
VITAL

A Toshiba Medical Systems Group Company

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DICOM 3.0 Conformance Statement
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1 Conformance Overview

The application supports image receives across the network from other systems for 2D viewing. All storage SOP Classes defined as of DICOM 2008 can be received and stored, but only the image types specified in the viewer support table can be loaded and viewed in the 2D application.

The application acts as a Verification SOP Class SCP.

Table 1-1 Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Verification	No	Yes
CT Image Storage	No	Yes
Enhanced CT Image Storage	No	Yes
MR Image Storage	No	Yes
Enhanced MR Image Storage	No	Yes
Grayscale Softcopy Presentation State Storage	No	Yes
Segmentation Image Storage	No	Yes
Computed Radiography Image Storage	No	Yes
Digital X-Ray Image Storage – For Presentation	No	Yes
Digital Mammography X-Ray Image Storage – For Presentation	No	No
Digital Mammography X-Ray Image Storage – For Processing	No	No
Digital Intra-Oral X-Ray Image Storage – For Presentation	No	Yes
Ultrasound Multi-frame Image Storage (Retired)	No	Yes
Ultrasound Image Storage (Retired)	No	Yes
Ultrasound Multi-frame Image Storage	No	Yes
Ultrasound Image Storage	No	Yes
X-Ray Angiographic Image Storage	No	Yes
X-Ray Radio fluoroscopic Image Storage	No	Yes
X-Ray 3D Angiographic Image Storage	No	Yes
Enhanced XA Image Storage	No	Yes
Nuclear Medicine Image Storage	No	Yes
Nuclear Medicine Image Storage (Retired)	No	Yes
Secondary Capture Image Storage	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	No	Yes
Multi-frame True Color Secondary Capture Image Storage	No	Yes
VL Image Storage (Retired)	No	Yes
VL Endoscopic Image Storage	No	Yes
VL Microscopic Image Storage	No	Yes

VL Slide-Coordinates Microscopic Image Storage	No	Yes
VL Photographic Image Storage	No	Yes
VL Multiframe Image Storage (Retired)	No	Yes
Photon Emission Tomography Image Storage	No	Yes
RT Image Storage	No	Yes
RT Dose Storage	No	Yes
RT Structure Set Storage	No	Yes
RT Beams Treatment Record Storage	No	Yes
Deformable Spatial Registration	No	Yes
Encapsulated PDF Storage	No	Yes
Key Object Selection Storage	No	Yes
Query/Retrieve		
Study Root Q/R – FIND	Yes	No
Study Root Q/R – MOVE	Yes	No
Workflow Management		
Storage Commitment Push Model	No	No
Print Management		
Basic Grayscale Print Management	No	No
Basic Color Print Management	No	No

Table 1-2 Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R	No	No
DVD		
General Purpose DVD-RAM	No	No

Table 1-3 Viewable SOP Classes

SOP Classes	SOP Class UID	Viewable
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Y
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Y
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Y
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Y
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Y
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Y
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Y
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	N
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Y
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Y
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Y
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	N

Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Y
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Y
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Y
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Y
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Y
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	N
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Y
X-Ray Radio fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Y
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Y
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Y
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	N
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	N
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	N
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	N
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	Y
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Y
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Y
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Y

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2 Introduction

2.1 Revision History

REVISION	EFF Date	AUTHORS	CHANGES FROM PREVIOUS REVISION
A	5/19/2011	K. Dupasquier	Initial VitreaView release
B	5/27/2011	M. Fuchs	Minor grammar corrections and spelling

2.2 Audience

This document is written for the people that need to understand how the VitreaView product 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. Also note that this document is formatted according to the DICOM Specification, Part 2: Conformance.

2.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between the VitreaView (VV) 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.

Terms and Definitions

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

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

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 – 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.

Digital Imaging and Communications in Medicine (DICOM) - DICOM is a global Information-Technology standard used in all hospitals worldwide.

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. 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). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Integrating the Healthcare Enterprise (IHE) - IHE is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical need in support of optimal patient care.

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.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: 0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].

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 or a class of objects; 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.

2.4 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 initial 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 specifies a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifies 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.

