



TSG iView ID

Image Display

Version: 1.0

DICOM Conformance Statement

Revision 1.1

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CONFORMANCE STATEMENT OVERVIEW

TSG iView Image Display is an IHE compliant application software product for viewing DICOM objects (images). It requests DICOM services in accordance with Workflow Application Profile for retrieving DICOM objects (images) for display in a healthcare setting.

It networks seamlessly with Image Archive actor to query and retrieve objects for viewing in accordance with DICOM protocols. Retrieved objects are stored in a local database. Objects may also be imported through media. Objects pass through a process of validation and authentication before storing in its local database.

TSG iView Image Display supports many DICOM classes in many transfer syntaxes (see box). It has DICOM Level 2 capability. It can display all DICOM tags including optional and private tags. Support for both Patient-Root and Study-Root query models provide convenient interface for retrieving images from archive.

Images for viewing are selected from its local database and moved to display area. Display parameters, such as window level/width, zoom, magnification of regions of interest, distances/angles measurements, color histogram, pixel properties, etc. appear in real time. For convenience, at user option, some properties are burnt-in on the image itself for display.

Multiple images from a series can be displayed together. Similarly, images from multiple series in a study may be displayed together. Multiple series may be from the same or different SOP classes. Multiple images are displayed side by side or overlapping in a variety of display schemes.

Application specific displays features are also available as option.

Table T1 provides an overview of the DICOM network services supported by TSG iView Image Display

**Table T1
DICOM NETWORK SERVICES**

SOP Classes	User of Service (SCU) role	Provider of Service (SCP) role
Transfer		
Ultrasound Image Storage	Yes	Yes
Ultrasound Multi-frame Image Storage	Yes	Yes
Ophthalmic 8 bit Photography Image Storage	Yes	Yes
Ophthalmic 16 bit Photography Image Storage	Yes	Yes
Stereometric Relationship Storage	Yes	Yes
Ophthalmic Tomography Image Storage	Yes	Yes
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage For Presentation	Yes	Yes
CT Image Storage	Yes	Yes
MR Image Storage	Yes	Yes

SOP Classes	User of Service (SCU) role	Provider of Service (SCP) role
X-Ray Angiographic Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Encapsulated PDF Storage	Yes	Yes
Lensometry Measurements	Yes	Yes
Autorefracton Measurements	Yes	Yes
Keratometry Measurements	Yes	Yes
Subjective Refraction Measurements	Yes	Yes
Visual Acuity Measurements	Yes	Yes
Spectacle Prescription Report	Yes	Yes
Query/Retrieve		
Patient Root Query Retrieve Information Model - FIND	Yes	No
Patient Root Query Retrieve Information Model - MOVE	Yes	No
Study Root Query Retrieve Information Model - FIND	Yes	No
Study Root Query Retrieve Information Model - MOVE	Yes	No

TSG iView Image Display does not provide DICOM Media Services. However, it supports local import / export of DICOM objects from its local database.

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0. Introduction

0.1 Purpose

This DICOM conformance statement is in accordance with Part PS 3.2 of Digital Imaging and Communication in Medicine (DICOM) [1]. This document is intended for people who need to understand how TSG iView ID 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 conformance statement describes the DICOM interface of TSG implementation of TSG iView ID (Image Display) software version 1.0

0.2 Revision History

Document Version	Date	Author	Description
1.0	16 Aug, 2008	Rishabh	New Document
1.1	19 Sep, 2008	Rishabh	Document is updated. Added the additional SOP Classes after completing the internal testing with MESA Tests.

0.3 Audience

This document is written for the people that need to understand how TSG iView ID 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.

0.4 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between TSG iView ID 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.

TSG iView ID is participating in an industry-wide testing program sponsored by Integrating the Healthcare Enterprise (IHE). The IHE Integration Statement for TSG iView ID, together with the IHE Technical Framework, may facilitate the process of validation testing. Therefore, TSG iView ID can be deployed in any IHE compliant workflow based information system to perform the role of Image Display including the role of Performed Procedure Step Manager. It supports all required transactions

and some optional transactions of the Workflow Integration Profile. For details, please see the IHE Integration Statement.

0.5 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 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.

0.6 Definitions

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*.

Attribute – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

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.

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.

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.

0.7 Abbreviations

AE	Application Entity
AET	Application Entity Title
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DNS	Domain Name System
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MPEG	Moving Picture Experts Group
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MWL	Modality Worklist
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit

R	Required (Key Attribute)
RIS	Radiology Information System.
RT	Radiotherapy
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
US	Ultrasound
VL	Visible Light
VR	Value Representation
XA	X-ray Angiography

0.8 References

- [1] NEMA PS 3.1-17
Digital Imaging and Communications in Medicine (DICOM) Standard, available free at
<http://medical.nema.org/>

1. Networking

1.1 IMPLEMENTATION MODEL

TSG iView ID Image Display is implemented as SCU for DICOM Image Archive Application Entities (AE). TSG iView ID Image Display interface initiates associations with remote Application Entities for Verification and query retrieve services.

TSG iView ID Image Display implements a local database for storing the retrieved DICOM Composite Information Objects. It uses proprietary database storage and retrieval technology. This technology allows dynamic introduction of new data items as they become available in composite information objects. This technology allows storage of any number new tags including private tags in the DICOM Composite Information Objects.

