



# **Technical Publications**

**Direction DOC2068936  
Revision 2**

## **SmartConsole™ Data Manager DICOM CONFORMANCE STATEMENT**

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## LIST OF REVISIONS

REV	DATE	DESCRIPTION	PAGES	APPR.
1	August 2018	Initial Release	All	M. Mesh
2	October 2018	Updates after external review	Page 4, Overview Section 1.2 Section 1.8 Section 2.1 Section 2.3.1.1.4 Section 2.3.1.2.1.1 Section 2.3.1.2.1.2.1	M. Mesh

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## CONFORMANCE STATEMENT OVERVIEW

The SmartConsole™ Data Manager (SmartConsole™ DM) DICOM implementation allows user to receive images from a remote DICOM station for primary or follow up processing by SmartConsole™ Application (see the "SmartConsole™ Application DICOM Conformance Statement" in Reference A in Section 1.6)

The SmartConsole™ DM allows the user to send images, created by SmartConsole™ Application functionality, or received from any other DICOM compliant system, to another DICOM station.

The SmartConsole™ DM DICOM implementation also provides a verification mechanism by which a remote application entity (AE) can verify application-level communication with the SmartConsole™ DM DICOM Server.

Table 0.1 provides an overview of the network services supported by SmartConsole™ Data Manager.

**Table 0.1 – Network Services**

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<b>Transfer</b>		
CT Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
PET Image Storage	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
Enhanced SR	Yes	Yes
Radiopharmaceutical Radiation Dose SR	Yes	Yes

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## 1. INTRODUCTION

### 1.1 OVERVIEW

This DICOM Conformance Statement is divided into Sections as described below:

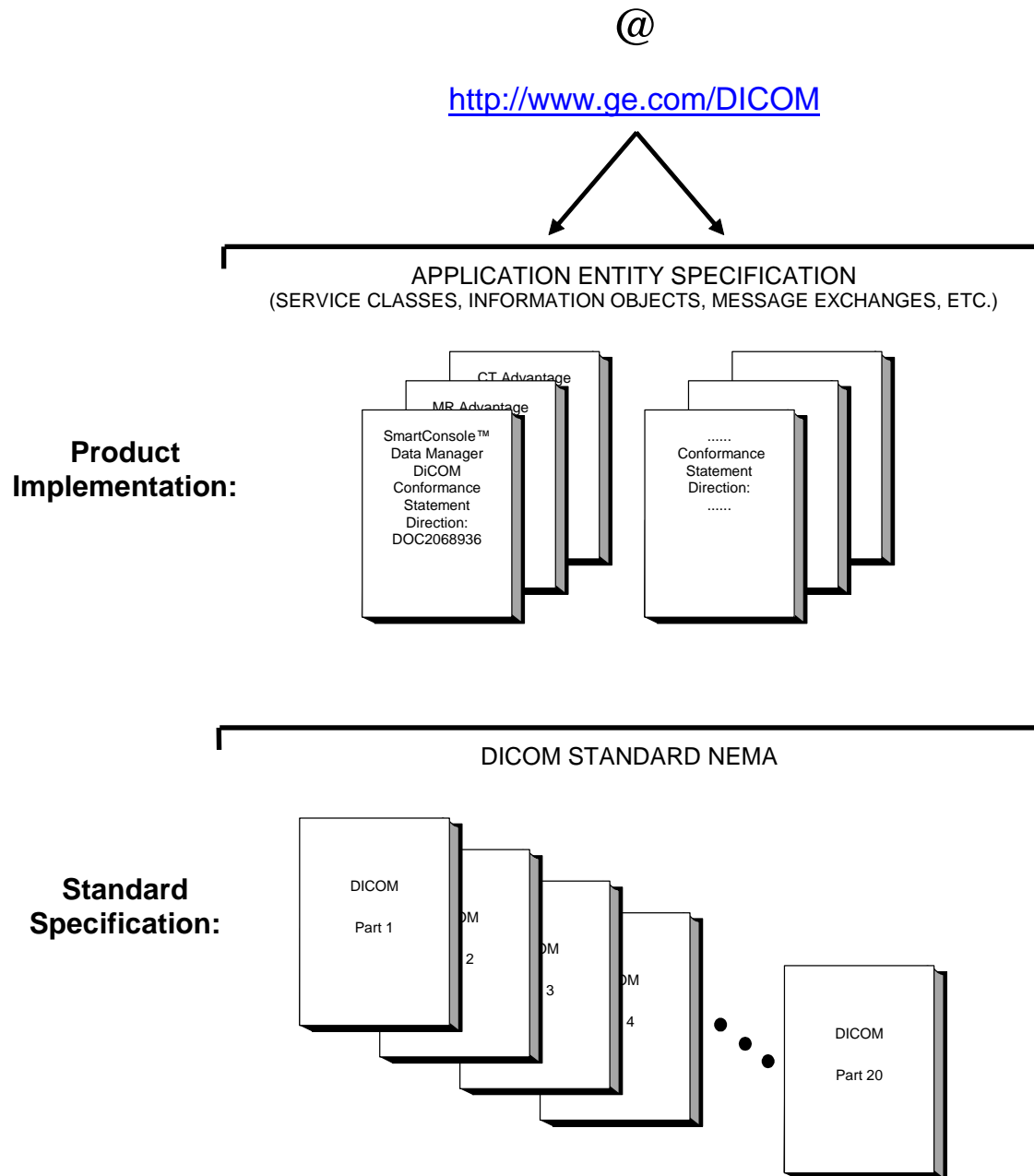
**Section 1 (Introduction)**, which describes the overall structure, intent, and references for this Conformance Statement.

