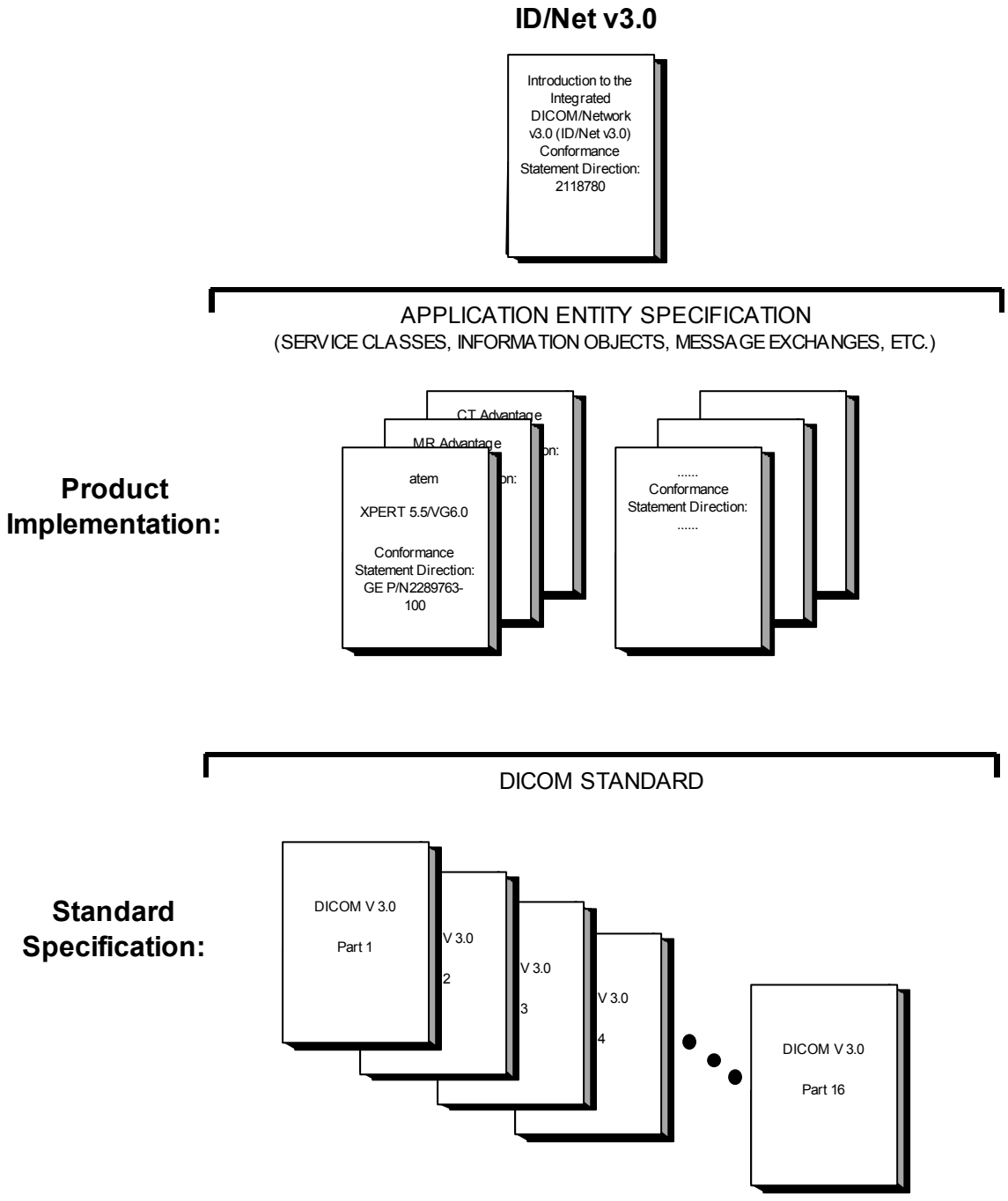
Overview

This DICOM Conformance Statement is divided into Sections as described below:
Introduction, which describes the overall structure, intent, and references for this Conformance Statement.
Section 1 (Implementation Model), which describes the Application Entities in the implementation with networking capability and how they relate to both local and remote Real-World Activities.
Section 2 (AE Specifications). This section in the DICOM Conformance Statement is a set of Application Entity Specifications.
Section 3 (Communication Profiles), which specifies Communication Profiles are supported.
Section 4 (Specialization).
Section 5 (Configuration).
Section 6 (Support of Extended Character Sets).
Section 7 (Study Root Query/Retrieve Information Model Definition),which specifies the use of the DICOM Study Root Query/Retrieve Model used to organize data and against which a Query/Retrieve will be performed.
Section 8 (Modality Worklist Information Model Definition), which specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed.
Section 9 (Print Management SOP Class Definition) ,which specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behaviour.
Appendix A (Private Data Dictionary),which provides value representation and multiplicity information for all of the Private Attributes, used by this implementation.

This Document provides the DICOM conformance statement for the **XPert and Acquisition** software implementation of the DICOM-3.0 standard.
In the following text the words **'XPERT'** and '**XPert**' refer to both **XPert** version 5.5 and **Acquisition** software version 6.0.
There are some Dicom services that is supported by **Xpert** and is not supported by **Acquisition** software and vice-versa. This document denotes such differences.

Overall DICOM Conformance Statement Document Structure

The Documentation Structure of the GEMS Conformance Statements and their relationship with the DICOM Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

XPert P&R Software Version 5.5 and
Acquisition software Version 6.0
Conformance Statement for DICOM
Direction GE P/N 2289763-100

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEMS network interface. Introductory information, which is applicable to all GEMS Conformance Statements, is described in the document:

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement
Direction: 2118780.

This Introduction familiarizes the reader with DICOM terminology and general concepts. It should be read prior to reading the individual products' GEMS Conformance Statements.

The GEMS Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information including Network Architecture and basic DICOM concepts, please refer to the Introduction.

For the convenience of software developers, there is "collector" Direction available. By ordering the collector, the Introduction described above and all of the currently published GEMS Product Conformance Statements will be received. The collector Direction is:

ID/Net v3.0 Conformance Statements
Direction: 2117016

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209
USA
Phone: +1–703-841-3200

Intended Audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standards and with the terminology and concepts which are used in those Standards.

If readers are unfamiliar with DICOM terminology they should first refer to the document listed below, then read the DICOM Standard itself, prior to reading this DICOM Conformance Statement document.

Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement
Direction: 2118780

Scope and field of application

It is the intent of this document, in conjunction with the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*, to provide an unambiguous specification for GEMS implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEMS medical data exchanged using DICOM. The GEMS Conformance Statements are available to the public.
The reader of this DICOM Conformance Statement should be aware that different GEMS devices are capable of using different Information Object Definitions. For example, a GEMS CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.
Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEMS implementation. If the user encounters unspecified private data elements while parsing a GEMS Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEMS devices.

Important remarks

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.

Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard.

DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEMS protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices, which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these DICOM Conformance Statements**. The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction** - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

References

A list of references, which is applicable to all GEMS Conformance Statements, is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*
The information object implementation refers to DICOM PS 3.3 (Information Object Definition).

Definitions

A set of definitions, which is applicable to all GEMS Conformance Statements, is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

Symbols and abbreviations

A list of symbols and abbreviations, which is applicable to all GEMS Conformance Statements, is included in the *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*.

Section 1 - Implementation Model

XPert are a multi-modality view and processing station. It uses the DICOM protocol to provide the following services:

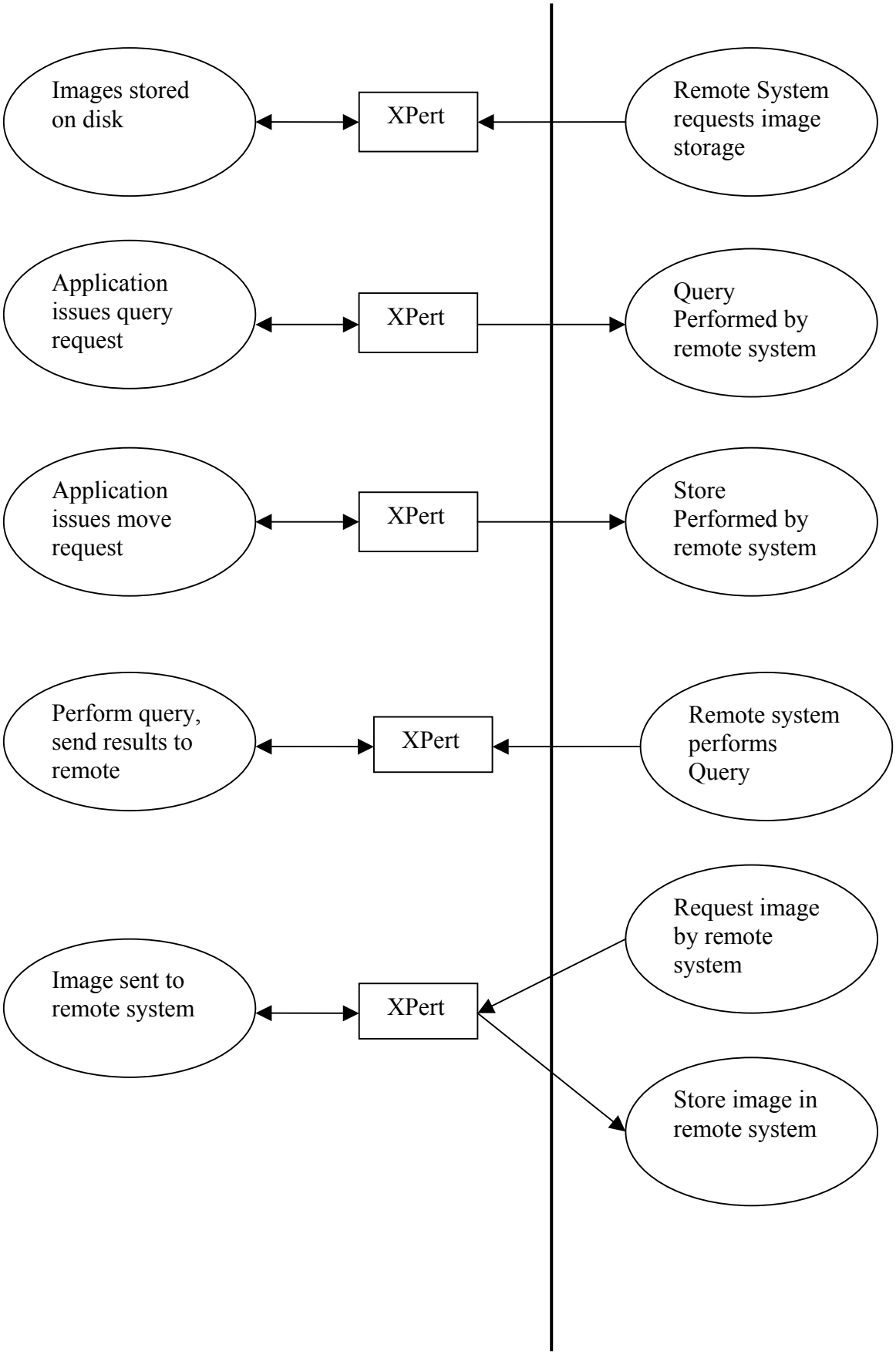
- Query remote databases
- Retrieve images from remote databases
- Print images on remote printers
- Enable access to its data base
- Send images to remote stations
- Store images sent by remote stations
  Note: this service is not supported by **Acquisition** software.
- Query remote databases for worklist
  Note: this service is supported only by **Acquisition** software.

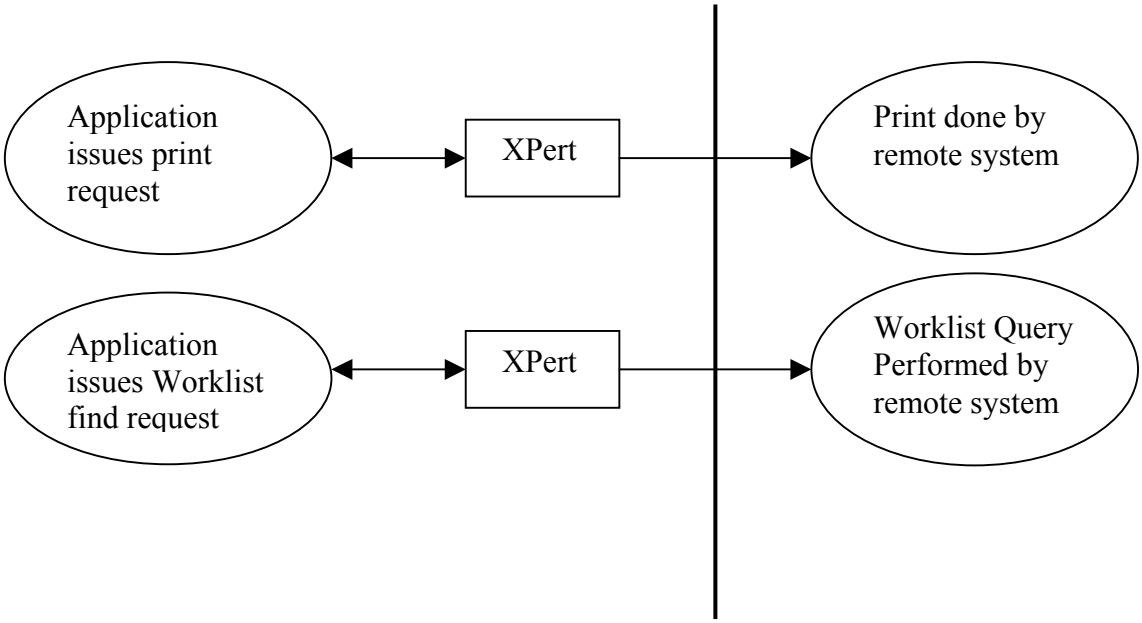
1.1 Application Data Flow Diagram

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

XPERT - This AE serves as the interface to all DICOM services as SCU and SCP.
As SCP it provides the DICOM find, move, storage and verification services.
As SCU it uses DICOM find, move, find worklist, print, and verification services.
Note:

- Find worklist service is supported only by **Acquisition** software.
- Storage service is not supported by **Acquisition** software.


