PRIMO S System

DICOM Conformance Statement

September 1, 2022
Document Ver. 2.3

PRIMO S VP referenced SW: v1.8.0 or later

1. CONFORMANCE STATEMENT OVERVIEW

This document describes the conformance of PRIMO S system to DICOM standard as regarding DICOM communication to save acquired images and associated Dose SR to a network storage device and request confirmation of storage, save images on CD-R, print to a networked hardcopy device, request for patient informations, images and procedures to perform, inform the information system about the work actually done.

Table 1-1 Network Services

SOP Class Name	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Option	No
Digital X-Ray Image Storage – For Presentation	Option	No
Query/Retrieve		
Patient Root Q/R Information Model - FIND	Option	No
Patient Root Q/R Information Model - MOVE	Option	No
Study Root Q/R Information Model - FIND	Option	No
Study Root Q/R Information Model - MOVE	Option	No
Workflow Management		
Modality Work List Information Model – FIND	Option	No
Modality Performed Procedure Step SOP Class	Option	No
Storage Commitment Push Model SOP Class	Option	No
Print Management		
Basic Grayscale Print Management Meta SOP Class	Option	No
Notes, Reports, Measurements Transfer		
X-Ray Radiation Dose SR	Option	No

The SOP classes are categorized as follows:

Table 1-2 UID Values

UID Value	UID Name	Category
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.1.1	Digital X-Ray Image Storage – For Presentation	Transfer
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Q/R Information Model - FIND	Query/Retrieve
1.2.840.10008.5.1.4.1.2.1.2	Patient Root Q/R Information Model - MOVE	Query/Retrieve
1.2.840.10008.5.1.4.1.2.2.1	Study Root Q/R Information Model - FIND	Query/Retrieve
1.2.840.10008.5.1.4.1.2.2.2	Study Root Q/R Information Model - MOVE	Query/Retrieve
1.2.840.10008.5.1.4.31	Modality Work List Information Model – FIND	Workflow Management
1.2.840.10008.3.1.2.3.3	Modality Performed Procedure Step SOP Class	Workflow Management
1.2.840.10008.1.20.1	Storage Commitment Push Model SOP Class	Workflow Management
1.2.840.10008.5.1.1.9	Basic Grayscale Print Management Meta SOP Class	Print Management
1.2.840.10008.5.1.4.1.1.88.67	X-Ray Radiation Dose SR	Notes, Reports, Measurements Transfer

Table 1-3 Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk - Recordable		
General Purpose CD-R	FSC : Option FSU:No	No
DVD		
General Purpose DVD-RAM	FSC : Option FSU:No	No
USB and Flash Memory		
General Purpose USB Media Interchange with JPEG	FSC : Option FSU : No	No

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3. INTRODUCTION

This document **Version 2.3** applies to the PRIMO S System.

3.1 Revision History

Document Version	Date of Issue	Description
1.0	27-03-2018	Preliminary Version
2.0	02-03-2020	Update Table 1-2 – Add Table 1-3 – Update Section 3.3 – Update Tables: 8.1-1, 8.1-2, 8.1-4, 8.1-6, 8.1-7, 8.1-26, 8.1-39 – Delete General Reference Module Table – Update Table 4.2-18
2.1	02-11-2021	Updated “Referenced SW” in the Front Page
2.2	24-06-2022	Added Dicom Query Retrieve service
2.3	01-09-2022	Document converted to “.docx” and completely reformatted

3.2 Audience

This document is written for the people that need to understand how PRIMO S will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product’s functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between PRIMO S and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.4 Terms and Definitions

The following terms, definitions and abbreviations are used in this document.
Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitons of these terms.

Abstract Syntax – generally equivalent to an *Information Object Definition* (IOD), the specification used to define the information to exchange in a message; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. Examples: MR image object definition, CT image object definition, image query information model.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title (AET) – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – smallest unit of information in an object definition; a data element identified by a tag. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object (see *Abstract Syntax*). The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C).

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in *italics* below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two *Application Entities* (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an intial network “handshake”. One of the two devices must initiate an *Association* (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (*Negotiation*).

DICOM specifes a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifes a variety of methods for encoding data, denoted *Transfer Syntaxes*. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called *Presentation Contexts.* The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* – which one is the *Service Class User* (SCU - client) and which is the *Service Class Provider* (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).
The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate *Information Object Definition*, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a *Response Status* indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a *Media Application Profile* that specifies “pre-negotiated” exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 Abbreviations

AE	Application Entity
AET	Application Entity Title
ASCII	American Standard Code for Information Interchange
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator

FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
ISO	International Organization for Standards
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MPEG	Moving Picture Experts Group
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NTP	Network Time Protocol
O	Optional (Key Attribute)
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)
RDSR	X-Ray Radiation Dose SR
RIS	Radiology Information System.
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
VR	Value Representation

3.7 References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

4. NETWORKING

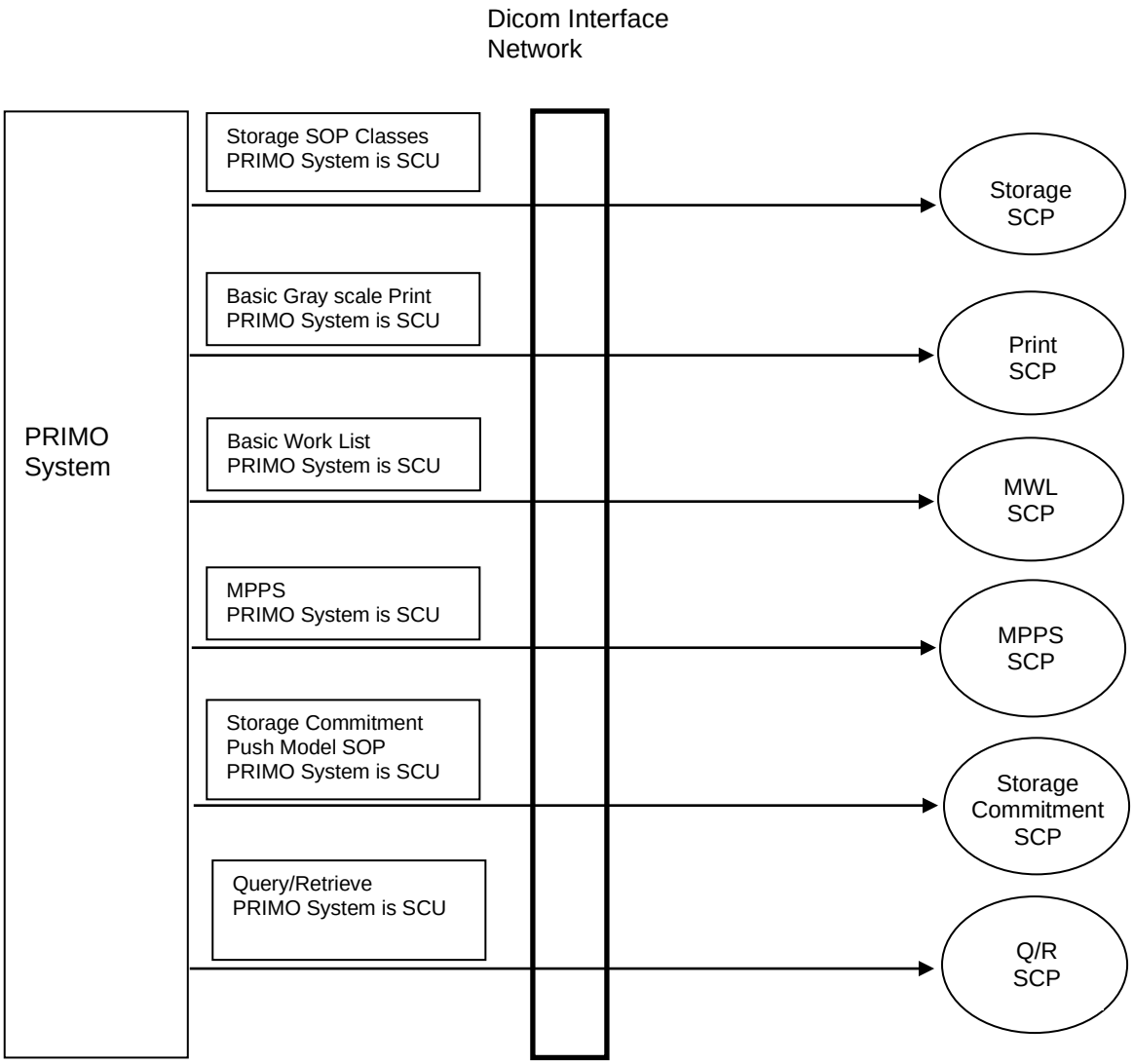
PRIMO S is a computed radiography modality device capable to acquire images.
PRIMO S is equipped with a *Dicom Interface Network (DIN*) that allows the transfer of images according with DICOM 3.0 standard.
This document describes the conformance of DIN to DICOM 3.0 standard.

