

Client OutlookTM Inc.

DICOM Conformance Statement

eUnity 1.1



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1 CONFORMANCE STATEMENT OVERVIEW

The eUnity enterprise system is comprised of a storage device and a diagnostic quality, zero install, web-based image viewer. The eUnity enterprise system is a single PACS application entity (AE).

The eUnity system will:

- store DICOM objects sent to it by service class users;
- request and retrieve images – as needed – from service class providers;
- and display images to a user.

eUnity conforms to the DICOM 3.0 2009 standard and provides Standard Conformance for the SOP classes listed in Table 1 - Network Services Supported.

Table 1 - Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Verification			
Verification	Yes	Yes	N/A
Transfer			
Computed Radiography Image Storage	Yes	Yes	Yes
Digital X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital X-Ray Image Storage – For Processing	Yes	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	Yes	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	Yes	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	Yes	Yes	No
CT Image Storage	Yes	Yes	Yes
Enhanced CT Image Storage	Yes	Yes	No
Ultrasound Multi-frame Image Storage	Yes	Yes	Yes
Ultrasound Multi-frame Image Storage (Retired)	Yes	Yes	Yes
MR Image Storage	Yes	Yes	Yes

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SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Enhanced MR Image Storage	Yes	Yes	No
MR Spectroscopy Storage	Yes	Yes	No
Enhanced MR Color Image Storage SOP Class	No	No	No
Ultrasound Image Storage	Yes	Yes	Yes
Ultrasound Image Storage (Retired)	Yes	Yes	Yes
Enhanced US Volume Storage	No	No	No
Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes	Yes
12-lead ECG Waveform Storage	Yes	Yes	No
General ECG Waveform Storage	Yes	Yes	No
Ambulatory ECG Waveform Storage	Yes	Yes	No
Hemodynamic Waveform Storage	Yes	Yes	No
Cardiac Electrophysiology Waveform Storage	Yes	Yes	No
Basic Voice Audio Waveform Storage	Yes	Yes	No
General Audio Waveform Storage	No	No	No
Arterial Pulse Waveform Storage	No	No	No
Respiratory Waveform Storage	No	No	No
Grayscale Softcopy Presentation State Storage SOP Class	Yes	Yes	No
Color Softcopy Presentation State Storage SOP Class	Yes	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	Yes	Yes	No
Blending Softcopy Presentation State Storage SOP Class	Yes	Yes	No
XA/XRF Grayscale Softcopy Presentation State Storage	No	No	No
X-Ray Angiographic Image Storage	Yes	Yes	Yes

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SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Enhanced XA Image Storage	Yes	Yes	No
X-Ray Radiofluoroscopic Image Storage	Yes	Yes	Yes
X-Ray Angiographic Bi-plane Image Storage (Retired)	Yes	Yes	Yes
Enhanced XRF Image Storage	Yes	Yes	Yes
X-Ray 3D Angiographic Image Storage	No	No	No
X-Ray 3D Craniofacial Image Storage	No	No	No
Breast Tomosynthesis Image Storage	No	No	No
Nuclear Medicine Image Storage (Retired)	Yes	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes	Yes
Raw Data Storage	Yes	Yes	No
Spatial Registration Storage	Yes	Yes	No
Spatial Fiducials Storage	Yes	Yes	No
Deformable Spatial Registration SOP Class	Yes	Yes	No
Segmentation SOP Class	Yes	Yes	No
Surface Segmentation Storage	No	No	No
Real World Value Mapping Storage	Yes	Yes	No
VL Endoscopic Image Storage	Yes	Yes	Yes
VL Image Storage (Retired)	Yes	Yes	Yes
VL Multiframe Image Storage (Retired)	Yes	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes	No
VL Microscopic Image Storage	Yes	Yes	Yes
Video Microscopic Image Storage	Yes	Yes	No
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes	No
VL Photographic Image Storage	Yes	Yes	Yes
Video Photographic Image Storage	Yes	Yes	No
Ophthalmic Photography 8 Bit Image Storage	Yes	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes	Yes
Stereometric Relationship Storage	Yes	Yes	No
Ophthalmic Tomography Image Storage	No	No	No
Lensometry Measurements Storage	No	No	No
Autorefractometry Measurements Storage	No	No	No