TSG iView ID Image Display implements import and export of DICOM Composite Information Objects through local media. Any media supported by operating platform may be used.

TSG iView ID Image Display implements multiple databases. A database is selectable through a user interface option.

1.1.1 Application Data Flow Diagram

TSGiView, along with an associated parameter file "Actor.ts1" maintained in the same folder of the server, is the application module to provide TSG iView ID network services. The following services are via a user interface.

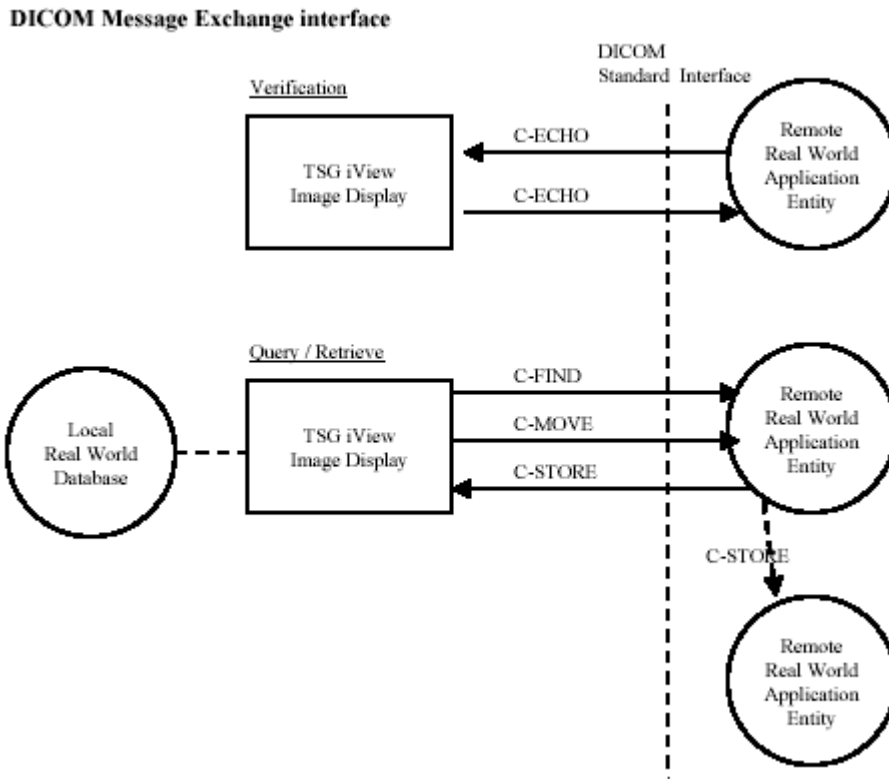
- **Query / Retrieve SCU:** TSG iView ID invokes an association for DICOM Query / Retrieve Service Class to a remote AE. Upon acceptance of the association by the remote AE, TSG iView ID transmits DICOM Query / Retrieve requests to the remote AE and waits for the response(s). After receiving the responses, it presents the responses in a grid for user to select the entry for transfer of DICOM objects from remote AE to itself or to another Application Entity. User interface facilitates creation for query for Patient Root or Study Root information model and sending the query to a remote entity. Remote entity is selected from among a list of authorized and user configurable remote entities.

Again, a simple user interface is provided to select a response item, display the return tags, and send a C-MOVE request to the same remote entity from where the responses are received. The move destination for DICOM objects is also selected from a list of authorized AEs, which includes self. This list is user configurable. As a default, TSG iView ID selects self for transfer of DICOM objects from the remote AE through C-MOVE request. Local database is also selected from a list of authorized and user configurable database folders, in which the retrieved objects are stored. Objects pass through a validation check before saving in the local database. Any error is reported in the response to the sending AE.

DICOM objects are received based on C-MOVE request identifier list.

- **Verification SCU:** TSGiView verifies TCP/IP path by operating system tool "Ping". Upon successful response from "Ping", TSGiView initiates associations for DICOM Verification Service Class to remote AE. TSGiView confirms success on receiving response from remote AE.
- **Verification SCP:** A remote Application Entity invokes an association for DICOM Verification Service Class to the AE of TSGiView. TSGiView accepts the association.

Figure F1
Data flow diagram – TSG iView ID



1.1.2 Functional Definition of Application Entity

TSGiView can be used on Microsoft Windows operating platform. The software has been tested to work on XP, OS, and OS Server, but it is expected to perform similarly on any other variant of Microsoft Operating System. The operating platform requires that MS DoNet Framework 2.0 be installed.

TSGiView is installed by copying the distribution software to a folder on the target system. No other installation procedures are required. Customization of self as Application Entity and Remote Entities TSGiView may communicate with is provided through a user interface after it is started.

TSGiView ID is started by a console command in accordance with the operating platform norms and set by the user as per preference

On starting TSGiView ID, it activates user interface screens for Query Retrieve, Viewing DICOM objects from the local database, and status of Message Exchange with remote Entities.