4.1 Implementation Model

4.1.1 Application Data Flow

This implementation model uses:

- the **Verification SOP Class** to verify application level communication between two DICOM 3.0 peers,
- the **DICOM Basic Print Management Meta SOP Class** to deliver studies to remote printers,
- the **Storage SOP Classes** to deliver studies and RDSR to archives,
- **Basic Work List Management service** for the acquisition of patient demographics,
- the **MPPS SOP Class** to send a report about a performed examination including data about the images acquired, beginning/end time, dose delivered, etc
- the **Storage Committment SOP Class** to confirm that an image or RDSR has been permanently stored by a device
- the **Query/Retrieve Service Class** to request and retrieve images



4.1.2 Functional Definition of AEs

The PRIMO S System is a digital radiographic image acquisition product utilizing a 3rd party X-Ray detector based on GdOS technology. The system allows the technologist to acquire and identify images, review images, add markers, adjust image processing, manipulate images (flip, rotate, etc.), pan/zoom and route images to their final destinations. The system is capable of obtaining patient demographic information manually from the user interface, or via a DICOM Work List.

4.1.3 Sequencing of Real World Activities

Not applicable.

4.2 AE Specifications

The PRIMO S System generates a single association establishment request and operates as application entity

4.2.1 PRIMO S AE Specification

4.2.1.1 SOP Classes

PRIMO S provides Standard Conformance to the following DICOM V3.0 SOP Class as a SCU:

Table 4-1 SOP Classes for PRIMO S AE

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Computed Radiography Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage – For Presentation SOP Class	1.2.840.10008.5.1.4.1.1.1.1
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Storage Commitment Service Class	1.2.840.10008.1.20.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Patient Root Q/R Informal Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Q/R Informal Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

PRIMO S provides Standard Conformance to the following DICOM V3.0 SOP Class as a SCP:

Table 4-2 SOP Classes for PRIMO S AE

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Computed Radiography Storage SOP Class	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage – For Presentation SOP Class	1.2.840.10008.5.1.4.1.1.1.1

The SCP role is assumed only during execution of Query/Retrieve service accepting C-STORE command following a C-MOVE.

4.2.1.2 Association Policies

4.2.1.2.1 General

The maximum PDU size, which the PRIMO S will negotiate, is 64KB.

The DICOM standard application context name for DICOM 3.0 always proposed:

Table 4-3 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

PRIMO S initiates one Association at a time for storage and print service processing transfer request in the active job queue list. Only one job will be active at a time, the others remain pending until the active job is completed or failed. At the same time PRIMO S can start associations for worklist, MPPS, storage commitment, Q/R, verify service. PRIMO S can receive only one C-ECHO/C-STORE request association a time.

Table 4-4 Number of Associations as an Association Initiator for PRIMO S

Maximum number of simultaneous associations	6

Table 4-5 Number of Associations as an Association Acceptor for PRIMO S

Maximum number of simultaneous associations	2

4.2.1.2.3 Asynchronous Nature

Asynchronous communication is not supported

4.2.1.2.4 Implementation Identifying Information

Table 4-6 DICOM Implementation Class and Version for PRIMO S

Implementation Class UID	1.3.6.1.4.1.34656.1.1
Implementation Version Name	ATSDICOM V1.1

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Verify

4.2.1.3.1.1 Description and Sequencing of Activities

The request for a Verification is initiated by user interaction and the result is displayed on user interface.
the Verification SCU opens an association with the Remote Verification SCP
Verification is transmitted using a C-ECHO request and the Remote Verification SCP replies with a C-ECHO response (status success)
the Verification SCU closes the association with the Remote Verification SCP

4.2.1.3.1.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Context as shown in the following table:

Table 4-7 Proposed Presentation Context for Connectivity Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The PRIMO S provides standard conformance to the DICOM Verification Service Class as an SCU. The status code for the C-ECHO is as follows:

Table 4-8 C-ECHO Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The C-ECHO Request is accepted and the success is reported to the user
Any other status code		The association is released using A-RELEASE and the failure is reported to the user

4.2.1.3.2 Activity – Send Images or X-Ray Dose SR

4.2.1.3.2.1 Description and Sequencing of Activities

A user can select images or RDSR and request them to be sent to multiple destinations.
One RDSR document is issued for each selected study.
Each request is forwarded to the job queue and processed individually.

- The Store SCU opens an association with the Remote Store SCP
- Images or RDSR are transferred using C-STORE service. Only one Image or RDSR is transferred on a single association
- The Store SCU waits the C-STORE return status, modifies the job status according to it and reports the job status to the user
- The Store SCU closes the association with the Remote Store SCP

4.2.1.3.2.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Contexts as shown in the following table:

Table 4-9 Proposed Presentation Contexts for Storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computer Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None
Digital x-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

4.2.1.3.2.3 SOP Specific Conformance for Storage SOP Classes

The DICOM transfer request and response are logged, together with tags and status details.
The behavior of PRIMO S when encountering status codes in a C-STORE response is summarized in the Table below:

Table 4-10 Storage C-STORE Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The SCP has successfully stored the SOP Instance. Job is marked as complete and it's removed from job queue. Job status is reported to the user
Any other status code		The association is released using A-RELEASE and the job is marked as failed. The status meaning is logged and the job status is reported to the user

The behavior of the AE during communication failure is summarized in the table below:

Table 4-11 Storage Communication Failure Behavior

Exception	Behavior
Association fail	Job is marked as failed; the reason is logged
Timeout	The Association is aborted using A-ABORT and the job is marked as failed. The

	reason is logged.
Association aborted	Job is marked as failed; the reason is logged

A failed sent job is automatically resent up to a maximum of 3 retries. Then, if the sent job is yet failed, the job status is reported to the user; in case, he can decide to resend the job manually.

The contents of CR Image Storage SOP Instances, created by PRIMO S conform to the DICOM CR Image IOD definition, are described in section 8.1.1.
The contents of DX Image Storage SOP Instances, created by PRIMO S conform to the DICOM DX Image IOD definition, are described in section 8.1.1.
The contents of X-Ray Radiation Dose SR SOP Instances, created by PRIMO S conform to the DICOM X-Ray Radiation Dose SR IOD definition, are described in section 8.1.1.

4.2.1.3.3 Activity – Request Storage Commitment

4.2.1.3.3.1 Description and Sequencing of Activities

The system can be configured to request to the Storage Commitment SCP the storage commitment of each Image or RDSR transferred to a Remote Store SCP.
PRIMO Starts an association negotiation and sends an N-ACTION Request to the Storage Commitment SCP; then closes the association.
The response of the commitment (N-EVENT-REPORT) is expected to be transferred on a separate association, started by the Storage Commitment SCP.
Once the Storage Commitment SCP has accepted the commitment to store the SOP Instances, PRIMO S marks the object as committed and leaves to the user the option to delete the SOP instances.

4.2.1.3.3.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Context as shown in the following table:

Table 4-12 Proposed Presentation Context for Storage Commitment

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

4.2.1.3.3.3 SOP Specific Conformance for Storage Commitment SOP Class

The DICOM request and response are logged, together with tags and status details.
The behavior of PRIMO S when encountering status codes in a N-ACTION response is summarized in the Table below:

Table 4-13 Storage Commitment N-ACTION Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The request for storage commitment is considered successfully sent. The system closes the association and waits for N-EVENT-REPORT message on a separate association
Any other status code		The association is released using A-RELEASE and the job is marked as failed. The status meaning is logged and the job status is reported to the user

The behavior of the AE during communication failure is summarized in the table below:

Table 4-14 Storage Commitment Communication Failure Behavior

Exception	Behavior
Association fail	Job is marked as failed; the reason is logged
Timeout	The Association is aborted using A-ABORT and the job is marked as failed. The

	reason is logged
Association aborted	Job is marked as failed; the reason is logged

The supported attributes building the data set of N-ACTION sent message are listed in the table below.
All type 1 attributes will be sent with a length different from zero.
The N-ACTION sent message refers to only one SOP Instance and the Transaction UID attribute uniquely identify the Storage Commitment Request.
The value of the Transaction UID attribute will be included by the Storage Commitment SCP in the Storage Commitment Result.
PRIMO S accepts N-EVENT-REPORT only on an association separated from the N-ACTION one.
Use of the Transaction UID attribute allows the PRIMO S to match requests and results that may occur over different associations.

Table 4-15 Storage Commitment N-ACTION Attributes

Attribute Description	Tag		Type	Matching Type
	Group	Element		
Transaction UID	0008	1195	1	
Referenced SOP Sequence	0008	1199	1	
> Referenced SOP Class UID	0008	1150	1	
> Reference SOP Instance UID	0008	1155	1	

PRIMO S accepts N-EVENT-REPORT messages and performs actions as in the following list:

- Replays with a status code of 0000H Success – Storage Commitment result has been successfully received
- If SCP issues an N-EVENT-REPORT with the Event Type ID set to 1 (storage commitment request successful : storage commitment successfully completed for the SOP Instance referenced by the Storage Commitment Request), the Image or RDSR associated with Transaction UID is marked as committed and the job status is reported to the user.
- If SCP issues an N-EVENT-REPORT with Event Type ID set to 2 (storage commitment request complete – failure exists: storage commitment isn't achieved for the SOP Instance referenced by the Storage Commitment Request), the association is closed.