**Section 2 (Network Conformance Statement)**, which specifies the GEHC equipment compliance to the DICOM requirements for the implementation of Networking features.

### 1.2 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.

## GEHC DICOM Conformance Statements



This document specifies the DICOM implementation. It is entitled:

SmartConsole™ Data Manager  
Conformance Statement for DICOM  
Direction **DOC2068936**



This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required interoperating with the GEHC network interface.

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

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

DICOM Secretariat  
NEMA  
1300 N. 17<sup>th</sup> Street, Suite 1752  
Rosslyn, VA 22209  
USA  
Phone: +1.703.841.3200

### 1.3 INTENDED AUDIENCE

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

### 1.4 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

### 1.5 IMPORTANT REMARKS

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

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.
- **Validation** - Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be

overlooked. Therefore, the **user** should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications.

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

- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements.** The **user** should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the **non-GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

## 1.6 REFERENCES

- **NEMA PS3** Digital Imaging and Communications in Medicine (DICOM) Standard, available free at <http://medical.nema.org/>
- **Reference A** Direction DOC2068940 "SmartConsole™ Application DICOM Conformance Statement"

## 1.7 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*.

**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.

**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.

## 1.8 SYMBOLS AND ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CSE	Customer Service Engineer
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DM	Data Manager
DNS	Domain Name System
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
LUT	Look-up Table
MFSC	Multi-Frame Secondary Capture
NM	Nuclear Medicine
O	Optional (Key Attribute)
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RIS	Radiology Information System
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol

- U Unique (Key Attribute)
- UL Upper Layer
- VR Value Representation

## 2. NETWORK CONFORMANCE STATEMENT

### 2.1 INTRODUCTION

This section of the DICOM Conformance Statement specifies the SmartConsole™ DM compliance to DICOM requirements for Networking features.

In view of the requirements to conform to a global standard that permits interoperability across equipment produced by different vendors, SmartConsole™ DM system will provide support for DICOM .

This section details the roles and DICOM Service Classes supported by the SmartConsole™ DM.

The SmartConsole™ DM DICOM implementation allows user to receive images stored in a remote DICOM station for primary or follow up processing by SmartConsole™ Application. In this situation SmartConsole™ DM provides the DICOM C-STORE service as a service class provider (SCP).

The SmartConsole™ DM allows the user to send images, created by SmartConsole™ Application or received from any other DICOM compliant system, to another DICOM station. In this situation SmartConsole™ DM provides the DICOM C-STORE service as a service class user (SCU).

