VARIOSTORAGE

DICOM Conformance Statement

15.11.2009

Revision 1

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1. INTRODUCTION

1.1. Scope and Field of Application

This document is the DICOM Conformance Statement for the VARIOSTORAGE medical imaging software application developed by Schaef Systemtechnik. Contained in this statement are detailed descriptions of how VARIOSTORAGE collaborates with other Medical Imaging devices and applications that conform to the DICOM 3.0 standard.

The intended user of this document is involved with software design and system integration. It is understood that this individual is familiar with the concepts and terms used throughout this document. Readers unfamiliar with the DICOM 3.0 standard should consult the actual documentation prior to examining this conformance statement.

1.2. Theory of Operations

The VARIOSTORAGE consists of the following components:

- A MediWeb Healthcare data repository based on the HL7 Reference Information Model (RIM) and DICOM real world information model.
- One or more inbound HL7 interfaces containing ADT, ORM and ORU messages.
- Zero or more outbound HL7 interfaces for forwarding inbound message streams.
- A DICOM interface supporting DICOM Modality Worklist Management (of the Query/Retrieve Services) as a Service Class Provider (SCP)
- A DICOM interface supporting DICOM Modality Performed Procedure Step (of the Study Management Services) as a Service Class Provider (SCP)
- A DICOM interface supporting DICOM Modality Performed Procedure Step (of the Study Management Services) as a Service Class User (SCU) so at to perform optional forwarding of previously received MPPS messages.
- A DICOM interface supporting DICOM Storage (using C-Store, C-Find, C-Move and C-Get) as a Service Class Provider
- A DICOM interface supporting DICOM Storage (using C-Store, C-Find, C-Move and C-Get) as a Service Class User

Each of these are loosely coupled applications that inter-operate and share the information management responsibilities for the MediWeb Healthcare data repository.

The HL7 receiver/processor components create and update the:

- Patients identification, demographic and medical information models
- Visit identification, status, admission, discharge and relationship information model
- Order, Imaging Service Request information

- Requested Procedure information
- Scheduled Procedure Step information
- Staff, Practitioner information
- Procedure Type information

The DICOM Modality Worklist SCP queries against the data in the required information model attributes to determine the correct results set.

The MPPS SCP will accept MPPS status and results messages from any modality implementing an MPPS SCU. Examples of data contained in an MPPS message includes (but is not limited to) the following:

- References to a previously scheduled procedure if the MPPS fulfills a procedure (or procedures) received via a Modality Worklist query from an MWL SCP.
- The time and date at which the imaging procedure was started at the modality.
- The time and date at which the imaging procedure was competed at the modality.
- Information related to the study and image series data generated by the modality.
- The DICOM archive application entity title to which the images were stored.
- The type of imaging modality used.
- Optionally, the names of physicians, radiologists, and technologists involved in the actual performance of the imaging procedure.
- If the imaging procedure was unscheduled (for example, in an Emergency or “trauma” situation), the patient name, patient identifier and other such data may be optionally provided.
- Study and image series related information
- The status of the procedure. Values of IN PROGRESS, DISCONTINUED or COMPLETED are accepted by the MPPS SCP.

The Storage service receives and stores the images acquired on the modality and allows these to be retrieved at a later time.

Finally the pre-fetch service uses the other information in the repository for determining relevant studies to be moved to the reading PAC location AETitles.

1.2.1. Configuration Information Models

In addition to those information models defined in the HL7 RIM and DICOM Model of the real world, there are several information models in the repository used to control the VARIOSTORAGEs operation.

The information required to fully configure the VARIOSTORAGE for operation are:

· HL7 Receiver TCP/IP socket information. This is the IP and port number to be used by the sending HIS/RIS application. There must be a separate port for each HL7 source application.

Typically this requires the co-ordination and possible configuration of the HIS/RIS vendors outbound message stream.

- HL7 Sending Application (MSH-3) / Facility information names (MSH-4). This information can be collected at site. It is used to allow the individual configuration of the message processor for a given stream. This allows two different streams to be processed by the same VARIOSTORAGE.
- Scheduled Modality Locations. These are the devices that will query against the MWL SCP, and optionally provide Performed Procedure Step results to the MPPS SCP. For these devices we need their AETitle, Name, Description and IP Address.
- Reading PACS Locations. These are the devices that will accept a C-Store for the relevant prior images. For these devices we need their AETitle, Name and Description.
- Archive Device Location. This is the AETitle, IP Address and Port Number of the device accepting the C-Move request used to move the relevant prior images to the Reading PACS Locations. Note: some configuration may need to be performed at the Archive device and/or PACS reading devices to enable the Archive to create associations with the PACS reading locations.
- Procedure Types. These are the list of procedures that will be ordered through the HL7 ORM message stream. Procedure types are either defined at installation time (using an imported list) or built dynamically by The VARIOSTORAGE from the content of the HL7 ORM messages. When
collected dynamically by The VARIOSTORAGE, configuration of the pre-fetch/auto-route capabilities will have to be made after the procedure types have been defined in the repository.
- Procedure Groups. The VARIOSTORAGE allows the institution to define groups containing any number of the defined Procedure Types. There are three types of procedure groups supported.

  The first type of procedure group is a relevance group. Relevance groups are interpreted by the pre-fetch mechanism as a list of procedures that yield relevant images for any other procedure in the same group. An example might be a grouping of the Chest related procedures into a Chest relevance group. When an ORM message is placed for a patient the pre-fetch logic determines if this patient has any relevant priors by looking for prior orders for the procedure types in the same relevance groups as the ordered procedure.

  The second type of procedure group is a reading group. Reading groups are used to specify where a group of procedures can be read (the PACS reading stations). Reading groups are used by the auto-route logic to determine where to send the relevant prior study images for the procedure being performed.

  The last type of procedure group is a scheduling group. Scheduling groups are used to specify on which modality devices the procedures in the group can be performed. The MWL logic uses this to determine which procedures should be returned from the query when an AETitle is included as a matching key.

  When using the dynamic Procedure Type collection capabilities of the VARIOSTORAGE, it will take some time before the complete list of procedure types has been experienced in the ORM message stream. The length of time depends on the frequency of the least ordered procedure within the institution. This means that the site will have to periodically check for newly defined procedures and configure their relevance, reading and scheduling information for these procedures. This might require several service calls over the first few months of operation to ensure these are being added to the configuration. Having the procedure list defined at install time results in far fewer service calls.

1.3. References and Definitions

All necessary references and definitions have been taken from the Digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 13 (NEMA PS 3.1-13) and from Health Level Seven Version 2.4 (HL7 V2.4), 2001.

1.4. Symbols and Abbreviations

All symbols and abbreviations used herein are described in the Digital Imaging and Communications in Medicine (DICOM) standard, parts 1 through 13 (NEMA PS 3.1-13) and Health Level Seven Version 2.4 (HL7 V2.4), 2001.