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SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Keratometry Measurements Storage	No	No	No
Subjective Refraction Measurements Storage	No	No	No
Visual Acuity Measurements Storage	No	No	No
Spectacle Prescription Report Storage	No	No	No
Macular Grid Thickness and Volume Report Storage SOP Class	No	No	No
Basic Text SR	Yes	Yes	No
Enhanced SR	Yes	Yes	No
Comprehensive SR	Yes	Yes	No
Procedure Log Storage	Yes	Yes	No
Mammography CAD SR	Yes	Yes	No
Key Object Selection Document	Yes	Yes	No
Chest CAD SR	Yes	Yes	No
X-Ray Radiation Dose SR	Yes	Yes	No
Colon CAD SR	No	No	No
Encapsulated PDF Storage SOP Class	Yes	Yes	No
Encapsulated CDA Storage SOP Class	Yes	Yes	No
Positron Emission Tomography Image Storage	Yes	Yes	Yes
Enhanced PET Image Storage	No	No	No
Basic Structured Display Storage	No	No	No
RT Image Storage	Yes	Yes	No
RT Dose Storage	Yes	Yes	No
RT Structure Set Storage	Yes	Yes	No
RT Beams Treatment Record Storage	Yes	Yes	No
RT Plan Storage	Yes	Yes	No
RT Brachy Treatment Record Storage	Yes	Yes	No
RT Treatment Summary Record Storage	Yes	Yes	No
Hanging Protocol Storage	No	No	No
Color Palette Storage	No	No	No
Standalone Curve Storage (Retired)	Yes	Yes	No
Standalone Modality LUT Storage (Retired)	Yes	Yes	No
Standalone Overlay Storage (Retired)	Yes	Yes	No

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SOP Classes	User of Service (SCU)	Provider of Service (SCP)	Display
Standalone PET Curve Storage (Retired)	Yes	Yes	No
Standalone VOI LUT Storage	Yes	Yes	No
Hardcopy Color Image Storage (Retired)	Yes	Yes	No
Hardcopy Greyscale Image Storage (Retired)	Yes	Yes	No
Query/Retrieve			
Patient Root Query/Retrieve Information Model FIND	Yes	No	N/A
Patient Root Query/Retrieve Information Model – MOVE	Yes	No	N/A
Study Root Query/Retrieve Information Model – FIND	Yes	No	N/A
Study Root Query/Retrieve Information Model – MOVE	Yes	No	N/A
Patient-Study Root Query/Retrieve Information Model – FIND	Yes	No	N/A
Patient-Study Root Query/Retrieve Information Model – MOVE	Yes	No	N/A

2 INTRODUCTION

2.1 REVISION HISTORY

Revision Number	Date	Reason for Change
1.0	January 19, 2011	Initial DICOM Conformance Statement

2.2 AUDIENCE

This document is written for individuals that need to understand how eUnity 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 this 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.

2.3 REMARKS

The scope of this DICOM Conformance Statement is to facilitate integration between eUnity 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.

2.4 ABBREVIATIONS

The following abbreviations are used within this DICOM Conformance Statement.

AE	Application Entity	MG	Mammography (X-ray)
AET	Application Entity Title	MR	Magnetic Resonance Imaging
CAD	Computer Aided Detection	NM	Nuclear Medicine
CR	Computed Radiography	OP	Ophthalmic Photography
CT	Computed Tomography	PACS	Picture Archiving and Communication System
DICOM	Digital Imaging and Communications in Medicine	PET	Positron Emission Tomography
DX	Digital X-ray	RF	Radiofluoroscopy
GSPS	Grayscale Softcopy Presentation State	RIS	Radiology Information System.
HIS	Hospital Information System	RT	Radiotherapy
HL7	Health Level 7 Standard	SC	Secondary Capture
IHE	Integrating the Healthcare Enterprise	SCP	Service Class Provider
IOD	Information Object Definition	SCU	Service Class User
ISO	International Organization for Standards	SOP	Service-Object Pair
IO	Intra-oral X-ray	SR	Structured Reporting
JPEG	Joint Photographic Experts Group	TCP/IP	Transmission Control Protocol/Internet Protocol
LUT	Look-up Table	US	Ultrasound
MPEG	Moving Picture Experts Group	VL	Visible Light
		VR	Value Representation
		XA	X-ray Angiography