Query Retrieve user interface screen presents a list of identifiers on which search of objects may be initiated. Choice of Patient Root and Study Root information Model is presented. User may provide

values for identifiers to be used for matching. User may select identifiers for which values are returned by the remote application entity that are selected based on matching criteria. Four levels of search are selectable – Patient, Study, Series or Instance. A drop-down list of authorized remote entities that provides the services of Image Archive is shown. A default Image Archive is automatically selected. User can select the archive from this list. A FIND button initiates association with the selected remote Image Archive and sends the FIND command along with list of identifiers. It waits for response. Each response received from the remote entity is presented in a grid. Rows in the grid are automatically expanded as responses arrive from remote entity. User may stop receiving the responses by clicking the Cancel button.

On selecting any row of the response grid, the returned value of identifiers is displayed. User may evaluate the rows by displaying the value of returned identifiers. Request for transfer of DICOM objects is initiated by clicking a button on a selected row in the grid of displayed responses. A request to MOVE DICOM objects is initiated. A command to transfer DICOM objects is sent to the remote entity on clicking the MOVE button on the selected row. User may select another destination to MOVE the objects through a drop down list of authorized remote entities. By default, “Me” is automatically selected.

TSGiView ID accepts another association from the remote entity to allow transfer of objects through C-STORE service. TSGiView ID provides the C-STORE service for received objects. It saves the received objects in its local database. Received objects pass through a process of validation before storing in the local database.

TSGiView ID may have many associations open simultaneously with remote entities, thus exchanges messages for performing various services. There is no maximum limit on the number of simultaneous associations active at a time. Each association is between two application entities. TSGiView ID initiates or accepts associations with only authorized entities

Status of associations is displayed in the Status Grid, each row of the grid providing information on the remote entity, type of association, current state of association, type of service in progress and the current state of progress of service. A log of the activity is created in the folder from where TSGiView ID is started. This log may be used for recording and debugging the operation of message exchange services.

A close command initiates closure of TSGiView ID. In this state, TSGiView ID does not initiate or accept new associations except when allowed by the user. User may stop TSGiView ID when all associations have terminated and all ports are in Idle and Disconnected state.

Viewing of objects is performed from the selected local database. Multiple local databases may be configured for storing retrieved objects. Database is selected from a drop down list presented.

Objects are displayed in two separate panes; one for viewing the properties of the object (values of tags in the object) and the other for viewing the image or graphic. Properties pane provides complete information of the meaning of the tag, its value and the value representation. Tags are grouped in information entities. Any information entity may be opened for displaying the tags and values contained in it. Image is displayed in a separate pane. Through a simple user interface, image is viewed by changing its display properties, zooming, etc. Multiframe images can be viewed similarly. Multiple instances of objects in a series may be viewed in a single pane by using scroll function.

Multiple series may be viewed simultaneously, each series in a separate pair of panes. Series may be form different studies. With this facility, all objects for a patient can be displayed simultaneously. Size and position of panes are interactively set under user control.

1.1.3 Sequencing of Real World Activities

2. AE SPECIFICATIONS

1.2.1 Real World Application Entity - Storage SCP

1.2.1.1 SOP Classes

This Application Entity provides Standard Conformance to the following Storage SOP Classes:

**Table T3
SOP CLASSES FOR STORAGE SCP / SCU**

SOP Classes	SOP Class UID	SCU	SCP
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes
Ophthalmic 16 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Yes	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.78.1	Yes	Yes
Autorefraction Measurements	1.2.840.10008.5.1.4.1.1.78.2	Yes	Yes
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.78.3	Yes	Yes
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.78.4	Yes	Yes
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.78.5	Yes	Yes
Spectacle Prescription Report	1.2.840.10008.5.1.4.1.1.78.6	Yes	Yes

. By altering the configuration it is possible to support additional or fewer SOP Classes.

1.2.1.2 Association Policies

1.2.1.2.1 General

The STORAGE-SCP AE can both accept Association Requests. The STORAGE-SCP AE will accept Association Requests for the Verification, and Storage Services.

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

**Table T4
DICOM APPLICATION CONTEXT**

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

1.2.1.2.2 Maximum PDU Size

**Table T5
Maximum PDU size received as SCP**

Maximum PDU size	20000
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1.2.1.2.3 Number of Associations

The STORAGE-SCP AE can support multiple simultaneous Associations requested by peer AEs. The maximum number of simultaneous Associations that can be processed is limited by hardware resources.

**Table T7
NUMBER OF ASSOCIATIONS ACCEPTED**

Maximum number of simultaneous Associations	N, where N is limited by available hardware resources
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1.2.1.2.4 Asynchronous Nature

Storage SCP does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table T7
ASYNCHRONOUS NATURE AS A SCU**

Maximum number of outstanding asynchronous transactions	1
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1.2.1.2.5 Implementation Identifying Information

The implementation information for the Application Entity is:

**Table T8
DICOM IMPLEMENTATION CLASS AND VERSION**

Implementation Class UID	1.2.826.0.1.3680043.8.342.10.1
Implementation Version Name	DICOMTALKS 6.0

Implementation Class UID and Implementation Version Name is the same as for other application entities in TSG iView ID. This is because, all application entities share the same engine, the work properties are determined by configurable set of parameters. These parameters are not under user control. These are set at the time of distribution of software product. The parameters depend upon the licensing terms.

