



DICOM Conformance Statement

Vitrexa Connection 7.4

November 5, 2018

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Overview

Vitre Connection is a self-contained networked information system used for receiving, archiving and displaying of diagnostic medical images. The system conforms to the DICOM 3.0 standard to allow the sharing of medical information with other digital imaging systems.

NETWORK SERVICES

| DICOM SOP Class Name | User of Service (SCU) | Provider of Service (SCP) | Display |
|--|-----------------------|---------------------------|---------|
| <i>Transfer</i> | | | |
| 12-lead ECG Waveform Storage | Yes | Yes | No |
| Acquisition Context SR Storage | Yes | Yes | No |
| Advanced Blending Presentation State Storage | Yes | Yes | No |
| Ambulatory ECG Waveform Storage | Yes | Yes | No |
| Arterial Pulse Waveform Storage | Yes | Yes | No |
| Autorefracton Measurements Storage | Yes | Yes | No |
| Basic Structured Display Storage | Yes | Yes | No |
| Basic Text SR | Yes | Yes | No |
| Basic Voice Audio Waveform Storage | Yes | Yes | No |
| Blending Softcopy Presentation State Storage | Yes | Yes | No |
| Breast Tomosynthesis Image Storage | Yes | Yes | No |
| Breast Projection X-Ray Image Storage – For Presentation | Yes | Yes | No |
| Breast Projection X-Ray Image Storage – For Processing | Yes | Yes | No |
| Cardiac Electrophysiology Waveform Storage | Yes | Yes | No |
| Chest CAD SR | Yes | Yes | No |
| Colon CAD SR | Yes | Yes | No |
| Color Softcopy Presentation State Storage | Yes | Yes | No |
| Comeal Topography Map Storage | Yes | Yes | No |
| Compositing Planar MPR Volumetric Presentation State Storage | Yes | Yes | No |
| Comprehensive SR | Yes | Yes | No |
| Comprehensive 3D SR | Yes | Yes | No |
| Computed Radiography Image Storage | Yes | Yes | No |

| | | | |
|--|-----|-----|----|
| Content Assessment Results Storage | Yes | Yes | No |
| CT Image Storage | Yes | Yes | No |
| CT Performed Procedure Protocol Storage | Yes | Yes | No |
| Deformable Spatial Registration Storage | Yes | Yes | No |
| Digital Intra-oral X-Ray Image Storage - For Presentation | Yes | Yes | No |
| Digital Intra-oral X-Ray Image Storage - For Processing | Yes | Yes | No |
| Digital Mammography X-Ray Image Storage - For Presentation | Yes | Yes | No |
| Digital Mammography X-Ray Image Storage - For Processing | Yes | Yes | No |
| Digital X-Ray Image Storage - For Presentation | Yes | Yes | No |
| Digital X-Ray Image Storage - For Processing | Yes | Yes | No |
| Encapsulated CDA Storage | Yes | Yes | No |
| Encapsulated PDF Storage | Yes | Yes | No |
| Enhanced CT Image Storage | Yes | Yes | No |
| Enhanced MR Color Image Storage | Yes | Yes | No |
| Enhanced MR Image Storage | Yes | Yes | No |
| Enhanced PET Image Storage | Yes | Yes | No |
| Enhanced SR | Yes | Yes | No |
| Enhanced US Volume Storage | Yes | Yes | No |
| Enhanced XA Image Storage | Yes | Yes | No |
| Enhanced XRF Image Storage | Yes | Yes | No |
| Extensible SR Storage | Yes | Yes | No |
| General Audio Waveform Storage | Yes | Yes | No |
| General ECG Waveform Storage | Yes | Yes | No |
| Grayscale Softcopy Presentation State Storage | Yes | Yes | No |
| Grayscale Planer MPR Volumetric Presentation State Storage | Yes | Yes | No |
| Hanging Protocol Storage | Yes | Yes | No |
| <i>Hardcopy Color Image Storage (Retired)</i> | Yes | Yes | No |
| <i>Hardcopy Grayscale Image Storage (Retired)</i> | Yes | Yes | No |
| Hemodynamic Waveform Storage | Yes | Yes | No |
| Implantation Plan SR Document Storage | Yes | Yes | No |

| | | | |
|---|-----|-----|----|
| Intraocular Lens Calculation Storage | Yes | Yes | No |
| Intravascular Optical Coherence Tomography Image Storage – For Presentation | Yes | Yes | No |
| Intravascular Optical Coherence Tomography Image Storage – For Processing | Yes | Yes | No |
| Key Object Selection | Yes | Yes | No |
| Keratometry Measurements Storage | Yes | Yes | No |
| Legacy Converted Enhanced CT Image Storage | Yes | Yes | No |
| Legacy Converted Enhanced MR Image Storage | Yes | Yes | No |
| Legacy Converted Enhanced PET Image Storage | Yes | Yes | No |
| Lensometry Measurements Storage | Yes | Yes | No |
| Macular Grid Thickness and Volume Report | Yes | Yes | No |
| Mammography CAD SR | Yes | Yes | No |
| MR Image Storage | Yes | Yes | No |
| MR Spectroscopy Storage | Yes | Yes | No |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | Yes | Yes | No |
| Multi-frame Grayscale Word Secondary Capture Image Storage | Yes | Yes | No |
| Multi-frame Single Bit Secondary Capture Image Storage | Yes | Yes | No |
| Multi-frame True Color Secondary Capture Image Storage | Yes | Yes | No |
| Multiple Volume Rendering Volumetric Presentation State Storage | Yes | Yes | No |
| Nuclear Medicine Image Storage | Yes | Yes | No |
| <i>Nuclear Medicine Image Storage (Retired)</i> | Yes | Yes | No |
| Ophthalmic Axial Measurements Storage | Yes | Yes | No |
| Ophthalmic Optimal Coherence Tomography En Face Image Storage | Yes | Yes | No |
| Ophthalmic Optimal Coherence Tomography B-scan Volume Analysis Storage | Yes | Yes | No |
| Ophthalmic Photography 16 Bit Image Storage | Yes | Yes | No |
| Ophthalmic Photography 8 Bit Image Storage | Yes | Yes | No |
| Ophthalmic Thickness Map Storage | Yes | Yes | No |
| Ophthalmic Tomography Image Storage | Yes | Yes | No |

