BRIT Systems

DICOM Conformance Statement

BRIT View

Release 3.3

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Revision History

Date	Release Number	Revised By	Sections Affected	Comments
Unknown	1	R. Barton	All	Initial Release
11/2004	2	R. Barton	All	Updates
1/2007	3	T. Harris	All	New Format

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1 Introduction

Medical imaging devices claiming conformance to the DICOM 3.0 Standard must indicate, in sufficient detail, the DICOM Service Class and Information Object to which they conform.

This document describes the conformance of the BRIT View product to the DICOM 3.0 Standard.

This conformance statement applies to the 3.3 software release.

1.1 Implementation Model

This implementation provides for simple transfer of images via the DICOM Storage Service Class as a Service Class User (SCU) and a Service Class Provider (SCP), and simple management of images the DICOM Query/Retrieve Service Class as an SCU.

Transfers of images from the workstation to a remote SCP are initiated by an operator enabling the EXPORT application from the UTILITY menu and then selecting the destination and sets of Patients or Series to queue for transfer. The export engine Application Entity (AE) transfers one series of images per association established with a selected Storage SCP.

The import server task supports the role of Storage SCP, and accepts images from DICOM 3.0 compliant remote SCUs. This task runs as a background process and requires no local operator actions to accept images. For diagnostic purposes, this task also supports the DICOM Verification Service class as an SCP.

An operator enables Query/Retrieve by selecting the ARCHIVE application from the UTILITY menu then selecting a Query/Retrieve SCP to access, and then the sets of series of images to retrieve. The import – server task on the local workstation provides the Storage SCP Application Entity (AE) that retrieved the images.
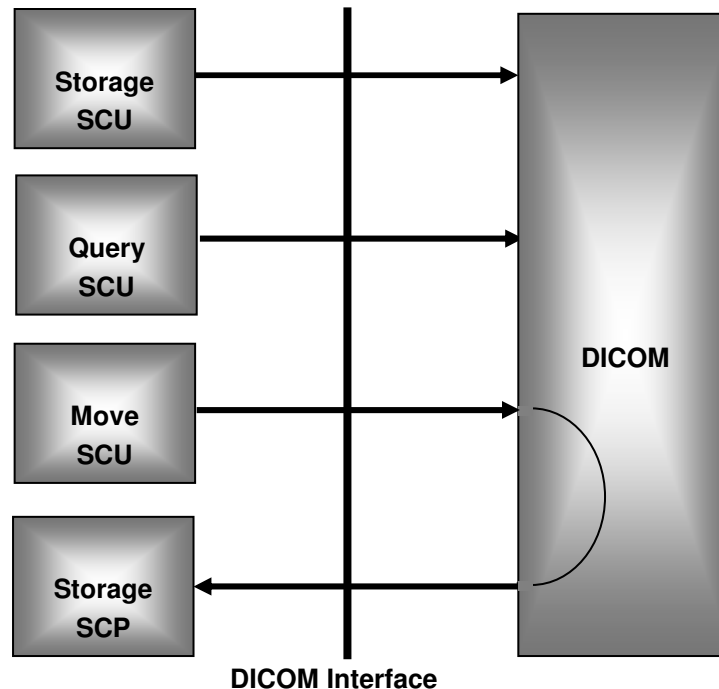
1.1.1   Application Data Flow Diagram

Figure 1 - Application Data Flow Diagram

1.1.2 Functional Definitions of AEs

The export engine AE begins execution when at least one series of images is queued for sending via DICOM. Normally, the export engine establishes an association with the remote Storage SCP, sends all images in the series, then terminates the association. If the export engine detects an error while sending an image, it will attempt to resend it; after three successive errors with the same image, the export engine will notify the operator and request operator intervention. If no errors are detected, the export engine continues to run until the export queue is emptied.

The workstation supports re-exporting of any multi-modality series of images that may have been imported into the database via DICOM. The workstation also supports exporting of series of images available via a remote database from another workstation.

The import server AE initiates (forks) a separate process for each association requested by remote Storage SCUs. The number of simultaneous associations that may be supported is only limited by the available resources and options supported by the underlying operating system.

The direct server AE establishes a new association to request images from a remote AE. This association is maintained until all requested images have been received, or an error condition is detected. The actual transfer of images to the workstation occurs on a separate association with an import server at the request of a corresponding remote Storage SCU. The direct server AE establishes an association each time the operator requests Patient Study, Series Information from a remote Query/Retrieve SCP.