1.2.1.4 Association Acceptance Policy

When STORAGE-SCP accepts an association, it will respond to storage requests. If the Called AE Title does not match the pre-configured AE Title shared by all the SCPs of the application, the association is rejected.

1.2.1.4.1 Activity – Receive Storage Request

1.2.1.4.1.1 Description and Sequencing of Activities

As instances are received they are inserted into the local database. If the received instance is a duplicate of a previously received instance, the database record will be overwritten with the new one.

1.2.1.4.1.2 Accepted Presentation Contexts

**Table T9
Presentation Context Table for STORAGE**

Presentation Context Table							
Abstract Syntax		Transfer Syntax				Role	Extended Negotiation
Name	UID	Name	UID				
Ultrasound Image Storage	1.2.840.10008.5.1.4 .1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2			SCP/SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1			SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2			SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50			SCP/SCU	None
		JPEG Extended (Process 2-4): 12 bit	1.2.840.10008.1.2.4.51			SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57			SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70			SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80			SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.81			SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.90			SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91			SCP/SCU	None
Ultrasound Multi-	1.2.840.10008.5.1.4	Implicit VR Little Endian	1.2.840.10008.1.2			SCP/SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
frame Image Storage	.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG Extended (Process 2 4): 12 bit	1.2.840.10008.1.2.4.51	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless) 1	1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG 2000 Image Compression 0	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG 2000 Image Compression 1	1.2.840.10008.1.2.4.91	SCP/SCU	None
		Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4 .1.1.77.1.5.1	Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1			SCP/SCU	None
Explicit VR Big Endian	1.2.840.10008.1.2.2			SCP/SCU	None
JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50			SCP/SCU	None
JPEG Extended (Process 2 4): 12 bit	1.2.840.10008.1.2.4.51			SCP/SCU	None
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57			SCP/SCU	None
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70			SCP/SCU	None
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80			SCP/SCU	None

Presentation Context Table						
Abstract Syntax		Transfer Syntax			Role	Extended Negotiation
Name	UID	Name	UID			
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.8	1	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.9	0	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.9	1	SCP/SCU	None
Ophthalmic 16 bit Photography Image Storage	1.2.840.10008.5.1.4 .1.1.77.1.5.2	Implicit Endian VR Little	1.2.840.10008.1.2		SCP/SCU	None
		Explicit Endian VR Little	1.2.840.10008.1.2.1		SCP/SCU	None
		Explicit Endian VR Big	1.2.840.10008.1.2.2		SCP/SCU	None
		JPEG (Process 1): Baseline for 8 bit	1.2.840.10008.1.2.4.50		SCP/SCU	None
		JPEG (Process 2-4): Extended 12 bit	1.2.840.10008.1.2.4.51		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70		SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80		SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.8	1	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.9	0	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.9	1	SCP/SCU	None
Stereometric Relationship Storage	1.2.840.10008.5.1.4 .1.1.88.33	Implicit Endian VR Little	1.2.840.10008.1.2		SCP/SCU	None
		Explicit Endian VR Little	1.2.840.10008.1.2.1		SCP/SCU	None
		Explicit Endian VR Big	1.2.840.10008.1.2.2		SCP/SCU	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4 .1.1.77.1.5.4	Implicit Endian VR Little	1.2.840.10008.1.2		SCP/SCU	None
		Explicit Endian VR Little	1.2.840.10008.1.2.1		SCP/SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG Extended (Process 2-4): 12 bit	1.2.840.10008.1.2.4.51	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless) 1	1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG 2000 Image Compression 0	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG 2000 Image Compression 1	1.2.840.10008.1.2.4.91	SCP/SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP/SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG Extended (Process 2-4): 12 bit	1.2.840.10008.1.2.4.51	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless) 1	1.2.840.10008.1.2.4.81	SCP/SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.91	SCP/SCU	None
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit Endian VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG (Process 1): Default for 8 bit Baseline	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG (Process 2-4): 12 bit Extended	1.2.840.10008.1.2.4.51	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless) 1	1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG Image Compression 2000	1.2.840.10008.1.2.4.91	SCP/SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit Endian VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG (Process 1): Default for 8 bit Baseline	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG (Process 2-4): 12 bit Extended	1.2.840.10008.1.2.4.51	SCP/SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP/SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP/SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50	SCP/SCU	None
		JPEG Extended (Process 2-4): 12 bit	1.2.840.10008.1.2.4.51	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70	SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless)	1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP/SCU	None
X-Ray	1.2.840.10008.5.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP/SCU	None

Presentation Context Table						
Abstract Syntax		Transfer Syntax			Role	Extended Negotiation
Name	UID	Name	UID			
Angiographic Image Storage	.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1		SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50		SCP/SCU	None
		JPEG Extended (Process 2 4): 12 bit	1.2.840.10008.1.2.4.51		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70		SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80		SCP/SCU	None
		JPEG-LS Lossy (Near-Lossless) 1	1.2.840.10008.1.2.4.81		SCP/SCU	None
		JPEG 2000 Image Compression 0	1.2.840.10008.1.2.4.90		SCP/SCU	None
		JPEG 2000 Image Compression 1	1.2.840.10008.1.2.4.91		SCP/SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4 .1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2		SCP/SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		SCP/SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		SCP/SCU	None
		JPEG Baseline (Process 1): Default for 8 bit	1.2.840.10008.1.2.4.50		SCP/SCU	None
		JPEG Extended (Process 2 4): 12 bit	1.2.840.10008.1.2.4.51		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		SCP/SCU	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) Default	1.2.840.10008.1.2.4.70		SCP/SCU	None
		JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80		SCP/SCU	None