| | | | |
|--|-----|-----|----|
| Ophthalmic Visual Field Static Perimetry Measurements Storage | Yes | Yes | No |
| Parametric Image Storage | Yes | Yes | No |
| Parametric Map Storage | Yes | Yes | No |
| Patient Radiation Dose SR Storage | Yes | Yes | No |
| Positron Emission Tomography Image Storage | Yes | Yes | No |
| Procedure Log | Yes | Yes | No |
| Pseudo-Color Softcopy Presentation State Storage | Yes | Yes | No |
| Radiopharmaceutical Radiation Dose SR | Yes | Yes | No |
| Raw Data Storage | Yes | Yes | No |
| Real World Value Mapping Storage | Yes | Yes | No |
| Respiratory Waveform Storage | Yes | Yes | No |
| RT Beams Delivery Instruction Storage | Yes | Yes | No |
| RT Beams Treatment Record Storage | Yes | Yes | No |
| RT Brachy Application Setup Delivery Instruction Storage | Yes | Yes | No |
| RT Brachy Treatment Record Storage | Yes | Yes | No |
| RT Dose Storage | Yes | Yes | No |
| RT Image Storage | Yes | Yes | No |
| RT Ion Beams Treatment Record Storage | Yes | Yes | No |
| RT Ion Plan Storage | Yes | Yes | No |
| RT Plan Storage | Yes | Yes | No |
| RT Structure Set Storage | Yes | Yes | No |
| RT Treatment Summary Record Storage | Yes | Yes | No |
| Secondary Capture Image Storage | Yes | Yes | No |
| Segmentation Storage | Yes | Yes | No |
| Segmented Volume Rendering Volumetric Presentation State Storage | Yes | Yes | No |
| Simplified Adult Echo SR Storage | Yes | Yes | No |
| Spatial Fiducials Storage | Yes | Yes | No |
| Spatial Registration Storage | Yes | Yes | No |
| Spectacle Prescription Report Storage | Yes | Yes | No |

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|--|-----|-----|----|
| Stereometric Relationship Storage | Yes | Yes | No |
| Standalone Overlay Storage (Retired) | Yes | Yes | No |
| Standalone Curve Storage (Retired) | Yes | Yes | No |
| Standalone Modality LUT Storage (Retired) | Yes | Yes | No |
| Standalone VOI LUT Storage (Retired) | Yes | Yes | No |
| Standalone PET Curve Storage (Retired) | Yes | Yes | No |
| Subjective Refraction Measurements Storage | Yes | Yes | No |
| Surface Scan Mesh Storage | Yes | Yes | No |
| Surface Scan Point Cloud Storage | Yes | Yes | No |
| Surface Segmentation Storage | Yes | Yes | No |
| Tractography Results Storage | Yes | Yes | No |
| Ultrasound Image Storage | Yes | Yes | No |
| <i>Ultrasound Image Storage (Retired)</i> | Yes | Yes | No |
| Ultrasound Multi-frame Storage | Yes | Yes | No |
| <i>Ultrasound Multi-frame Storage (Retired)</i> | Yes | Yes | No |
| Video Endoscopic Image Storage | Yes | Yes | No |
| Video Microscopic Image Storage | Yes | Yes | No |
| Video Photographic Image Storage | Yes | Yes | No |
| Visual Acuity Measurements Storage | Yes | Yes | No |
| VL Endoscopic Image Storage | Yes | Yes | No |
| <i>VL Image Storage (Retired)</i> | Yes | Yes | No |
| VL Microscopic Image Storage | Yes | Yes | No |
| VL Photographic Image Storage | Yes | Yes | No |
| VL Slide-Coordinates Microscopic Image Storage | Yes | Yes | No |
| VL Whole Slide Microscopy Image Storage | Yes | Yes | No |
| VOI LUT Box (Retired) | Yes | Yes | No |
| Volume Rendering Volumetric Presentation State Storage | Yes | Yes | No |
| Wide Field Ophthalmic Photography Stereographic Projection Image Storage | Yes | Yes | No |
| Wide Field Ophthalmic Photography 3D Coordinates Image Storage | Yes | Yes | No |

| | | | |
|--|-----|-----|-----|
| X-Ray 3D Angiographic Image Storage | Yes | Yes | No |
| X-Ray 3D Craniofacial Image Storage | Yes | Yes | No |
| <i>X-Ray Angiographic Bi-Plane Image Storage (Retired)</i> | Yes | Yes | No |
| X-Ray Angiographic Image Storage | Yes | Yes | No |
| X-Ray Radiation Dose SR | Yes | Yes | No |
| X-Ray Radiofluoroscopic Image Storage | Yes | Yes | No |
| XA/XRF Grayscale Softcopy Presentation State Storage | Yes | Yes | No |
| Query/Retrieve | | | |
| Patient Root Q/R – FIND | Yes | Yes | N/A |
| Patient Root Q/R - MOVE | Yes | Yes | N/A |
| Study Root Q/R – FIND | Yes | Yes | N/A |
| Study Root Q/R - MOVE | Yes | Yes | N/A |
| Modality Worklist | | | |
| Modality Worklist – FIND | Yes | Yes | N/A |
| Verification | | | |
| Verification | Yes | Yes | N/A |

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1 Introduction

1.1 Revision History

| Document Version | Date | Author | Description |
|------------------|------------------|--------------|---|
| 1.0 | 20 February 2018 | Vital Images | Released with Vitrea Connection 7.0. |
| 1.1 | 16 April, 2018 | Vital Images | Updated for Vitrea Connection 7.1. |
| 1.2 | 15 May, 2018 | Vital Images | Updated for Vitrea Connection 7.2. Updated references to DICOM standard. |
| 1.3 | 21 August, 2018 | Vital Images | Updated for Vitrea Connection 7.3. Updated references to DICOM standard. Updated references to IHE Technical Framework for IT infrastructure. Updated references to IHE Technical Framework for Radiology. |
| 1.4 | 5 November, 2018 | Vital Images | Updated for Vitrea Connection 7.4. Updated references to DICOM standard. Added definition of DICOM Proxy Server. |

1.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 standard and the appropriate IHE Profiles.