1.5. Revision Number

Version	**Date**	**Description**
Revision 0	Sep 30, 2002	· First Initial Release
Revision 1	Dec 24, 2002	· Inclusion of Workflow Components
Revision 1	Feb 11, 2003	· Revisions to more effectively display
Revision 1	Nov 15, 2009	

1.6. Considerations

Readers should note the following points:

- This document on its own should not be interpreted as a guarantee of connectivity between VARIOSTORAGE and any equipment and/or applications offered by other vendors.
- Integration of VARIOSTORAGE with the equipment and/or applications of different vendors,
including Schaef Systemtechnik GmbH, is outside the scope of the DICOM 3.0 standard and product conformance statements. Integration and interoperability of different equipment/applications are the sole responsibility of the user.
- In the case of any possible connectivity inferred by a user to exist between VARIOSTORAGE
and another product, the user is responsible for testing and verifying the inferred connectivity.
- Future changes to the DICOM 3.0 standard may require alterations to be made to Fusion Server. Schaef Systemtechnik GmbH reserves the right to modify the VARIOSTORAGE architecture as needed, in order to meet changing standards.
- The user should ensure that any existing DICOM equipment also changes with the future developments of the DICOM standards. Failure to keep pace with any alterations in the DICOM standards may result in decreased or lost connectivity.
- All trade names mentioned in this document are recognize.

2. IMPLEMENTATION MODEL 2.1.

Application Data Flow Diagram

The Implementation Model for the VARIOSTORAGE is depicted below:

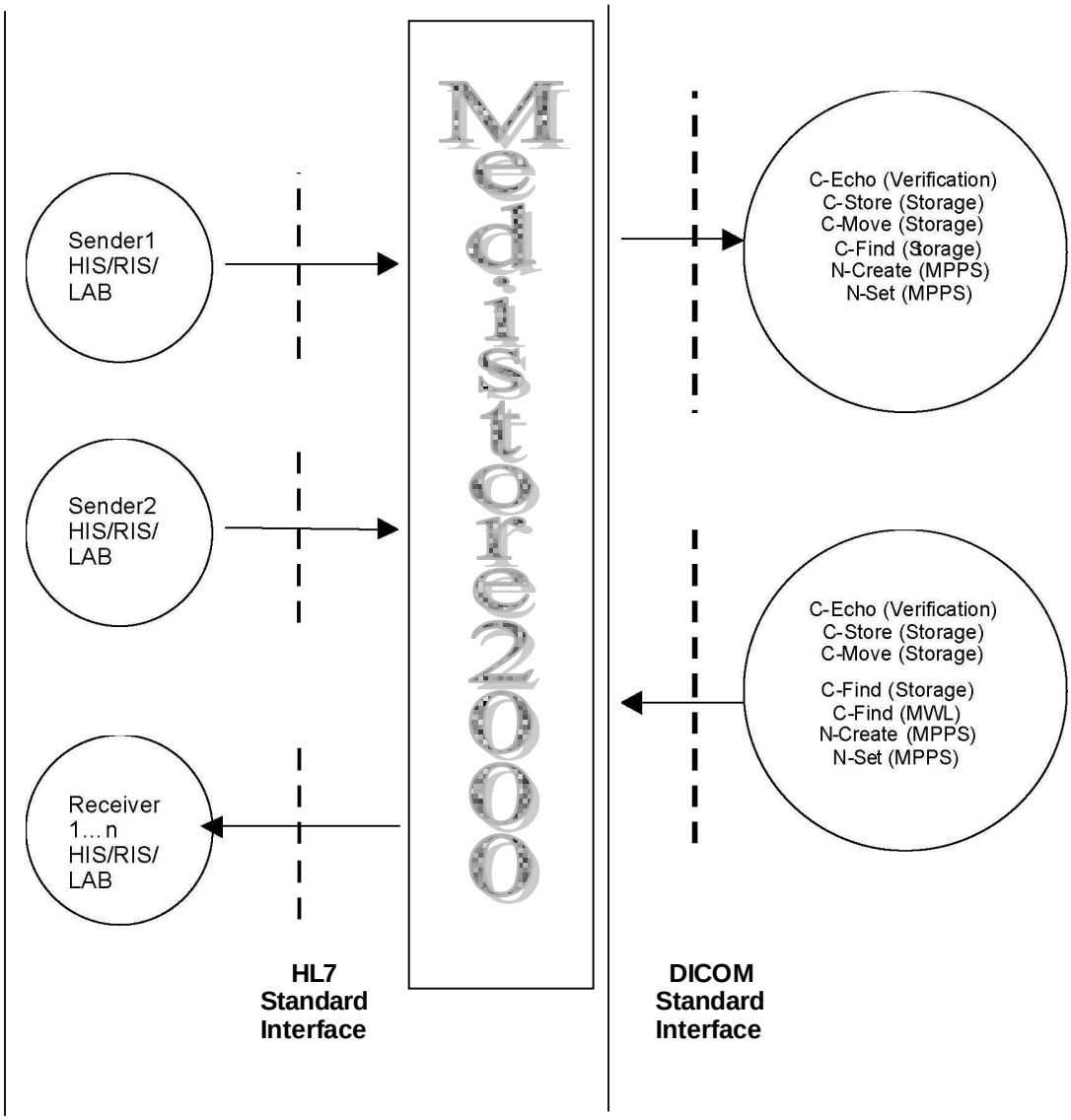

Figure 1: VARIOSTORAGE Application Data Flow Diagram

The VARIOSTORAGE starts when the system is started, and shuts down when the system is turned off. Table 1 below describes the supported Host Operating Systems. The VARIOSTORAGE AE's DICOM services runs as a background service of the host operating system.

Name of OS
Windows 2000 Server
Windows 2000 Advanced Server
Windows 2000 Professional
Windows 2003 Server
Windows XP Professional

Table 1: Supported Host Operating Systems

2.1.1. Inbound HL7

The receiver interface uses the standard network mechanism for communication based on the HL7 Version 2.3 Implementation Guide. The VARIOSTORAGE will initiate the TCP/IP connection by creating a server socket on which it will accept connections. The VARIOSTORAGE supports systems that use the same connection for sending an indefinite number of messages, as well as those who send a single message per connection.

Once the VARIOSTORAGE accepts an HL7 socket connection, the sending system transmits the first interface record (i.e., data) in sequence and should wait for the receipt of an ACK or NAK. The VARIOSTORAGE will then request each subsequent message by sending an acknowledgment (ACK). This ACK acts as both the acknowledgment for receipt of the previous record transmission from the other system and as the request for transmission of the next record in sequence. The next record is defined as the record following the last record for which an acknowledgment was previously received.

The data record will be encased within a communication packet. The framing characters of the communications packet will be determined by VARIOSTORAGE automatically, however the default values identifying the communications packet will be an ASCII 11, followed by the message segments which will be separated by ASCII CR (i.e., 13_{10}), followed by ASCII 28.

2.1.2. Outbound HL7

The VARIOSTORAGE supports forwarding of ***all*** received HL7 messages to a defined list of targets. Future version will allow selective forwarding. This feature can be used to fan out an HL7 message stream to multiple destinations.