Presentation Context Table						
Abstract Syntax		Transfer Syntax			Role	Extended Negotiation
Name	UID	Name	UID			
		JPEG-LS Lossy (Near-Lossless)		1.2.840.10008.1.2.4.81	SCP/SCU	None
		JPEG Image Compression	2000	1.2.840.10008.1.2.4.90	SCP/SCU	None
		JPEG Image Compression	2000	1.2.840.10008.1.2.4.91	SCP/SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Lensometry Measurements	1.2.840.10008.5.1.4.1.1.178.1	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Autorefracton Measurements	1.2.840.10008.5.1.4.1.1.178.2	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Keratometry Measurements	1.2.840.10008.5.1.4.1.1.178.3	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Subjective Refraction Measurements	1.2.840.10008.5.1.4.1.1.178.4	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Visual Acuity Measurements	1.2.840.10008.5.1.4.1.1.178.5	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None
		Explicit Endian	VR Little	1.2.840.10008.1.2.1	SCP/SCU	None
		Explicit Endian	VR Big	1.2.840.10008.1.2.2	SCP/SCU	None
Spectacle	1.2.840.10008.5.1.4	Implicit Endian	VR Little	1.2.840.10008.1.2	SCP/SCU	None

Presentation Context Table								
Abstract Syntax		Transfer Syntax				Role	Extended Negotiation	
Name	UID	Name		UID				
Prescription Report	.1.1.78.6	Explicit Endian	VR	Little	1.2.840.10008.1.2.1		SCP/SCU	None
		Explicit Endian	VR	Big	1.2.840.10008.1.2.2		SCP/SCU	None

1.2.1.4.1.3 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

1.2.1.4.2 SOP Specific Conformance

1.2.1.4.2.1 SOP Specific Conformance to Storage Service Class

The associated Activity with the Storage service is the storage of medical image data received over the network on a designated hard disk. The STORAGE-SCP AE will return a failure status if it is unable to store the images on to the hard disk.

The STORAGE-SCP AE does not have any dependencies on the number of Associations used to send images to it. Images belonging to more than one Study or Series can be sent over a single or multiple Associations. Images belonging to a single Study or Series can also be sent over different Associations. There is no limit on either the number of SOP Instances or the maximum amount of total SOP Instance data that can be transferred over a single Association.

The STORAGE-SCP AE is configured to retain the original DICOM data in DICOM Part 10 compliant file format. The STORAGE-SCP AE is Level 2 (Full) conformant as a Storage SCP. In addition, all Private and SOP Class Extended Elements are maintained in the DICOM format files. In addition to saving all Elements in files, a subset of the Elements are stored in the database to support query and retrieval requests and also allow updating of Patient, Study, and Series information by user input, or demographic and Study related messages.

1.2.1.4.2.2 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.

1.2.1.4.2.3 Transfer Syntax Selection Policies

STORAGE-SCP has no preference for any Transfer Syntax. If offered a choice of Transfer Syntaxes in a Presentation Context, it will select the first acceptable 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.

1.2.1.4.2.4 Response Status

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

**Table T10
Response Status for STORAGE-SCP and Receive Storage Request**

Service Status	Further Meaning	Status Codes	Reason
Failure	Refused: Out of Resources	A700	Never sent
	Error: Data Set does not match SOP Class	A900	Never sent – only warning is issued
	Error: Cannot understand	C000	Error in dataset syntax. Dataset is checked before storage
Warning	Coercion of Data Elements	B000	Never sent - no coercion is ever performed
	Data Set does not match SOP Class	B007	Data set is checked prior to storage
	Elements Discarded	B006	Never sent – all elements are always stored
Success		0000	

1.2.2 Real World Application Entity - Storage SCU

1.2.1.2 SOP Classes

This Application Entity provides Standard Conformance to the Storage SOP Classes given in Table T3

1.2.2.2 Association Policies

1.2.2.2.1 General

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

**Table T11
DICOM APPLICATION CONTEXT**

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

1.2.2.2.2 Maximum PDU Size

**Table T12
Maximum PDU size proposed**

Maximum PDU size	20000
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1.2.2.2.3 Number of Associations

STORAGE-SCU attempts to initiate a new association for each instance of transfer request.

**Table T13
NUMBER OF ASSOCIATIONS INITIATED**

Maximum number of simultaneous Associations	N, where N is limited by available hardware resources
---	---

Storage SCP can accept any number of Associations at a time; the upper limit of number of Associations is dependant on the available hardware resources.