Images stored on disk
XPert
Remote System requests image storage
Application issues query request
XPert
Query Performed by remote system
Application issues move request
XPert
Store Performed by remote system
Perform query, send results to remote
XPert
Remote system performs Query
Request image by remote system
Image sent to remote system
XPert
Store image in remote system
DICOM


Application issues print request
XPert
Print done by remote system
Application issues Worklist find request
XPert
Worklist Query Performed by remote system
DICOM

1.2 Functional Definitions of AE's

XPERT AE enables users of **XPert** system to perform a query using DICOM protocol from remote stations. The XPERT AE gives the following services to the local application as an SCU:

- Establish an association with a remote AE
- Release an association with a remote AE
- Query for studies (using all models)
- Query for images (using all models)
- Initiates Move operation to receive images
- Initiates Store operation to send images to remote
- Initiates Print Management services
- Query remote databases for worklist
  Note: this service is supported only by **Acquisition** software.

As SCP XPERT waits for another application to connect at the presentation address configured for its AE title. XPERT will accept associations with Presentation Contexts for SOP classes of the Storage (not supported by **Acquisition** software), Query Retrieve (C-MOVE and C-FIND only) and Verification Classes.

When performing a Storage Service Class, XPERT will receive images and store them into the system's disk.
Note: this service is not supported by **Acquisition** software.

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

Performing a Query-Retrieve Service Class (C-MOVE) XPert will issue a C-STORE (to the target AE) for every image in the request.

1.3 Sequencing of Real World Activities

Not Applicable.

Section 2 - AE Specifications

2.1 XPERT - Specification

XPERT provides Standard Conformance to the following DICOM Classes as an SCU:

SOP Class Name	SOP Class UID
Study root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient/Study only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Study root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
NM Image Information Object	1.2.840.10008.5.1.4.1.1.20
CT Image Information Object	1.2.840.10008.5.1.4.1.1.2
MR Image Information Object	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Information Object	1.2.840.10008.5.1.4.1.1.7
Basic Greyscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18
Modality Worklist information Model Find	1.2.840.10008.5.1.4.31
Verification	1.2.840.10008.1.1

Note: Modality Worklist information Model Find is supported only by **Acquisition** software.

XPERT provides standard conformance to the following DICOM SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Study root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
NM Image Information Object	1.2.840.10008.5.1.4.1.1.20
CT Image Information Object	1.2.840.10008.5.1.4.1.1.2
MR Image Information Object	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Information Object	1.2.840.10008.5.1.4.1.1.7
Verification	1.2.840.10008.1.1

2.1.1 Association Establishment Policies

2.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is: 1.2.840.10008.3.1.1.1

The maximum PDU size which the XPERT AE will is configurable, with a minimum of 1K byte.

The SOP Class Extended Negotiation is not supported.

2.1.1.2 Number of Associations

The number of simultaneous associations, which will be accepted by XPERT, is limited only by the kernel parameters underlying TCP/IP implementation. XPERT will spawn a new process for each connection request it services. Therefore XPERT can have multiple simultaneous connections, and there is no inherit limitation on the number of simultaneous associations, which the Application Entity is represented by XPERT, can maintain.

2.1.1.3 Asynchronous Nature

XPERT will only allow a single outstanding operation on an association. Therefore XPERT will not perform asynchronous window negotiation.

2.1.1.4 Implementation Identifying Information

XPERT will provide a single implementation Class UID which is 1.2.840.113704.3.1.1

2.1.2 Association Initiation Policy

XPERT initiates an association as part of an execution of a C-ECHO, C-FIND, C-STORE, C-MOVE and PRINT commands.

2.1.2.1 Local system requests verification

2.1.2.1.1 Association Real-World Activity

XPERT initiates a C-ECHO to sense existence and availability of remote AE

2.1.2.1.2 Proposed Presentation contexts

XPERT will use the Presentation Context, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.1.2.1 SOP Specific Conformance statement for Verification SOP Class

XPERT provides standard conformance to the DICOM Verification Service Class as an SCU for the Verification Class, UID = 1.2.840.10008.1.1

2.1.2.2 User clicks on remote system icon, User Selects a Study

2.1.2.2.1 Association Real-World Activity

XPERT initiates a C-FIND as a result of user request to see entries in remote station or to obtain information about a specific study.
For each level of a query operation, a single association is established.
Xpert interprets the status codes of query operation according to DICOM PS3.4 C.4.1.1.4 .

2.1.2.2.2 Proposed Presentation contexts

XPERT will use the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.2.2.1 SOP Specific Conformance statement for C-FIND SOP Class

XPERT provides standard conformance to the DICOM FIND Service Class as an SCU for the following SOP Classes:

- Patient Root Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.1.1
- Study Root Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.2.1
- Patient/Study Only Query/Retrieve Information Model - FIND, UID=1.2.840.10008.5.1.4.1.2.3.1

This implementation can perform single C-FIND operation over a single association.
Upon receiving a C-FIND confirmation containing a Pending status, this implementation will wait for further C-FIND responses from the remote DICOM AE.
Upon receiving a C-FIND confirmation containing a status other than Pending, this implementation will terminate the association.

2.1.2.3 Image sent to remote system

2.1.2.3.1 Association Real-World Activity

The associated Real-World activity associated with the C-STORE command is retrieval of images from the XPERT archive and storage of the images to the requesting remote station using a C-STORE command.

The operator must both select study(ies) or image(s) to be transferred from the specified catalog and select a destination from the 'Copy' dialog box. Once these selections have been made, the operator pushes the "OK" button to initiate an image send operation. The XPERT will then initiate an association with the remote AE in order to send the selected image(s).
Note that for each send operation one association is established.

2.1.2.3.2 Proposed Presentation contexts

XPERT will use the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
CT Image	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.3.2.1 SOP Specific Conformance statement for C-STORE SOP Class

XPERT provides standard conformance to the DICOM 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
- 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

2.1.2.4 Application Request for Image Transfer

2.1.2.4.1 Association Real-World Activity

XPERT initiates a C-MOVE to request the remote system to send an image to the local station.