2.5 REFERENCES

NEMA PS3	Digital Imaging and Communications in Medicine (DICOM) Standard (http://medical.nema.org/)
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3 NETWORKING

3.1 IMPLEMENTATION MODEL

3.1.1 Application Data Flow

The Application Data flow diagram depicts associations and real world activities performed by the eUnity Application Entity.

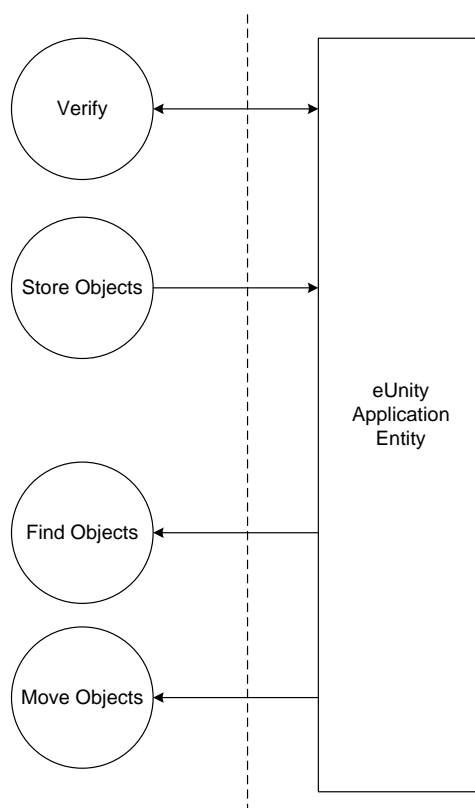


Figure 1: Functional Overview - Application Data Flow

- Verify activity will initiate and respond to associations that request verification of communications.
- Store Objects activity will accept associations from a remote AE to store DICOM objects.
- Find Objects activity will initiate an association to query a remote AE.
- Move Objects activity will initiate an association to retrieval DICOM objects from a remote AE.

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3.1.2 Functional Definition of Application Entities

This section provides functional definitions for all local Application Entity in the eUnity system.

3.1.2.1 Verify

eUnity will respond to a DICOM C-Echo requests from a remote AE. eUnity can also make outbound C-Echo requests to a remote AE.

3.1.2.2 Store Objects

eUnity will respond to DICOM C-Store requests from a remote AE. DICOM objects sent from a remote AE will be stored on the file system; some additional DICOM attributes will be stored in the database.

3.2 AE SPECIFICATIONS:

This section outlines the specifications for the Application Entities in the eUnity system.

3.2.1.1 SOP Classes

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

Table 2 - SOP Classes for eUnity AE

SOP Classes	SOP Class UID	SCU	SCP	Display
Verification				
Verification	1.2.840.10008.1.1	Yes	Yes	N/A
Transfer				
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes	Yes
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes	Yes
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes	No
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes	Yes
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes	No
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes	Yes
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes	No

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SOP Classes	SOP Class UID	SCU	SCP	Display
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes	No
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	Yes	No
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes	No
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	Yes	Yes	No
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	Yes	Yes	No

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SOP Classes	SOP Class UID	SCU	SCP	Display
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4	Yes	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes	Yes
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	Yes	Yes
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	Yes	No
Deformable Spatial Registration SOP Class	1.2.840.10008.5.1.4.1.1.66.3	Yes	Yes	No
Segmentation SOP Class	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	Yes	No
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes	Yes
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	Yes	Yes
VL Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	Yes	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes	No
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes	Yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	Yes	No
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes	No
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes	Yes
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes	Yes