**Table T14
NUMBER OF ASSOCIATIONS ACCEPTED**

Maximum number of simultaneous Associations	SCU does not accept Associations
---	----------------------------------

1.2.2.2.4 Asynchronous Nature

Storage SCU does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table T15
ASYNCHRONOUS NATURE AS A SCU**

Maximum number of outstanding asynchronous transactions	1
---	---

1.2.2.2.5 Implementation Identifying Information

The implementation information for the Application Entity is:

**Table T16
DICOM IMPLEMENTATION CLASS AND VERSION**

Implementation Class UID	1.2.826.0.1.3680043.8.342. 10.1
Implementation Version Name	DICOMTALKS 6.0

Implementation Class UID and Implementation Version Name is the same as for other application entities in TSG iView IM. This is because, all application entities share the same engine, the work properties are determined by configurable set of parameters. These parameters are not under user control. These are set at the time of distribution of software product. The parameters depend upon the licensing terms.

1.2.2.3 Association Initiation Policy

STORAGE-SCU attempts to initiate a new association for each instance of transfer request.

1.2.2.4.1 Activity – Send Storage Request

1.2.2.4.1.1 Description and Sequencing of Activities

For each SOP instance, a data set is created in the transfer syntax accepted for the Abstract Syntax, and an attempt is made to transmit it to the selected remote AE. If the send fails, for whatever reason, no retry will be performed, and an attempt will be made to send the next instance.

1.2.2.4.1.2 Proposed Presentation Contexts

STORAGE-SCU will propose Presentation Contexts for all Storage SOP Classes supported by the SCU.

For each SOP Class, STORAGE-SCU will propose multiple supported Transfer Syntaxes to allow SCP to choose preferred transfer syntax. Please refer to Table T3

1.2.2.4.1.3 Extended Negotiation

No extended negotiation is performed, though STORAGE-SCU:

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

1.2.2.4.2 SOP Specific Conformance

1.2.2.4.2.1 SOP Specific Conformance to Storage Service Class

STORAGE-SCU provides standard conformance to the Storage Service Class.

1.2.2.4.2.2 Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations

1.2.2.4.2.3 Transfer Syntax Selection Policies

STORAGE-SCU has no preference for any Transfer Syntax. It proposes all transfer syntaxes supported for the SOP Class in a fixed order as given in Table T3. .

1.2.2.4.2.4 Response Status

STORAGE-SCU will behave as described in the Table below in response to the status returned in the C-STORE response command message.

**Table T18
Response Status for STORAGE-SCP and Receive Storage Request**

Service Status	Further Meaning	Status Codes	Behavior
Failure	Refused: Out of Resources	A7xx	The user is notified and the failure is logged

Service Status	Further Meaning	Status Codes	Behavior
	Error: Data Set does not match SOP Class	A9xx	The user is notified and the failure is logged
	Error: Cannot understand	Cxxx	The user is notified and the failure is logged
Warning	Coercion of Data Elements	B000	Ignored
	Data Set does not match SOP Class	B007	Ignored
	Elements Discarded	B006	Ignored
Success		0000	Ignored

1.2.3 Query Retrieve SCU

1.2.3.1 SOP Classes

Query Retrieve SCU provides Standard Conformance to the following SOP Classes:

**Table T19
SOP Classes Supported by FIND-SCU**

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Study Root Query Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Patient Root Query Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Query Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

1.2.3.2 Association Policies

1.2.3.2.1 General

The QUERY-RETRIEVE-SCU AE initiates Associations for Verification, C-FIND, and C-MOVE requests. In the case of a C-MOVE request, the QUERY-RETRIEVE-SCP AE will issue a command to the STORAGE-SCU AE to initiate an Association with the Destination DICOM AE to send images as specified by the originator of the C-MOVE Request.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

**Table T20
DICOM APPLICATION CONTEXT FOR QUERY-RETRIEVE-SCP AE**

Application Context Name	1.2.840.10008.3.1.1.1
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**Table T20
Maximum PDU Size Received for FIND-SCP**

Maximum PDU size received	20000
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1.2.3.2.2 Number of Associations

The QUERY-RETRIEVE-SCU AE can support multiple simultaneous Associations. Urrently provides issuing one QUERY-RETRIEVE request at a time.

**Table T21
Number of Associations for FIND-SCU**

Maximum number of simultaneous associations	1
---	---

1.2.3.2.3 Asynchronous Nature

The QUERY-RETRIEVE-SCU AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

**Table F.4.2-12
ASYNCHRONOUS NATURE AS A SCP FOR QUERY-RETRIEVE-SCU AE**

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)
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1.2.3.2.4 Implementation Identifying Information

**Table T22
DICOM IMPLEMENTATION CLASS AND VERSION**

Implementation Class UID	1.2.826.0.1.3680043.8.342. 10.1
Implementation Version Name	DICOMTALKS 6.0

Implementation Class UID and Implementation Version Name is the same as for other application entities in TSG iView ID. This is because, all application entities share the same engine, the work properties are determined by configurable set of parameters. These parameters are not under user control. These are set at the time of distribution of software product. The parameters depend upon the licensing terms.

1.2.3.3 Association Initiation Policy

The QUERY-RETRIEVE-SCU AE initiates Association each time user selects FIND or MOVE function from the user interface.