Each configured outbound HL7 feed will connect to a configured TCP/IP Server socket (IP address and Port #). The framing characters for these can be configured. Upon connection it will send the first message and wait for an acknowledgement ACK or negative acknowledgement NAK.

The number of re-transmit attempts to be tried for a NAK is configurable. If after the configured number of re-tries it still receives a NAK, the message will be marked in error and the next message transmitted.

Upon receipt of an ACK, the message will be marked as transmitted and the next message will be transmitted

2.1.3. C-Move Study

The VARIOSTORAGE will generate requests to a defined C-Move SCP to move a study when relevant prior images need to be moved to a PAC reading location. The C-Move SCP will create the necessary association with the specified AE Title.

2.1.4. C-Find Modality Worklist

The VARIOSTORAGE will accept requests to C-Find a modality worklist. The data which is used to determine the worklist is stored in the MediWeb Healthcare data repository.

2.1.5. N-CREATE Modality Performed Procedure Step

The VARIOSTORAGE will accept an N-CREATE request message for a Modality Performed Procedure Step.

2.1.6. N-SET Modality Performed Procedure Step

The VARIOSTORAGE will accept an N-SET request message for a Modality Performed Procedure Step.

2.2. Functional Definitions of Application Entities

All communications and image transfer with the remote application is accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

Below is a table of the functions supported by VARIOSTORAGE application entities:

SCU	**SCP**
• Verification • Storage	• Verification • Storage • Query/Retrieve · Worklist Management • Modality Performed Procedure Step

Table 2: VARIOSTORAGE AE Functions

2.3. Sequencing of Real World Activities

There must be at least one Inbound HL7 connection with a HIS/RIS in order for the worklist SCP to function properly. For pre-fetch and auto-route to function, the VARIOSTORAGE must be the Modality Worklist SCP used by modalities that generate images or there must be MPPS implemented or manual study / order reconciliation occurring. The Study Instance UID created by the VARIOSTORAGE and provided to the modalities must then be used in the images created and stored in the archive. It is the Study Instance UID linkage that is used to move these images in future orders where they are deemed to be relevant.

Configuration and use of all other application components are optional.

2.4. Sequencing of Real World Activities

Not applicable.

3. APPLICATION ENTITY SPECIFICATIONS

3.1. AE Specifications for VARIOSTORAGE DICOM Services

SOP Classes as SCU	
SOP Class UID	**SOP Class Name**
Verification	
1.2.840.10008.1.1	Verification
MPPS	
1.2.840.10008.3.1.2.3.3	Modality Performed Procedure Step
Storage	
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage
1.2.840.10008.5.1.4.1.1.2	CT Image Storage
1.2.840.10008.5.1.4.1.1.1.1	Digital X Ray Image Storage for Presentation
1.2.840.10008.5.1.4.1.1.1.1.1	Digital X Ray Image Storage for Processing
1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-Oral- X-Ray Image storage (Presentation)
1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-Oral- X-Ray Image storage (Raw)
1.2.840.10008.5.1.4.1.1.4	MR Image Storage
1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Image Storage
1.2.840.10008.5.1.4.1.1.3.1	US Multi-Frame Image Storage (retired)
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage
1.2.840.10008.5.1.4.1.1.8	Standalone Overlay Storage
1.2.840.10008.5.1.4.1.1.9	Standalone Curve Storage
1.2.840.10008.5.1.4.1.1.10	Standalone Modality LUT Storage
1.2.840.10008.5.1.4.1.1.11	Standalone VOI LUT Storage
1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography X-Ray Image Storage - For Presentation
1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography X-Ray Image Storage - For Processing
1.2.840.10008.5.1.4.1.1.20	Nuclear Medicine Image Storage
1.2.840.10008.5.1.4.1.1.5	Nuclear Medicine Image Storage (Retired)
1.2.840.10008.5.1.4.1.1.12.1	X-Ray Angiographic Image Storage
1.2.840.10008.5.1.4.1.1.12.2	X-Ray Radiofluoroscopic Image Storage
1.2.840.10008.5.1.4.1.1.12.3	X-Ray Radiofluoroscopic Biplane Image Storage (retired)
1.2.840.10008.5.1.1.27	Stored Print Storage
1.2.840.10008.5.1.1.29	Hard Copy Grayscale Image Storage
1.2.840.10008.5.1.1.30	Hard Copy Colour Image Storage
1.2.840.10008.5.1.4.1.1.128	Positron Emission Tomography (PET) Image Storage
1.2.840.10008.5.1.4.1.1.129	Standalone PET Curve
1.2.840.10008.5.1.4.1.1.481.4	Radiotherapy (RT) Beams Treatment Record Storage
1.2.840.10008.5.1.4.1.1.481.6	Radiotherapy (RT) Brachy Treatment Record Storage
1.2.840.10008.5.1.4.1.1.481.1	Radiotherapy (RT) Image Storage
1.2.840.10008.5.1.4.1.1.481.2	Radiotherapy (RT) Dose Storage
1.2.840.10008.5.1.4.1.1.481.3	Radiotherapy (RT) Structure Set Storage
1.2.840.10008.5.1.4.1.1.481.5	Radiotherapy (RT) Plan Storage
1.2.840.10008.5.1.4.1.1.481.7	Radiotherapy (RT) Summary Treatment Record Storage
1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image Storage
1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image Storage
1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic
1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image Storage

Table 3: SOP Classes Supported as an SCU

SOP Classes as SCP	
SOP Class UID	**SOP Class Name**
Verification	
1.2.840.10008.1.1	Verification
Worklist Management	
1.2.840.10008.5.1.4.31	Modality Worklist Management
MPPS	
1.2.840.10008.3.1.2.3.3	Modality Performed Procedure Step
Storage	
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage
1.2.840.10008.5.1.4.1.1.2	CT Image Storage
1.2.840.10008.5.1.4.1.1.1.1	Digital X Ray Image Storage for Presentation
1.2.840.10008.5.1.4.1.1.1.1.1	Digital X Ray Image Storage for Processing
1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-Oral- X-Ray Image storage (Presentation)
1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-Oral- X-Ray Image storage (Raw)
1.2.840.10008.5.1.4.1.1.4	MR Image Storage
1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Image Storage
1.2.840.10008.5.1.4.1.1.3	Ultrasound Multi-frame Image Storage (retired)
1.2.840.10008.5.1.4.1.1.3.1	US Multi-Frame Image Storage
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage
1.2.840.10008.5.1.4.1.1.8	Standalone Overlay Storage
1.2.840.10008.5.1.4.1.1.9	Standalone Curve Storage
1.2.840.10008.5.1.4.1.1.10	Standalone Modality LUT Storage
1.2.840.10008.5.1.4.1.1.11	Standalone VOI LUT Storage
1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography X-Ray Image Storage - For Presentation
1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography X-Ray Image Storage - For Processing
1.2.840.10008.5.1.4.1.1.20	Nuclear Medicine Image Storage
1.2.840.10008.5.1.4.1.1.5	Nuclear Medicine Image Storage (Retired)
1.2.840.10008.5.1.4.1.1.12.1	X-Ray Angiographic Image Storage
1.2.840.10008.5.1.4.1.1.12.3	XRayAngiographicBiPlane
1.2.840.10008.5.1.4.1.1.12.2	X-Ray Radiofluoroscopic Image Storage
1.2.840.10008.5.1.4.1.1.12.3	X-Ray Radiofluoroscopic Biplane Image Storage (retired)
1.2.840.10008.5.1.1.27	Stored Print Storage
1.2.840.10008.5.1.1.29	Hard Copy Grayscale Image Storage
1.2.840.10008.5.1.1.30	Hard Copy Colour Image Storage
1.2.840.10008.5.1.4.1.1.128	Positron Emission Tomography (PET) Image Storage
1.2.840.10008.5.1.4.1.1.129	Standalone PET Curve
1.2.840.10008.5.1.4.1.1.481.4	Radiotherapy (RT) Beams Treatment Record Storage
1.2.840.10008.5.1.4.1.1.481.6	Radiotherapy (RT) Brachy Treatment Record Storage
1.2.840.10008.5.1.4.1.1.481.1	Radiotherapy (RT) Image Storage
1.2.840.10008.5.1.4.1.1.481.2	Radiotherapy (RT) Dose Storage
1.2.840.10008.5.1.4.1.1.481.3	Radiotherapy (RT) Structure Set Storage
1.2.840.10008.5.1.4.1.1.481.5	Radiotherapy (RT) Plan Storage
1.2.840.10008.5.1.4.1.1.481.7	Radiotherapy (RT) Summary Treatment Record Storage
1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image Storage
1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image Storage
1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic

SOP Classes as SCP	
SOP Class UID	**SOP Class Name**
1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image Storage
Query/Retrieve	
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Model – FIND
1.2.840.10008.5.1.4.1.2.1.2	Patient Root Query/Retrieve Model – MOVE
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Model – FIND
1.2.840.10008.5.1.4.1.2.2.2	Study Root Query/Retrieve Model – MOVE

Table 4: SOP Classes Supported as an SCP

3.1.1. Association Establishment Policies

3.1.1.1. General

The DICOM Application Context Name (ACN) that is always proposed by the VARIOSTORAGE AE is “1.2.840.10008.3.1.1.1” The services shall offer a maximum PDU size defaulted to 64kB (65536 bytes) and may be configured from a minimum of 4kB (4096 bytes).

3.1.1.2. Number of Associations

VARIOSTORAGE can support multiple associations simultaneously, both as an SCP and as an SCU.

As an SCP, the DICOM Service will listen for incoming associations and spawn a new process (a server “child”) to manage each request. This ability means it is possible for VARIOSTORAGE to receive both images and query/retrieve requests from multiple SCUs simultaneously. Users may increase the maximum number of simultaneous associations as needed.

As an SCU, VARIOSTORAGE can send images to multiple SCPs simultaneously, spawning a new thread for each destination.

3.1.1.3. Asynchronous Nature

VARIOSTORAGE does not support asynchronous operations. All operations will be performed synchronously.

3.1.1.4. Implementation Identifying Information

The Implementation Class UID is: 1.2.804.114118.20

The Implementation Version String is: FusionServer

3.1.2. Association Initiation Policy

VARIOSTORAGE initiates associations for the following activities:

- DICOM communication verification between VARIOSTORAGE and a remote system.
- Sending images from the local VARIOSTORAGE database to a remote system.

3.1.2.1. Verify Communication with a Remote System

3.1.2.1.1. Associated Real World Activity

VARIOSTORAGE will initiate an association for the echo service.

3.1.2.1.2. Proposed Presentation Contexts

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

Table 5: Verify Communication with a Remote System Presentation Context

3.1.2.1.3. SOP Specific Conformance Statement for SOP Verification Class

VARIOSTORAGE provides standard conformance for DICOM communication verification.

3.1.2.2. Receive Worklist Query from a Remote System

3.1.2.2.1. Associated Real World Activity

A remote system queries VARIOSTORAGE for a worklist.

3.1.2.2.2. Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Worklist C-FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

The following table identifies the match types used.

RV	Range Value match
SV	Single Value match
WC	Wild Card match
SQ	Sequence match

VARIOSTORAGE supports all required matching key types. Subject to availability from the HIS, it supports all required return keys. VARIOSTORAGE supports the following elements for this SOP class. It supports all attributes listed, however, specific availability per site is dependent on the site's HL7 data availability and system configuration. Note that only those attributes supported by are listed and all DICOM Type 1 attributes for the Modality Worklist Information model are supported. DICOM Type 2 attributes not listed in this table are handled in that a zero-length attribute will be returned in response to a query for the specified Type 2 attribute.

Module	Attribute Name	Tag	Matching Key Type	Return Key Type
~~SOP Common~~	~~Specific Character Set~~	~~(0008,0005)~~		~~1C~~
Scheduled Procedure Step	Scheduled Procedure Step Sequence	(0040,0100)	SQ	1
	>Scheduled Station AE Title	(0040,0001)	SV	1
	>Scheduled Procedure Step Start Date	(0040,0002)	SV, RV	1
	~~>Scheduled Procedure Step Start Time~~ Note: If no date is specified when performing a time or time range search, the date range from Jan 1, 1970 to one year from the current date is used as the date/time range.	~~(0040,0003)~~	~~SV, RV~~	~~1~~
	>Modality	(0008,0060)	SV	1
	>Scheduled Performing Physician Name	(0040,0006)	WC	2
	>Scheduled Procedure Step Description	(0040,0007)		1
	>Scheduled Procedure Step ID	(0040,0009)		1
	>Scheduled Station Name	(0040,0010)	SV	2
	>Scheduled Station Location	(0040,0011)		2
	~~>Pre-Medication~~	~~(0040,0012)~~		~~2C~~
	>Scheduled Procedure Step Status	(0040,0020)		3
	>Comments on Scheduled Procedure Step	(0040,0400)		3
Requested Procedure	Requested Procedure ID	(0040,1001)		1
	~~Requested Procedure Description~~	~~(0032,1060)~~		~~1C~~
	Requested Procedure Code Sequence	(0032,1064)		1C
	>Code Value	(0008,0100)		1C
	>Coding Scheme Designator	(0008,0102)		1C
	>Code Meaning	(0008,0104)		3
	Study Instance UID	(0020,000D)	SV	1
	Referenced Study Sequence	(0008,1110)		2
	>Referenced SOP Class UID	(0008,1150)		1C
	>Referenced SOP Instance UID	(0008,1155)		1C
	Patient Transport Arrangements	(0040,1004)		2
	Reason for Requested Procedure	(0040,1002)		3
	~~Requested Procedure Comments~~	~~(0040, 1400)~~		~~3~~
Imaging Service Request	Accession Number	(0008,0050)	SV, RV	2
	Requesting Physician	(0032,1032)		2
	Referring Physicians Names	(0008, 0090)		2
	~~Reason for the Imaging Service Request~~	~~(0040,2001)~~		~~3~~
	Imaging Service Request Comments	(0040, 2400)		3
	Requesting Service	(0032,1033)		3
	Issue Date of Imaging Service Request	(0040, 2004)		3
	Issue Time of Imaging Service Request	(0040, 2005)		3
	Placer Order Number / Imaging Service Request	(0040, 2016)		3
	Filler Order Number / Imaging Service Request	(0040, 2017)		3
	Call back Phone Numbers	(0040, 2010)		3
Patient Identification	Patient Name	(0010,0010)	WC, SV	1
	Patient ID	(0010,0020)	WC, SV	1
	Issuer of Patient IDS	((0010,0021)	WC, SV	3
Patient Demographic	Patient's Birth Date	(0010,0030)		2
	Patient's Sex	(0010,0040)		2
	Occupation	(0010,2180)		3

