WITT
BIOMEDICAL

DICOM 3.0
Conformance Statement

For

DCM v2.93

Revision 1.0
October 23, 2003

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Revision History

Revision	Date	Author	Reason for Change
1.0	10/23/03	CM	Preliminary version

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Disclaimer

Witt Biomedical certifies that the DCM software is in compliance with the ACR-NEMA DICOM 3.0 standard. However, due to the flexibility of DICOM, the user and/or company must perform integration testing to verify that DCM is compatible and meets the requirements of the integration with another system. The testing must include but not be limited to sending DICOM Datasets (images/video) for all type of images you wish to transfer. If the results of your testing are not conclusive please contact your representative to guide you through your testing process.

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1. Introduction

1.1 Scope

This document states the conformance statement of Witt Biomedical DICOM compliant software/hardware family to DICOM 3.0 standard. It applies to:

DCM
- o Verification & Store Module (Included)

Please note that each module has it's own capabilities, which are identified when considered appropriate.

1.2 Content Structure

The DICOM conformance statement consists of sections 2 through 7. It follows the content requirements of DICOM PS 3.2

1.3 Intended Audience

This Conformance Statement is intended for software engineers, system integrators, field engineers, and biomedical technicians. The audience is assumed to have a practical and working knowledge of DICOM standard and software interfaces in general.

1.4 Requirements and Use

Since the DICOM interface option and/or modules are not available if not purchased, System integrators who wish to implement a DICOM compliant hardware device and/or software from another manufacturer, need to contact the appropriate authority to activate or purchase the appropriate options/modules. In some circumstance hardware upgrade might be required to accommodate such options.

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1.5 Acronyms and abbreviations

The following acronyms and abbreviations are used in this Conformance Statement:

AE	Application Entity
DICOM	Digital Imaging and Communication in Medicine
FIFO	First In First Out
HL7	Health Level Seven
IP	Internet Protocol
JPEG	Joint Photographic Experts Group (compression format)
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
Q/R	Query and Retrieve

1.6 References

DICOM Digital Imaging and Communication in Medicine, NEMA PS 3.1-3.14, 1999

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2. Implementation Model Verification

In order for foreign applications (SCU) to verify if they can request a connection and establish one they must perform a verification request. DCM Image Storage service is responsible to respond to such request. If such request fails make sure that the foreign AE is configured on the DCM Image Store configuration.

3. Implementation Model

Each DICOM SCU and SCP is an Application Entity (AE).

3.1 Application Data Flow Diagram

3.1.1 Verification Application Entity
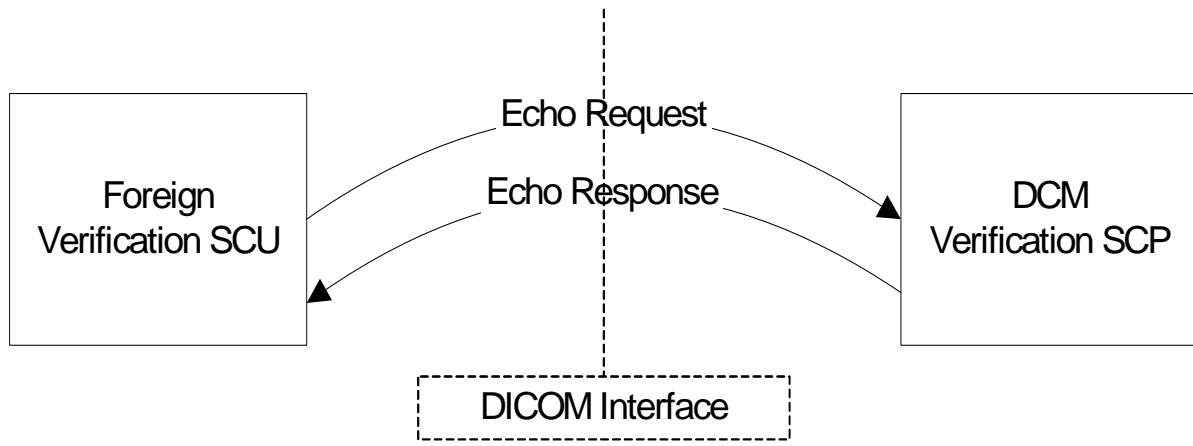
3.1.1.1 Presentation Context Table

Any of the presentation context found in the following reference table are accepted for the DICOM Store SCP to receive the verification request (C-ECHO).