4.2.1.3.4 Activity – Request Modality Worklist

4.2.1.3.4.1 Description and Sequencing of Activities

The user requests a list of work studies to be executed and can filter the request by patient name, patient ID, date/time, accession number.
PRIMO Starts an association negotiation and sends a C-FIND-RQ Request to the Worklist SCP.
Then receives a C-FIND-RSP Response from Workilist SCP and closes the association.

4.2.1.3.4.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Context as shown in the following table:

Table 4-16 Proposed Presentation Context for Modality Worklist

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information	1.2.840.10008.5.1.4.31	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

Model - FIND SOP Class					

4.2.1.3.4.3 SOP Specific Conformance for Modality Worklist SOP Class

The DICOM request and response are logged, together with tags and status details.
The behavior of PRIMO S when encountering status codes in a C-FIND-RQ response is summarized in the Table below:

Table 4-17 Modality Worklist C-FIND-RQ Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The received working list is displayed to the user
Any other status code		The association is released using A-RELEASE and an error message is displayed to the user

The behavior of the AE during communication failure is summarized in the table below:

Table 4-18 Modality Worklist Communication Failure Behavior

Exception	Behavior
Association fail	An error message is displayed to the user
Timeout	An error message is displayed to the user
Association aborted	An error message is displayed to the user

The following table shows specific attributes used in C-FIND-REQ command.
All type 1 attributes will be sent with a length different from zero; all type 2 or 3 attributes will be sent, possibly with a length of zero.

Table 4-19 Modality Worklist C-FIND-RQ Attributes

Attribute Name	Tag		Return Key Type	Matching Key Type	Note
	Group	Element			
Accession Number	0008	0050	2	O	
Additional Patient History	0010	21B0	3	O	
Admission ID	0038	0010	2	O	
Admitting Date	0038	0020	3	O	
Admitting Time	0038	0021	3	O	
Allergies	0010	2110	2	O	
Last Menstrual Date	0010	21D0	3	O	
Medical Alerts	0010	2000	2	O	
Occupation	0010	2180	3	O	
Other Patient IDs Sequence	0010	1000	3	O	
Other Patient Names	0010	1001	3	O	
Patient Age	0010	1010	3	O	
Patient Comments	0010	4000	3	O	
Referring Physician Name	0008	0090	2	O	
Patient Name	0010	0010	1	R	Single value / Wildcard
Patient ID	0010	0020	1	R	
Patient Birth Date	0010	0030	2	O	
Patient Sex	0010	0040	2	O	
Patient State	0038	0500	2	O	

Patient's Size	0010	1020	3	O	
Patient's Weight	0010	1030	2	O	
Pregnancy Status	0010	21C0	2	O	
Requesting Physician	0032	1032	2	O	
Study Instance UID	0020	000D	1	O	
Requested Procedure Description	0032	1060	1C	O	
Requested Procedure Code Sequence	0032	1064	1C	O	
>> Code Value	0008	0100	1	O	
>> Code Meaning	0008	0104	3	O	
Scheduled Procedure Step Sequence	0040	0100	1	R	
> Modality	0008	0060	1	R	Single value or no filter
> Scheduled Station AE title	0040	0001	1	R	No value. Filter is applied when worklist is received
> Scheduled Procedure Step Start Date	0040	0002	1	R	Single value / Range matching
> Scheduled Procedure Step Start Time	0040	0003	1	R	Single value / Range matching
> Scheduled Performing Physiscian's Name	0040	0006	2	R	
> Scheduled Procedure Step Description	0040	0007	1C	O	
> Scheduled Protocol Code Sequence	0040	0008	1C	O	
>> Code Value	0008	0100	1	O	
>> Code Meaning	0008	0104	3	O	
> Pre Medication	0040	0012	2C	O	
> Scheduled Procedure Step ID	0040	0009	1	O	
> Scheduled Station Name	0040	0010	2	O	
> Scheduled Procedure Step Location	0040	0011	2	O	
> Requested Contrast Agent	0032	1070	2C	O	
Requested Procedure ID	0040	1001	1	O	
Smoking Status	0010	21A0	3	O	
Special Needs	0038	0050	2	O	
Visit Comments	0038	4000	3	O	
Visit Status ID	0038	0008	3	O	
Requesting Service	0032	1033	3	O	
Patient Species Description	0010	2201	3	O	
Patient Species Code Sequence	0010	2202	3	O	
>> Code Value	0008	0100	1	O	
>> Code Meaning	0008	0104	3	O	
Patient Breed Description	0010	2292	3	O	
Patient Breed Code Sequence	0010	2293	3	O	
>> Code Value	0008	0100	1	O	
>> Code Meaning	0008	0104	3	O	
Responsible Person	0010	2297	3	O	
Responsible Person Role	0010	2298	3	O	
Responsible Organization	0010	2299	3	O	

Patient Sex Neutered	0010	2203	3	O	
Study ID	0020	0010	2	O	

4.2.1.3.5 Activity – Create and Update Modality Performed Procedure Step

4.2.1.3.5.1 Description and Sequencing of Activities

The system can be configured to request to MPPS SCP the creation and/or setting of remote MPPS on typical events related to examination/images life cycle. After the execution of a Scheduled Procedure Step, the system can communicate to the SCP informations on acquired images.
The creation of a remote MPPS is started on the first image acquisition of a study.
PRIMO Starts an association negotiation and sends a N-CREATE Request to the MPPS SCP to create and set a remote MPPS. Then PRIMO S closes the association.
The setting of a remote MPPS is started on the occurrence of specific events, such as *"End of Image Acquisition"* or *"Close Study".* The details of setting of the MPPS are configurable.
PRIMO Starts an association negotiation and sends a N-SET Request to the MPPS SCP to update a remote MPPS. Then PRIMO S closes the association.
If a MPPS related to the acquisition of images is in "IN PROGRESS" status and new images are acquired with different *modality* attribute (i.e. CR/DX), the first MPPS is completed on the server and a new one is created for the new images.

4.2.1.3.5.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Context as shown in the following table:

Table 4-20 Proposed Presentation Context for Modality Performed Procedure Step

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

4.2.1.3.5.3 SOP Specific Conformance for Modality Performed Procedure Step SOP Class

The DICOM request and response are logged, together with tags and status details.
The behavior of PRIMO S when encountering status codes in a N-CREATE/N-SET response is summarized in the Table below:

Table 4-21 MPPS N-CREATE/N-SET Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The MPPS notification is considered successfully
Any other status code		The association is released using A-RELEASE and an error message is logged in a local log file

The behavior of the AE during communication failure is summarized in the table below:

Table 4-22 MPPS Communication Failure Behavior

Exception	Behavior
Association fail	An error message is logged in a local log file
Timeout	An error message is logged in a local log file
Association aborted	An error message is logged in a local log file

The following tables show specific attributes used in N-CREATE and N-SET commands.
All type 1 attributes will be sent with a length different from zero; all type 2 or 3 attributes will be sent, possibly with a length of zero.

Table 4-23 MPPS N-CREATE Attributes

Attribute Name	Tag		Type	Note
	Group	Element		
SOP Class UID	0008	0016	1	1.2.840.10008.3.1.2.3.3
SOP Instance UID	0008	0018	1	
Modality	0008	0060	1	
Procedure Code Sequenze	0008	1032	2	
> Code Value	0008	0100	1	
> Coding Scheme Designator	0008	0102	1	
> Code Meaning	0008	0104	3	
Referenced Patient Sq	0008	1120	2	Always empty
Patient Name	0010	0010	2	
Patient ID	0010	0020	2	
Patient Birth Date	0010	0030	2	
Patient Sex	0010	0040	2	
Image Area Dose Product	0018	115E	3	
Study ID	0020	0010	2	
Performed Station AE title	0040	0241	1	
Performed Station Name	0040	0242	2	
Performed Location	0040	0243	2	
Performed Procedure Step Start Date	0040	0244	1	
Performed Procedure Step Start Time	0040	0245	1	
Performed Procedure Step End Date	0040	0250	2	
Performed Procedure Step End Time	0040	0251	2	
Performed Procedure Step Status	0040	0252	1	
Performed Procedure Step ID	0040	0253	1	
Performed Procedure Step Description	0040	0254	2	
Performed Procedure Type Description	0040	0255	2	
Performed Protocol Code Sequence	0040	0260	2	Always empty
Scheduled Step Attribute Sequence	0040	0270	1	
>Accession Number	0008	0050	2	
> Referenced Study Sequence	0008	1110	2	Always empty
> Study Instance UID	0020	000D	1	
> Requested Procedure Description	0032	1060	2	
> Scheduled Procedure Step Description	0040	0007	2	
> Scheduled Protocol Code Sequence	0040	0008	2	
>> Code Value	0008	0100	1	
>> Coding Scheme Designator	0008	0102	1	
>> Code Meaning	0008	0104	3	