1.3 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Vitrea Connection and other vendors' medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 standard. However, it is not guaranteed to ensure the desired interoperability and successful interconnectivity with existing DICOM systems.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Vitrea Connection and other vendors' equipment.
- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM 3.0 standard will evolve to meet the users' future requirements. Vital Images, Inc reserves the right to make changes to its products or to discontinue its delivery.

1.4 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Abbreviations and terms are as follows:

| | |
|---------|--|
| AE | Application Entity |
| AET | Application Entity Title |
| DICOM | Digital Imaging and Communications in Medicine |
| DIMSE | DICOM Message Service Element |
| GSDF | Grayscale Standard Display Function |
| GUI | Graphical User Interface |
| HIS/RIS | Hospital Information System / Radiology Information System |
| HL7 | Health Level 7 |
| IHE | Integrating the Healthcare Enterprise |
| IHE-TF | Integrating the Healthcare Enterprise Technical Framework |
| IOD | Information Object Definition |
| ISO | International Standard Organization |
| PDU | DICOM Protocol Data Unit |
| LUT | Look-up Table |
| P-LUT | Presentation Look-up Table |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | DICOM Service-Object Pair |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TLS | Transport Layer Security |
| UID | Unique Identifier |
| VR | Value Representation |
| XDS | Cross-Enterprise Document Sharing |

1.5 References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1- 3.21, 2018d
- [IHE-TF] IHE Radiology Technical Framework, HIMSS/RSNA, Vol. I – IV, Revision 17.0, July 27, 2018
- [IHE-TF] IHE IT Infrastructure Technical Framework, HIMSS/RSNA, Vol. I – IV, Revision 15, July 24, 2018

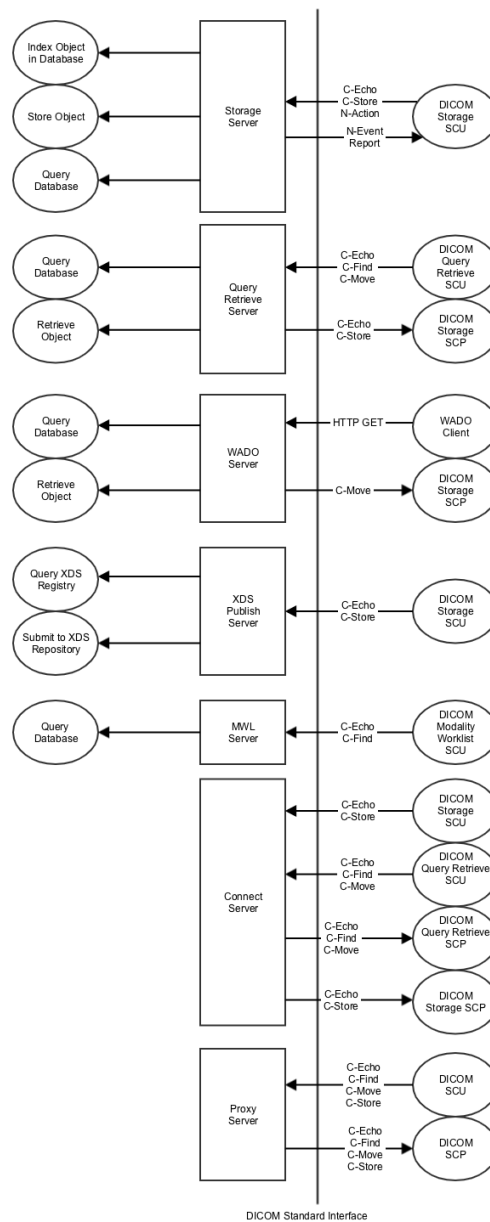
2 Networking

2.1 Implementation Model

2.1.1 Application Data Flow

Vitreax Connection is logically divided into different DICOM Application Entities: Storage Server, Query/Retrieve Server, WADO Server, XDS Publish Server, MWL Server and Connect Server.

Application Data Flow Diagram



The Storage Server AE implements the DICOM Storage and Verification Service Classes.

The Query/Retrieve Server AE implements the DICOM Retrieve and Verification Service Classes.

The WADO Server AE implements the WADO Service Classes.

The XDS Publish Server AE implements the DICOM Storage and Verification Service Classes.

The MWL Server AE implements the DICOM Modality Worklist and Verification Service Classes.

The Connect Server AE implements the DICOM Storage, Retrieve and Verification Service Classes.

The Proxy Server AE implements the DICOM Storage, Retrieve and Verification Service Classes.

2.1.2 Functional Definitions of AEs

2.1.2.1 Functional Definition of Vitrea Connection Storage Server AE

Vitrea Connection Storage Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the Storage Server AE expects it to be a DICOM application.

The Storage Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification, Storage, and Storage Commitment Service Classes.

Any objects received on such Presentation Contexts will be added to the Object Repository.

As an option, the Storage Server AE can be configured to modify the contents of objects with information found in scheduled procedure steps (i.e. modality worklist reconciliation).

As an option, the Storage Server AE can be configured to extract measurements that are stored as XML strings in objects and to write those measurements to files.

As part of regular maintenance activities, more specifically the synchronization of information that has been received by the Storage Server AE, the Storage Server AE will initiate a request to query for and retrieve objects from the AE that originally stored the object.