2.1.2.4.2 Proposed Presentation contexts

XPERT will use the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Patient Root Query/ Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.4.2.1 SOP Specific Conformance statement for C-MOVE SOP Class

XPERT provides standard conformance to the DICOM MOVE Service Class as an SCU for the following SOP Classes:

- Patient Root Query/Retrieve Information Model - MOVE, UID=1.2.840.10008.5.1.4.1.2.1.2
- Study Root Query/Retrieve Information Model - MOVE, UID=1.2.840.10008.5.1.4.1.2.2.2

Note that for each level of a retrieve operation, a single association is established.
Upon receiving a C-MOVE confirmation containing a Pending status, this implementation will wait for further C-MOVE responses from the remote DICOM AE.
Upon receiving a C- MOVE confirmation containing a status other than Pending, this implementation will terminate the association.

2.1.2.5 Remote system Request Image Transfer

2.1.2.5.1 Association Real-World Activity

The associated Real-World activity associated with the C-Move command is retrieval of images from the XPERT archive and storage of the images to the requesting remote station using a C-STORE command.

Note that for each send operation one association is established.

2.1.2.5.2 Proposed Presentation contexts

XPERT will use the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
CT Image	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.5.2.1 SOP Specific Conformance statement for C-STORE SOP Class

XPERT provides standard conformance to the DICOM 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
- 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

2.1.2.6 Local system requests to print image

2.1.2.6.1 Association Real-World Activity

XPERT initiates a Print Management request to print image on a remote printer.

2.1.2.6.2 Proposed Presentation contexts

XPERT will use the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ex Neg
Basic Greyscale Print Management Meta	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.6.2.1 SOP Specific Conformance statement for Print Management Meta SOP Class

XPERT provides standard conformance to the DICOM Print Management Service class an SCU for the following Meta SOP classes:

- Basic Greyscale Print Management Meta, UID = 1.2.840.10008.5.1.1.9
- Basic Color Print Management Meta, UID = 1.2.840.10008.5.1.1.18

2.1.2.7 User clicks on Worklist button

2.1.2.7.1 Association Real-World Activity

XPERT initiates a Worklist find request as a result of user request to get entries in remote station of the scheduled studies.
Note: this service is supported only by **Acquisition** software.

2.1.2.7.2 Proposed Presentation contexts

XPERT will use the Presentation Context, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ex. N
Modality Worklist Information Module	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.7.2.1 SOP Specific Conformance statement for Modality Worklist SOP Class

XPERT provides standard conformance to the DICOM Modality Worklist Service Class as an SCU for the Modality Worklist Information Module SOP Class,
UID = 1.2.840.10008.5.1.4.31

2.1.3 Association Acceptance Policy

XPERT places no limitation on who may connect to it or on the number of simultaneous connections it will support.

2.1.3.1 Remote System Request Verification

A remote system request verification from XPERT using the C-ECHO command.

2.1.3.1.1 Associated Read-World Activity

XPERT performs the verification Service Class by responding with C-ECHO-RSP.

2.1.3.1.2 Presentation Context Table

XPERT will accept the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.1.3.1.2.1 SOP Specific Conformance to Verification SOP Class

XPERT provides standard conformance to the DICOM Verification Service Class as an SCP for the Verification Class, UID=1.2.840.10008.1.1

2.1.3.1.3 Presentation Context Acceptance Criterion

XPERT will accept any Presentation Context from the table in section 2.1.3.1.2

2.1.3.2 Remote System Request Image Storage

Remote system requests image storage from XPERT, as a result of a C-MOVE command issued by XPERT itself.

2.1.3.2.1 Association Real-World Activity

The associated Real-World activity associated with the C-STORE operation is the storage of the image to disk of the system upon XPERT is running. XPERT will issue a failure status if it is unable to store the image on the disk.

Note: C-STORE SCP role is not supported by **Acquisition** software.

2.1.3.2.2 Presentation Context Table

XPERT will accept the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Name	UID	Name	UID	Role	Ext Neg
NM Image	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
CT Image	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
MR Image	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
SC Image	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.1.3.2.2.1 SOP Specific Conformance to Storage SOP Class

XPERT provides standard conformance to the DICOM Storage Service Class as a SCP for the following SOP Classes:

- NM Image Storage, UID = 1.2.840.10008.5.1.4.1.1.20
- 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
- SC Image Storage, UID = 1.2.840.10008.5.1.4.1.1.7

XPERT conforms to the SOP's of the Storage Service Class at Level 2. In case of a successful C-STORE, the stored image is recorded on the disk, otherwise an error is returned.

2.1.3.2.3 Presentation Context Acceptance Criterion

XPERT will accept any Presentation Context from the table in section 2.1.3.2.2

2.1.3.3 Remote System Request Image Transfer

A remote system request image transfer using the C-MOVE command.

2.1.3.3.1 Associated Read-World Activity

The associated Real-World activity associated with the C-MOVE command is retrieval of images from the XPERT's archive and storing the images to the requesting remote system using C-STORE command. XPert will issue a failure status if it is unable to process the transfer request.

2.1.3.3.2 Presentation Context Table

XPERT will accept the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Study Root MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.1.3.3.2.1 SOP Specific Conformance to C-MOVE SOP Class

XPERT provides standard conformance to the DICOM Query/Retrieve Service Class as a SCP for the Study Root Query/Retrieve Information Model class - MOVE, UID=1.2.840.10008.5.1.4.1.2.2.2

2.1.3.3.3 Presentation Context Acceptance Criterion

XPERT will accept any Presentation Context from the table in section 2.1.3.3.2

2.1.3.4 Remote System Initiate Query Request

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

2.1.3.4.1 Associated Read-World Activity

XPERT performs the query and send the responses to the issuer.

2.1.3.4.2 Presentation Context Table

XPERT will accept the Presentation Contexts, which are shown in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax			
Name	UID	Name	UID	Role	Ext Neg
Study Root FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.1.3.4.2.1 SOP Specific Conformance to C-FIND SOP Class

XPERT provides standard conformance to the DICOM Query/Retrieve Service Class as a SCP for the Study Root Query/Retrieve Information Mode Class - FIND, UID=1.2.840.10008.5.1.4.1.2.2.1

2.1.3.4.3 Presentation Context Acceptance Criterion

XPERT will accept any Presentation Context from the table is section 2.1.3.4.2

Section 3 - Communication Profiles

3.1 Supported Communication Stacks (Parts 8,9)

XPERT provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

3.2 TCP/IP Stack

XPERT inherit its TCP/IP stack from the OS/2 system upon which it executes.

3.2.1 Physical Media Support

XPERT is indifferent to the physical medium over which TCP/IP executes.

Section 4 - Specialization

Not Applicable

Section 5 - Configuration

5.1 AE Title/Presentation Address Mapping

This mapping is defined during the XPERT installation procedure.

5.2 Configurable Parameters

- Maximum PDU size – default: 4096 bytes
- Time out – default: 5 sec.

Section 6 - Support of Extended Character Sets

No Extended Character Set is supported.

