DICOM 3.0
Conformance Statement

For

CALYSTO

Revision 1.1
August 11, 2004

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Revision History

Revision	Date	Author	Reason for Change
1.0	02/02/04	JC	Preliminary version
1.1	08/11/04	JC	Added Print Management SCU

Copyright Statement

Disclaimer

Witt Biomedical certifies that the CALYSTO 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 the Series 4 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.

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:

CALYSTO (Hereinafter S4):

- Query & Retrieve Module
- Worklist Module
- DICOM Print Module

Please note that each module has its 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 the 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 circumstances a hardware upgrade may be required to accommodate such options.

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

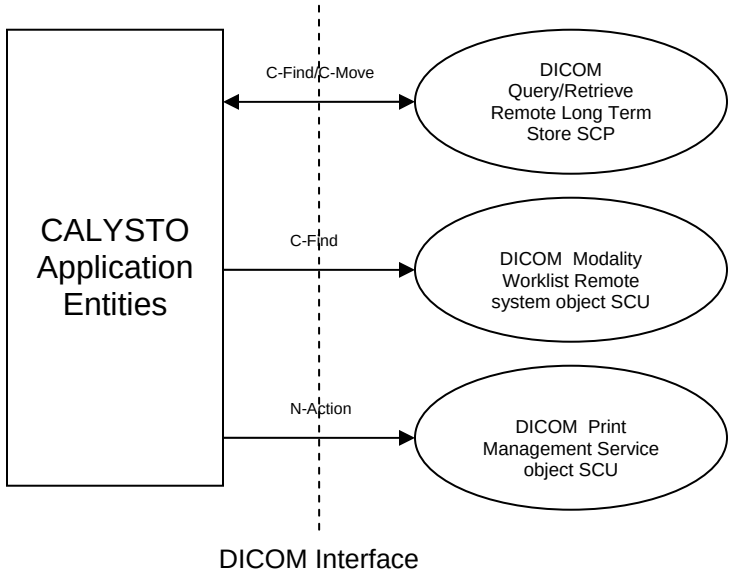
IP	Internet Protocol
JPEG	Joint Photographic Experts Group (compression format)
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
Q/R	Query and Retrieve
S4	CALYSTO

2. Implementation Model

CALYSTO consists of a set of communicating processes that deal with DICOM communication. There is a process that queries for patient/study data and retrieves images for a particular series. There is a process that queries for worklist data. There is also a process that prints DICOM images. The processes that implement CALYSTO DICOM network interface can be separated into three entities: Query/Retrieve SCU/SCP, Worklist SCU and Print Management SCU. The application entity titles attached to the application entities are configurable.

2.1 Application Data Flow Diagram

The Implementation Model for the CALYSTO Workstation DICOM network services is shown below.



2.2 Functional Definition of AE's

CALYSTO initiates a connection with another application at the presentation address configured for its Application Entity Title. S4 will attempt associations with Presentation Contexts for the following SOP Classes:

- Query/Retrieve Service Class
- Modality Worklist Service Class
- Print Management Service Class

2.2.1 Query/Retrieve Service Class

Query/Retrieve Service Class in S4 is implemented as an SCU. The Q/R SCU/SCP is activated whenever a user requests transmission of one or more objects from a remote SCP.

2.2.2 Modality Worklist Service Class

Modality Worklist Service Class in S4 is implemented as an SCU. The Modality Worklist SCU is activated whenever a user requests modality Worklist data from a remote SCP.

2.2.3 Print Management Service Class

Print Management Service Class in S4 is implemented as an SCU. The Print Management SCU is activated whenever a user requests to print DICOM image data from a remote SCP.

3. AE Specifications

3.1 Query/Retrieve SCU/SCP

This application entity provides standard conformance to the following DICOM SOP classes as an SCU:

SOP Class Name	**SOP Class UID**
Patient Root Query/Retrieve C-FIND Request	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve C-MOVE Request	1.2.840.10008.5.1.4.1.2.1.2

3.1.1 Association Establishment Policies

3.1.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16000 bytes.

3.1.1.2 Implementation Identifying Information

The implementation UID of this application is:

Implementation Class UID	1.2.840.1015.1.27.1.2

3.1.2 Association Initiation by Real-World Activity

3.1.2.1 Real-World Activity "Query SCU"

An instance of the Query SCU application entity is started in order to query for patient data for the purpose of retrieving images from a remote Storage SCP. The calling application entity name will always be configurable. The called application entity name must be configured together with the presentation address to be used in the configuration.

3.1.2.1.1 Associated Real-World Activity

The user enters patient or study level information in the application's query/retrieve dialog. The user then continues to query until the target is found. The user then selects retrieve images.

3.1.2.1.2 Proposed Presentation Contexts

CALYSTO will propose the following Transfer Syntaxes:

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
Explicit VR Big Endian	1.2.840.10008.1.2.2

3.1.2.1.3 Association Acceptance Policy

This application entity never accepts associations.

3.1.2.2 Real-World Activity "Retrieve SCP"

An instance of the Retrieve SCP application entity is started in order to retrieve images from a remote Storage SCP. The calling application entity is configurable. The application entity name must be configured together with the presentation address to be used in the configuration.

3.1.2.2.1 Association Real-World Activity

After the user queried for patient data, the user then selects to retrieve images.