	Confidentiality Constraint on Patient Data	(0040,3001)		3
	Military Rank	(0010,1080)		3
	Branch of Service	(0010,1081)		3
	Ethnic Group	(0010,2160)		3
	Patients Religious Preferences	(001021F0)		3

3.1.2.2.3. MWL C-Find Response Codes

The VARIOSTORAGE AE responds to a C-Find request with the following response codes:

Response	**Value**
C_FIND_SUCCESS	0x0000
C FIND_PENDING	OxFFOO
C FIND PENDING NO OPTIONAL KEY SUPPORT	0xFF01
~~C FIND FAILURE REFUSED NO RESOURCES~~	~~0xA700~~
C FIND FAILURE INVALID DATASET	0xA900
C FIND_FAILURE UNABLE TO PROCESS	0xC001
C_FIND_CANCEL_REQUEST_RECEIVED	OxFEOO

3.1.2.2.4. MWL Search Constraints

The MWL search is a function of the criterion (data attributes) specified in the incoming C-FIND. The MWL SCP does not apply any default constraints on an incoming query, with the exception of the following:

1. If the incoming query is a time range with no date constraint, the date range Jan 1, 1970 to the current day + 365 days will be applied as the date constraint.
2. The MWL code uses a lower date bound of 18000101.
3. If the date range is missing an upper bound, the current date is used as an upper bound.
4. For time ranges, a missing lower bound is substituted by 00:00:00 and missing upper bound is substituted by 23:59:59.
5. A date range with a missing time range is executed by appending 23:59:59 to the upper bound and 00:00:00 to the lower bound.
6. A combination of these methods is used to satisfy the various date-time range permutations.

Examples:

A. If the data set contains a range value 20010101-20010130 for (0040,0002) and no value for (0040,0003) , then the value of (0040,0003) for the purposes of the query will be assumed to be 000000.000-235959.999

If the data set contains a range value 090000.000-130000.000 for (0040,0003) and no value for (0040,0002) , then the value of (0040,0002) for the purposes of the query will be assumed to be 19700101-PLUSONEYEAR where PLUSONEYEAR will be computed as one year from the execution date of the query.

3.1.2.3. Receive Modality Performed Procedure Step Notification from a Remote System

3.1.2.3.1. Associated Real World Activity

A remote system informs the VARIOSTORAGE of the modality performed procedure step.

3.1.2.3.2. Accepted Presentation Contexts

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Modality Performed Procedure Step N-CREATE	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP/ SCU	None
Modality Performed Procedure Step N-SET	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP/ SCU	None

3.1.2.3.3. N-CREATE Attributes

MPPS SCP N-Create Attributes

Module	**Attribute Name**	**Tag**	**Database Update Clarification** **Y: yes, always stored** **K: Integration critical attribute** **U: stored in the "unscheduled" case** M: MWL implied (provided through query of MWL SCP) **G: Required for MPPS group case resolution**	**Key Typ e**
SOP Common	Specific Character Set	(0008,0005)		1C
	MPPS SOP Instance UID		Y, K, U, G	1
Performed Procedure Step Relationship	Scheduled Step Attribute Sequence	(0040,0270)	Y,K,U,M,G	1
	>Study Instance UID	~~(0020,000D)~~	~~Y,K, U,M,G~~	~~1~~
	>Referenced Study Sequence	(0008,1110)	K,M,G	2

	>>Referenced SOP Class UID	(0008,1150)	M,G	1
	>> Referenced SOP Instance UID	(0008,1155)	K,M,G	1
	>Accession number	(0008,0050)	M,U	2
	>Requested Procedure ID	(0040,1001)	M,G	2
	>Scheduled Procedure Step ID	(0040,009)	M,G	
	Patient Name	(0010,0010)	M,U	2
	Patient ID	~~(0010,0020)~~	~~M,U~~	~~2~~
	Patient Birth Date	(0010,0032)	M,U	2
	Patient Gender	(0010,0040)	M,U	2
Performed Procedure Step Information	Performed Procedure Step ID	(0040,0253)	Y	1
	Performed Station AE Title	~~(0040,0241)~~	~~Y~~	~~1~~
	Performed Procedure Step Start Date	(0040,0244)	Y	1
	Performed Procedure Step Start Time	(0040,0245)	Y	1
	Performed Procedure Step End Date	(0040,0250)	Y	2
	Performed Procedure Step End Time	(0040,0251)	Y	2
	Performed Procedure Step Status	(0040,0252)	Y	1
	Performed Procedure Step Description	(0040,0254)	Y	2
	Comments on the Performed Procedure Step	(0040,0280)	Y	3
	Procedure Code Sequence	(0008,1032)	Y	2
	>Code Value	(0008,0100)	Y	2
Image Acquisition Results	Modality	(0008,0060)	U	1
	Performed Series Sequence	(0040,0340)	Y	2
	>Performing Physician Name	(0008,1050)	Y	2
	>Protocol Name	(0018,1030)	Y	1
	>Operator Name	(0008,1070)	Y	2
	> Series Instance UID	(0020,OOOe)	Y	1
	>Series Description	(0008,103e)	Y	2
	~~>Retrieve AE Title~~	~~(0008,0054)~~	~~Y~~	~~2C~~
	>Referenced Image Sequence	(0008,1140)	Y	2C
	»Referenced SOP Class UID	(0008,1150)	Y	1C
	»Referenced SOP Instance UID	(0008,1155)	Y	1C
	~~>Referenced Non-image Composite~~ SOP Instance Sequence	~~(0040,0220)~~	~~Y~~	~~2C~~
	»Referenced SOP Class UID	(0008,1150)	Y	1C
	»Referenced SOP Instance UID	(0008,1155)	Y	1C

3.1.2.3.4. N-Set Attributes

MPPS SCP N-Set Attributes

Module	**Attribute Name**	**Tag**	**Database Update** **Y: yes/stored R:** **Referenced**	**Key Type**
~~SOP Common~~	~~Specific Character Set~~	~~(0008,0005)~~		~~1C~~
	MPPS SOP Instance UID		R	1