2.5 Abbreviations

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
JPEG	Joint Photographic Experts Group
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
NM	Nuclear Medicine
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PDU	Protocol Data Unit
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
US	Ultrasound
VV	VitreView
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

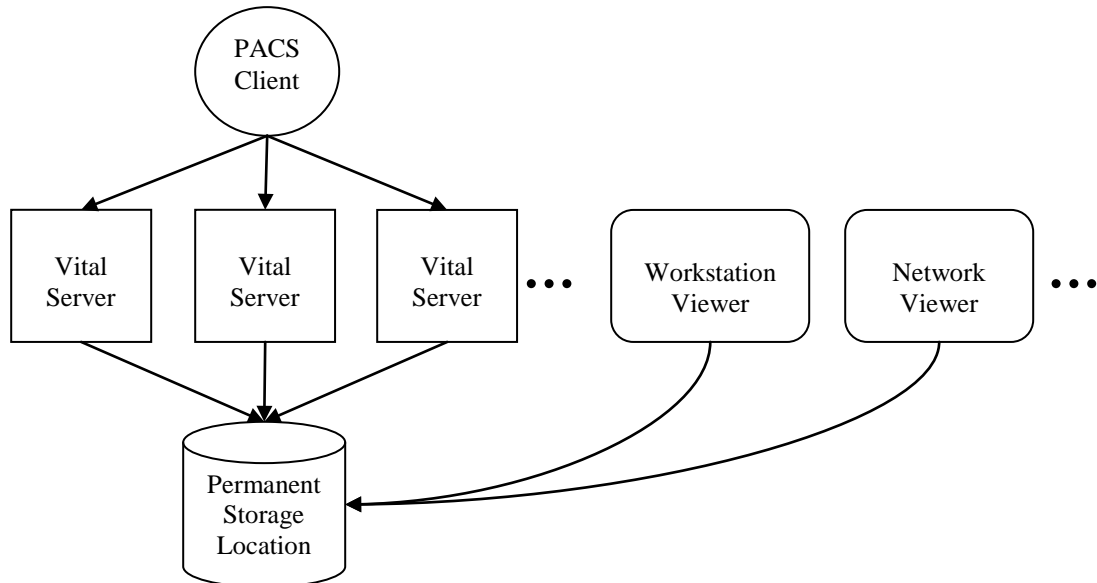
2.6 References

- NEMA PS3 DICOM Standard, available free at <http://medical.nema.org/> PS 3-2008
- IHE IHE, further information available at <http://www.ihe.net/>

3 Implementation Model

3.1 Application Data Flow

Figure 3-1 Architectural Model



The implementation consists of a set of applications which provide a user interface, internal database and network listeners that spawn additional threads or processes as necessary to handle incoming connections.

Conceptually the network services may be modeled as the following separate AEs, though in fact some AEs share (configurable) AE Titles:

- ECHO-SCP, which responds to verification requests
- STORAGE-SCP, which receives images and other composite instances from remote entities

3.2 Functional Definition of AE's

3.2.1 ECHO-SCP

ECHO-SCP waits in the background for connections, will accept associations with Presentation Contexts for SOP Class of the Verification Service Class, and will respond successfully to echo requests.

3.2.2 STORAGE-SCP

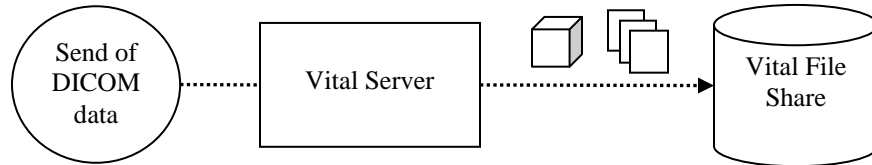
STORAGE-SCP continuously runs in the background, waiting for connections and will accept associations with Presentation Contexts for SOP Classes of the Storage Service Class and the Verification Service Class. It will store the received instances to the local database, complete preprocessing, and store the data to the Vital File Share, after which they are listed and viewed through the user interface.

Sequencing of Real-World Activities

3.2.3 Proprietary data creation

The VitreaView product support the creation of proprietary data. Upon receive of data, the server will run pre-processing and post-processing steps.

Figure 3-2 Receive of data for processing



3.2.4 Data Deletion

After the data has been received and transferred it can be removed from the system. This can be done through the internal monitoring service which removes reviewed or old data based on configurable settings or it can be done manually upon request. See the Users Guide for further information on configuration.

3.2.5 DICOM Validation

3.2.5.1 Invalid Dicom Values

Within the system there is validation for DICOM tags. Any tags of type 1 (including all UIDs) which are missing, empty, or longer than the defined Standard value will be rejected at the time of SCP receive. These tags have been identified as possible patient hazards if incorrectly populated, therefore they will not be allowed into the system. Users should reconcile the non-conformant data if it is to be processed by the system.