1.2.3.4.1 Activity – Handling Query and Retrieval Requests

1.2.3.4.1.1 Description and Sequencing of Activity

The QUERY-RETRIEVE-SCU AE initiates Associations for valid Presentation Contexts. It can be configured to only propose Associations with certain hosts (using TCP/IP address) and/or Application Entity Titles.

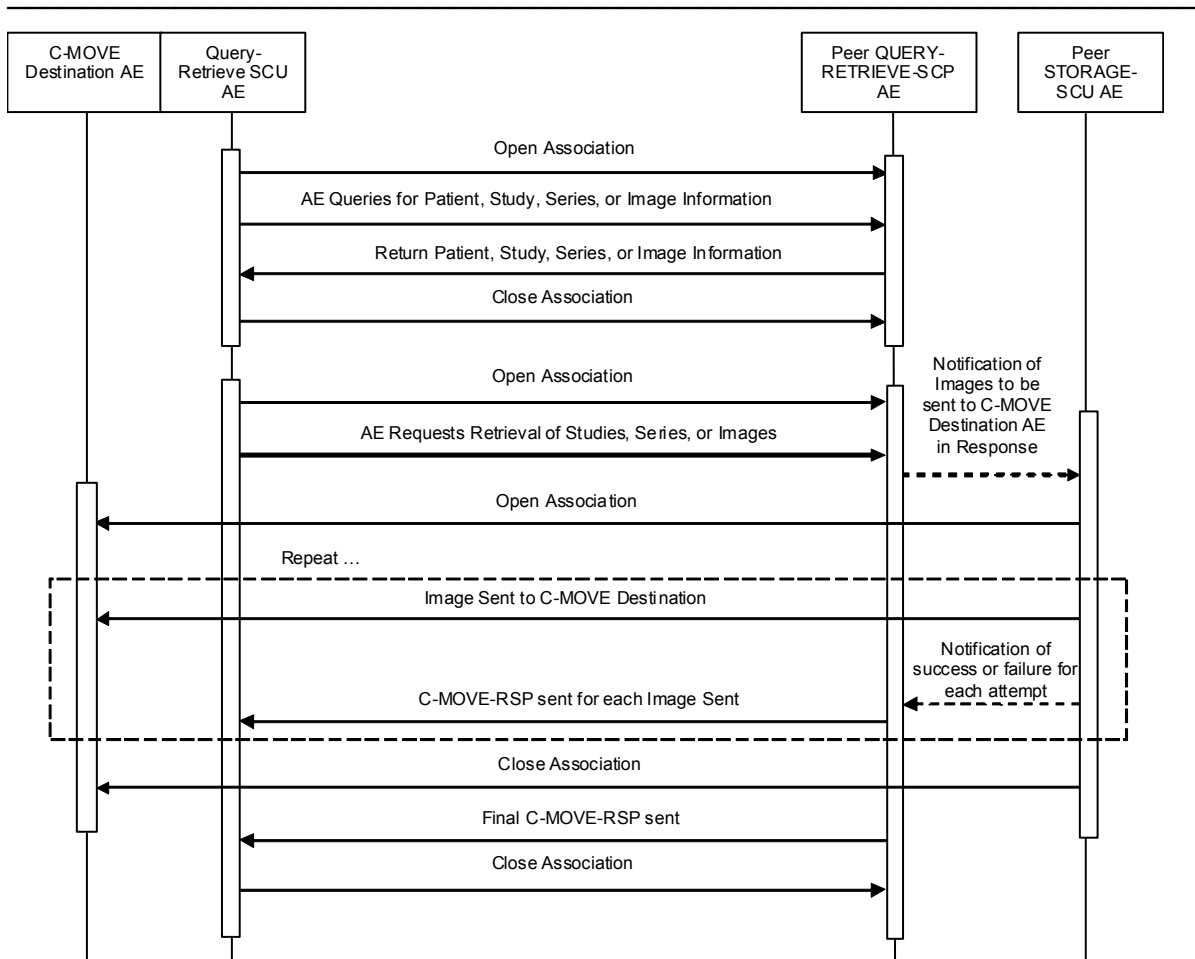


Figure F 3
SEQUENCING OF ACTIVITY – HANDLING QUERY AND RETRIEVAL REQUESTS

The following sequencing constraints illustrated in Figure 3 apply to the QUERY-RETRIEVE-SCU AE for handling queries (C-FIND-Requests):

1. QUERY-RETRIEVE-SCU AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. QUERY-RETRIEVE-SCU AE sends a C-FIND-RQ Message
3. QUERY-RETRIEVE-SCP AE returns a C-FIND-RSP Message to the QUERY-RETRIEVE-SCU AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete. QUERY-RETRIEVE-SCU AE closes the Association.

The following sequencing constraints illustrated in Figure 3 apply to the QUERY-RETRIEVE-SCU AE for handling retrievals (C-MOVE-Requests):

1. QUERY-RETRIEVE-SCU AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. QUERY-RETRIEVE-SCU AE sends a C-MOVE-RQ Message
3. QUERY-RETRIEVE-SCP AE notifies the STORAGE-SCU AE to send the Composite SOP Instances to the peer C-MOVE Destination AE as indicated in the C-MOVE-RQ.
4. After attempting to send a SOP Instance, the STORAGE-SCU AE indicates to the QUERY-RETRIEVE-SCP AE whether the transfer succeeded or failed. The QUERY-RETRIEVE-SCP AE then returns a C-MOVE-RSP indicating this success or failure.