As part of regular maintenance activities, more specifically when Vitrea Connection is configured as a cache, the Storage Server AE will initiate a request to store objects to one or more AEs that are serving as a long-term archive.

2.1.2.2 Functional Definition of Vitrea Connection Query/Retrieve Server AE

Vitrea Connection Query/Retrieve Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the Retrieve Server AE expects it to be a DICOM application.

The Vitrea Connection Query/Retrieve Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification and Retrieve Service Classes.

The Vitrea Connection Query/Retrieve Server AE responds to queries based on the records stored in its database.

The Vitrea Connection Query/Retrieve Server AE is used to query and retrieve DICOM objects that were stored to the Storage Server AE.

2.1.2.3 Functional Definition of WADO Server AE

Vitrea Connection WADO Server Application Entity waits for another application to connect at the URL configured for its Application Entity Title. When another application connects, the WADO Server AE expects it to be a web application.

The WADO Server AE will accept web requests for retrieval of images.

The WADO Server AE responds to queries based on the records stored in its database.

The WADO Server AE is used to retrieve DICOM objects that were stored to the Storage Server AE. It expects that the requesting application already knows the SOP Instance UIDs of the DICOM objects that it wishes to retrieve.

If the requested object cannot be found in local storage, the WADO Server AE will initiate a request to retrieve the object from the AE that originally stored the object.

2.1.2.4 Functional Definition of XDS Publish Server AE

Vitrea Connection XDS Publish Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the XDS Publish Server AE expects it to be a DICOM application.

The XDS Publish Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification and Storage Service Classes.

The XDS Publish Server AE will create a Key Object Selection document and publish it to an XDS Document Repository.

The XDS Publish Server AE may query the XDS Document Registry to get details about previously published Key Object Selection documents.

2.1.2.5 Functional Definition of MWL Server AE

Vitreia Connection MWL Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the MWL Server AE expects it to be a DICOM application.

The MWL Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification and Modality Worklist Service Classes.

The MWL Server AE responds to queries based on the records stored in its database.

2.1.2.6 Functional Definition of Connect Server AE

Vitreia Connection Connect Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the Connect Server AE expects it to be a DICOM application.

The Connect Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification and Query/Retrieve Service Classes.

The Connect Server AE responds to queries by proxying the Query/Retrieve requests to one or more AEs and providing the collated results to the original requesting AE.

2.1.2.7 Functional Definition of Proxy Server AE

Vitreia Connection Proxy Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the Proxy Server AE expects it to be a DICOM application.

The Proxy Server AE will accept Associations with Presentation Contexts for SOP Classes of the Verification, Storage and Query/Retrieve Service Classes.

The Proxy Server AE responds to queries by proxying the Query/Retrieve/Storage requests to one or more AEs and providing the results to the original requesting AE.

2.2 AE Specifications

The following tables define default values that are referenced by the following sections.

The following Transfer Syntaxes are represented by the term [Default TS List]:

| Name List | UID List |
|---------------------------|---------------------|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

The following Transfer Syntaxes are represented by the term [Extended TS List]:

| Name List | UID List |
|---------------------------|---------------------|
| 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 |
| JPEG Baseline (Process 1) | 1.2.840.10008.1.2.4.50 |
| JPEG Extended (Process 2 & 4) | 1.2.840.10008.1.2.4.51 |
| JPEG Lossless, Non-Hierarchical (Process 14) | 1.2.840.10008.1.2.4.57 |
| JPEG Lossless, Non- Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]) | 1.2.840.10008.1.2.4.70 |
| JPEG-LS Lossless Image Compression | 1.2.840.10008.1.2.4.80 |
| JPEG-LS Lossy (Near-Lossless) Image Compression | 1.2.840.10008.1.2.4.81 |
| JPEG 2000 Lossless Image Compression | 1.2.840.10008.1.2.4.90 |
| JPEG 2000 Lossy Image Compression | 1.2.840.10008.1.2.4.91 |
| RLE Lossless | 1.2.840.10008.1.2.5 |

The following SOP Classes are represented by the term [Default SOP Class List]:

| Name List | UID List | Transfer Syntax |
|--|-------------------------------|------------------------|
| <i>VOI LUT Box (Retired)</i> | 1.2.840.10008.5.1.1.22 | [Default TS List] |
| <i>Hardcopy Grayscale Image Storage (Retired)</i> | 1.2.840.10008.5.1.1.29 | [Extended TS List] |
| <i>Hardcopy Color Image Storage SOP Class (Retired)</i> | 1.2.840.10008.5.1.1.30 | [Extended TS List] |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | [Extended TS List] |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | [Extended TS List] |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | [Extended TS List] |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | [Extended TS List] |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | [Extended TS List] |
| Digital Intra-Oral X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | [Extended TS List] |
| Digital Intra-Oral X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | [Extended TS List] |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | [Extended TS List] |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | [Extended TS List] |
| Legacy Converted Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.2 | [Extended TS List] |
| <i>Ultrasound Multi-frame Image Storage (Retired)</i> | 1.2.840.10008.5.1.4.1.1.3 | [Extended TS List] |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | [Extended TS List] |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | [Extended TS List] |

| | | |
|--|-------------------------------|--------------------|
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | [Extended TS List] |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | [Extended TS List] |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | [Extended TS List] |
| Legacy Converted Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.4 | [Extended TS List] |
| <i>Nuclear Medicine Image Storage (Retired)</i> | 1.2.840.10008.5.1.4.1.1.5 | [Extended TS List] |
| <i>Ultrasound Image Storage (Retired)</i> | 1.2.840.10008.5.1.4.1.1.6 | [Extended TS List] |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | [Extended TS List] |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 | [Extended TS List] |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | [Extended TS List] |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 | [Extended TS List] |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | [Extended TS List] |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | [Extended TS List] |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | [Extended TS List] |
| Standalone Overlay Storage (Retired) | 1.2.840.10008.5.1.4.1.1.8 | [Default TS List] |
| Standalone Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.9 | [Default TS List] |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | [Default TS List] |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 | [Default TS List] |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | [Default TS List] |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | [Default TS List] |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | [Default TS List] |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | [Default TS List] |
| General Audit Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.2 | [Default TS List] |
| Arterial Pulse Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.5.1 | [Default TS List] |
| Respiratory Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.6.1 | [Default TS List] |
| Standalone Modality LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.10 | [Default TS List] |
| Standalone VOI LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.11 | [Default TS List] |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | [Default TS List] |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | [Default TS List] |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | [Default TS List] |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | [Default TS List] |