1.1.3 Sequencing of Real-World Activities

Not applicable

2 Application Entity Specifications

2.1 Vi-Star and Montage Application Entities – Specification

The following table identifies the supported SOP:

Table 1 - Supported SOP

SOP Class Name	SOP Class UID	Role
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	SCU and SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	SCU and SCP
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	SCU and SCP
NM Image Storage	1.2.840.10008.5.1.4.1.1.5	SCU and SCP
US Image Storage	1.2.840.10008.5.1.4.1.1.6	SCU and SCP
SC (Secondary Capture) Image Storage	1.2.840.10008.5.1.4.1.1.7	SCU and SCP
Verification	1.2.840.10008.1.1	SCU and SCP
Patient/Study Only, Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	SCU
Patient/Study Only, Query/Retrieve	1.2.840.10008.5.1.4.1.2.3.3	SCU

SOP Class Name	SOP Class UID	Role
Information Model – FIND		
Patient/Root, Query/Retrieve Information Model-FIND	1.2.840.10008.5.1.4.1.2.1.2	SCU
Patient/Root, Query/Retrieve Information Model-MOVE	1.2.840.10008.5.1.4.1.2.2.1	SCU
Patient/Root, Query/Retrieve Information Model-FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
Patient/Root, Query/Retrieve Information Model-MOVE	1.2.840.10008.5.1.4.1.2.1.2	SCU

Note: The actual level of conformance may depend on the conformance of DICOM information objects originally received by the workstation.

Interpretation of a conformance statement should not be used as a substitute for vigorous clinical validation of the information being transferred between heterogeneous pieces of equipment.

2.1.1 Association Establishment Policies

2.1.1.1 General

The DICOM application Context proposed is always 1.2.840.10008.3.1.1.1. The maximum PDU siade allowed is 16KB.

2.1.1.2 Number of Associations

The number of simultaneous associations that may be supported by the import server is only limited by the available resources supported by the underlying operating system.

The export engine normally establishes a new association for each series of images transferred and terminated the association after each series transfer is completed.

The direct server AE establishes an association each time the operator requests Patient, Study, Series information from a remote Query/Retrieve SCP.

The direct server AE establishes a new association to request images from a remote AE. This association is maintained until all requested images have been received, or an error condition is detected.

The actual transfer of images to a workstation occurs on a separate association with a server at the time of a corresponding remote Storage SCU.

2.1.1.3 Asynchronous Nature

There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

The Implementation UID supplied for DICOM 3.0 associations is 2.16.840.1.113662.4.2.1.

2.1.2 Association Initiation by Real-World Activity

The import server AE does not initiate any associations.

The following real-world activities initiate associations:

1. The export engine AE initiates an association for each series queued for transfer.

2. The direct server AE initiates an association each time it queries a remote AE to obtain Patient, Study, and Series Information.

3. The direct server AE initiates an association each time it requests that a remote AE sends a series of images.

4. Selecting a new remote SCP (a new destination for DICPM EXPORT) or a new source for Query/Retrieve) initiates temporary associations to determine the roles and services supported by the remote SCP.

2.1.2.1 Real-World Activity – Sending a Series of Images

2.1.2.1.1 Associated Real-World Activity

An operator:

➢ Enables MANUAL DICOM EXPORT; selects a valid Destination AE for DICOM EXPORT; selects interactively from the available databases sets of Patients, Studies, Series for DICOM EXPORT.

➢ Issues a "Continue" command when a series is unable to transfer completely possibly because of an error situation. The export engine will retry sending any given image a maximum of three times before notifying the operator that there is a problem (a message is posted in the system's DICOM log file).

2.1.2.1.2 Presentation Contexts

The following table shows the presentation Contexts for sending a series of images:

Table 2 - Presentation Contexts for Sending a Series of Images

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
CR Image	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CT Image	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.5	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
US Image	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.1.3 SOP Specific Conformance to Storage SOP Classes

If the export engine AE detects any errors, a message suggesting to the operator an alternative course of action is always displayed. An operator may elect to: continue (retry), skip the series (delete it from the export queue), or cancel all remaining series in the queue. If the export engine AE is unable to open an

association with a selected destination AE, an appropriate message is displayed on the screen. There are no special messages displayed when a successful response to the C-STORE operation is received.

When the export engine sends any image that was originally received via DICOM, the original information object received is typically re-sent. If this is not possible, a derived information object will be resent.

When exporting images, the following optional information may be included:

Level	Description	Tag	Type
Patient	Patient Name	00100010	R
Patient	Patient ID	00100020	U
Patient	Patient Birth Date	00100030	O
Patient	Patient Birth Time	00100032	O
Patient	Patient Sex	00100040	O

Level	Description	Tag	Type
Study	Study Date	00080020	R
Study	Study Time	00080030	R
Study	Accession Number	00800050	R
Study	Study ID	00200010	R
Study	Study Instance UID	00200000	U
Study	Referring Physician Name	00080090	O
Study	Study Description	00081030	O
Study	Patient's Age	00101010	O
Study	Patient's Size	00101020	O
Study	Patient's Weight	00101030	O

Level	Description	Tag	Type
Series	Modality	00080060	R
Series	Series Number	00200011	R
Series	Series Instance UID	0020000E	U
Series	Body Part Examined	00180015	O

Level	Description	Tag	Type
Image	Image Number	00200013	R

2.1.2.2 Associated Real-World Activity

2.1.2.2.1 Associated Real-World Activity

The Associated Real-World Activity of the server is to request directory information from a remote DICOM server. This occurs when the operator selects the ARCHIVE application from the menu and selects the source SCP to Query for directory information.