Performed Procedure Step Information	Performed Procedure Step End Date	(0040,0250)	Y	1
	Performed Procedure Step End Time	(0040,0251)	Y	1
	Performed Procedure Step Status	(0040,0252)	Y	1
	Performed Procedure Step Description	(0040,0254)	Y	2
	Comments on the Performed Procedure Step	(0040,0280)	Y	3
	Procedure Code Sequence	(0008,1032)	Y	2
	>Code Value	(0008,0100)	Y	2
Image Acquisition Results	Performed Series Sequence	(0040,0340)	Y	1
	>Performing Physician Name	(0008,1050)	Y	2
	>Protocol Name	(0018,1030)	Y	1
	>Operator Name	(0008,1070)	Y	2
	> Series Instance UID	~~(0020,000e)~~	~~Y~~	~~1C~~
	>Series Description	(0008,103e)	Y	2C
	>Retrieve AE Title	(0008,0054)	Y	2C
	>Referenced Image Sequence	(0008,1140)	Y	2C
	>>Referenced SOP Class UID	(0008,1150)	Y	1C
	>>Referenced SOP Instance UID	(0008,1155)	Y	1C
	> Referenced Non-image Composite SOP Instance Sequence	(0040,0220)	Y	2C
	»Referenced SOP Class UID	(0008,1150)	Y	1C
	»Referenced SOP Instance UID	(0008,1155)	Y	1C

3.1.2.3.5. MPPS N-Create/N-Set Response Codes

The VARIOSTORAGE AE responds to N-Create and N-Set requests with the following response codes:

MPPS N-Create and N-Set Response Codes

Response	Value (decimal/hex)
N CREATE SUCCESS	0 / 0x0000
N CREATE MISSING ATTRIBUTE	288 / 0x0120
N CREATE MISSING ATTRIBUTE VALUE	289 / 0x0121
N CREATE INVALID ATTRIBUTE VALUE	262 / 0x0106
N CREATE DUPLICATE SOP INSTANCE	273 / 0x0111
N SET SUCCESS	0 / 0x000
N SET INVALID ATTRIBUTE VALUE	262 / 0x0106
N SET MISSING ATTRIBUTE VALUE	289 / 0x0121
N SET NO SUCH SOP INSTANCE	274 / 0x0112
LOCAL LIMIT EXCEEDED	6 / 0x0006

3.1.2.3.6. MPPS SCP Study Instance UID Conformance

Ideally, the MPPS SCP considers the study instance UID the sole matching key when relating a performed procedure step to the originally scheduled procedure. The study instance UID appears in the Scheduled Step Attribute Sequence of the N-CREATE request. The MPPS SCP will initially assume this UID was obtained by the modality through a Modality Worklist Query of the MWL SCP. This study instance UID should have been stored in the image set and returned as a reference in the MPPS N-CREATE.

If the MPPS SCP fails to match on the study instance UID (due to the modality device having generated the UID) the MPPS SCP will attempt to match the Referenced SOP Instance UID of the N-CREATE Referenced Study Sequence to the originally scheduled procedure. The referenced study sequence is also available to the modality through an MWL query of the MWL SCP, and the modality should return this reference in all MPPS N-CREATE requests.

If the MPPS SCP cannot match a performed procedure to the requested procedure using either of the above methods, the modality-generated Study Instance UID, Study ID and accession number (if provided) are saved in the database, but the procedure is considered an unscheduled (or trauma) procedure. In this case the system records the procedure as an unknown procedure appropriate for the modality type that was the source of the N-CREATE message.

The MPPS service is configurable for patient demographic information storage in the unscheduled (or trauma) MPPS case. The options are as follows:

- Option 1:
  Match the modality provided patient ID to an ID known to the database and create the unscheduled procedure for that patient. If no patient ID match is found the modality provided patient information and demographic data is saved in a new patient record created by the MPPS SCP.

- Option 2:
  Create a new patient demographic data record for each unscheduled MPPS N-CREATE event, and do NOT attempt a match on the Patient ID field.

3.1.2.3.7. MPPS Group Case Conformance

The group case occurs when a modality performs two or more procedures through one study acquisition. For example, a helical scan CT MWL query may indicate two orders scheduled for the current patient: a “CT Head” and “CT Neck”. The modality may have the ability to fulfill both requests via a single scan. The MPPS group case allows for the reporting of such procedures.

The MPPS SCP rigorously follows the IHE (Integrating the Healthcare Enterprise) Technical Framework (Year 3 and 4) recommendations for the MPPS group case. The integration critical details are…

- A single Study Instance UID must be generated by the modality for the image and standalone IODs. The same Study Instance UID is referenced in ALL instances of the N-CREATE Scheduled Step Attribute Sequence. The MPPS SCP will reject an N-CREATE group case if the Study Instance UIDs are not identical.
- The number of N-CREATE Scheduled Step Attribute Sequence items shall correspond exactly to the number of procedures being grouped.
- The Referenced Study Sequence in each occurrence of the N-CREATE Scheduled Step Attribute Sequence must be the same Referenced Study Sequence provided in the MWL request for the procedure being grouped.
  The MPPS SCP will reject an N-CREATE group case if any Referenced Study Sequence fails to match a scheduled procedure known to the system.
- The MPPS SCP will verify that each Referenced Study Sequence (in the multiple N-CREATE Scheduled Step Attribute sequences) references the same patient database entity. If multiple patient references are detected the N-CREATE request will be rejected.

3.1.2.3.8. MPPS Message Forwarding as an SCU

The MPPS SCP can optionally forward all received N-SET and N-CREATE messages to a second MPPS SCP. The MPPS DICOM service then appears as an MPPS SCU.

All received N-CREATE and N-SET messages are forwarded as they were received – the messages is not parsed and reassembled. The message is forwarded using the same presentation context negotiated when the originating modality performed the association with the MPPS SCP.

The MPPS SCP can accept multiple simultaneous associations, however the message forwarding subsystem will establish only a single association with the remote MPPS SCP. Messages are queued and forwarded in the order in which they were received. The queue buffer size is configurable.

3.1.2.5. Send Images to a Remote System

3.1.2.5.1. Associated Real World Activity

The VARIOSTORAGE AE will initiate associations for the following reasons:

A C-MOVE or a C-GET request is received from a remote DICOM AE and an association is initiated to perform a C-STORE sub operation.

A VARIOSTORAGE user requests that a set of objects be sent to a remote DICOM AE and an association is initiated to perform a C-STORE sub operation.