Section 7 – Study Root Query/Retrieve Information Model Definition

7.1 Introduction

This section specifies the use of the DICOM Study Root Query/Retrieve Model used to organize data and against which a Query/Retrieve will be performed. The contents of this section are:
Section 7.1 - Introduction
Section 7.2 - Study Root Information Model Description
Section 7.3 - Study Root Information Model Entity-Relationship Model
Section 7.4 - Information Model Keys

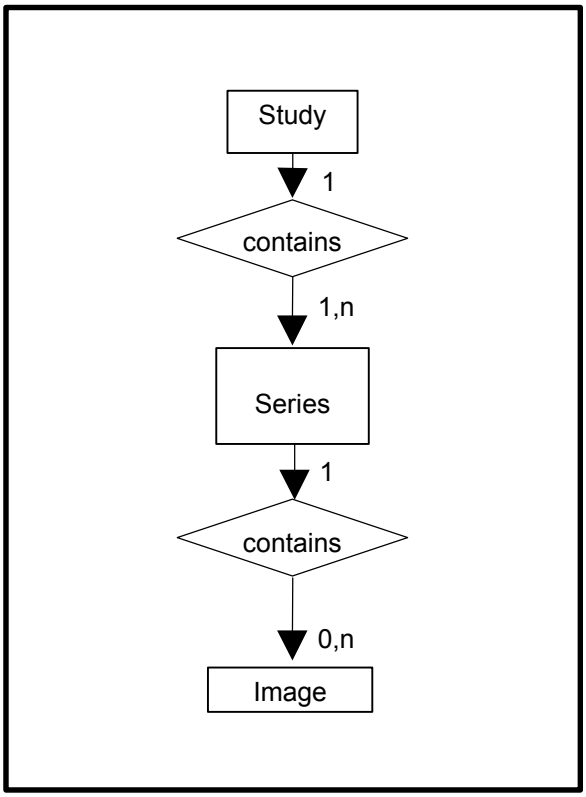
7.2 Study Root Information Model Description

The Study Root Query/Retrieve Information Model is based upon a three level hierarchy:
-1 Study
-2 Series
-3 Image
The study level is the top level and contains Attributes associated the Study IE of Image IODs. Attributes of patients are considered to be attributes of studies. Study IEs are modality independent.
The series level is below the study level and contains Attributes associated with the Series, Frame of Reference and Equipment IEs of Image IODs. A series belongs to a single study. A single study may have multiple series. Seriesies are modality dependent.
The lowest level is the image level and contains Attributes associated with the Image IE of Image IODs. An image belongs to a single series. A single series may contain multiple images. Image IEs are modality dependent

7.3 Study Root Information Model Entity-Relationship Model

The Entity-Relationship diagram for the Study Root Information Model schema is shown in the illusration below. In this figure, the following diagrammatic convention is established to represent the information organization:
• each entity is represented by a rectangular box
• each relationship is represented by a diamond shaped box.
• the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.
The relationships are fully defined with the maximum number of possible entities in the relationship shown. In other words, the relationship between Series and Image can have up to n Images per Series.

STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL E/R DIAGRAM



7.3.1 Entity Description

Please refer to the DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve Information Model.

7.3.1.1 Study Entity Description

The Study Entity defines the characteristics of a medical study performed on a patient. A study is a collection of one or more series of medical images which are logically related for the purpose of diagnosing a patient. Each study is associated with exactly one patient.

7.3.1.2 Series Entity Description

The Series Entity defines the attributes which are used to group images into distinct logical sets. Each series is associated with exactly one study.

7.3.1.3 Image Entity Description

The Image Entity defines the attributes which describe the pixel data of an image. The pixel data is generated as a direct result of patient scanning (an Original image). An image is defined by its image plane, pixel data characteristics gray scale and/or color mapping characteristics and modality specific characteristics (acquisition parameters and image creation information).

7.3.2 Xpert/VG Mapping of DICOM Entities

Mapping of DICOM Entities to XPERT Entities

DICOM	XPERT
Study	Study
Series	-
Image	Group

7.4 Information Model Keys

Please refer to the DICOM Standard PS 3.4 (Service Class Specifications) for a description of each of the levels contained within the Study Root Query/Retrieve Information Model.
The following Level descriptions are included to specify what data elements are supported and what type of filtering can be applied. It should be noted that they are the same ones as defined in the DICOM Standard PS 3.4 (Service Class Specifications).

7.4.1 Supported Filtering

Following are the types of matching that are supported by this implementation:
-1 Single Value matching
-2 List of UID Matching
-3 Universal Matching
-4 Wild Card Matching
-5 Range of Date

7.4.2 Study Level

This section defines the keys at the Study Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

Study Level Attributes for the Root Query/Retrieve Information Model

Attribute Name	Tag	Type	Attribute Description
Study Date	(0008,0020)	R	Matched
Study Time	(0008,0030)	R	Matched
Accession Number	(0008,0050)	R	Matched

Patient's Name	(0010,0010)	R	Matched. Matching performed without regard to the PN VR individual component values.
Patient ID	(0010,0020)	R	Matched
Study ID	(0020,0010)	R	Matched
Study Instance UID	(0020,000D)	U	Matched
Study Description	(0008,1030)	O	Returned

Q/R Study Level and Location for Retrieve Attributes

Attribute Name	Tag	Type	Attribute Description
Query Retrieve Level	(0008,0052)	-	Value = STUDY

7.4.3 Series Level

This section defines the keys at the Series Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

Study Level Attributes for the Root Query/Retrieve Information Model

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	R	Matched
Series Number	(0020,0011)	R	Matched
Series Instance UID	(0020,000E)	U	Matched
Series Date	(0008,0021)	O	Returned
Series Description	(0008,103E)	O	Returned

Q/R Series Level and Location for Retrieve Attributes

Attribute Name	Tag	Type	Attribute Description
Query Retrieve Level	(0008,0052)	-	Value = SERIES

7.4.4 Image Level

This section defines the keys at the Image Level of the Study Root Query/Retrieve Information Model that are supported by this implementation.

Image Level Attributes for the Root Query/Retrieve Information Model

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020,0013)	R	Matched
SOP Instance UID	(0008,0018)	U	Matched
Rows	(0028,0010)	O	Returned
Columns	(0028,0011)	O	Returned
Number of Frames	(0028,0008)	O	Returned

Q/R Image Level and Location for Retrieve Attributes

Attribute Name	Tag	Type	Attribute Description
Query Retrieve Level	(0008,0052)	-	Value = IMAGE

7.5 Private Data Dictionary

There are no private query key attributes defined for this implementation.