The SmartConsole™ DM DICOM implementation also provides a verification mechanism by which a remote application entity (AE) can verify application-level communication with the SmartConsole™ DM DICOM Server. In these situation, SmartConsole™ DM provides the DICOM C-ECHO service a SCP.

**Note:** For detailed specification of Images produced by SmartConsole™ Application refer to "SmartConsole™ Application DICOM Conformance Statement" (**Reference A** in Section 1.6).

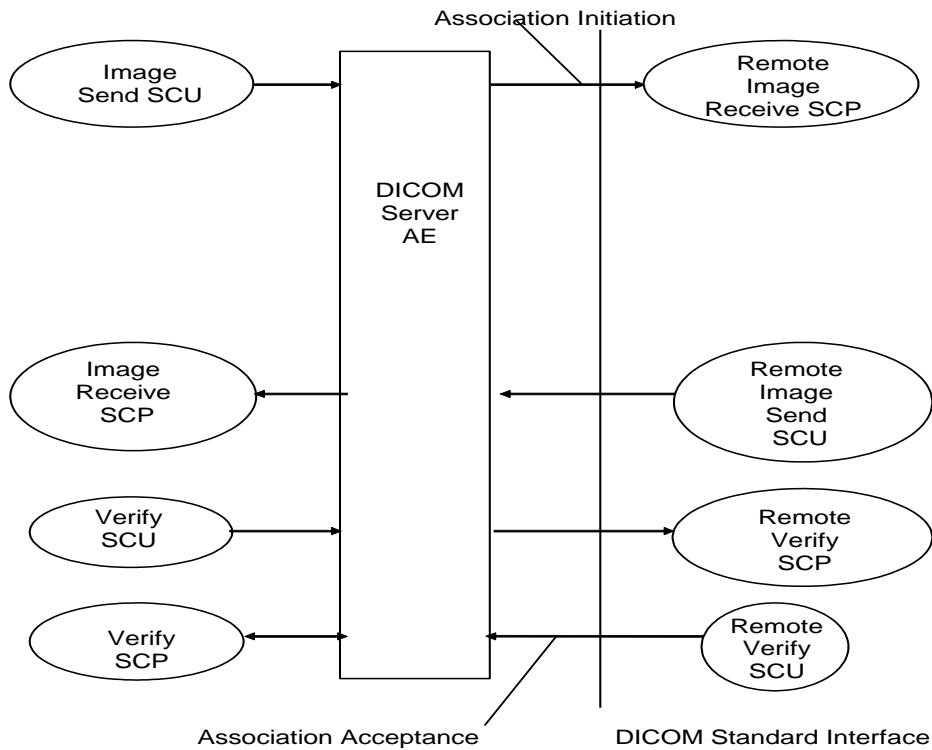
## 2.2 IMPLEMENTATION MODEL

### 2.2.1 Application Data Flow Diagram

All DICOM functionality on the SmartConsole™ DM product is logically provided by the DICOM Server AE. The DICOM Server AE is commanded to perform DICOM services through the use of the SmartConsole™ DM user interface. The DICOM Server AE also listens on a pre-defined port for incoming connections from remote DICOM AEs.

The network application model for the SmartConsole™ DM is shown in the following illustration :

ILLUSTRATION 2-1  
SMARTCONSOLE™ DM NETWORK APPLICATION MODEL AND DATA FLOW DIAGRAM



## 2.2.2 Functional Definition of AE's

The SmartConsole™ DM DICOM Server Application Entity (AE) initiates the following functions:

- **Store:** Initiates a DICOM association in order to send images to a remote AE. If the remote AE accepts presentation context applicable to the image(s) being sent, the DICOM Server will send the images via the C-STORE service.
- **Verify:** Initiates a DICOM association in order to send a verification message to a remote AE via a C-ECHO-RQ message.

The SmartConsole™ DM DICOM Server AE responds to the following functions:

- **Store:** Responds to incoming C-STORE -RQ messages by storing the incoming data stream onto the disk.
- **Verify:** Responds to incoming C-ECHO-RQ messages by returning a C-ECHO-RSP message with a status of "success."