3.2.5.2 Demographic Updates

SCP receives instances which may have changed demographic data. The new instances received replace the previously received specific instances. Demographic information in the system is updated to match the latest received instances and necessary volumes are regenerated.

3.2.5.3 Duplicate Unique IDs

Data with duplicate Unique IDs are in violation of the DICOM standard. However this kind of data is sometimes created in an healthcare enterprise as a woraround for certain workflows. The system has different levels of support depending on which UIDs are duplicated.

Data with same (duplicate) StudyInstanceUID but with unique Series and/or InstanceUIDs is received and stored in the system.

Data with same (duplicate) SeriesInsanceUID but in different Studies is received by the system but is not stored in the database. They need to be administratively cleaned out.

Data with same (duplicate) SOPInstanceUID but in different Series is received and stored in the system.

4 AE Specification

4.1 ECHO-SCP

4.1.1 SOP Classes

ECHO-SCP provides Standard Conformance to the following SOP Class(es):

Table 4-1 SOP Classes supported by ECHO-SCP

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	Yes

4.1.2 Association Policies

4.1.2.1 General

ECHO-SCP accepts but never initiates associations.

Table 4-2 Maximum PDU size received as a SCP for ECHO-SCP

Maximum PDU size received	Unlimited
---------------------------	-----------

4.1.2.2 Number of Associations

Table 4-3 Number of Associations as a SCP for ECHO-SCP

Number of Associations	Unlimited
------------------------	-----------

4.1.2.3 Asynchronous Nature

ECHO-SCP will only allow a single outstanding operation on an Association. Therefore, ECHO-SCP will not perform asynchronous operations window negotiation.

4.1.2.4 Implementation Identifying Information

Table 4-4 DICOM Implementation Class and Version for ECHO-SCP

Implementation Class UID	1.3.6.1.4.1.25403.1.1.1
Implementation Version Name	Dicom 0.1

4.1.2.5 Association Acceptance Contexts

When ECHO-SCP accepts an association, it will respond to echo requests. If the Called AE Title does not match the pre-configured AE Title of the application, the association will be rejected.

Table 4-5 Accepted Presentation Contexts for ECHO-SCP

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
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.1.2.5.1 Extended Negotiation

No extended negotiation is performed.

4.1.2.5.2 SOP Specific Conformance

4.1.2.5.2.1 SOP Specific Conformance Verification SOP Class

ECHO-SCP provides standard conformance to the Verification Service Class.

4.1.2.5.2.2 Presentation Context Acceptance Criterion

ECHO-SCP will only accept a Presentation Context compatible with the ones listed in Table 4.5 and 4.6.

4.1.2.5.2.3 Transfer Syntax Selection Policies

ECHO-SCP will select the first Transfer Syntax proposed by the client that is supported by the SCP, per Presentation Context.

ECHO-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2 STORAGE-SCP

4.2.1 SOP Classes

STORAGE-SCP provide Standard Conformance to the following SOP Class(es):

Table 4-6 SOP Classes Supported by STORAGE-SCP

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	No
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes

X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radio fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
Segmentation Image Storage	1.2.840.10008.5.1.4.1.1.66.4	No	Yes
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	No	Yes
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	No	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes
VL Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	No	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes
Deformable Spatial Registration	1.2.840.10008.5.1.4.1.1.66.3	No	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	No	Yes

4.2.2 Association Policies

4.2.2.1 General

STORAGE-SCP accepts but never initiates associations.

Table 4-7 Maximum PDU Size Received for STORAGE-SCP

Maximum PDU size received	Unlimited, default is 16384
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4.2.2.2 Number of Associations

Table 4-8 Number of Associations for STORAGE-SCP

Maximum number of simultaneous associations	Unlimited
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4.2.2.3 Asynchronous Nature

STORAGE-SCP will not perform asynchronous operations window negotiation for outstanding negotiations.

4.2.2.4 Implementation Identifying Information

Table 4-9 DICOM Implementation Class and Version for STORAGE-SCP

Implementation Class UID	1.2.840.113747.20080222
Implementation Version Name	VIMS_1.0

4.2.3 Association Initiation Policy

STORAGE-SCP does not initiate associations.

4.2.4 Association Acceptance Policy

When STORAGE-SCP accepts an association, it will respond to storage requests. The exact behavior for a given AE title can be configured by service personnel.