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SOP Classes	SOP Class UID	SCU	SCP	Display
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	Yes	No
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes	No
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes	No
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes	No
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	Yes	Yes	No
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes	Yes	No
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes	No
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes	No
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes	No
Encapsulated PDF Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes	No
Encapsulated CDA Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.2	Yes	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes	No
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	Yes	No
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	Yes	Yes	No
Standalone Modality LUT Storage (Retired)	1.2.840.10008.5.1.4.1.1.10	Yes	Yes	No
Standalone Overlay Storage (Retired)	1.2.840.10008.5.1.4.1.1.8	Yes	Yes	No
Standalone PET Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.129	Yes	Yes	No
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Yes	Yes	No
Hardcopy Color Image Storage (Retired)	1.2.840.10008.5.1.1.30	Yes	Yes	No

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SOP Classes	SOP Class UID	SCU	SCP	Display
Hardcopy Greyscale Image Storage (Retired)	1.2.840.10008.5.1.1.29	Yes	Yes	No
Query/Retrieve				
Patient Root Query/Retrieve Information Model FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes	N/A
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes	N/A
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes	N/A
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes	N/A
Patient-Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.3	No	Yes	N/A
Patient-Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	No	Yes	N/A

3.2.1.2 Association Policies

3.2.1.2.1 General

The eUnity AE will accept requests for Verification and for Storage. The following Application Context Name will be proposed and accepted by the eUnity AE.

Table 3 - DICOM Application Context

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

3.2.1.2.2 Number of Associations.

The eUnity AE can support multiple simultaneous associations requested by peer AEs. Default is 10. This value can be configured through the attribute "MaxPoolSize" in the Application Server configuration file (i.e. *jboss-service.xml* for JBoss application server).

Table 4 - Max. Number of Simultaneous Associations

Maximum number of simultaneous associations	10 (Configurable)
--	-------------------

3.2.1.2.3 Asynchronous Nature

The eUnity AE does not support asynchronous communication. Multiple outstanding transactions are not supported. It allows up to one invoked and one performed operation on an Association (it is synchronous).

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Table 5 - Max. Number of Asynchronous Transactions

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)
--	----------------------

3.2.1.2.4 Implementation Identifying Information

The implementation information identifying this Application Entity is:

Table 6 - DICOM Implementation Class and Version for eUnity AE

Implementation Class UID	1.2.40.2.13.1.1
Implementation Version Name	dcm4che-1.4.28

3.2.1.3 Association Initiation Policy

The eUnity AE initiates associations for the following real-world activities:

- Verify Communication
- Find Objects
- Move Objects

3.2.1.3.1 Real World Activity – Verify Communication (SCU)**3.2.1.3.1.1 Description and Sequencing of Activities**

Send a request to a remote AE to verify the configuration of the DICOM connection.

3.2.1.3.1.2 Proposed Presentation Contexts

For Verification the eUnity AE proposes the following Presentation Contexts:

Table 7 - Presentation Contexts Proposed by eUnity AE for Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.1.3.1.3 SOP Specific Conformance for Verification

The eUnity AE provides standard conformance to the DICOM Verification Service Class as an SCU.

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3.2.1.3.2 Real World Activity – Find Object (SCU)

3.2.1.3.2.1 Description and Sequencing of Activities

The eUnity AE will initiate a query to a remote AE to retrieve DICOM information about a single study or a group of studies. This information usually comes before a request to retrieve the DICOM objects for display (see 3.2.1.3.2 Real World Activity – Move Objects (SCU)).

3.2.1.3.2.2 Proposed Presentation Contexts

The eUnity PACS will query with the following presentation contexts:

Table 8 - Presentation Contexts Proposed by eUnity AE for Find

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Relational-queries
Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Relational-queries
Patient/Study Only Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Relational-queries

3.2.1.3.1.3 SOP Specific Conformance for Find

The eUnity PACS AE conforms to the DICOM Query/Retrieve service class as an SCU.

The eUnity PACS AE supports relational-queries extended SCU behaviour for the Patient Root Query, Study Root Query and the Patient/Study Only Query/Retrieve.