Presentation Context Table						
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

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3.1.2 Image Storage Application Entity
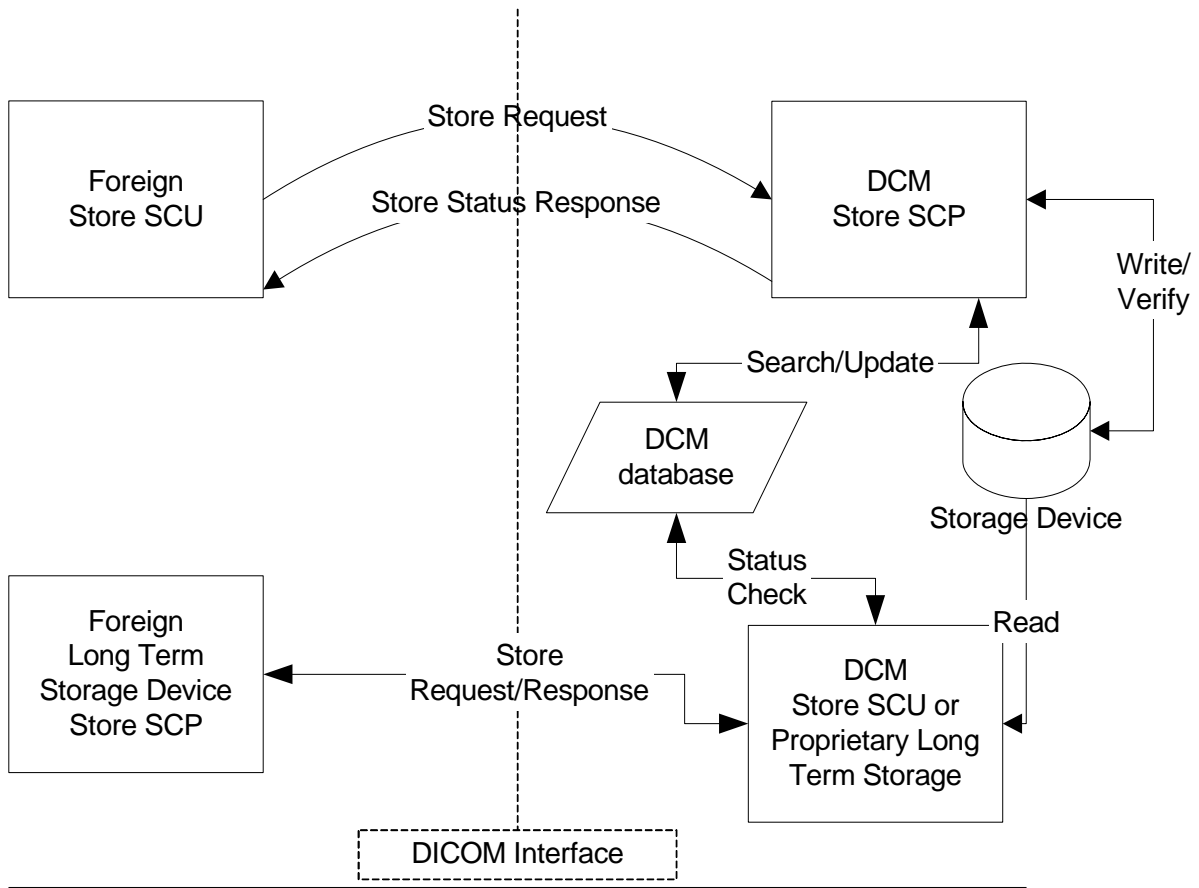
3.1.2.1 Presentation Context Table

Here is a list of image storage classes accepted by the Image Storage AE. Any of the presentation contexts in the following table are accepted for the DICOM Store SCP to receive images. The use can restrict accepted presentation context in the Store SCP configuration panel.

Presentation Context						
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation	
Name	UID	Name	UID			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	See Table below	See Table below	SCP	None	
CT Storage	1.2.840.10008.5.1.4.1.1.2					
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	See Table below	See Table below	SCP	None	
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	See Table below	See Table below	SCP	None	
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	See Table below	See Table below	SCP	None	
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	See Table below	See Table below	SCP	None	
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	See Table below	See Table below	SCP	None	
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	See Table below	See Table below	SCP	None	

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X-ray Angiographic Bi-plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	See Table below	See Table below	SCP	None
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	See Table below	See Table below	SCP	None
X-ray RadioFluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	See Table below	See Table below	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	See Table below	See Table below	SCP	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	See Table below	See Table below	SCP	None
PET Image Storage (DICOM 98)	1.2.840.10008.5.1.4.1.1.128	See Table below	See Table below	SCP	None
Digital Xray Pres Image Storage	1.2.840.10008.5.1.4.1.1.1.1	See Table below	See Table below	SCP	None
Digital Mammo Pres Image Storage	1.2.840.10008.5.1.4.1.1.1.2	See Table below	See Table below	SCP	None
Digital Intra Oral Pres Image Storage	1.2.840.10008.5.1.4.1.1.1.3	See Table below	See Table below	SCP	None
Visible Light Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	See Table below	See Table below	SCP	None
Visible Light Micro-Film Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	See Table below	See Table below	SCP	None
Visible Light Slide Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	See Table below	See Table below	SCP	None
Visible Light Photo Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	See Table below	See Table below	SCP	None

Each of the storage SOP classes listed above can be transferred using one of the following transfer syntaxes.