5. Once the STORAGE-SCU AE has completed all attempts to transfer the SOP Instances to the C-MOVE Destination AE, or the first failure occurred, the QUERY-RETRIEVE-SCP AE sends a final C-MOVE-RSP indicating the overall success or failure of the retrieval.
6. QUERY-RETRIEVE-SCU AE closes the Association.

1.2.3.4.1.2 Presentation Contexts

QUERY-RETRIEVE-SCU AE will propose Presentation Contexts as shown in the following table:

Table T23
Proposed Presentation Contexts by the QUERY-RETRIEVE-SCU AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Query Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient Root Query Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

The QUERY-RETRIEVE-SCU AE requests hierarchical queries and not relational queries. There are no attributes always returned by default. Only those attributes requested in the query identifier are expected to be returned.

Patient Root Information Model

All required search keys on each of the four levels (Patient, Study, Series, and Image) are supported. However, the Patient ID (0010,0020) key must have at least a partial value if the Patient's Name (0010,0010) is not present in a Patient Level query.

Study Root Information Model

All the required search keys on each of the three levels (Study, Series, and Image) are supported. If no partial values are specified for Study attributes then either the Patient ID (0010,0020) key or the Patient's Name (0010,0010) must have at least a partial value specified.

**Table T24
Patient Root C-FIND SCU Supported Elements**

Level Name Attribute Name	Tag	VR	Types of Matching
SOP Common Specific Character Set	0008,0005	CS	NONE
Patient Level Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Issuer of Patient ID	0010,0021	LO	S,*,U
Patient's Birth Date	0010,0030	DA	S,U
Patient's Sex	0010,0040	CS	S,U
Other Patient IDs	0010,1000	LO	NONE
Other Patient Names	0010,1001	PN	NONE
Study Level Study Date	0008,0020	DA	S,R,U
Study Time	0008,0030	TM	R,U
Accession Number	0008,0050	SH	S,*,U
Study ID	0020,0010	SH	S,*,U
Study Instance UID	0020,000D	UI	S,U,L
Referring Physician's Name	0008,0090	PN	S,*,U
Study Description	0008,1030	LO	S,*,U
Series Level Modality	0008,0060	CS	S,U
Series Number	0020,0011	IS	S,*,U
Series Instance UID	0020,000E	UI	S,U,L
Operator's Name	0008,1070	PN	NONE
Image Level Instance Number	0020,0013	IS	S,*,U
SOP Instance UID	0008,0018	UI	S,U,L

**Table T25
STUDY ROOT C-FIND SCU SUPPORTED ELEMENTS**

Level Name Attribute Name	Tag	VR	Types of Matching
SOP Common Specific Character Set	0008,0005	CS	NONE
Study Level Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Issuer of Patient ID	0010,0021	LO	S,*,U
Patient's Birth Date	0010,0030	DA	S,U

Patient's Sex	0010,0040	CS	S,U
Other Patient IDs	0010,1000	LO	NONE
Other Patient Names	0010,1001	PN	NONE
Study Date	0008,0020	DA	S,R,U
Study Time	0008,0030	TM	R,U
Accession Number	0008,0050	SH	S,*,U
Study ID	0020,0010	SH	S,*,U
Study Instance UID	0020,000D	UI	S,U,L
Referring Physician's Name	0008,0090	PN	S,*,U
Study Description	0008,1030	LO	S,*,U
Series Level			
Modality	0008,0060	CS	S,U
Series Number	0020,0011	IS	S,*,U
Series Instance UID	0020,000E	UI	S,U,L
Operator's Name	0008,1070	PN	NONE
Image Level			
Instance Number	0020,0013	IS	S,*,U
SOP Instance UID	0008,0018	UI	S,U,L

The tables should be read as follows:

- Attribute Name: Attributes supported for returned C-FIND.
- Tag: Appropriate DICOM tag for this attribute.
- VR: Appropriate DICOM VR for this attribute.
- Types of Matching: The types of Matching requested by the C-FIND SCU. A "S" indicates the identifier attribute can specify Single Value Matching, a "R" will indicate Range Matching, a "*" will denote wildcard matching, an 'U' will indicate universal matching, and 'L' will indicate that UID lists are supported for matching. "NONE" indicates that no matching is supported, but that values for this Element in the database can be returned.

**Table T26
QUERY-RETRIEVE-SCP AE C-FIND RESPONSE STATUS RETURN BEHAVIOR**

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Matching is complete. No final identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to as an alert to the User Interface, and to the Service Log.
Failed	Identifier does not match SOP Class	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is output to the Service Log.

	Unable to process	C001	The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database. For example, this can occur if a Patient Level query is issued but the identifier has only empty values for both the Patient ID and the Patient Name. Error message is output to the Service Log.
Cancel	Matching terminated due to Cancel Request	FE00	The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing and current match is supplied.	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.
	Matches are continuing but one or more Optional Keys were not supported.	FF01	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if there are Optional keys in the query identifier that are not supported.