3.1.2.2.2 Proposed Presentation Contexts

CALYSTO will propose the following Transfer Syntaxes and Abstract Syntaxes:

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 Lossy JPEG Compressed	1.2.840.10008.1.2.4.50
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

Abstract Syntax Name	**UID**
Media Storage Directory Storage	1.2.840.10008.1.3.10
Basic Study Content Notification Class	1.2.840.10008.1.9
Storage Commitment Push Model Class	1.2.840.10008.1.20.1
Storage Commitment Pull Model Class	1.2.840.10008.1.20.2
Detached Patient Management Class	1.2.840.10008.3.1.2.1.1
Detached Patient Management Meta Class	1.2.840.10008.3.1.2.1.4
Detached Visit Management Class	1.2.840.10008.3.1.2.2.1
Detached Study Management Class	1.2.840.10008.3.1.2.3.1
Study Component Management Class	1.2.840.10008.3.1.2.3.2
Modality Performed Procedure Step Class	1.2.840.10008.3.1.2.3.3
Modality Performed Procedure Step Retrieve Class	1.2.840.10008.3.1.2.3.4
Modality Performed Procedure Step Notification Class	1.2.840.10008.3.1.2.3.5
Detached Results Management Class	1.2.840.10008.3.1.2.5.1
Detached Results Management Meta Class	1.2.840.10008.3.1.2.5.4
Detached Study Management Meta Class	1.2.840.10008.3.1.2.5.5
Detached Interpretation Management Class	1.2.840.10008.3.1.2.6.1
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Computed Tomography Image Storage	1.2.840.10008.5.1.4.1.1.2
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Magnetic Resonance Image Storage	1.2.840.10008.5.1.4.1.1.4

Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radio Fluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone Positron Emission Tomography Curve Storage	1.2.840.10008.5.1.4.1.1.129
Radiotherapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1
Radiotherapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
Radiotherapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
Radiotherapy Beams Treatment Record Storage Class	1.2.840.10008.5.1.4.1.1.481.4
Radiotherapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
Radiotherapy Brachy Treatment Record Storage Class	1.2.840.10008.5.1.4.1.1.481.6
Radiotherapy Treatment Summary Record Storage Class	1.2.840.10008.5.1.4.1.1.481.7
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Visible Light Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1
Visible Light Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2
Visible Light Endoscopic Image Storage Class	1.2.840.10008.5.1.4.1.1.77.1.1
Visible Light Microscopic Image Storage Class	1.2.840.10008.5.1.4.1.1.77.1.2
Visible Light Slide-Coordinates Microscopic Image Storage Class	1.2.840.10008.5.1.4.1.1.77.1.3
Visible Light Photographic Image Storage Class	1.2.840.10008.5.1.4.1.1.77.1.4
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1

3.1.2.2.3 Presentation Context Acceptance Criteria

CALYSTO accepts the association of objects for temporary storage that match the user enter query criteria.

3.2 Modality Worklist SCU

This application entity provides standard conformance to the following DICOM SOP classes as an SCU:

SOP Class Name	SOP Class UID
Modality Worklist Info Model C-FIND Request	1.2.840.10008.5.1.4.31

3.2.1 Association Establishment Policies

3.2.1.1 General

The DICOM standard application context name, which is always proposed, is:

Application context name	1.2.840.10008.3.1.1.1

The maximum PDU length is 16000 bytes.

3.2.1.2 Implementation Identifying Information

The implementation UID of this application is:

Implementation Class UID	1.2.840.1015.1.27.1.2

3.2.2 Association Initiation by Real-World Activity

3.2.2.1 Real-World Activity "Modality Worklist"

An instance of the Modality Worklist SCU application entity is started in order to retrieve patient data from a remote Modality Worklist SCP for the purpose of admitting a patient. The calling application entity name is configurable. The called application entity name must be configured together with the presentation address to be used in the configuration.

3.2.2.1.1 Association Real-World Activity

The user enters a series of information in the application's DICOM Worklist Query dialog. The user then selects the target and clicks "Confirm Selection."

3.2.2.2 Proposed Presentation Contexts

CALYSTO supports the following transfer syntaxes:

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
Explicit VR Big Endian	1.2.840.10008.1.2.2

3.2.3 Association Acceptance Policy

This application entity never accepts associations.

3.3 Print Management SCU

This application entity provides standard conformance to the following DICOM SOP classes as an SCU.

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP class	1.2.840.10008.5.1.1.18
Printer Class	1.2.840.10008.5.1.1.16
Basic Annotation Box Class	1.2.840.10008.5.1.1.15

3.3.1 Association Establishment Policies

3.3.1.1 General

The DICOM standard application context name, which is always proposed is:

Application context name	1.2.840.10008.3.1.1.1

3.3.1.2 Implementation Identifying Information

The implementation UID of this application is:

Implementation Class UID	1.2.840.1015.1.27.1.2

3.3.2 Association initiation by Real-World Activity

3.3.2.1 Real-World Activity "Print Management Service"

An instance of the Print Management SCU application entity is started in order to print DICOM images from a remote Print Management SCP. The calling application entity name is configurable. The called application entity name must be configured together with the presentation address to be used in the configuration.

3.3.2.1.1 Association Real-World Activity

The user selects the image(s) to be printed. Then, the user selects which Print Management SCP to printer. The user finally selects 'Print' to print the image(s).

3.3.2.2 Proposed Presentation Contexts

CALYSTO supports the following transfer syntaxes:

Transfer Syntax Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2

3.3.3 Association Acceptance Policy

This application entity never accepts associations.

4. Communication Profiles

4.1 Supported Protocol Stacks (Parts 8, 9)

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

Our system is using TCP/IP stack on all DICOM compliant devices.

4.2 TCP/IP Stack

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

4.3 Physical Media Support

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

5. Configuration

CALYSTO AE's can configure the following parameters:

- Acceptable foreign SCP (IP Address and AE Title)
- Port number for SCP

6. Support of Basic/Extended Character Sets

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