| | | |
|---|--------------------------------|--------------------|
| XA/XRF Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.5 | [Default TS List] |
| Grayscale Planer MPR Volumetric Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.6 | [Default TS List] |
| Compositing Planar MPR Volumetric Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.7 | [Default TS List] |
| Advanced Blending Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.8 | [Default TS List] |
| Volume Rendering Volumetric Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.9 | [Default TS List] |
| Segmented Volume Rendering Volumetric Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.10 | [Default TS List] |
| Multiple Volume Rendering Volumetric Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.11 | [Default TS List] |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | [Extended TS List] |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | [Extended TS List] |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | [Extended TS List] |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | [Extended TS List] |
| <i>X-Ray Angiographic Bi-Plane Image Storage (Retired)</i> | 1.2.840.10008.5.1.4.1.1.12.3 | [Extended TS List] |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | [Extended TS List] |
| X-Ray 3D Craniofacial Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.2 | [Extended TS List] |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | [Extended TS List] |
| Breast Projection X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.13.1.4 | [Extended TS List] |
| Breast Projection X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.13.1.5 | [Extended TS List] |
| Intravascular Optical Coherence Tomography Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.14.1 | [Extended TS List] |
| Intravascular Optical Coherence Tomography Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.14.2 | [Extended TS List] |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | [Extended TS List] |
| Parametric Map Storage | 1.2.840.10008.5.1.4.1.1.30 | [Extended TS List] |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | [Extended TS List] |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | [Extended TS List] |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | [Extended TS List] |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 | [Extended TS List] |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | [Extended TS List] |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 | [Extended TS List] |

| | | |
|--|----------------------------------|--------------------|
| Tractography Results Storage | 1.2.840.10008.5.1.4.1.1.66.6 | [Extended TS List] |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | [Extended TS List] |
| Surface Scan Mesh Storage | 1.2.840.10008.5.1.4.1.1.68.1 | [Extended TS List] |
| Surface Scan Point Cloud Storage | 1.2.840.10008.5.1.4.1.1.68.2 | [Extended TS List] |
| <i>VL Image Storage (Retired)</i> | 1.2.840.10008.5.1.4.1.1.77.1 | [Extended TS List] |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | [Extended TS List] |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | [Extended TS List] |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | [Extended TS List] |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | [Extended TS List] |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | [Extended TS List] |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | [Extended TS List] |
| Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | [Extended TS List] |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | [Extended TS List] |
| Ophthalmic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | [Extended TS List] |
| Stereometric Relationship Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.3 | [Extended TS List] |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 | [Extended TS List] |
| Wide Field Ophthalmic Photography Stereographic Projection Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.5 | [Extended TS List] |
| Wide Field Ophthalmic Photography 3D Coordinates Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.6 | [Extended TS List] |
| Ophthalmic Optimal Coherence Tomography En Face Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.7 | [Extended TS List] |
| Ophthalmic Optimal Coherence Tomography B-scan Volume Analysis Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.8 | [Extended TS List] |
| VL Whole Slide Microscopy Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.6 | [Extended TS List] |
| Lensometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.1 | [Default TS List] |
| Autorefractometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.2 | [Default TS List] |
| Keratometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.3 | [Default TS List] |
| Subjective Refraction Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.4 | [Default TS List] |
| Visual Acuity Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.5 | [Default TS List] |
| Spectacle Prescription Report Storage | 1.2.840.10008.5.1.4.1.1.78.6 | [Default TS List] |

| | | |
|---|-------------------------------|--------------------|
| Ophthalmic Axial Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.7 | [Default TS List] |
| Intraocular Lens Calculations Storage | 1.2.840.10008.5.1.4.1.1.78.8 | [Default TS List] |
| Macular Grid Thickness and Volume Report | 1.2.840.10008.5.1.4.1.1.79.1 | [Default TS List] |
| Ophthalmic Visual Field Static Perimetry Measurements Storage | 1.2.840.10008.5.1.4.1.1.80.1 | [Default TS List] |
| Ophthalmic Thickness Map Storage | 1.2.840.10008.5.1.4.1.1.81.1 | [Default TS List] |
| Corneal Topography Storage | 1.2.840.10008.5.1.4.1.1.82.1 | [Default TS List] |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | [Default TS List] |
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | [Default TS List] |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | [Default TS List] |
| Comprehensive 3D SR | 1.2.840.10008.5.1.4.1.1.88.34 | [Default TS List] |
| Extensible SR Storage | 1.2.840.10008.5.1.4.1.1.88.35 | [Default TS List] |
| Procedure Log | 1.2.840.10008.5.1.4.1.1.88.40 | [Default TS List] |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | [Default TS List] |
| Key Object Selection | 1.2.840.10008.5.1.4.1.1.88.59 | [Default TS List] |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | [Default TS List] |
| X-Ray Radiation Dose SR | 1.2.840.10008.5.1.4.1.1.88.67 | [Default TS List] |
| Radiopharmaceutical Radiation Does SR | 1.2.840.10008.5.1.4.1.1.88.68 | [Default TS List] |
| Colon CAD SR | 1.2.840.10008.5.1.4.1.1.88.69 | [Default TS List] |
| Implantation Plan SR Document Storage | 1.2.840.10008.5.1.4.1.1.88.70 | [Default TS List] |
| Acquisition Context SR Storage | 1.2.840.10008.5.1.4.1.1.88.71 | [Default TS List] |
| Simplified Adult Echo SR Storage | 1.2.840.10008.5.1.4.1.1.88.72 | [Default TS List] |
| Patient Radiation Dose SR Storage | 1.2.840.10008.5.1.4.1.1.88.73 | [Default TS List] |
| Content Assessment Results Storage | 1.2.840.10008.5.1.4.1.1.90.1 | [Default TS List] |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | [Default TS List] |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 | [Default TS List] |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | [Extended TS List] |
| Legacy Converted Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.128.1 | [Default TS List] |
| Standalone PET Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.129 | [Default TS List] |
| Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.130 | [Extended TS List] |
| Basic Structured Display Storage | 1.2.840.10008.5.1.4.1.1.131 | [Extended TS List] |