> Scheduled Procedure Step ID	0040	0009	2	
> Requested Procedure ID	0040	1001	2	
Total Time of Fluoroscopy	0040	0300	3	
Total Number of Exposures	0040	0301	3	
Exposure Dose sequence	0040	030E	3	
> KVp	0018	0060	3	
> Exposure Time	0018	1150	3	
Comments on Radiation Dose	0040	0310	3	dGy*cm2
Performed Series Sequence	0040	0340	2	
> Retrieve AE Title	0008	0054	2	
> Series Description	0008	103E	2	
> Performing Physician’s Name	0008	1050	2	
> Operator’s Name	0008	1070	2	
> Referenced Image Sequence	0008	1140	2	
>> Referenced SOP Class UID	0008	1150	1	
>> Referenced SOP Instance UID	0008	1155	1	
> Protocol Name	0018	1030	1	
> Series Instance UID	0020	000E	1	
> Referenced Non-Image Composite SOP Instance Sequence	0040	0220	2	Always empty

Table 4-24 MPPS N-SET Attributes

Attribute Name	**Tag**		**Type**	**Type Final State**	**Note**
	Group	**Element**			
SOP Instance UID	0008	0018	1		
Image Area Dose Product	0018	115E	3		
Performed Procedure Step End Date	0040	0250	3	1	
Performed Procedure Step End Time	0040	0251	3	1	
Performed Procedure Step Status	0040	0252	3		
Total Time of Fluoroscopy	0040	0300	3		
Total Number of Exposures	0040	0301	3		
Exposure Dose Sequence	0040	030E	3		
> KVp	0018	0060	3		
> Exposure Time	0018	1150	3		
Performed Series Sequence	0040	0340	3	1	
> Retrieve AE Title	0008	0054	2	2	
> Series Description	0008	103E	2	2	
> Performing Physician’s Name	0008	1050	2	2	
> Operator’s Name	0008	1070	2	2	

> Referenced Image Sequence	0008	1140	2	1*	
>> Referenced SOP Class UID	0008	1150	1	1*	
>> Referenced SOP Instance UID	0008	1155	1	1*	
> Protocol Name	0018	1030	1	1	
> Series Instance UID	0020	000E	1	1	
> Referenced Non-Image Composite SOP Instance Sequence	0040	0220	2		Always empty

***** Before or when MPPS Status is set to “COMPLETE” or “DISCONTINUED” the SCU shall have sent to the SCP a list of all Image SOP Instance

4.2.1.3.6 Activity – Print Images

4.2.1.3.6.1 Description and Sequencing of Activities

On an user request to print one or more film, PRIMO Starts an association negotiation for the *Print Management Service Class* with the printer server and sends commands:

- N-CREATE Basic Film Session
- N-CREATE Basic Film Box (1-m)
- N-SET Basic Grayscale Image Box (1-n)
- N-ACTION Print Basic Film Session
- N-DELETE Basic Film Session

Then PRIMO S closes the association.
PRIMO S opens an association for each Film Session to be printed.
Each request is forwarded to the job queue and processed individually.
The operator can activate a direct print of the frame currently displayed; a single frame print film (STANDARD 1\1 format) is requested to the Print Server.
Alternatively the operator, using a film editor, can select the film layout among those supported by the printer, choose the frames to insert in any image box and set other print parameters (film destination, print priority etc.).

4.2.1.3.6.2 Proposed Presentation Contexts

The PRIMO S AE is capable of proposing the Presentation Context as shown in the following table:

Table 4-25 Proposed Presentation Context for Print

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

The PRIMO Supports the following mandatory SOP classes which are defined under the Basic Grayscale Print Management Meta SOP Class of the DICOM Print Management Service Class:

Table 4-26 Print SOP Classes

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

4.2.1.3.6.3 SOP Specific Conformance for Print SOP Classes

The DICOM request and response are logged, together with tags and status details.
The behavior of the AE during communication failure is summarized in the table below:

Table 4-27 Print Communication Failure Behavior

Exception	Behavior
Association fail	Job is marked as failed; the reason is logged
Timeout	The Association is aborted using A-ABORT and the job is marked as failed. The reason is logged.
Association aborted	Job is marked as failed; the reason is logged

A failed send job is automatically resend up to a maximum of 3 retries. Then, if the send job is yet failed, the job status is reported to the user; in case, he can decide to resend the job manually.

4.2.1.3.6.4 SOP Specific Conformance for Basic Film Session SOP Class

The behavior of PRIMO S when encountering status codes in a N-CREATE/N-ACTION/N-DELETE response is summarized in the Table below.

Table 4-28 Basic Film Session N-CREATE/N-ACTION/N-DELETE Response Status Handling Behavior

Code	Status	Meaning
0000	Success	N-CREATE: Film session successfully created N-ACTION: Film belonging to the film session are accepted for printing; job is marked as printed and it's removed from job queue. Job status is reported to the user N-DELETE: the association is closed and the local copy of the session is destroyed.
Any other status code		The association is released using A-RELEASE and the job is marked as failed. The status meaning is logged and the job status is reported to the user

N-CREATE : this command will be used to create a Film Session Instance. The following table shows specific attributes.

Table 4-29 Basic Film Session N-CREATE Attributes

Attribute Name	Tag		Type	Value
	Group	Element		
Number of Copies	2000	0010	3	Number of copies to be printed for each film of the film session
Print Priority	2000	0020	3	Specifies the priority of the print job. Enumerated Values: HIGH MED LOW
Medium Type	2000	0030	3	Medium type: PAPER CLEAR FILM BLUE FILM

Film Destination	2000	0040	3	Film destination: MAGAZINE = the exposed film is stored in film magazine PROCESSOR = the exposed film is developed in film processor BIN_i = the exposed film is deposited in a sorter bin where "I" represents the bin number

N-ACTION. This command will be used to create a Print Job Instance to print the whole printing session.

N-DELETE. This command will be used to delete the whole Print Session after the Print Job Instance creation.

4.2.1.3.6.5 SOP Specific Conformance for Basic Film Box SOP Class

The behavior of PRIMO S when encountering status codes in a N-CREATE response is summarized in the Table below.

Table 4-30 Basic Film Box N-CREATE Response Status Handling Behavior

Code	Status	Meaning
0000	Success	Film Box successfully created
Any other status code		The association is released using A-RELEASE and the job is marked as failed. The status meaning is logged and the job status is reported to the user

N-CREATE : this command will be used to create a Film Box Instance. The following table shows specific attributes.

Table 4-31 Basic Film Box N-CREATE Attributes

Attribute Name	Tag		Type	Value
	Group	Element		
Image Display Format	2010	0010	1	Type of image display format STANDARD\c,r ROW\R1,R2,R3… COL\C1,C2,C3… SLIDE, SUPERSLIDE, CUSTOM\i
Film Orientation	2010	0040	3	Film orientation. PORTRAIT = vertical film position LANDSCAPE = horizontal film position
Film Size ID	2010	0050	3	Film size identification. 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A4, A3

Referenced Film Session Sequence	2010	0500	1	
>Referenced SOP Class UID	0008	1150	1	
>Referenced SOP Instance UID	0008	1155	1	

4.2.1.3.6.6 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

The behavior of PRIMO S when encountering status codes in a N-SET response is summarized in the Table below.

Table 4-32 Basic Grayscale Image Box N-SET Response Status Handling Behavior

Code	Status	Meaning
0000	Success	Image successfully stored in Image Box
Any other status code		The association is released using A-RELEASE and the job is marked as failed. The status meaning is logged and the job status is reported to the user

N-SET: this command will be used to update a Grayscale Image Instance. The following table shows specific attributes.

Table 4-33 Basic Grayscale Image Box N-SET Attributes

Attribute Name	Tag		Type	Value
	Group	Element		
Image Box Position	2020	0010	1	Position of the image on the film
Basic Grayscale Image Sequence	2020	0110	1	
>Samples Per Pixel	0028	0002	1	
>Photometric Interpretation	0028	0004	1	
>Rows	0028	0010	1	
>Columns	0028	0011	1	
>Pixel Aspect Ratio	0028	0034	1	
>Bits Allocated	0028	0100	1	
>Bits Stored	0028	0101	1	
>High Bit	0028	0102	1	
>Pixel Representation	0028	0103	1	
>Pixel Data	7FE0	0010	1	

4.2.1.3.7 Activity – Query/Retrieve Images

4.2.1.3.7.1 Description and Sequencing of Activities

The user queries a list of useful studies to a Dicom Archive and can filter the request with some parameters (patient name, patient ID, Study Date). Then the user selects one or more studies from the returned matching list and requests to retrieve the associated images from the Archive.
The retrieved studies, stored locally, can be displayed but they cannot be modified.

According to Dicom Standard, PRIMO S can query studies both in *Patient Root Mode* and *Study Root Mode*:

- ***Patient Root Mode*** : To Query a Study List, PRIMO S starts an association negotiation and sends a C-FIND-RQ Patient Level Request to the Remote Archive.
  Then receives a C-FIND-RSP Response with the patients matching list from the Remote Archive.

For each received patient record, PRIMO S sends a C-FIND-RQ Study Level Request to the Remote Archive and receives a C-FIND-RSP Response with the studies matching list from the Remote Archive.
Finally PRIMO S closes the association.