3.1.2.5.2. Proposed Presentation Contexts

Presentation Context Table for Send to Remote System				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See Below	scu	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	See Below	scu	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	See Below	scu	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	See Below	scu	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	See Below	scu	None
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	See Below	scu	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	See Below	scu	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See Below	scu	None
US Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	See Below	scu	None
US Multi-Frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	See Below	scu	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See Below	scu	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	See Below	scu	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	See Below	scu	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	See Below	scu	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	See Below	scu	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	See Below	scu	None
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	See Below	scu	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	See Below	scu	None
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	See Below	scu	None
X-Ray Angiographic	1.2.840.10008.5.1.4.1.1.12.1	See Below	scu	None

Presentation Context Table for Send to Remote System				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Image Storage				
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	See Below	SCU	None
X-Ray Angiographic Bi-plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	See Below	SCU	None
Positron Emission Tomography (PET) Image Storage	1.2.840.10008.5.1.4.1.1.128	See Below	SCU	None
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	See Below	SCU	None
Radiotherapy (RT) Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	See Below	SCU	None
Radiotherapy (RT) Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	See Below	SCU	None
Radiotherapy (RT) Image Storage	1.2.840.10008.5.1.4.1.1.481.1	See Below	SCU	None
Radiotherapy (RT) Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	See Below	SCU	None
Radiotherapy (RT) Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	See Below	SCU	None
Radiotherapy (RT) Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	See Below	SCU	None
Radiotherapy (RT) Summary Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.7	See Below	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	See Below	SCU	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	See Below	SCU	None
VL Slide-Coordinates Microscopic	1.2.840.10008.5.1.4.1.1.77.1.3	See Below	SCU	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	See Below	SCU	None
Stored Print Storage	1.2.840.10008.5.1.1.27	See Below	SCU	None
Hard Copy Grayscale Image Storage	1.2.840.10008.5.1.1.29	See Below	SCU	None
Hard Copy Colour Storage	1.2.840.10008.5.1.1.30	See Below	SCU	None

Table 6: Send Images to a Remote System Presentation Context

Transfer Syntaxes for Send To Remote System	
Name	UID
Implicit VR, Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 7: Send Images to a Remote System Transfer Syntax

3.1.2.5.3. SOP Specific Conformance Statement for SOP Image Storage Class

When performing C-STORE operations on behalf of a users request to send an image to a remote DICOM AE and a failed, refused or warning response is received, the VARIOSTORAGE AE notifies the user that the operation did not complete successfully. Successful C-STORE operations are not reported.

VARIOSTORAGE provides full (level 2) conformance as a SCP for the Storage service class. This means that upon sending an image received via DICOM to another DICOM compliant system it will send out all attributes that it received (this includes private attributes from other vendors).

Images stored in the VARIOSTORAGE database that are to be sent to remote systems are converted to instances of the corresponding SOP Storage class(es). Images are then sent sequentially to the remote system(s). When sending multiple images to one remote system, a new association is negotiated for each series.

3.1.3. Association Acceptance Policy

VARIOSTORAGE accepts associations for the activities listed below:

- DICOM communication verification between a remote system and VARIOSTORAGE.
- Receiving images from a remote system.
- Processing remote system queries.
- Initiation of image transfer to a remote system in response to a request for retrieval.

VARIOSTORAGE will reject association requests from unknown AEs. Similarly, remote systems will reject VARIOSTORAGE's association requests if the VARIOSTORAGE AE title is not correctly configured.

3.1.3.1. Verification from a Remote System

3.1.3.1.1. Associated Real World Activity

VARIOSTORAGE will send an echo response to verification requests made by remote systems.

3.1.3.1.2. Accepted Presentation Contexts

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

Table 8: Verify Communication from a Remote System Presentation Context

3.1.3.1.3. SOP Specific Conformance Statement for SOP Verification Class

VARIOSTORAGE provides standard conformance for DICOM communication verification.

3.1.3.1.4. Presentation Context Acceptance Criterion

VARIOSTORAGE will accept all presentation contexts which match those of the table in sec 3.1.3.1.2 (above). No specific acceptance and/or prioritization rules are required.

3.1.3.2. Receive Images from a Remote System

3.1.3.2.1. Associated Real World Activity

A remote system pushes (i.e., sends) images to VARIOSTORAGE. Upon completion of the transfer, the images are available locally and can be selected for display.

3.1.3.2.2. Accepted Presentation Contexts

Presentation Context Table for Receive from a Remote System				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See Below	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	See Below	SCP	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	See Below	SCP	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	See Below	SCP	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	See Below	SCP	None
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	See Below	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	See Below	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See Below	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	See Below	SCP	None
Ultrasound Multi-frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3.	See Below	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See Below	SCP	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	See Below	SCP	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	See Below	SCP	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	See Below	SCP	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	See Below	SCP	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	See Below	SCP	None
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	See Below	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	See Below	SCP	None
Nuclear Medicine Image Storage (retired)	1.2.840.10008.5.1.4.1.1.5	See Below	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	See Below	SCP	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	See Below	SCP	None
X-Ray Angiographic Bi-plane Image Storage (retired)	1.2.840.10008.5.1.4.1.1.12.3	See Below	SCP	None

Presentation Context Table for Receive from a Remote System				
Abstract Syntax		**Transfer Syntax**	**Role**	**Extended Negotiation**
Name	**UID**			
Positron Emission Tomography (PET) Image Storage	1.2.840.10008.5.1.4.1.1.128	See Below	SCP	None
Standalone PET Curve	1.2.840.10008.5.1.4.1.1.129	See Below	SCP	None
Radiotherapy (RT) Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	See Below	SCP	None
Radiotherapy (RT) Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	See Below	SCP	None
Radiotherapy (RT) Image Storage	1.2.840.10008.5.1.4.1.1.481.1	See Below	SCP	None
Radiotherapy (RT) Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	See Below	SCP	None
Radiotherapy (RT) Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	See Below	SCP	None
Radiotherapy (RT) Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	See Below	SCP	None
Radiotherapy (RT) Summary Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.7	See Below	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	See Below	SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	See Below	SCP	None
VL Slide-Coordinates Microscopic	1.2.840.10008.5.1.4.1.1.77.1.3	See Below	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	See Below	SCP	None
Stored Print Storage	1.2.840.10008.5.1.1.27	See Below	SCP	None
Hard Copy Grayscale Image Storage	1.2.840.10008.5.1.1.29	See Below	SCP	None
Hard Copy Colour Storage	1.2.840.10008.5.1.1.30	See Below	SCP	None

Table 9: Receive Images from a Remote System Presentation Context

Transfer Syntaxes for Receive from Remote System	
Name	**UID**
Implicit VR, Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 10: Receive Images from a Remote System Transfer Syntax

3.1.3.2.3. SOP Specific Conformance Statement for SOP Storage Class

The VARIOSTORAGE AE conforms to the SOP's of the Storage SOP Class at Level 2 (full). No elements are discarded or coerced by the VARIOSTORAGE AE. In the case of a successful C-STORE operation the object has successfully been written to disk in the VARIOSTORAGE database. If an image is sent with the same SOP Instance UID (0008, 0018) as one that already exists on the VARIOSTORAGE AE, VARIOSTORAGE will receive it. If it is a duplicate in terms of UID and identical in terms of object content it will be rejected. If it is a duplicate in terms of UID and different in terms of object content it will be flagged and the user will be notified.

VARIOSTORAGE AE responds to a C-STORE request with one of the response codes listed in below:

C-STORE RESPONSE CODES			
Service Status	**Status Description**	**Status Code (0000,0090)**	**Related Fields**
Refused	Out of Resources: There were insufficient resources to process the request. The request was not processed	A765	None
Error	Processing Failure: A condition arose which prevented the processing of the request.	0110	None
~~Success~~		~~0000~~	~~None~~

Table 11: C-STORE RESPONSE CODES

3.1.3.2.4. Presentation Context Acceptance Criterion

No criterion.

3.1.3.3. Query the VARIOSTORAGE Database

3.1.3.3.1. Associated Real World Activity

A remote system queries the VARIOSTORAGE database to determine what studies are present on the system.