| | | |
|--|-------------------------------|--------------------|
| CT Performed Procedure Protocol Storage | 1.2.840.10008.5.1.4.1.1.200.2 | [Default TS List] |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | [Extended TS List] |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | [Default TS List] |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | [Default TS List] |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | [Default TS List] |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | [Default TS List] |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | [Default TS List] |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | [Default TS List] |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | [Default TS List] |
| RT Ion Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | [Default TS List] |
| RT Beams Delivery Instruction Storage | 1.2.840.10008.5.1.4.34.7 | [Default TS List] |
| RT Brachy Application Setup Delivery Instruction Storage | 1.2.840.10008.5.1.4.34.10 | [Default TS List] |

2.2.1 Vitrea Connection Storage Server AE Specification

2.2.1.1 SOP Classes

Vitrea Connection Storage Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitrea Connection Storage Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-----------------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | No |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | No |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | No |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | No |
| Storage Commitment Push Model | 1.2.840.10008.5.1.20.1 | Yes | Yes |
| [Default SOP Class List] | | Yes | Yes |

2.2.1.2 Association Establishment Policy

2.2.1.2.1 General

The Vitrea Connection Storage Server AE can both accept and propose Association Requests. The Vitrea Connection Storage Server AE will accept and propose Association Requests for the Verification, Storage, and Storage Commitment Push Model Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection Storage Server AE

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

2.2.1.2.2 Number of Associations

Vitrea Connection Storage Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the configuration GUI.

Number of Associations accepted by Vitrea Connection Storage Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.1.2.3 Asynchronous Nature

Vitrea Connection Storage Server 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).

Asynchronous Nature as SCP for Vitrea Connection Storage Server AE

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

2.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection Storage Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.1.3 Association Acceptance Policy

2.2.1.3.1 Activity - Receive Images

Description and Sequencing of Activities

A remote peer DICOM Application Entity, acting as a Storage SCU, establishes an association with Vitrea Connection Storage Server that accepts these Associations for the purpose of receiving supported SOP Class Instances requests.

In the default configuration any Calling and Called AET will be accepted. If the Called AET does not correspond to the actual Storage Server AET, only a Presentation Context for the Verification SOP Class will be accepted and the SCU can only verify the DICOM Association, but cannot invoke any other related DICOM service.

The Storage Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|------------------------|----------|--------------------------|---|
| 2 - rejected transient | provider | 2 - local-limit exceeded | The (configurable) maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time. |

| | | | |
|------------------------|------|--|---|
| 1 - rejected permanent | user | 2 - application context name not supported | The Association request contained an unsupported Application Context Name. An association request with the same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitreia Connection Storage Server AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitreia Connection Storage Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|-------------------------------|----------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCP | None |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | [Default TS List] | SCP | None |
| [Default SOP Class List] | | | SCP | None |

The preferred (default) Transfer Syntax is Explicit VR Little Endian.

SOP Specific Conformance

Specific Conformance for the Verification SOP Class

Vitreia Connection Storage Server provides standard conformance to the DICOM Verification Service Class as an SCP. The status code for the C-ECHO is described in the following table:

Vitreia Connection Storage Server C-Echo Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------|------------|--------------------------------|
| Success | Success | 0000 | The C-ECHO request is accepted |

Specific Conformance for the Storage SOP Classes

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

The Vitreia Connection Storage Server 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 Vitreia Connection Storage Server AE always retains the original DICOM data in DICOM Part 10 compliant file format, which is stored in the local storage system. The Vitreia Connection Storage Server 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 is stored in the Vitreia Connection Storage Server database to support query and retrieval requests.

By default, the Vitrea Connection Storage Server AE will not transcode information from one transfer syntax to another. All information is stored as it is received. However, it is possible to configure the Vitrea Connection Storage Server AE apply the following transcoding between transfer syntaxes when storing images. If the Vitrea Connection Storage Server AE is unable to transcode an image that is being stored, the Vitrea Connection Storage Server AE will store the image in its original format.

As an option, the Vitrea Connection Storage Server AE can be configured to update the metadata associated with the DICOM data based on information found in scheduled procedure steps (i.e. modality worklist reconciliation). The original DICOM data is not modified, but only the metadata. A complete history of metadata is stored, so that the updates performed can be examined and even rolled back by an administrator.

The Vitrea Connection Storage Server AE can be configured to selectively apply KOS rejection notes to subsequent DICOM C-Find and C-Move requests, depending on which AE Title is queried, as per the specification of Information Object Change Management.

| Transcode from Transfer Syntax | Transcode to Transfer Syntax |
|---|---|
| 1.2.840.10008.1.2 (Implicit VR Little Endian) | 1.2.840.10008.1.2.4.80 (JPEG-LS Lossless Image Compression) |
| 1.2.840.10008.1.2.1 (Explicit VR Little Endian) | 1.2.840.10008.1.2.4.80 (JPEG-LS Lossless Image Compression) |
| 1.2.840.10008.1.2.2 (Explicit VR Big Endian) | 1.2.840.10008.1.2.4.80 (JPEG-LS Lossless Image Compression) |

Storage Server AE C-STORE Response

Vitrea Connection Storage Server C-STORE 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 Vitrea Connection database or a file system operation. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Error | Duplicate SOP Instance UID | D000 | This status is returned if the instance already exists in the database and the Vitrea Connection Storage Server AE is configured to refuse duplicate instances. The appropriate Status will be sent in the C-STORE Response. Error 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. |