2.1.2.2.2 Presentation Context

The following table shows the presentation context:

Table 3 - Presentation Context – Patient/Study Root Find

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Patient/Study Root Find	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient/Study Root 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/Study Root 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

2.1.2.2.3 SOP Specific Conformation to FIND SOP Classes

2.1.2.3 Real-World Activity – Requesting a Series of Images

2.1.2.3.1 Associated Real-world Activity

2.1.2.3.2 Presentation Contexts

The following table shows the presentation context:

Table 4 - Presentation Contexts - Patient/Study Root Move

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CR Image	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CT Image	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.5	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
US Image	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.2.3.3 SOP Specific Conformance to Move SOP Classes

This implementation provides conformance as an SCU for C-MOVE.

2.1.2.4 Real-World Activity – Selecting a New Remote SCP

2.1.2.4.1 Associated Real-World Activity

Selecting a new remote SCP (a new destination for DICOM EXPORT or a new source for Query/Retrieve) initiates a temporary association to determine the roles and services supported by the remote SCP.

2.1.2.4.2 Proposed Presentation Contexts

These are the same as for Real-World Activity 1 and 2 respectively (see above).

2.1.3 Association Acceptance Policy

The export engine and direct server AE's never accept associations.

The import server task accepts associations as a Storage SCP and as a Verification SCP. Images accepted by the import server are entered into the workstation's database. The workstation attempts, whenever possible, to store DICOM information in a form that may be re-exported exactly as received.

The import server may be configured to accept associations on various ports (as long as there is no conflict with a port used by other workstation tasks); port 104 is typically used by default. Usually a single Application Title is configured for use b all SCI's that will be sending images to the workstation. The DICOM import server must be configured by a Field Engineer.

The manufacturers of any devices connected to the workstation are responsible for the proper operation of their respective equipment, such that performance of the workstation is not adversely affected.

2.1.3.1 Real-World Activity

The Real-World Activity associated with the C-STORE operation in the conversion of the DICOM image into a form suitable for the workstation database.

2.1.3.2 Proposed Presentation Contexts

The BRIT View will accept Presentation Contexts as shown in the following table:

Table 5 - Presentation Context - Verification - Service Class

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CR Image	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
CT Image	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
MR Image	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
NM Image	1.2.840.10008.5.1.4.1.1.5	DICOM Implicit	1.2.840.10008.1.2	SCU	None

		VR Little Endian			
US Image	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
SC Image	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

2.1.3.3   SOP Specific Conformance

2.1.3.3.1 SOP Specific Conformance to Verification SOP Class

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

2.1.3.3.2 SOP Specific Conformance to Storage SOP Class

BRIT conforms to the Storage SOP at Level 2 (Full).

The BRIT View does not attempt to verify that DICOM images sent to the workstation are fully compliant with DICOM. If the sending system sends the required Type I fields, the import-server will accept the object.

A successful C-STORE operation, implies that the manage was successfully entered into the database.

Images will be stored in the workstation database until they are deleted by the operator.

If the C-STORE operation is unsuccessful, the server will return one of the following status codes:

Status Code	Meaning

2.1.3.4   Presentation Context Acceptance Criterion

The import server always accepts a Presentation Context for the Verification SOP Class with the DICOM Default Transfer Syntax. It will also accept any of the presentation contexts listed in the table m section 2.1.3.2.

2.1.3.5   Transfer Syntax Selection Policies

The import server will only receive images using the Implicit VR, Little Endian, syntax.

3 Communication Profiles

3.1 Supported Communication Stacks (Parts 8,9)

Applications provide DICOM 3.0 TCP/IP Network Communications Support as defined in Part 9 of the DICOM standard.

3.2 OSI Stack

No OSI stack communications are provided with this implementation.

3.3 TCP/IP Stack

The TCP/IP protocol stack is supported.

3.3.1   Physical Media Support

The following media are supported:

  ➢ Twisted pair Ethernet
  ➢ Thinnet Ethernet
  ➢ Thicknet Ethernet

3.4 Point-to-Point Stack

No point-to-point stack communications are provided.

4 Extensions/Specializations/Privatizations

No extensions, specializations, or privatizations are used in this implementation.

5 Configuration

DICOM applications, and other networking applications, must be configured by a BRIT Systems Field Service Engineer.

6 Support of Extended Character Sets

Extended Character Sets are not used or supported in this implementation.