Section 8 – Modality Worklist Information Model Definition

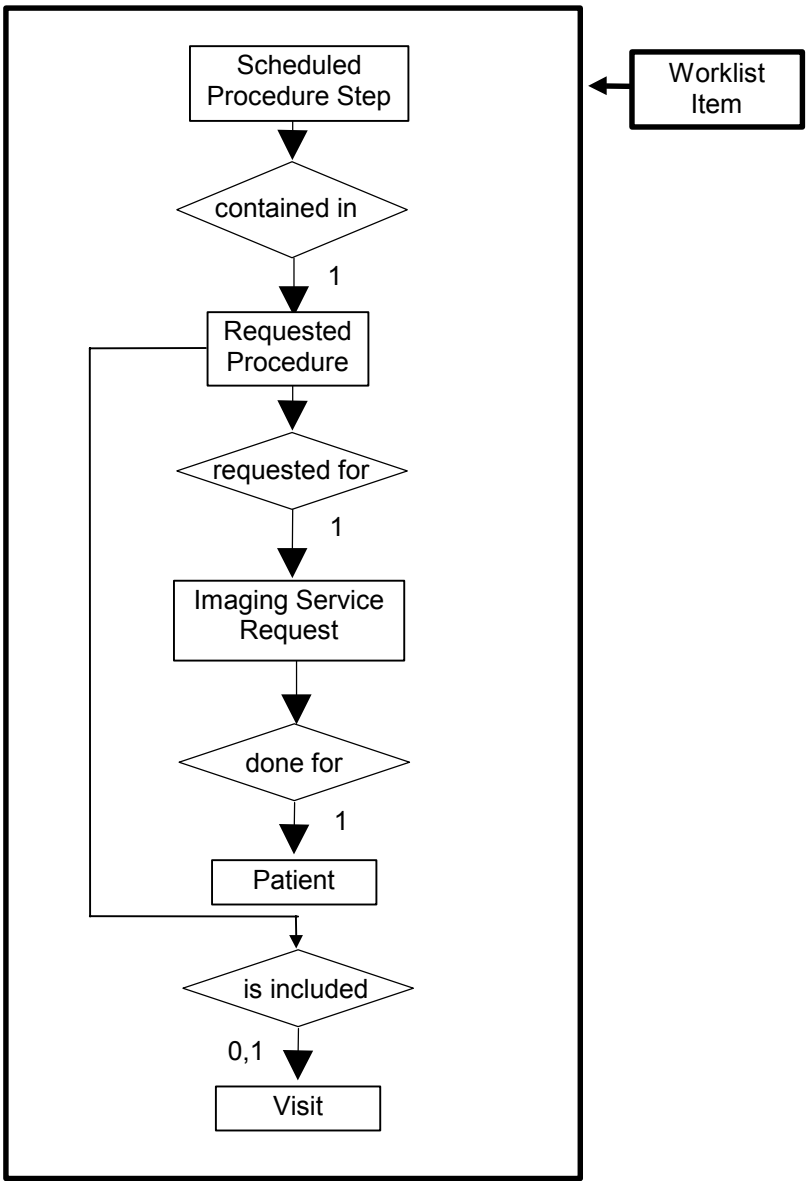
8.1 Introduction

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed. The contents of this section are:
Section 8.1 - Introduction
Section 8.2 - Information Model Entity-Relationship Model
Section 8.3 - Information Model Module Table
Section 8.4 - Information Model Keys

8.2 Modality Worklist Information Model Entity-Relationdhip Model

The Entity-Relationship diagram for the Modality Worklist Information Model schema is shown in the illusration below. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization :
• each entity is represented by a rectangular box
• each relationship is represented by a diamond shaped box.
• the fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

MODALITY WORKLIST INFORMATION MODEL E/R DIAGRAM



8.2.1 Entity Descriptions

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

8.2.2 XPERT Mapping of DICOM entities

MAPPING OF DICOM ENTITIES TO XPERT ENTITIES

DICOM	XPERT Entity
Scheduled Procedure Step	Study
Requested Procedure	Study
Imaging Service Request	Study
Visit	-
Patient	Study

8.3 Information Model Module Table

Within an entity of the DICOM Modality Worklist Information Model, attributes are grouped into related set of attributes. A set of related attributes is termed a module. A module facilitates the understanding of the semantics concerning the attributes and how the attributes are related with each other. A module grouping does not infer any encoding of information into datasets.
The table below identifies the defined modules within the entities which comprise the DICOM Modality Worklist Information Model. Modules are identified by Module Name.
See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

MODALITY WORKLIST INFORMATION MODEL MODULES

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	-
	Scheduled Procedure Step	8.4.2.1
Requested Procedure	Requested Procedure	8.4.3.1
Imaging Service Request	Imaging Service Request	8.4.4.1
Visit	Visit Identification	-
	Visit Status	-
	Visit Relationship	-
	Visit Admission	-
Patient	Patient Relationship	-
	Patient Identification	8.4.5.1
	Patient Demographic	8.4.5.2
	Patient Medical	-

8.4 Information Model Keys

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.
The following Module descriptions are included to specify what data elements are supported and what type of matching can be applied. It should be noted that they are the same ones as defined in the DICOM Standard PS 3.4 (Service Class Specifications).

8.4.1 Supported Matching

Following are the types of matching that can be request by the implementation :

- Single Value matching
- Universal Matching
- Wild Card Matching
- Sequence Matching

8.4.2 Sheduled Procedure Step Entity

8.4.2.1 Scheduled Procedure Step Module

SCHEDULED PROCEDURE STEP MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
>Scheduled Station AE Title	(0040,0001)	R	1	No	Single Value Matching is requested
>Scheduled Procedure Step Start Date	(0040,0002)	R	1	No	Single Value,Universal Matching may be requested
>Scheduled Procedure Step Start Time	(0040,0003)	R	1	No	Empty value is sent in request
>Modality	(0008,0060)	R	1	Yes	Value of “NM” is sent in request
>Scheduled Performing Physician's Name	(0040,0006)	R	2	Yes	Single Value,Universal,Wild Card Matching may be requested
>Scheduled Procedure Step Description	(0040,0007)	O	1C	No	Empty value is sent in request
>Scheduled Station Name	(0040,0010)	O	2	No	Empty value is sent in request
>Scheduled Procedure Step Location	(0040,0011)	O	2	No	Empty value is sent in request
>Pre-Medication	(0040,0012)	O	2C	No	Empty value is sent in request
>Scheduled Procedure Step ID	(0040,0009)	O	1	No	Empty value is sent in request
>Comments on the Scheduled Procedure Step	(0040,0400)	O	3	No	Empty value is sent in request

8.4.3 Requested Procedure Entity

8.4.3.1 Requested Procedure Module

REQUESTED PROCEDURE MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Requested Procedure ID	(0040,1001)	O	1	No	Empty value is sent in request
Study Instance UID	(0020,000D)	O	1	No	Empty value is sent in request
Requested Procedure Priority	(0040,1003)	O	2	No	Empty value is sent in request
Patient Transport Arrangements	(0040,1004)	O	2	No	Empty value is sent in request
Requested Procedure Location	(0040,1005)	O	3	No	Empty value is sent in request
Requested Procedure Comments	(0040,1400)	O	3	No	Empty value is sent in request
Confidentiality Code	(0040,1008)	O	3	No	Empty value is sent in request
Reporting Priority	(0040,1009)	O	3	No	Empty value is sent in request
Names of Intended Recipients of results	(0040,1010)	O	3	No	Empty value is sent in request