- ***Study Root Mode*** : To Query a Study List, PRIMO S starts an association negotiation and sends a C-FIND-RQ Study Level Request to the Remote Archive.
  Then receives a C-FIND-RSP Response with the studies matching list from the Remote Archive and closes the association.

To Retrieve the Images associated to the selected Study, PRIMO S starts an association negotiation and sends a C-MOVE-RQ Request to the Remote Archive; then receives a C-MOVE-RSP Response from the Remote Archive and closes the association.
For each received C-MOVE-RQ command, the Archive Server starts an association negotiation with PRIMO S to Store the Images of the Requested Study; then closes the association.

4.2.1.3.7.2 Proposed Presentation Contexts

Table 4-34 Proposed Presentation Context for Query/Retrieve

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Explicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None

4.2.1.3.7.3 SOP Specific Conformance for Query/Retrieve SOP Classes

The DICOM request and response are logged, together with tags and status details.
The behavior of PRIMO S when encountering status codes in a C-FIND-RQ response is summarized in the Table below:

Table 4-35 Patient/Study Root Q/R C-FIND-RQ Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The records received are displayed
Any other status code		The association is released using A-RELEASE and an error message is displayed to the user

Table 4-36 Patient/Study Root Q/R C-MOVE-RQ Response Status Handling Behavior

Code	Status	Meaning
0000	Success	The system waits for image instances to be received in a C-STORE separate association.
Any other status code		The association is released using A-RELEASE and an error message is displayed to the user

The behavior of the AE during communication failure is summarized in the table below:

Table 4-37 Q/R Communication Failure Behavior

Exception	Behavior
Association fail	An error message is displayed to the user
Timeout	An error message is displayed to the user
Association aborted	An error message is displayed to the user

4.2.1.3.7.4 SOP Specific Conformance for Patient Root Q/R IM – FIND SOP Class

The following table shows specific attributes used in C-FIND-RQ command.
Matching key attributes may be of type Required (R), Optional (O) or User (U).

Table 4-38 Patient Root Q/R IM - C-FIND Patient Level keys

Attribute Name	Tag		Type	Source
	Group	Element		
Patient's Name	0010	0010	R	user
Patient ID	0010	0020	R	user
Patient's Birth Date	0010	0030	O	
Patient's Sex	0010	0040	O	

Table 4-39 Patient Root Q/R IM - C-FIND Study Level keys

Attribute Name	Tag		Type	Source
	Group	Element		
Study Date	0008	0020	R	
Study Time	0008	0030	R	
Accession Number	0008	0050	R	
Modalities in Study	0008	0061	O	
Study Description	0008	1030	O	
Patient's Name	0010	0010	R	auto
Patient ID	0010	0020	R	auto
Study Instance UID	0020	000D	U	
Study ID	0020	0010	R	
Number of Study Related Instances	0020	1208	O	

4.2.1.3.7.5 SOP Specific Conformance for Patient Root Q/R IM – MOVE SOP Class

The following table shows specific attributes used in C-MOVE-RQ command.
Matching key attributes may be of type Required (R), Optional (O) or User (U).

Table 4-40 Patient Root Q/R IM - C-MOVE Study Level keys

Attribute Name	Tag		Type	Source
	Group	Element		
Patient ID	0010	0020	R	auto
Study Instance UID	0020	000D	R	auto

4.2.1.3.7.6 SOP Specific Conformance for Study Root Q/R IM – FIND SOP Class

The following table shows specific attributes used in C-FIND-RQ command.
Matching key attributes may be of type Required (R), Optional (O) or User (U).

Table 4-41 Study Root Q/R IM - C-FIND Study Level keys

Attribute Name	Tag		Type	Source
	Group	Element		
Study Date	0008	0020	R	
Study Time	0008	0030	R	
Accession Number	0008	0050	R	
Modalities in Study	0008	0061	O	
Study Description	0008	1030	O	
Patient's Name	0010	0010	R	user
Patient ID	0010	0020	R	user
Patient's Birth Date	0010	0030	O	
Patient's Sex	0010	0040	O	
Study Instance UID	0020	000D	U	
Study ID	0020	0010	R	
Number of Study Related Instances	0020	1208	O	

4.2.1.3.7.7 SOP Specific Conformance for Study Root Q/R IM – MOVE SOP Class

The following table shows specific attributes used in C-MOVE-RQ command.
Matching key attributes may be of type Required (R), Optional (O) or User (U).

Table 4-42 Study Root Q/R IM - C-MOVE Study Level keys

Attribute Name	Tag		Type	Source
	Group	Element		
Study Instance UID	0020	000D	R	auto

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Verify

4.2.1.4.1.1 Description and Sequencing of Activities

The PRIMO S will accept associations in order to receive C-ECHO request.

- the Verification SCU opens an association with PRIMO S
- the Verification SCU sends a C-ECHO request and PRIMO S replies with a C-ECHO response (status success)
- the Verification SCU closes the association with PRIMO S

4.2.1.4.1.2 Accepted Presentation Contexts

The PRIMO S AE is capable of accepting the Presentation Context as shown in the following table:

Table 4-43 Acceptable Presentation Context for Connectivity Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCP	None

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class

The DICOM request and response are logged, together with tags and status details.
The PRIMO S provides standard conformance to the DICOM Verification Service Class as an SCP. The behavior and the response status of PRIMO S following a C-ECHO request is shown in the following table.

Table 4-44 Verify C-ECHO Response Status

Code	Status	Reason
0000	Success	The C-ECHO Request was successfully received
Otherwise, the association is aborted		

4.2.1.4.2 Activity – Receive Storage Commitment Response

4.2.1.4.2.1 Description and Sequencing of Activities

The PRIMO S will accept associations in order to receive responses to a Storage Commitment Request.

- the Storage Commitment SCP opens an association with PRIMO S
- the Storage Commitment SCP sends a N-EVENT-REPORT request notifying the PRIMO S of the status of a previous Storage Commitment Request. PRIMO S replies with a N-EVENT-REPORT response confirming receipt
- the Storage Commitment SCP closes the association with PRIMO S

4.2.1.4.2.2 Accepted Presentation Contexts

The PRIMO S AE is capable of accepting the Presentation Contexts as shown in the following table:

Table 4-45 Acceptable Presentation Contexts for Activity Receive Storage Commitment Response

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCU	None
Verification	1.2.840.10008.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCP	None

4.2.1.4.2.3 SOP Specific Conformance for Storage Commitment SOP Class

The DICOM request and response are logged, together with tags and status details.
The behavior and the response status of PRIMO S following a N-EVENT-REPORT request is shown in the following table.

Table 4-46 Storage Commitment N-EVENT-REPORT Response Status

Code	Status	Reason
0000	Success	The Storage Commitment result was successfully received

4.2.1.4.3 Activity – Receive Remote Images

4.2.1.4.3.1 Description and Sequencing of Activities

The reception of Images on a C-STORE association follows a Query/Retrieve C-MOVE-RQ command. Received Images are stored locally and displayed to the user.

4.2.1.4.3.2 Accepted Presentation Contexts

The PRIMO S AE is capable of accepting the Presentation Contexts as shown in the following table:

Table 4-47 Acceptable Presentation Contexts for Storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.2.1	SCP	None

4.2.1.4.3.3 SOP Specific Conformance for Storage SOP Class

The DICOM request and response are logged, together with tags and status details.
The behaviour and the response status of PRIMO S following a C-STORE request is shown in the following table.

Table 4-48 Storage C-STORE Response Status

Code	Status	Reason
0000	Success	The SOP Instance was successfully received

4.3 Network Interfaces

4.3.1 Physical Network Interface

The PRIMO S provides TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.
The PRIMO S uses the TCP/IP stack of the Windows 7 Pro operating system under which it executes.

4.3.2 Additionals Protocols

None.

4.3.3 IPv4 and IPv6 Support

PRIMO Supports IPv4 only.

4.4 Configuration

The PRIMO S configuration is loaded into the PRIMO S database present on HD.

4.4.1 AE Title/ Presentation Address Mapping

4.4.1.1 Local AE Titles

The local AET mapping and configuration is specified in the following table.

Table 4-49 AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
PRIMO S	PRIMO S	104

4.4.1.2 Remote AE Title/ Presentation Address Mapping

The AE Titles, host names and port numbers of remote applications are configured using ‘Dicom Setup’ user interface.

4.4.2 Parameters

A large number of parameters related to acquisition and general operation can be configured using the Dicom Setup user interface. The PRIMO S Technical Manual describes details on general configuration capabilitites.