3.1.3.3.2. Accepted Presentation Contexts

Presentation Context Table for Query of the Local VARIOSTORAGE Database				
Abstract Syntax		**Transfer Syntax**	**Role**	**Extended Negotiation**
Name	**UID**			
Patient Root Query Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	See Below	SCP	No
Study Root Query Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	See Below	SCP	No

Table 12: Query the VARIOSTORAGE Database Presentation Contexts

Transfer Syntaxes for Query of the Local VARIOSTORAGE Database	
Name	**UID**
Implicit VR, Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 13: Query the VARIOSTORAGE Database Transfer Syntax

3.1.3.3.3. SOP Specific Conformance Statement for SOP Query Class

The VARIOSTORAGE AE responds to a C-FIND request with one of the following response codes:

C-FIND RESPONSE CODES			
Service Status	**Status Description**	**Status Code (0000,0090)**	**Related Fields**
Refused	Out of Resources: There were insufficient resources to process the request. The request was not processed	A700	None
Error	Identifier does not match SOP Class: A required attribute is not present in the message identifier. The request was not processed.	A900	None
	Unable To Process: A condition arose which prevented the processing of the request	C065	(None
Cancel	Matching terminated: No more response messages will be sent as a result of Cancel request from the SCU	FE00	None
Success	Matching is complete: No final identifier is supplied	0000	None
Pending	Matches are continuing: Current match supplied and any Optional Key were supported in the same manner as Required Keys.	FF00	Identifier
	Matches are continuing: Warning that one or more Optional Keys were not supported for existence and/or matching identifier	FF01	Identifier

Table 14: C-FIND RESPONSE CODES

All Required (R) and Unique (U) Study and Series level keys are supported for Patient Root and Study Root information models. In addition, certain Optional (O) keys are supported. The following tables outline the supported keys.

Table 15: Patient Root Query/Retrieve Supported Keys

Level (0008,0052)	Description	Tag	Support
PATIENT	Patient's Birth Date	(0010,0030)	Matching / Existence
	Patient's Birth Time	(0010,0032)	Matching / Existence
	Patient's Sex	(0010,0040)	Matching / Existence
	Issuer of Patient ID	(0010,0021)	Existence Only
	~~Other Patient Ids~~	~~(0010,1000)~~	~~Existence Only~~
	Other Patient Names	(0010,1001)	Existence Only
	Number of Patient Related Studies	(0020,1200)	Existence Only
	Number of Patient Related Series	(0020,1202)	Existence Only
	Number of Patient Related Instances	(0020,1204)	Existence Only
STUDY	Referring Physician's Name	(0008,0090)	Matching / Existence
	Study Description	(0008,1030)	Existence Only
	Name of Physicians Reading Study	(0008,1060)	Existence Only
	Number of Study Related Series	(0020,1206)	Existence Only
	Number of Study Related Instances	(0020,1208)	Existence Only
	Modalities in Study	(0008,0061)	Matching / Existence
SERIES	Series Description	(0008,103E)	Existence Only
	Body Part Examined	(0018,0015)	Existence Only
	Number of Series Related Instances	(0020,1209)	Existence Only
IMAGE	No Image Level Keys are Supported		

The proceeding table lists the levels supported for the Study Root Query/Retrieve.

Table 16: Study Root/Query Supported Keys

Level (0008,0052)	Description	Tag	Support
STUDY	Patient's Birth Date	(0010,0030)	Matching / Existence
	Patient's Sex	(0010,0040)	Matching / Existence
	Issuer of Patient ID	(0010,0021)	Existence Only
	Other Patient Ids	(0010,1000)	Existence Only
	Other Patient Names	(0010,1001)	Existence Only
	Name of Physicians Reading Study	(0008,1060)	Existence Only
	Study Description	(0008,1030)	Existence Only
	~~Referring Physician's Name~~	~~(0008,0090)~~	~~Matching / Existence~~
	Number of Patient Related Studies	(0020,1200)	Existence Only
	Number of Patient Related Series	(0020,1202)	Existence Only
	Number of Patient Related Images	(0020,1204)	Existence Only
	Number of Study Related Series	(0020,1206)	Existence Only
	~~Number of Study Related Images~~	~~(0020,1208)~~	~~Existence Only~~
	Modalities in Study	(0008,0061)	Matching / Existence
SERIES	Series Description	(0008,103E)	Existence Only
	Body Part Examined	(0018,0015)	Existence Only
IMAGE	No Image Level Keys are Supported		

In addition, VARIOSTORAGE also supports the following types of attribute matching:

- Single Value Matching
- Universal Matching
- Wild Card Matching
- Range Matching
- List of UID Matching

3.1.3.3.4. Presentation Context Acceptance Criterion

VARIOSTORAGE will accept all presentation contexts which match those of the preceding table (above, preceding page). No specific acceptance and/or prioritization rules are required.

3.1.3.4. Retrieve from VARIOSTORAGE

3.1.3.4.1. Associated Real World Activity

A remote system retrieves one or more studies from the VARIOSTORAGE database.

3.1.3.4.2. Accepted Presentation Contexts

Presentation Context Table for Retrieve from the VARIOSTORAGE Database				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Patient Root Query Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	See Below	SCP	No
Study Root Query Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	See Below	SCP	No

Table 17: Retrieve from VARIOSTORAGE Presentation Context

Transfer Syntaxes for Retrieve from the VARIOSTORAGE Database	
Name	UID
Implicit VR, Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2

Table 18: Retrieve from VARIOSTORAGE Transfer Syntaxes

3.1.3.4.3. SOP Specific Conformance Statement for SOP Retrieve Class

VARIOSTORAGE provides standard conformance.

3.1.3.4.4. Presentation Context Acceptance Criterion

VARIOSTORAGE can be configured to only accept requests for retrieval from those systems to which the application has been configured.

4. COMMUNICATION PROFILE

4.1. Supported Communication Stacks

DICOM Part 8 is supported by VARIOSTORAGE through TCP/IP.

4.2. TCP/IP Stack

The TCP/IP stack supported by VARIOSTORAGE is inherited from the host operating system. Refer to Table 1 for the supported Host Operating Systems

4.2.1. Physical Media Support

Any host operating system supported physical media. Refer to Table 1 for the supported Host Operating Systems

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

5.1. Standard Extended/Specialized/Private SOPs

Not applicable.

5.2. Private Transfer Syntaxes

Not applicable.

6. CONFIGURATION

Local AE titles are configurable.

6.1. AE Title/Presentation Address Mapping

The local AE title can be configured by authorized personnel. Such personnel may change configurations through the settings of the Server Configuration.

6.2. Configuration Parameters

The following fields are configurable for the local AE:

- Local AE Title
- Listening TCP/IP Port (default port is 104)
- Priority of child processes (default is normal)

The following fields are configurable for any remote AE:

- Remote AE Title
- Remote TCP/IP Port
- Remote IP Address

7. SUPPORT OF EXTENDED CHARACTER SETS

No support of extended character sets is offered by VARIOSTORAGE at this time.