8.4.4 Imaging Service Request Entity

8.4.4.1 Imaging Service Request Module

IMAGING SERVICE REQUEST MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Accession Number	(0008,0050)	O	2	Yes	Single Value,Universal,Wild Card Matching can be requested
Requesting Physician	(0032,1032)	O	2	No	Empty value is sent in request
Referring Physician's Name	(0008,0090)	O	2	No	Empty value is sent in request
Reason for the Imaging Service Request	(0040,2001)	O	3	No	Empty value is sent in request
Imaging Service Request Comments	(0040,2400)	O	3	No	Empty value is sent in request
Issuing Date of Imaging Service Request	(0040,2004)	O	3	No	Empty value is sent in request
Issuing Time of Imaging Service Request	(0040,2005)	O	3	No	Empty value is sent in request
Order entered by ...	(0040,2008)	O	3	No	Empty value is sent in request
Order Enterer’s Location	(0040,2009)	O	3	No	Empty value is sent in request
Order Callback Phone Number	(0040,2010)	O	3	No	Empty value is sent in request

8.4.5 Patient Entity

8.4.5.1 Patient Identification

PATIENT IDENTIFICATION MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient's Name	(0010,0010)	R	1	Yes	Single Value,Universal,Wild Card Matching can be requested
Patient ID	(0010,0020)	R	1	Yes	Single Value,Universal,Wild Card Matching can be requested

8.4.5.2 Patient Demographic

PATIENT DEMOGRAPHIC MODULE ATTRIBUTES

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patients Birth Date	(0010,0030)	O	2	Yes	Empty value is sent in request
Patient's Sex	(0010,0040)	O	2	Yes	Empty value is sent in request

8.5 Private data dictionary

There are no private query key attributes defined for this implementation.

Section 9 – Print Management SOP Class Definition

9.1 Introduction

This section of the DICOM Conformance Statement specifies the supported Print Management SOP and Meta SOP Classes, the optional attributes and service elements supported, the valid range of values for mandatory and optional attributes, and the status code behaviour.

9.2 Print Management SOP Class Definitions

9.2.1 Basic Film Session SOP Class

9.2.1.1 IOD Description

9.2.1.1.1 IOD modules

Module	Reference	Module Description
SOP Common	-	Contains SOP Common information
Basic Film Session Presentation Module	9.2.1.1.2	Contains Film Session presentations information
Basic Film Session Relationship	9.2.1.1.3	References to related SOPs

9.2.1.1.2 Basic Film Session Presentation Module

Attribute name	Tag	Attribute Description
Number of Copies	(2000,0010)	Range of values sent: from 1 to 10
Print Priority	(2000,0020)	Values sent: HIGH or LOW
Medium Type	(2000,0030)	Defined Terms sent: PAPER or CLEAR FILM or BLUE FILM
Film Destination	(2000,0040)	
Film Session Label	(2000,0050)	
Memory Allocation	(2000,0060)	

9.2.1.1.3 Basic Film Session Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Film Box Sequence	(2000,0500)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

9.2.1.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-SET	Not used
N-DELETE	Used
N-ACTION	Not used

9.2.1.2.1 N-CREATE

9.2.1.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Number of Copies	(2000,0010)	Used
Print Priority	(2000,0020)	Used
Medium Type	(2000,0030)	Used
Film Destination	(2000,0040)	Not used
Film Session Label	(2000,0050)	Not used
Memory Allocation	(2000,0060)	Not used

9.2.1.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Warning	B600	Memory allocation not supported	Print status warning to user and try to continue execution
Success	0000	Film session successfully created	Continue execution

9.2.1.2.1.3 Behavior

There is no specific behaviour

9.2.1.2.2 N-DELETE

The N-DELETE is used to delete the complete Basic Film Session SOP Instance hierarchy.

9.2.1.2.2.1 Status

There are no specific status codes.

9.2.1.2.2.2 Behavior

There is no specific behaviour

9.2.2 Basic Film Box SOP Class

9.2.2.1 IOD Description

9.2.2.1.1 IOD modules

Module	Reference	Module Descripion
SOP Common	-	Contains SOP Common information
Basic Film Box Presentation Module	9.2.2.1.2	Contains Film Box presentation information
Basic Film Box Relationship	9.2.2.1.3	References to related SOPs

9.2.2.1.2 Basic Film Box Presentation Module

Attribute Name	Tag	Attribute Description
Image Display Format	(2010,0010)	Possible values sent: STANDARD\1,1 | 1,2 | 2,1 | 2,2 | 2,3 | 3,2 | 3,3 | 3,4 | 4,3 4,4 | 4,5 | 5,4 ROW\4,4,2 | 3,2 | 4,4,4,2 | 4,4,1 | 3,3,2 | 3,3,3,2 | 3,3,1 | 4,4,4,1
Film Orientation	(2010,0040)	PORTRAITor LANDSCAPE
Film Size ID	(2010,0050)	Defined Terms sent: 8INX10IN 11INX14IN 14INX14IN 14INX17IN
Magnification Type	(2010,0060)	Interpolation type by which the printer magnifies the image in order to fit the image in the image box on film; Defined Terms: REPLICATE BILINEAR CUBIC NONE
Smoothing Type	(2010,0080)	Range of values sent : 0-290
Border Density	(2010,0100)	Defined Terms sent : BLACK or WHITE Range of values sent: 10-390
Empty Image Density	(2010,0110)	Defined Terms sent : BLACK or WHITE Range of values sent : 10-390
Min Density	(2010,0120)	Range of values sent : 10-390
Max Density	(2010,0130)	Range of values sent : 10-390
Trim	(2010,0140)	Enumerated Values sent: YES or NO

9.2.2.1.3 Basic Film Box Relationship Module

Attribute Name	Tag	Attribute Description
Referenced Film Session Sequence	(2010,0500)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Referenced Image Box Sequence	(2010,0510)	This sequence is not sent to Print SCP
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Referenced Basic Annotation Box Sequence	(2010,0520)	This sequence is not sent to Print SCP
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

9.2.2.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-CREATE	M
N-ACTION	M
N-DELETE	Used
N-SET	Not used

9.2.2.2.1 N-CREATE

9.2.2.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Image Display Format	(2010,0010)	M
Referenced Film Session Sequence	(2010,0500)	M
>Referenced SOP Class UID	(0008,1150)	M
>Referenced SOP Instance UID	(0008,1155)	M
Referenced Image Box Sequence	(2010,0510)	-
>Referenced SOP Class UID	(0008,1150)	-
>Referenced SOP Instance UID	(0008,1155)	-
Referenced Basic Annotation Box Sequence	(2010,0520)	Not used
>Referenced SOP Class UID	(0008,1150)	Not used
>Referenced SOP Instance UID	(0008,1155)	Not used
Film Orientation	(2010,0040)	Used
Film Size ID	(2010,0050)	Used
Magnification Type	(2010,0060)	Used
Max Density	(2010,0130)	Used
Configuration Information	(2010,0150)	Not used
Annotation Display Format ID	(2010,0030)	Not used
Smoothing Type	(2010,0080)	Used
Border Density	(2010,0100)	Used
Empty Image Density	(2010,0110)	Used
Min Density	(2010,0120)	Used
Trim	(2010,0140)	Used

9.2.2.2.1.2 Status

There are no specific status codes.