5. MEDIA INTERCHANGE

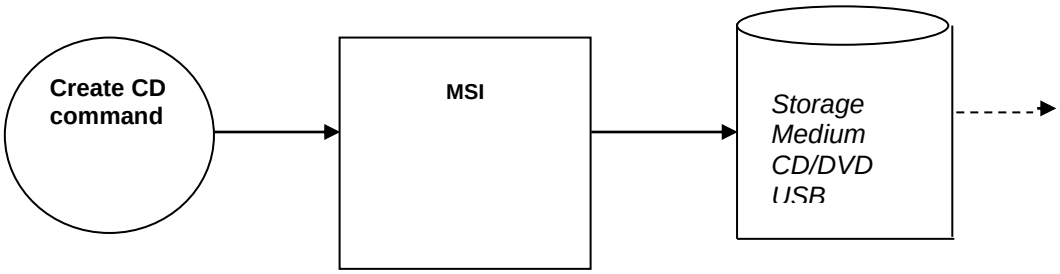
PRIMO S is equipped with a *Media Storage Interface* (MSI) that allows the creation and saving of a file-set on CD/DVD or USB drive according with DICOM 3.0 standard.

5.1 Implementation Model

MSI is an application capable to convert local storage images in a file set on exam base and to write the file set to a CD-R or USB drive. A dedicated menu command starts the exporting of images on CD/DVD or USB drive.

5.1.1 Application Data Flow

Figure 5.1-1
Application Data Flow Diagram for Media Storage



5.1.2 Functional Definition of AEs

After the user selection of studies, MSI starts CD/DVD image construction and formatting or checking and initializing the USB drive. If no errors are detected, MSI writes new Dicom Files on the medium.
It returns the command exit status to be displayed on the main monitor (depending on status return code).

5.1.3 Sequencing of Real World Activities

Not applicable.

5.1.4 File Meta Information for Implementation Class and Version

The implementation information written to the File Meta Header in each file is:

Table 5-1 Dicom Implementation Class and Version for MSI

Implementation Class UID	1.3.6.1.4.1.34656.1.1
Implementation Version Name	ATSDICOM V1.1

5.2 AE Specifications

5.2.1 MSI AE Specification

MSI provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed in the table below.

Table 5-2 Application Profiles, Activities and Roles for MSI

Application Profiles supported	Real World Activity	Role	SC Option
STD-GEN-CD/DVD	Create CD/DVD	FSC	Interchange
STD-GEN-USB	Create	FSC	Interchange

5.2.1.1 File Meta Information for the MSI AE

The Source Application Entity Title is set by the user in the Dicom Setup dialog.

5.2.1.2 Real World Activities

5.2.1.2.1 Real World Activity – Create

MSI acts as an FSC using the Interchange Option when requested to save images on CD/DVD or USB drive. MSI uses all the SOP Instances of the selected exam to build a file-set to be written to the media.
A corresponding DICOMDIR is created and the file set is written in an empty CD/DVD or in an initialized USB drive.

5.2.1.2.1.1 Media Storage Application Profile

The Application Profiles used from MSI are listed in Table 5.2-1. There are no extensions or specializations.

The SOP Classes and Transfer Syntax used in STD-GEN-CD/DVD or STD-GEN-USB profile are shown in the table below.

Table 5-3 IODs, SOP Classes and Transfer Syntax for STD-GEN-CD/DVD

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1

5.3 Augmented and Private Application Profiles

5.3.1 Augmented Application Profiles

None.

5.3.2 Private Application Profiles

None.

5.4 Media Configuration

A large number of parameters can be configured using the Dicom Setup user interface. The PRIMO S Technical Manual describes details to setup media storage parameters.

6. SUPPORT OF CHARACTER SETS

The following specific character set are supported and are selectable:

- ISO-IR 100 Latin 1
- ISO-IR 101 Latin 2
- ISO-IR 109 Latin 3
- ISO-IR 110 Latin 4
- ISO-IR 144 Cyrillic

- ISO-IR 127 Arab
- ISO-IR 126 Greek
- ISO-IR 138 Hebrew
- ISO-IR 148 Latin 5
- ISO-IR 192 Unicode UTF-8

7. SECURITY

PRIMO S does not support any specific security measures. It is assumed that PRIMO S is used within a secured environment.
It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to PRIMO S.
- Firewall or router protections to ensure that PRIMO S only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8. ANNEXES

8.1 IOD Contents

8.1.1 Created SOP Instances

Tables 8.1-1 to 8.1-3 specify the attributes of CR/DX Image and X-Ray Radiation Dose SR IOD created by PRIMO S.
The abbreviations used in the following tables:
M – Mandatory module
U – User Option module
C – Conditional module
All type 1 attributes will be sent with a length different from zero; all type 2 or 3 attributes will be sent, possibly with a length of zero.

Table 8-1 IOD of Created CR SOP Instances

IE	Module	Reference	Usage
Patient	Patient	Table 8.1-4	M
Study	General Study	Table 8.1-5	M
	Patient Study	Table 8.1-6	U
Series	General Series	Table 8.1-7	M
	CR Series	Table 8.1-8	M
Equipment	General Equipment	Table 8.1-10	M
Image	General Image	Table 8.1-12	M
	Image Pixel	Table 8.1-13	M
	Contrast/bolus	Table 8.1-14	C
	CR Image	Table 8.1-15	M
	SOP Common	Table 8.1-16	M

Table 8-2 IOD of Created DX SOP Instances

IE	Module	Reference	Usage
Patient	Patient	Table 8.1-4	M
Study	General Study	Table 8.1-5	M
	Patient Study	Table 8.1-6	U
Series	General Series	Table 8.1-7	M
	DX Series	Table 8.1-9	M
Equipment	General Equipment	Table 8.1-10	M
Image	General Image	Table 8.1-12	M
	Image Pixel	Table 8.1-13	M
	Contrast/bolus	Table 8.1-14	U
	DX Anatomy Imaged	Table 8.1-17	M
	DX Image	Table 8.1-18	M
	DX Detector	Table 8.1-19	M
	DX Positioning	Table 8.1-20	U
	X-Ray Acquisition Dose	Table 8.1-21	U
	X-Ray Generation	Table 8.1-28	U
	X-Ray Filtration	Table 8.1-24	U
	X-Ray Grid	Table 8.1-29	U
	VOI LUT	Table 8.1-22	C (Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION. Shall not be present otherwise).
	Acquisition Context	Table 8.1-23	M
	SOP Common	Table 8.1-16	M

Table 8-3 IOD of Created X-Ray Radiation Dose SR SOP Instances

IE	Module	Reference	Usage
Patient	Patient	Table 8.1-4	M
Study	General Study	Table 8.1-5	M
	Patient Study	Table 8.1-6	U
Series	SR Document Series	Table 8.1-11	M
Equipment	General Equipment	Table 8.1-10	M
	Enhanced General Equipment	Table 8.1-25	M
Document	SOP Common	Table 8.1-16	M
	SR Document General	Table 8.1-26	M
	SR Document Content	Table 8.1-27	M

Table 8-4 Patient Module (CR, DX, RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Patient Name	0010	0010	2	

Patient ID	0010	0020	2	
Patient's Birth Date	0010	0030	2	
Patient's Sex	0010	0040	2	
Other Patient IDs Sequence	0010	1002	3	≥1 items
Responsible Person	0010	2297	2C	Required if the patient is an animal. May be present otherwise
Responsible Organization	0010	2299	2C	Required if the patient is an animal. May be present otherwise
Patient Species Description	0010	2201	1C	Required if the patient is an animal. May be present otherwise
Patient Breed Description	0010	2292	2C	Required if the patient is an animal. May be present otherwise
Patient Breed Code Sequence	0010	2293	2C	≥0 items; required if the patient is an animal
Breed Registration Sequence	0010	2294	2C	≥0 items; required if the patient is an animal
Patient Comments	0010	4000	3	

Table 8-5 General Study Module (CR, DX, RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Study Instance UID	0020	000D	1	
Study Date	0008	0020	2	
Study Time	0008	0030	2	
Referring Physician's Name	0008	0090	2	
Study ID	0020	0010	2	
Accession Number	0008	0050	2	
Study Description	0008	1030	3	

Table 8-6 Patient Study Module (CR, DX, RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Patient’s Age	0010	1010	3	
Patient’s Size	0010	1020	3	
Patient’s Weight	0010	1030	3	
Patient’s Sex Neutered	0010	2203	2C	Required if the patient is an animal. Enumerated Values: Altered, Unaltered

Table 8-7 General Series Module (CR, DX)

Attribute Name	Tag	Type	Note

	Group	Element		
Modality	0008	0060	1	CR for CR Modality DX for DX Modality
Series Instance UID	0020	000E	1	
Series Number	0020	0011	2	
Laterality	0020	0060	2C	Required if the body part examined is a paired structure and Image Laterality (0020,0062) is not present (So, only CR) Enumerated Values: R (Right), L (Left)
Protocol Name	0018	1030	3	
Operator's name	0008	1070	3	
Body Part Examined	0018	0015	3	
Performing Physician's Name	0008	1050	3	
Anatomical Orientation Type	0010	2210	1C	Required if the patient is an animal and the anatomical frame of reference is not bipedal. Enumerated Values: Biped, Quadruped

Table 8-8 CR Series Module (CR)

Attribute Name	Tag		Type	Note
	Group	Element		
Body Part Examined	0018	0015	2	
View Position	0018	5101	2	Enumerated Values: AP = Anterior/Posterior PA = Posterior/Anterior LL = Left Lateral RL = Right Lateral RLD = Right Lateral Decubitus LLD = Left Lateral Decubitus RLO = Right Lateral Oblique LLO = Left Lateral Oblique