Vitrea Connection Storage Server Service Communication Failure Behavior

| Exception | Behavior |
|--|---|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The Storage Server SCP AE is waiting for the next C-STORE Request on an open Association but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received, they are maintained in the database. They are not automatically discarded because of a later failure. Error message is output to the Service Log. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). I.e. The Storage Server SCP AE is waiting for the next C-STORE Data Set PDU but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. If a C-STORE Data Set has not been fully received, the data already received is discarded. If some Composite SOP Instances have already been successfully received over the Association, they are maintained in the database. Error message is output to the Service Log. |
| Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure) | Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received, they are maintained in the database. They are not automatically discarded because of a later failure. |

Specific Conformance for the Storage Commitment SOP Class

The associated activity with the Storage Commitment Push Model service is the communication by the Vitrea Connection Storage Server AE to peer AEs that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows peer AEs to determine whether the Vitrea Connection Storage Server has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the peer AE system.

The Vitrea Connection Storage Server AE takes the list of Composite SOP Instance UIDs specified in a Storage Commitment Push Model N-ACTION Request and checks if they are present in the Vitrea Connection query/retrieve Server repository. As long as the Composite SOP Instance UIDs are present in the database, the Vitrea Connection Storage Server AE will consider those Composite SOP Instance UIDs to be successfully archived. The Vitrea Connection Storage Server AE does not require the Composite SOP Instances to actually be successfully written to archive media in order to commit to responsibility for maintaining these SOP Instances.

Once the Vitrea Connection Storage Server AE has checked for the existence of the specified Composite SOP Instances, it will then attempt to send the Notification request (N-EVENT-REPORT-RQ). The Vitrea Connection Storage Server AE will request a new Association with the peer AE that made the original N-ACTION Request.

The Vitrea Connection Storage Server AE will not cache Storage Commitment Push Model N-ACTION Requests that specify Composite SOP Instances that have not yet been transferred to the Vitrea Connection Query/Retrieve Server. If a peer AE sends a Storage Commitment Push Model N-ACTION Request before the specified Composite SOP Instances are later sent over the same Association, the Vitrea Connection Storage Server AE will not commit to responsibility for such SOP Instances.

The Vitrea Connection Storage Server AE does not support the optional Storage Media File-Set ID & UID attributes in the N-ACTION request.

The Vitrea Connection Storage Server AE will support Storage Commitment Push Model requests for SOP Instances of any of the Storage SOP Classes that are also supported by the Vitrea Connection Storage Server AE:

Supported Referenced SOP Classes In Storage Commitment Push Model N-ACTION Requests

| SOP Class Name | SOP Class UID |
|--------------------------|---------------|
| [Default SOP Class List] | |

Storage Server AE N-ACTION Response

The Vitrea Connection Storage Server AE will return the following Status Code values in N-ACTION Responses:

Vitrea Connection Storage Server N-ACTION Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-------------------------|------------|--|
| Success | Success | 0000 | The SCP has successfully received the Storage Commitment Push Model N-ACTION Request and can process the commitment request for the indicated SOP Instances. |
| Error | Processing Failure | 0110 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be parsed or fully processed due to a database or system failure. |
| Error | Missing Attribute | 0120 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because a required attribute is missing from the N-ACTION Request Data Set. |
| Error | Missing Attribute Value | 0121 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because a Type 1 attribute in the NACTION Request Data Set does not specify a value. |

Storage Server AE N-EVENT Response

The Vitrea Connection Storage Server AE will exhibit the following Behavior according to the Status Code value returned in an N-EVENT-REPORT Response from a destination Storage Commitment Push Model SCU:

Vitrea Connection Storage Server N-EVENT Report Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|----------------------|----------------|--|
| Success | Success | 0000 | The SCU has successfully received the Storage Commitment Push Model N-EVENT-REPORT Request. Success indication message is output to the Service Log. |
| Warning | Attribute List Error | 0107 | Transmission of Storage Commitment Push Model N-EVENT-REPORT Request is considered successful. Warning indication message is output to the Service Log. |
| * | * | Any Other Code | This is treated as a permanent Failure. Error indication message is output to the Service Log. |

The next table reports the Vitrea Connection Storage Server behavior in case of communication failure:

Vitrea Connection Storage Server AE Storage Commitment Push Model Communication Failure Behavior

| Exception | Behavior |
|--|--|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The Storage Server SCP AE is waiting for the next N-ACTION Request on an open | The Association is aborted by issuing a DICOM A-ABORT. If some Composite SOP Instances have been successfully received over the same Association via the Storage Service, |

| | |
|--|---|
| Association but the timer expires. | <p>they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure.</p> <p>Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed.</p> <p>Error indication message is output to the Service Log.</p> |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). | <p>The Association is aborted by issuing a DICOM A-ABORT.</p> <p>If some Composite SOP Instances have been successfully received over the same Association via the Storage Service, they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure.</p> <p>Any previously received Storage Commitment Push Model N-ACTION Request will still be fully processed.</p> <p>Error indication message is output to the Service Log.</p> |
| Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure). | <p>The TCP/IP socket is closed.</p> <p>If some Composite SOP Instances have been successfully received over the same Association via the Storage Service, they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure.</p> <p>Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed.</p> <p>Error indication message is output to the Service Log.</p> |

2.2.1.4 Association Initiation Policy

2.2.1.4.1 Activity – Synchronize Objects with an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection Storage Server AE will initiate a new Association when attempting to synchronize objects that have been previously stored by an external Peer. The Storage Server AE will send the Association Request to the specific Peer, and upon successful negotiation of the required Presentation Context, a query request and possibly a retrieve request will be sent to the Peer.