## 2.2.3 Sequencing of Real-World Activities

SmartConsole™ DM Application Entity receives images from acquisition modality or another DICOM station; creates derived images using SmartConsole™ Application processing functionality, sends images to the remote DICOM station automatically at the end of processing or manually.

## 2.3 AE SPECIFICATIONS

### 2.3.1 DICOM Server AE Specification

The DICOM Server Application Entity provides Standard Conformance to the following DICOM SOP Classes as an SCU and/or as an SCP:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	Yes	Yes



PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes

### 2.3.1.1 Association Establishment Policies

#### 2.3.1.1.1 General

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

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

The maximum length PDU receive size for the DICOM Server is:

Maximum Length PDU	64234 (Not Configurable)
--------------------	--------------------------

The SOP Class Extended Negotiation is not supported.

#### 2.3.1.1.2 Number of Associations

The DICOM Server AE (SCU) will initiate a single DICOM association to perform a single selected object (study/series/image) send to a remote node. One association is opened per image both in manual send and in auto-send. Multiple Send operations can be performed.

DICOM Server AE can initiate a maximum of 5 simultaneous associations to remote nodes.

The DICOM Server AE (SCP) can accept multiple DICOM associations opened simultaneously to service verifications.

The DICOM Server AE can support a maximum of 5 simultaneous associations initiated by remote nodes.

#### 2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

#### 2.3.1.1.4 Implementation Identifying Information

The Implementation UID for this DICOM Implementation is:

SmartConsole™ Implementation UID	1.2.840.113619.6.441
SmartConsole™ Implementation Version Name	NUEVO_MC3_401

#### 2.3.1.2 Association Initiation Policy

When the DICOM Server Application Entity initiates an Association for any Real-World Activity, it will propose the Presentation Contexts for all Real-World Activities; i.e., there is only a single, comprehensive Presentation Context Negotiation proposed for the AE.

The DICOM Server AE proposes only a single Transfer Syntax in each Presentation Context; i.e., for each Abstract Syntax in the following Presentation Context Tables, the AE proposes one Presentation Context for each specified Transfer Syntax.

The DICOM Server AE initiates a new association in the following cases:

- Due to an image send operation being initiated from the DICOM Server user interface, or by auto send option.
- Due to a Verify operation initiated to determine whether the remote DICOM station is operational.

### 2.3.1.2.1 Real-World Activity: Image Send

#### 2.3.1.2.1.1 Associated Real-World Activity

There are two ways to send image data: manual and automatic.

In the manual way, in order to send data, the operator must both select objects (Study/Series/ Image(s)) to be transferred from the SmartConsole™ DM Data Manager Browser. Once these selections have been made, the operator selects the Transfer Destination to initiate a send operation.

In the automatic way, when any single processing preset has been completed, the reconstructed data is automatically sent to the destination(s) which are predefined within system configuration ; the DICOM Server AE will then initiate an association with the remote AE in order to send the selected object(s) – one object per association – and will accept and interpret responses received from the remote AE.

The UI will indicate the status of the object (Study, Series, Image) being transferred. The status can be one of PENDING, IN-PROGRESS, COMPLETED, or FAILURE. The associated error messages due to a failed status can be found in system log.

#### 2.3.1.2.1.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by DICOM Server AE for Activity “Image Send”					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Secondary Image Capture Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

### 2.3.1.2.1.2.1 SOP Specific DICOM Conformance Statement for All Storage SOP Classes

Data images, created by SmartConsole™ Application, includes optional data elements in the SOP Instances as described in “SmartConsole™ Application DICOM Conformance Statement” (see **Reference A** in Section 1.6).

All the operations used by this SOP class support an **Association Timer**. This timer is started when the association request is sent, and is stopped when the respective response is received. The default time-out value is 60 seconds and is not configurable.

Each C-STORE operation also supports an **Operation Inactivity Timer**. This time-out starts once the first C-STORE request has been issued (on association) or received and is reset each time a C-STORE response has been received or when subsequent C-STORES are sent. This time-out is 5 minutes. It is non-configurable.

If any of the two timers mentioned above expires, the connection is closed and the operation in progress is considered failed.