4.2.4.1 Activity – Receive Storage Request

4.2.4.1.1 Description and Sequencing of Activities

As instances are received they are written to the local file system and a record inserted into the temporary database. If the received instance is a duplicate of a previously received instance, the old file will be overwritten with the new one, however the database records will not. At a later time, the received DICOM instances will be moved to the Vital File Share, updated in the permanent tables, and are then made available for viewing.

4.2.4.1.2 Accepted Presentation Contexts

Table 4-10 Accepted Presentation Contexts for STORAGE-SCP and Receive Storage Request

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4-6	See Table 4-6	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
		JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8) <i>(Retired)</i>	1.2.840.10008.1.2.4.53	SCP	None
		JPEG Full Progression, Non-Hierarchical (Process 10 & 12) <i>(Retired)</i>	1.2.840.10008.1.2.4.55	SCP	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP	None
		RLE Lossless	1.2.840.10008.1.2.5	SCP	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.81	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

4.2.4.1.2.1 Extended Negotiation

No extended negotiation is performed, though STORAGE-SCP:

- Is a Level 2 Storage SCP (Full – does not discard any data elements)
- Does not support digital signatures
- Does not coerce any received data elements

4.2.4.1.3 SOP Specific Conformance

4.2.4.1.3.1 SOP Specific Conformance to Storage SOP Classes

STORAGE-SCP provides standard conformance to the Storage Service Class. STORAGE-SCP does not support Grayscale Softcopy Presentation State as required by Enhanced CT Image Storage and Enhanced MR Image Storage.

4.2.4.1.3.2 Presentation Context Acceptance Criterion

STORAGE-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.4.1.3.3 Transfer Syntax Selection Policies

STORAGE-SCP prefers JPEG Lossless Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

- First encountered JPEG Lossless Transfer Syntax (including JPEG 2000 Lossless)
- First encountered Implicit Transfer Syntax
- Default Transfer Syntax

STORAGE-SCP will accept duplicate Presentation Contexts, that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same priority for selecting a Transfer Syntax for each.

4.2.4.1.3.4 Response Status

STORAGE-SCP will behave as described in the Table below when generating the C-STORE response command message.

Table 4-11 Response Status for STORAGE-SCP and Receive Storage Request

Service Status	Further Meaning	Status Codes	Reason
Refused	Out of Resources	A7xx	Association limit reached, local disk space low
Error	Data Set does not match SOP Class	A9xx	Never sent – data set is not checked prior to storage
	Cannot understand	Cxxx	Internal processing error
Warning	Coercion of Data Elements	B000	Never sent - no coercion is ever performed
	Data Set does not match SOP Class	B007	Never sent - data set is not checked prior to storage
	Elements Discarded	B006	Never sent – all elements are always stored
Success		0000	

5 Network Interfaces

5.1 Physical Network Interface

The application is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

5.2 Additional Protocols

When host names rather than IP addresses are used in the configuration properties to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system.

6 Configuration

Configuration is performed through the use of an administration web interfaces. Refer to the product documentation for specific details.

6.1 AE Title/Presentation Address Mapping

Each AE has an alias assigned to allow a user to easily distinguish AEs from each other. Aliases are configurable, and are generally human-readable strings. Presentation addresses (IP address and Port) are also configurable for all AEs.

6.2 Parameters

Table 6-1 Configuration Parameters Table

Parameter	Configurable	Default Value
General Parameters		
PDU Size	Yes	65kB
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	No	60 seconds
General DIMSE level time-out values	No	60 seconds
Time-out waiting for response to TCP/IP connect() request. (Low-level timeout)	No	60 seconds
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	No	60 seconds
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	No	60 seconds
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	None
AE Specific Parameters (all AEs)		
Size constraint in maximum object size	No	None
Maximum PDU size the AE can receive	No	Unlimited
Maximum PDU size the AE can send	Yes	65kB
AE specific DIMSE level time-out values	No	60 seconds
Number of simultaneous Associations by Service and/or SOP Class	No	Unlimited
SOP Class support	Yes	See Table 6-2
Transfer Syntax support	Yes	See Table 6-3

Parameter	Configurable	Default Value
General Parameters		
Supported DIMSE services	Yes	None

Table 6-2 Default SOP Classes for Configured AEs

SOP Class Name	SOP Class UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1

Table 6-3 Default Transfer Syntaxes for Configured AEs

Transfer Syntax Name	Transfer Syntax UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1

7 Support of Character Sets

All Vital Images DICOM applications support ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set). No other character sets are supported.

8 Security

8.1 Network

Vital Images DICOM applications do not support any specific network security measures. It is assumed the software 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 the software.
- Firewall or router protections to ensure that the software 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.