Table 8-9 DX Series Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Presentation Intent Type	0008	0068	1	Enumerated Values: FOR PRESENTATION, FOR PROCESSING

Table 8-10 General Equipment Module (CR, DX, RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Manufacturer	0008	0070	2	
Institution Name	0008	0080	3	
Station Name	0008	1010	3	
Manufacturer's Model Name	0008	1090	3	
Device Serial Number	0018	1000	3	
Software Version	0018	1020	3	
Institution Address	0008	0081	3	

Table 8-11 SR Document Series Module (RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Series Date	0008	0021	3	
Series Time	0008	0031	3	
Modality	0008	0060	1	SR
Referenced Performed Procedure Step Sequence	0008	1111	2	0-1 item
Series Number	0020	0011	1	
Serie Instance UID	0020	000E	1	
Series Description	0008	103E	3	

Table 8-12 General Image Module (CR, DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Image Type	0008	0008	3	DERIVED\PRIMARY
Acquisition Date	0008	0022	3	
Acquisition Time	0008	0032	3	
Instance Number	0020	0013	2	
Burned In Annotation	0028	0301	3	Enumerated Values: YES, NO
Patient Orientation	0020	0020	2C	Required if image does not require Image Orientation (0020,0037) and Image Position (0020,0032). May be present otherwise
Lossy Image Compression	0028	2110	3	Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected tolossy compression.

Table 8-13 Image Pixel Module (CR, DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Samples per Pixel	0028	0002	1	1
Photometric Interpretation	0028	0004	1	MONOCHROME1 MONOCHROME2
Rows	0028	0010	1	
Columns	0028	0011	1	
Pixel Aspect Ratio	0028	0034	1C	Required if the aspect ratio values do not have a ratio of 1:1
Bits Allocated	0028	0100	1	8,16 depending on Bit Stored
Bits Stored	0028	0101	1	8,12,16 (Configurable)
High Bit	0028	0102	1	Bits Stored –1
Pixel Representation	0028	0103	1	
Pixel Data	7FE0	0010	1C	Required if Pixel Data Provider URL (0028,7FE0) is not present

Table 8-14 Contrast/bolus Module (CR, DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Contrast/Bolus Agent	0018	0010	2	

Table 8-15 CR Image Module (CR)

Attribute Name	Tag		Type	Note
	Group	Element		
KVP	0018	0060	3	
Exposure Time	0018	1150	3	
Exposure	0018	1152	3	
X-Ray Tube Current	0018	1151	3	
Exposure in µAs	0018	1153	3	
Imager Pixel Spacing	0018	1164	3	
Relative X-Ray Exposure	0018	1405	3	
Pixel Spacing	0028	0030	1C	Required if the image has been calibrated. May be present otherwise

Table 8-16 SOP Common Module (CR, DX, RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Specific Character Set	0008	0005	1C	

SOP Class UID	0008	0016	1	
SOP Instance UID	0008	0018	1	

Table 8-17 DX Anatomy Imaged Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Image Laterality	0020	0062	1	Enumerated Values: R (right), L (left), U (unpaired), B (both left and right)
Anatomic Region Sequence	0008	2218	2	1 item

Table 8-18 DX Image Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Pixel Intensity Relationship	0028	1040	1	LIN
Pixel Intensity Relationship Sign	0028	1041	1	1/-1
Rescale Intercept	0028	1052	1	0
Rescale Slope	0028	1053	1	1
Rescale Type	0028	1054	1	US
Presentation LUT Shape	2050	0020	1	IDENTITY / INVERSE
Lossy Image Compression	0028	2110	1	Always 00
Burned In Annotation	0028	0301	1	YES/NO
Patient Orientation	0020	0020	1C	Required if View Code Sequence (0054,0220) is not present. May be present otherwise

Table 8-19 DX Detector Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Detector Type	0018	7004	2	SCINTILLATOR
Detector Configuration	0018	7005	3	AREA
Imager Pixel Spacing	0018	1164	1	
Pixel Spacing	0028	0030	1C	Required if the image has been calibrated. May be present otherwise

Table 8-20 DX Positioning Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
View Position	0018	5101	3	
Positioner Type	0018	1508	2	

Table 8-21 X-Ray Acquisition Dose Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
KVP	0018	0060	3	
Distance Source to Detector	0018	1110	3	
Exposure Time	0018	1150	3	
Exposure	0018	1152	3	
Exposure in µAs	0018	1153	3	
Image and Fluoroscopy Area Dose Product	0018	115E	3	
Relative X-Ray Exposure	0018	1405	3	
X-Ray Tube Current	0018	1151	3	

Table 8-22 VOI LUT Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
VOI LUT Sequence	0028	3010	1C	Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and Window Center (0028,1050) is not present. May also be present if Window Center is present
>LUT Descriptor	0028	3002	1	
>LUT Data	0028	3006	1	
Window Center	0028	1050	1C	Required if Presentation Intent Type (0008,0068) is FOR PRESENTATION and VOI LUT Sequence (0028,3010) is not present. May also be present if VOI LUT Sequence is present
Window Width	0028	1051	1C	Required if Window Center (0028,1050) is present

Table 8-23 Acquisition Context Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Acquisition Context Sequence	0040	0555	2	≥0 items

Table 8-24 X-Ray Filtration Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		

Filter Type	0018	1160	3	Defined Terms are: NONE STRIPE Empty if undefined
Filter Material	0018	7050	3	May be multi-valued. Defined Terms: MOLYBDENUM ALUMINUM COPPER RHODIUM NIOBIUM EUROPIUM LEAD Empty if undefined
Filter Thickness Minimum	0018	7052	3	
Filter Thickness Maximum	0018	7054	3	

Table 8-25 Enhanced General Equipment Module (RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Manufacturer	0008	0070	1	
Manufacturer's Model Name	0008	1090	1	
Device Serial Number	0018	1000	1	
Software Versions	0018	1020	1	

Table 8-26 SR Document General Module (RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Content Date	0008	0023	1	
Content Time	0008	0033	1	
Instance Number	0020	0013	1	
Referenced Request SQ	0040	A370	1C	≥1 items; required if this document fulfils at least one Requested Procedure
Performed Procedure Code SQ	0040	A372	2	≥0 items
Completion Flag	0040	A491	1	Enumerated Values: Partial, Complete
Completion Flag Description	0040	A492	3	
Verification Flag	0040	A493	1	Enumerated Values: Unverified, Verified
Preliminary Flag	0040	A496	3	Enumerated Values: Preliminary, Final

Table 8-27 SR Document Content Module (RDSR)

Attribute Name	Tag		Type	Note
	Group	Element		
Value Type	0040	A040	1	CONTAINER
Concept Name Code Sq	0040	A043	1C	1 item; required if Value Type (0040,A040) is Container and a heating is present or this is the Root Content Item
>Code Value	0008	0100	1	113701
>Coding Scheme Designator	0008	0102	1	DCM
>Code Meaning	0008	0104	1	X-Ray Radiation Dose Report
Continuity of Content	0040	A050	1	SEPARATE
Content Template Sq	0040	A504	1C	1 item
>Mapping Resource	0008	0105	1	DCMR
>Template Identifier	0040	DB00	1	10001
Content Sq	0040	A730	1C	See Figure 8.1-1 and Tables 8.1-30to39

Table 8-28 X-Ray Generation Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Exposure Control Mode Description	0018	7062	3	Defined Terms are: no AEC cells AEC_center_cell AEC_right_cell AEC_center_and_right_cells AEC_left_cell AEC_left_and_center_cells AEC_left_and_right_cells AEC_left_and_center_and_right_cells

Table 8-29 X-Ray Grid Module (DX)

Attribute Name	Tag		Type	Note
	Group	Element		
Grid	0018	1166	3	Defined Terms are: FIXED, FOCUSED, RECIPROCATING, PARALLEL, CROSSED, NONE