9.2.2.2.1.3 Behavior

There is no specific behaviour

9.2.2.2.2 N-DELETE

9.2.2.2.2.1 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy.

9.2.2.2.3 N-ACTION

N-ACTION is used to print one or more films of the film session.

9.2.2.2.3.1 Attributes

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU
Print	1	Referenced Print Job Sequence	(2100,0500)	Not used.
		>Referenced SOP Class UID	(0008,1150)	Not used.
		>Referenced SOP Instance UID	(0008,1155)	Not used.

9.2.2.2.3.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Success	0000	Film accepted for printing; if supported, the Print Job SOP Instance is created	Application continues execution
Warning	B603	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	Application warns user and continues execution
Failure	C602	Unable to create Print Job SOP Instance; print queue is full	Application warns user , deletes Film Session and releases assosiation with the Print SCP
	C604	Image position collision : multiple images assigned to single image position	Application warns user , deletes Film Session and releases assosiation with the Print SCP
	C603	Image size is larger than image box size (by using the specified magnification value)	Application warns user , deletes Film Session and releases assosiation with the Print SCP

9.2.2.2.3.3 Behavior

The SCU uses the N-ACTION to request the SCP to print one or more copies of a single film of the film session.

9.2.3 Image Box SOP Classes : Basic Grayscale Image Box SOP Class, Basic Color Image Box SOP Class

9.2.3.1 IOD description

9.2.3.1.2 IOD modules

Module	Reference	Module Description
SOP Common	-	Contains SOP Common information
Image Box Presentation Module	9.2.3.1.3	Contains Image Box presentation information
Image Box Relationship Module	-	References to related SOPs

9.2.3.1.2 Image Box Pixel Presentation Module

Attribute Name	Tag	Attribute Description
Image Position	(2020,0010)	Range of values dependeds on Image Display Format field
Polarity	(2020,0020)	Specifies whether minimum pixel values (after VOI LUT transformation) are to printed black or white; Enumerated Values: NORMAL = pixels shall be printed as specified by the Photometric Interpretation (0028,0004) REVERSE = pixels shall be printed with the opposite polarity as specified by the Photometric Interpretation (0028,0004) If Polarity (2020,0020) is not specified by the SCU, the SCP shall print with NORMAL polarity.
Magnification Type	(2010,0060)	Interpolation type by which the printer magnifies the image in order to fit the image in the image box on film; Defined Terms: REPLICATE BILINEAR CUBIC NONE
Smoothing Type	(2010,0080)	Range of values sent : 0-290
Requested Image Size	(2020,0030)	
Preformatted Grayscale Image Sequence	(2020,0110)	
>Samples Per Pixel	(0028,0002)	The value is 1
>Photometric Interpretation	(0028,0004)	The value is MONOCHROME2
>Rows	(0028,0010)	The value depends on specific Pixel Data
>Columns	(0028,0011)	The value depends on specific Pixel Data
>Pixel Aspect Ratio	(0028,0034)	The value is 1\1
>Bits Allocated	(0028,0100)	The value is 8
>Bits Stored	(0028,0101)	The value is 8
>High Bit	(0028,0102)	The value is 7
>Pixel Representation	(0028,0103)	The value is 0
>Pixel Data	(7FE0,0010)	
Preformatted Color Image Sequence	(2020,0111)	
>Samples Per Pixel	(0028,0002)	The value is 3
>Photometric Interpretation	(0028,0004)	The value is RGB
>Planar Configuration	(0028,0006)	The value is 1
>Rows	(0028,0010)	The value depends on specific Pixel Data
>Columns	(0028,0011)	The value depends on specific Pixel Data
>Pixel Aspect Ratio	(0028,0034)	The value is 1\1
>Bits Allocated	(0028,0100)	The value is 8
>Bits Stored	(0028,0101)	The value is 8
>High Bit	(0028,0102)	The value is 7
>Pixel Representation	(0028,0103)	The value is 0
>Pixel Data	(7FE0,0010)	

9.2.3.2 DIMSE Service Group

DIMSE Service Element	Usage SCU
N-SET	M

9.2.3.2.1 N-SET

9.2.3.2.1.1 Attributes

Attribute Name	Tag	Usage SCU
Image Position	(2020,0010)	M
Preformatted Grayscale Image Sequence Preformatted Color Image Sequence	(2020,0110) (2020,0111)	M
>Samples Per Pixel	(0028,0002)	M
>Photometric Interpretation	(0028,0004)	M
>Planar Configuration	(0028,0006)	For Color Image Box the value is 1
>Rows	(0028,0010)	M
>Columns	(0028,0011)	M
>Pixel Aspect Ratio	(0028,0034)	The aspect ration is always 1\1
>Bits Allocated	(0028,0100)	M
>Bits Stored	(0028,0101)	M
>High Bit	(0028,0102)	M
>Pixel Representation	(0028,0103)	M
>Pixel Data	(7FE0,0010)	M
Polarity	(2020,0020)	Used
Referenced Overlay Sequence	(0008,1130)	Not used
>SOP Class UID	(0008,1150)	Not used
>SOP Instance UID	(0008,1155)	Not used
Magnification Type	(2010,0060)	Used
Smoothing Type	(2010,0080)	Used
Requested Image Size	(2020,0030)	Used

9.2.3.2.1.2 Status

Service Status	Status Codes	Further Meaning	Application Behavior When receiving Status Codes
Failue	C605	Insufficient memory in printer to store the image	Application warns user , deletes Film Session and releases assosiation with the Print SCP

9.2.3.2.1.3 Behavior

The SCU never instructs the SCP to erase the image in the image position by setting a zero length and no value in the Attribute Preformatted Grayscale Image Sequence (2020,0110) or Preformatted Color Image Sequence (2020,0111).

Appendix A – Private Data Dictionary

This section provides value representation and multiplicity information for all of the Private Attributes used by this implementation.

Attribute Name	Tag	VR	VM	Description
Private Creator Identification	(0027,0010)	LO	1	Identification is used to reserve a block of Private Elements. Value: **APEX_PRIVATE**
Bed Position	(0027,1011)	DS	1	Location of the patient table (or gantry relative to the table) in mm.
Private Creator Identification	(7FA1,0010)	LO	1	Identification is used to reserve a block of Private Elements. Value: **ELGEMS_XPERT**
XPert Composite Report Item buffer	(7FA1,1000)	OB	1	This field contains all original structures are required to restore Xpert Composite Report Item.
Xpert Composite Report Item Identificator	(7FA1,1010)	OB	1	This field contains structure that identfies original Composite Report Item within Xpert archive