3.2.1.3.2 Real World Activity – Move Objects (SCU)

3.2.1.3.2.1 Description and Sequencing of Activities

The eUnity AE will initiate a retrieve operation to a remote AE to retrieve DICOM information in order to display a study. These requests usually follow after a query request for study metadata. (see 3.2.1.3.2 Real World Activity – Find Object (SCU)).

3.2.1.3.2.2 Proposed Presentation Contexts

The eUnity PACS will move with the following presentation contexts:

Table 9 - Presentation Contexts Proposed by eUnity AE for Move

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Patient/Study Only Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

3.2.1.3.1.3 SOP Specific Conformance for Move

The eUnity PACS AE conforms to the DICOM Query/Retrieve service class as an SCU.

3.2.1.4 Association Acceptance Policy

The eUnity PACS AE initiates associations for the following real-world activities:

- Verify Communication
- Store Objects

3.2.1.4.1 Real World Activity – Verify Communication (SCP)

3.2.1.4.1.1 Description and sequencing of Activities

The eUnity AE will respond to Verification requests to provide an SCU with the ability to determine if the eUnity is receiving DICOM requests.

3.2.1.4.1.2 Accepted Presentation Contexts

The following presentation contexts are accepted for verification:

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Table 10 - Presentation Contexts Accepted by eUnity AE for Verification

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

3.2.1.4.1.3 SOP Specific Conformance for SOP Class

The status code for C-Echo are described in the following table:

Table 11 - Verification Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The C-Echo request is accepted.

3.2.1.4.2 Real World Activity – Store Objects Communication (SCP)**3.2.1.4.2.1 Description and sequencing of Activities**

The eUnity AE will store image that are sent to it from a remote AE. Images are stored in a local cache file system and are not guaranteed to be stored for any amount of time. Cached images are cleaned up when space is required to store new images.

3.2.1.4.2.2 Accepted Presentation Contexts

The following presentation contexts are accepted for storage:

Table 12 - Presentation Contexts Accepted by eUnity AE for Storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	<i>Transfer syntaxes for Image Storage.</i>		SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	<i>Transfer syntaxes for Image Storage.</i>		SCP	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	<i>Transfer syntaxes for Image Storage.</i>		SCP	None

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Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	<i>Transfer syntaxes for Image Storage.</i>	SCP	None

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Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Pseudo-Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
X-Ray Angiographic Bi-plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None

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Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Deformable Spatial Registration SOP Class	1.2.840.10008.5.1.4.1.1.66.3	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Segmentation SOP Class	1.2.840.10008.5.1.4.1.1.66.4	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
VL Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	<i>Transfer syntaxes for Image Storage.</i>	SCP	None

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Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Encapsulated PDF Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.1	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Encapsulated CDA Storage SOP Class	1.2.840.10008.5.1.4.1.1.104.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Standalone Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.9	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None

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Standalone Modality LUT Storage (Retired)	1.2.840.10008.5.1.4.1.1.10	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Standalone Overlay Storage (Retired)	1.2.840.10008.5.1.4.1.1.8	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Standalone PET Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.129	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	<i>Transfer syntaxes for Non-Image Storage.</i>	SCP	None
Hardcopy Color Image Storage (Retired)	1.2.840.10008.5.1.1.30	<i>Transfer syntaxes for Image Storage.</i>	SCP	None
Hardcopy Greyscale Image Storage (Retired)	1.2.840.10008.5.1.1.29	<i>Transfer syntaxes for Image Storage.</i>	SCP	None

Table 13 - Accepted Transfer Syntaxes for Image Storage

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
JPEG Baseline	1.2.840.10008.1.2.4.50
JPEG Extended	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
RLE Lossless	1.2.840.10008.1.2.5

Table 14 - Accepted Transfer Syntaxes for Non-Image Storage

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1

3.2.1.4.2.3 SOP Specific Conformance for SOP Class

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The associated activity with the storage service is the storage of medical DICOM data received over the network on a designated storage repository. The eUnity AE will return a failure status if it is unable to store the received instance(s).