Upon receiving a C-STORE confirmation containing a status other than Successful or Warning, this implementation will consider the current request to be a failure but will continue to attempt to send any remaining images in the request on a different association.

When DICOM Server AE initiates an association to issue a C-STORE, the image will be transmitted by the DICOM Server AE with the same elements as was created locally.

Transfer log shows one of these statuses for store request: PENDING, IN-PROGRESS, COMPLETED, or FAILURE. The specific error codes can be observed in the log.

Following are the status codes that are more specifically processed when receiving messages from a Storage SCP equipment :

Service Status	Status Code	Further Meaning	SmartConsole™ DM Behavior When Receiving Status Code	Related Fields
Failed	A700	Refused: Out of resources	Final image send job status is set to FAILED.	None
	C000	Error: Cannot understand	Final image send job status is set to FAILED.	None
Success	0000		Final image send job status is set to COMPLETED	None

### 2.3.1.2.2 Real-World Activity: Verify SCU

#### 2.3.1.2.2.1 Associated Real-World Activity

The user selects any of defined remote DICOM AE and presses on “Check connection” button. The DICOM Server AE initiates an association with the remote DICOM AE in order to verify communication at the application level. The success or failure of the verification process is displayed to the user.

#### 2.3.1.2.2.2 Proposed Presentation Context Table

Presentation Context Table – Proposed by DICOM Server AE for Verify SCU Activity					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

#### 2.3.1.2.2.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Class

The DICOM Server AE provides standard conformance to the DICOM Verification Service Class.

All the operations used by this SOP class support an Association Timer. This timer is started when the association request is sent, and is stopped when the respective response is received. The default time-out value is 15 seconds and is not configurable.

### 2.3.1.3 Association Acceptance Policy

Only those remote DICOM AE added to SmartConsole™ DM DICOM configuration may connect to the DICOM Server AE. The maximum number of associations accepted in parallel is limited to 5.

The DICOM Server AE responds to image store operations initiated by remote AE's as result of Retrieve real-world Activity. Remote AE sends data to SmartConsole™ DM DICOM server to be stored in the SmartConsole™ DM database.

Any remote AE can open an association to the DICOM Server AE for the purpose of application level communication verification.

### 2.3.1.3.1 Real-World Activity: Store Images

#### 2.3.1.3.1.1 Associated Real-World Activity

The DICOM Server AE starts to listen for associations from the Remote Retrieve SCP DICOM station when Remote Image Send service is initiated. No operator action is required to respond to a Store request.

The real-world activity associated with the Store request is to store the image data in the local database and send a C-STORE -RSP message with the status of “success” for each image that can be stored in the local database. A C-STORE-RSP message with the status “failed” is sent for each image that cannot be stored in the local database.

There is not any Time-outs defined in DICOM Server for Image Storage operation.

#### 2.3.1.3.1.2 Accepted Presentation Context Table

Presentation Context Table - Accepted by DICOM Server AE for Activity “Store Images”					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Secondary Image Capture Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

### 2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes

The DICOM Server AE provides Level 2 (FULL) Conformance for all above mentioned SOP Classes, and stores all standard and private data elements of received SOP Instances.

The DICOM Server AE provides Digital Signature Level 3 support of above mentioned SOP Classes, as it provides full fidelity storage of received SOP Instances.

The DICOM Server AE validates that the Attributes of the SOP Instance meet the requirements of the IOD with respect to Value Representation, presence of Type 1 and 2 elements, valid values, and consistency between image attributes and pixel data.

The DICOM Server AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

Successfully received SOP Instances may be accessed via the user interface. SOP Instances are stored until manually deleted by the user.