Figure 8.1-1
Template Structure

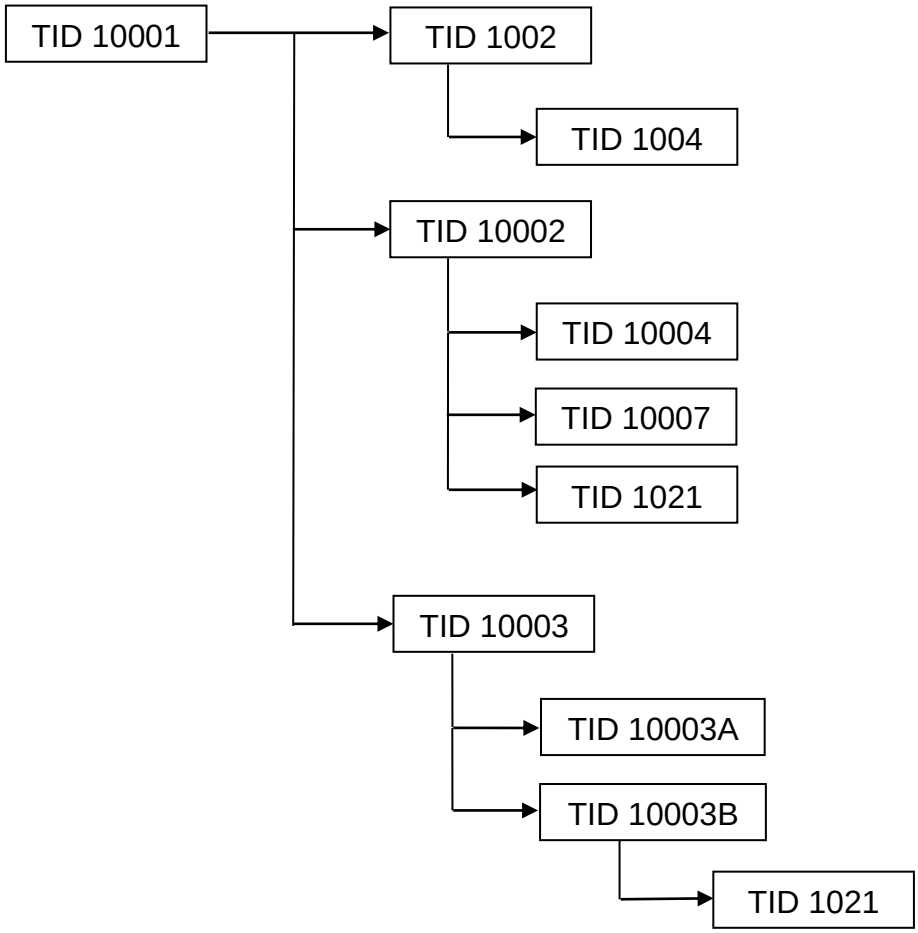


Table 8-30 TID 1002 Observer Context

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Has Obs Context	CODE	EV(121005,DCM, ”Observer Type”)	MC	EV(121007,DCM,”Device”)
	Has Obs Context	INCLUDE	DTID(1004) “Device Observer Identifying Attributes”	MC	

Table 8-31 TID 1004 Device Observer Identifying Attributes

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Has Obs Context	UIDREF	EV(121012,DCM,”Device Observer UID”)	M	
	Has Obs Context	TEXT	EV(121013,DCM,”Device Observer Name”)	U	
	Has Obs Context	TEXT	EV(121014,DCM,”Device Observer Manufacturer”)	U	
	Has Obs Context	TEXT	EV(121015,DCM,”Device Observer Model Name”)	U	
	Has Obs Context	TEXT	EV(121016,DCM,”Device Observer Serial Number”)	U	
	Has Obs Context	TEXT	EV(121017,DCM,”Device Observer Physical Location During Observation”)	U	
	Has Obs Context	CODE	EV(113876,DCM,”Device Role in Procedure”)	U	

Table 8-32 TID 1021 Device Participant

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Contains	CODE	EV(113876,DCM,"Device Role in Procedure")	M	
>	Has Properties	TEXT	EV(113877,DCM,"Device Name")	U	
>	Has Properties	TEXT	EV(113878,DCM,"Device Manufacturer")	M	
>	Has Properties	TEXT	EV(113879,DCM,"Device Model Name")	M	
>	Has Properties	TEXT	EV(113880,DCM,"Device Serial Number")	M	
>	Has Properties	UIDREF	EV(121012,DCM,"Device Observer UID")	M	

Table 8-33 TID 10001 Projection X-Ray Radiation Dose

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
		CONTAINER	EV(113701,DCM,"X-Ray Radiation Dose Report")	M	
>	Has Concept Mod	CODE	EV(121058,DCM,"Procedure Reported")	M	
>>	Has Concept Mod	CODE	EV(G-C0E8,SRT,"Has Intent")	M	
>		INCLUDE	DTID(1002)"Observer Context"	M	
>	Has Obs Context	CODE	EV(113705,DCM,"Scope of Accumulation")	M	
>>	Has Properties	UIDREF	DCID 10001 "UID Types": StudyInstanceUID	M	
>	Contains	CODE	EV(113944,DCM,"X-Ray Mechanical Data Available")	U	
>	Contains	INCLUDE	DTID(10002)"Accumulated X-Ray Dose"	MC	
>	Contains	INCLUDE	DTID(10003)"Irradiation Event X-Ray Data"	MC	
>	Contains	CODE	EV(113854,DCM,"Source of Dose Information")	M	

Table 8-34 TID 10002 Accumulated X-Ray Dose

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
		CONTAINER	EV(113702,DCM,"Accumulated X-Ray Dose Data")	M	
>	Has Concept Mod	CODE	EV(113764,DCM,"Acquisition Plane")	M	
>	Contains	CONTAINER	EV(122505,DCM,"Calibration")	MC	
>>	Has Concept Mod	CODE	EV(113794,DCM,"Dose Measurement Device")	M	
>>	Contains	DATETIME	EV(113723,DCM,"Calibration Date Time")	M	
>>	Contains	NUM	EV(122322,DCM,"Calibration Factor")	M	
>>	Contains	NUM	EV(113763,DCM,"Calibration Uncertainty")	M	
>>	Contains	TEXT	EV(113724,DCM,"Calibration Responsible Party")	M	
>>	Contains	TEXT	EV(113720,DCM,"Calibration Protocol")	U	
>	Contains	INCLUDE	DTID(10004)"Accumulated Fluoroscopy and Acquisition Projection X-Ray Dose"	MC	
>	Contains	INCLUDE	DTID(10007)"Accumulated Total Projection Radiography Dose"	MC	
>	Contains	INCLUDE	DTID(1021)"Device Participant"	MC	

Table 8-35 TID 10003 Irradiation Event X-Ray Data

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
		CONTAINER	EV(113706,DCM,"Irradiation Event X-Ray Data")	M	
>	Has Concept Mod	CODE	EV(113764,DCM,"Acquisition Plane")	M	
>	Contains	UIDREF	EV(113769,DCM,"Irradiation Event UID")	M	
>	Contains	DATETIME	DT(111526,DCM,"DateTime Started"	M	
>	Contains	CODE	EV(113721,DCM,"Irradiation Event Type")	M	
>	Contains	TEXT	EV(125203,DCM,"Acquisition Protocol")	U	
>	Contains	CODE	EV(123014,DCM,"Target Region")	M	
>	Contains	NUM	EV(122130,DCM,"Dose Area Product")	MC	
>	Contains	INCLUDE	DTID(10003A)"Irradiation Event X-Ray Detector Data"	MC	
>	Contains	INCLUDE	DTID(10003B)"Irradiation Event X-Ray Source Data"	MC	

Table 8-36 TID 10003A Irradiation Event X-Ray Detector Data

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Contains	NUM	EV(113845,DCM,"Exposure Index")	MC	
	Contains	NUM	EV(113846,DCM,"Target Exposure Index")	MC	
	Contains	NUM	EV(113847,DCM,"Deviation Index")	MC	

Table 8-37 TID 10003B Irradiation Event X-Ray Source Data

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Contains	NUM	EV(113738,DCM,"Dose(RP)")	MC	
	Contains	TEXT	EV(113780,DCM,"Reference Point Definition")	MC	
	Contains	NUM	EV(113768,DCM,"Number of Pulses")	MC	
	Contains	NUM	EV(113733,DCM,"KVP")	M	
	Contains	NUM	EV(113736,DCM,"Exposure")	MC	
	Contains	INCLUDE	DTID(1021)"Device Participant"	MC	

Table 8-38 TID 10004 Accumulated Fluoroscopy and Acquisition Projection X-Ray Dose

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Contains	NUM	EV(113727,DCM,"Acquisition Dose Area Product Total")	M	
	Contains	NUM	EV(113729,DCM,"Acquisition Dose(RP) Total")	MC	
	Contains	NUM	EV(113855,DCM,"Total Acquisition Time")	M	

Table 8-39 TID 10007 Accumulated Total Projection Radiography Dose

NL	Rel with Parent	VT	Concept Name	Req. Type	Value
	Contains	NUM	EV(113722,DCM,"Dose Area Product Total")	M	
	Contains	NUM	EV(113725,DCM,"Dose(RP) Total")	MC	
	Contains	NUM	EV(113731,DCM,"Total Number of Radiographic Frames")	U	
	Contains	TEXT	EV(113780,DCM,"Reference Point Definition")	MC	

8.1.2 Usage of Attributes from Received IOD' s

Not applicable.

8.1.3 Attribute Mapping

Not applicable.

8.1.4 Coerced/Modified Fields

None.

8.2 Data Dictionary of Private Attributes

None.

8.3 Coded Terminology and Templates

8.3.1 Context Groups

No Context Group modification or extension are used.

8.3.2 Template Specifications

No extensions to standard templates and/or private templates are used.

8.3.3 Private Code Definitions

None

8.4 Grayscale Image Consistency

Not applicable.

8.5 Standard Extended/Specialized/Private SOP Classes

The PRIMO S uses some additional Type 3 Attributes. See 8.1.1 Created SOP Instances.

8.6 Private Transfer Syntaxes

None.