The eUnity 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 eUnity AE is configured to retain the original DICOM data in DICOM Part 10 compliant file format. The eUnity 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 eUnity 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.

If the received instance is a duplicate of a previously received instance, the old file and database information will not be overwritten with the new one.

Table 15 - Storage Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system repository.
Error	Processing Failure	0110	This status is returned due to internal errors such as a processing failure response from the internal database or a filesystem operation. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log.
Warning	Coercion of Data Elements	B000	This status is returned if one or more Attribute values were coerced/modified on reception. Image transmission is considered successful. The appropriate SUCCESS Status will be sent in the C-STORE Response. Warning indication message is output to the Service Log.
Warning	Data Set does not match SOP class	B007	This status is returned if the C-STORE Request specifies Attributes that are not specific as part of the Storage SOP class. Image transmission is considered successful. The appropriate SUCCESS Status will be sent in the C-STORE Response. Warning indication message is output to the Service Log.

3.3 NETWORK INTERFACES

eUnity provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the DICOM Standard. The eUnity system inherits its TCP/IP stack from the computer system upon which it executes.

3.3.1 Physical Network Interface

eUnity is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Java Runtime Environment.

3.4 CONFIGURATION

3.4.1 AE Title/Presentation Address Mapping

3.4.1.1 Local AE Titles.

The local AE title mapping and network ports are configured through administration web interface. By default the AE activities are configured as follows:

Table 16 - Default AE Service Configuration

Application Entity	Default AE Title	Default TCP/IP Port
Verification	EUNITY	11112
Store	EUNITY	11112

3.4.1.2 Remote AE Title/Presentation Address Mapping

Configuration of remote host names and port numbers can be done through the administration web interface.

In the default configuration, Association Requests with any Calling AET will be accepted.

Find and Move requests will only be made to known and properly configured AE systems.

3.4.2 Parameters

The following table shows the eUnity configuration parameters relevant to DICOM communication.

Table 17 - Configuration Parameters

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
Listening Port	Yes	11112
Maximum number of simultaneous Associations	Yes	10
Time-out waiting for acceptance or rejection Response	Yes	5 seconds

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Parameter	Configurable (Yes/No)	Default Value
General Parameters		
to an Association Open Request. (Application Level timeout)		
General DIMSE level time-out values	Yes	60 seconds
Maximum PDU size the AE can receive	Yes	16532
Maximum PDU size the AE can send	Yes	65535
Pack Command and Data PDV's in one PDU	Yes	false
Storage AE		
Accepted Called AETs	Yes	EUNITY
Accepted Calling AETs	Yes	any
List of DICOM AETs that identify the location from which composite object instance(s) received by this Storage Server may be retrieved on the network.	Yes	NONE
Accept Missing Patient ID	Yes	False
Accept Missing Patient Name	Yes	False

4 MEDIA INTERCHANGE

eUnity does not support Media Storage.

5 SUPPORT OF CHARACTER SETS

eUnity supports ISO_IR 100 (ISO 8859-1 Latin 1) as an extended character set.

6 SECURITY

6.1 SECURITY PROFILES

eUnity does not implement any DICOM security profiles from PS 3.15.

6.2 ASSOCIATION LEVEL SECURITY

eUnity can be configured to accept Association Requests from a limited list of Calling AE



Titles. In the default configuration, Association requests with any Calling AET and any Called AET will be accepted. However, if the Called AET is not correspondent to any of the actual Storage Server AETs, only acceptance of the Presentation Context for Verification SOP Class will be returned in the Association Acceptance Response (A-ASSOCIATE AC).

6.3 APPLICATION LEVEL SECURITY

The eUnity system requires user authentication in order for a user to access the administration console and viewing functionality.

7 ANNEXES

7.1 IOD CONTENTS

7.1.1 Created SOP Instance(s)

eUnity does not create SOP instances.

7.1.2 Usage of Attributes from received IOD's

eUnity does not require an DICOM attributes other than those specified as mandatory by the DICOM Standard.

7.2 DATA DICTIONARY OF PRIVATE ATTRIBUTES

eUnity has no private attributes.