Following are the status codes the DICOM Server AE may send back to the SCU Equipment after performing the requested **Storage** :

Service Status	Status Code	Further Meaning	Status Code Explanation	Related Fields Sent Back to the SCU
Failure	A700	Refused: Out of resources	Returned if the DICOM Server runs out of resources (e.g. memory); error logged.	None
	C000	Error: Cannot Understand	Returned by the DICOM Server if for any other reason, not specified elsewhere in this table, the Store operation failed; error logged.	None
Success	0000			None

### 2.3.1.3.1.3 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM Server AE will select Transfer Syntaxes according to the following priority (highest priority first):

- Explicit VR Little Endian
- Implicit VR Little Endian

### 2.3.1.3.1.4 Presentation Context Acceptance Criterion

The DICOM Server AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

#### 2.3.1.3.1.5 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM Server AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian

### 2.3.1.3.2 Real-World Activity: Verify SCP

#### 2.3.1.3.2.1 Associated Real-World Activity

The DICOM Server AE starts to listen for associations when SmartConsole™ application is started. No operator action is required to respond to a Verification request.

The real-world activity associated with the Verification request is to send a C-ECHO-RSP message with a status of “success” to the requesting AE.

There is not any Time-out defined in DICOM Server for Verify SCP operation.

#### 2.3.1.3.2.2 Accepted Presentation Context Table

Presentation Context Table - Accepted by DICOM Server AE for Activity “Verify SCP”					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

#### 2.3.1.3.2.2.1 SOP Specific DICOM Conformance Statement for Verification SOP Class

The DICOM Server AE provides standard conformance to the DICOM verification service class.

#### 2.3.1.3.2.3 Presentation Context Acceptance Criterion

The DICOM Server evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for Verify SCP Real-World Activity.

#### 2.3.1.3.2.4 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM Server will select only Implicit VR Little Endian Transfer Syntax.

## 2.4 COMMUNICATION PROFILES

### 2.4.1 Supported Communication Stacks

The DICOM Upper Layer Protocol is supported using TCP/IP, as specified in DICOM PS3.8.

The TCP/IP stack is inherited from the Linux Operating System.

### 2.4.2 Physical Media Support

Ethernet 802.3 provides the physical network layer for this product.

### 2.4.3 Additional Protocols

SmartConsole™ DM implementation supports DHCP Protocol

### 2.4.4 IPv4 and IPv6 Support

SmartConsole™ DM implementation supports IPv4 only

## 2.5 EXTENSIONS / SPECIALIZATIONS/ PRIVATIZATIONS

### 2.5.1 Standard Extended / Specialized / Private SOP Classes

#### 2.5.1.1 Standard Extended SOP Classes

The product provides Standard Extended Conformance to all supported SOP Classes, through the inclusion of additional Type 3 Standard Elements and Private Data Elements.

#### 2.5.1.2 Private SOP Class

No Private SOP Class is supported.

### 2.5.2 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

## 2.6 CONFIGURATION

The SmartConsole™ DM system is configured by GE Healthcare Field Service Engineers. The DICOM configuration items below are configurable or re-configurable by a Field Service Engineer but are not accessible through the implementation user interface.



## 2.6.1 AE Title/Presentation Address Mapping

SmartConsole™ DM allows the configuration of the mapping of remote AE titles to IP addresses and ports. The IP address of a remote AE may be in a different subnet (using routing). A router is configurable to ensure communication from one sub-net to another.

This configuration is performed by GE Healthcare Field Service Engineers.

## 2.6.2 Configurable Parameters

The following fields are configurable for DICOM Server AE (local):

- Local AE Title (default value is computer hostname)

**Note:** Local Listening Port Number (default value is 4006), PDU length and any time-outs are not configurable for DICOM Server AE. The configuration of IP routers and subnet mask is available on a OS level.

The following fields are configurable for every remote DICOM AE:

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

**Note:** All configurations must be performed by a GE Field Engineer. The DICOM configuration items are configurable or re-configurable by a Field Service Engineer but are not accessible through the SmartConsole™ DM user interface.

## 2.7 SUPPORT OF EXTENDED CHARACTER SETS

The SmartConsole™ DM is configurable with a single single-byte extended character set, either the default ISO\_IR 100 (Latin alphabet Number 1 supplementary set), or the alternate ISO\_IR 101 (Latin alphabet Number 2 supplementary set).

## 2.8 CODES AND CONTROLLED TERMINOLOGY

Refer to "SmartConsole™ Application DICOM Conformance statement" (**Reference A** in Section 1.6)

## 2.9 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.

3. Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))