Note: If client initiate a multi-file send during a single association, all file must be of the same SOP & Transfer syntax.

Transfer Syntax Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Default Lossless JPEG Compressed	1.2.840.10008.1.2.4.70
RLE Compressed	1.2.840.10008.1.2.5
Others (Optional)	
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Extended (Process 3 & 5)	1.2.840.10008.1.2.4.52
JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8)	1.2.840.10008.1.2.4.53
JPEG Spectral Selection, Non-Hierarchical (Process 7 & 9)	1.2.840.10008.1.2.4.54
JPEG Full Progression, Non-Hierarchical (Process 10 & 12)	1.2.840.10008.1.2.4.55
JPEG Full Progression, Non-Hierarchical (Process 11 & 13)	1.2.840.10008.1.2.4.56
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical (Process 15)	1.2.840.10008.1.2.4.58
JPEG Extended, Hierarchical (Process 16 & 18)	1.2.840.10008.1.2.4.59
JPEG Extended, Hierarchical (Process 17 & 19)	1.2.840.10008.1.2.4.60
JPEG Spectral Selection, Hierarchical (Process 20 & 22)	1.2.840.10008.1.2.4.61
JPEG Spectral Selection, Hierarchical (Process 21 & 23)	1.2.840.10008.1.2.4.62
JPEG Full Progression, Hierarchical (Process 24 & 26)	1.2.840.10008.1.2.4.63
JPEG Full Progression, Hierarchical (Process 25 & 27)	1.2.840.10008.1.2.4.64
JPEG Lossless, Hierarchical (Process 28)	1.2.840.10008.1.2.4.65
JPEG Lossless, Hierarchical (Process 29)	1.2.840.10008.1.2.4.66

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3.2 Functional Definition of AE

3.2.1 Verification Application Entity

The Verification AE is a SCP module that permanently waits for a DICOM 3.0 verification request from a remote Verification AE. Upon connection it return a response to the remote Verification AE based on the WPS current configuration.

The response can be one of the following:
- Success (Remote AE Accepted)
- Rejected (Remote AE Rejected)

The response is based on an internal query of acceptable remote AE connections.

3.2.2 Image Storage Application Entity

The Image Storage AE uses DICOM 3.0 Storage service (SCP) to store single and multi-frame image/video. Supported image/video SOP CLASS are described in section 3.1.2.

DCM Image Storage service can accept a single connection.

DCM can accept all AE Titles SCU (in test mode) or accept a limited list of AE for security purposes.

DCM will accept and store the image "as-is" without modification of its type (RLE, JPEG…) or attributes.

Upon reception of a DICOM file (single or multi-frame), DCM will verify if the image was already received previously and process accordingly.

Each DICOM file will be placed on the WITT Network and kept on the server (including long term storage) ready to be used for review by WITT review stations or be queried by foreign review stations.

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3.3 Supported Protocol Stacks (parts 8, 9)

DCM network apparatus are all using DICOM upper layer protocol as defined in Parts 8 and 9 of DICOM standard.

Our system is using TCP/IP stack on all DICOM compliant devices including print. (Excluding physical media transfer on CD-R, DVD, MO)

3.4 TCP/IP Stack

DCM devices are all using TCP/IP stack via Microsoft Windows Winsock interface.

3.5 Physical Media Support

Witt Biomedical recommends using at least 100BASE-T (IEEE 802.3) network and network devices. Slower network, such as 10BASE T, would provide unacceptable user response times for almost all modality data sets.

4. Configuration

Every AE can configure the following parameters:
- Acceptable foreign SCU (IP Address and/or AE Title)
- Port number for SCU & SCP
- Number of simultaneous connection per service
- Proprietary Network Information

4.1 Verification AE

4.2 Image Storage AE

- Network directory structure (if storing on foreign server… (NFS, FTP of Microsoft Network))
- Acceptable SOP CLASS
- Acceptable Transfer Syntax for each SOP CLASS
- Long Term Storage Configuration

5. Support of Basic/Extended Character Sets

DCM supports the following character set: ISO-IR (100) Latin alphabet #1

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