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. Vitrea Connection Storage Server AE will propose Presentation Contexts as shown in the following table:

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|---|-----------------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | [Default TS List] | SCU | None |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | [Default TS List] | SCU | None |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | [Default TS List] | SCU | None |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.2 | [Default TS List] | SCU | None |

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

2.2.1.4.2 Activity – Archive Objects to an External Peer AE

Description and Sequencing of Activities

When configured as a cache, the Vitrea Connection Storage Server AE will initiate a new Association when attempting to archive objects that have been previously stored. The Storage Server AE will send the Association Request to the Peer that is serving as an archive, and upon successful negotiation of the required Presentation Context, a verification request, a storage request and possibly a storage commitment request will be sent to the Peer.

The Vitrea Connection Storage Server AE can be configured to send KOS rejection notes to Peer AEs when archive objects are changed.

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. Vitrea Connection Storage Server AE will propose Presentation Contexts as shown in the following table:

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|-------------------------------|----------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |
| [Default SOP Class List] | | [Default TS List] | SCU | None |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | [Default TS List] | SCU | None |

2.2.2 Vitrea Connection Query/Retrieve Server AE Specification

2.2.2.1 SOP Classes

Vitrea Connection Query/Retrieve Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitrea Connection Query/Retrieve Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-----------------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | No | Yes |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | No | Yes |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | No | Yes |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | No | Yes |
| [Default SOP Class List] | | Yes | No |

2.2.2.2 Association Establishment Policy

2.2.2.2.1 General

The Vitrea Connection Query/Retrieve Server AE can both accept and propose Association Requests. The Vitrea Connection Query/Retrieve Server AE will accept Association Requests for the Verification and Query/Retrieve Services. It will propose Associations for Verification and Storage Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection Query/Retrieve Server AE

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

2.2.2.2.2 Number of Associations

Vitrea Connection Query/Retrieve Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the attribute "MaxClients" in the Application Server configuration.

Number of Associations accepted for Vitrea Connection Query/Retrieve Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.2.2.3 Asynchronous Nature

Vitrea Connection Query/Retrieve Server 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).

Asynchronous Nature as SCP for Vitrea Connection Query/Retrieve Server AE

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

2.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection Query/Retrieve Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.2.3 Association Initiation Policy

2.2.2.3.1 Activity - Send Images Requested by an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection Query/Retrieve AE will initiate a new Association when a valid C-MOVE Request has been performed by an external Peer. The Query/Retrieve AE will send the Association Request to the specific C-MOVE destination, and upon successful negotiation of the required Presentation Context the image transfer is started. In all cases an attempt will be made to transmit all the indicated images in a single Association but this may not always be possible. The Association will be released when all the images have been sent.

If an error occurs during transmission over an open Association, the image transfer is halted. The Query/Retrieve AE will not attempt to independently retry the image export.

By default, the Vitrea Connection Query/Retrieve Server AE will not transcode information from one transfer syntax to another when sending images to the specific C-MOVE destination. However, if the specific C-MOVE destination does not support the transfer syntax that the image was stored in, either as it was received originally or as transcoded by the Vitrea Connection Storage Server AE, the Vitrea Connection Query/Retrieve Server AE will attempt the following transcodings:

| | |
|---------------------------------------|-------------------------------------|
| Transcode from Transfer Syntax | Transcode to Transfer Syntax |
|---------------------------------------|-------------------------------------|

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. The default Transfer Syntaxes are the Transfer Syntax of the originally received instance plus the [Default TS List].

Vitrea Connection Query/Retrieve AE will propose Presentation Contexts as shown in the following table:

Proposed Presentation Contexts by the Vitrea Connection Query/Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|--------------------------|-------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |
| [Default SOP Class List] | | | SCU | None |

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

Specific Conformance for Image, SR and KIN SOP Classes

The Query/Retrieve Server AE will exhibit the following behavior according to the Status Code value returned in a C-STORE Response from a destination C-STORE SCP:

Vitrea Connection Query/Retrieve Server AE C-STORE Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|---------------------------|-------------|---|
| Success | Success | 0000 | The remote Storage SCP has successfully stored the exported SOP Instance. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Success indication message is output to the Service Log. |
| Refused | Out of Resources | A700 – A7FF | This is treated as a permanent Failure. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| Error | Cannot Understand | C000 – CFFF | This is treated as a permanent Failure. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| Warning | Coercion of Data Elements | B000 | Image transmission is considered successful. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Success indication message is output to the Service Log. |

| | | | |
|---------|-----------------------------------|-----------------------|---|
| Warning | Data Set does not match SOP Class | B007 | Image transmission is considered successful. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Warning indication message is output to the Service Logs. |
| Warning | Elements Discarded | B006 | Image transmission is considered successful. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Success indication message is output to the Service Log. |
| Warning | Attribute List Error | 0107 | Image transmission is considered successful. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Success indication message is output to the Service Log. |
| Warning | Attribute Value Out of Range | 0116 | Image transmission is considered successful. The appropriate PENDING or SUCCESS Status will be sent in the C-MOVE Response. Success indication message is output to the Service Log. |
| * | * | Any other status code | This is treated as a permanent Failure. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |

Vitrea Connection Query/Retrieve Server AE Communication Failure Behavior

| Exception | Behavior |
|--|---|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the CMOVE Response. Error indication message is output to the Service Logs. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the CMOVE Response. Error indication message is output to the Service Logs. |
| Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the CMOVE Response. Error indication message is output to the Service Logs. |

2.2.2.3.2 Activity - Retrieve Images Requested by an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection Query/Retrieve AE will initiate a new Association when a valid C-MOVE Request has been performed by an external Peer but one or more of the requested objects is not found in local storage. The Query/Retrieve AE will send an Association Request to the AE that originally stored the objects, and upon successful negotiation of the required Presentation Context a retrieve request is started. The Association will be released when all the images have been sent.

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. The default Transfer Syntaxes are the Transfer Syntax of the

originally received instance plus the [Default TS List].

The following Transfer Syntaxes are represented by the term [Default TS List]:

[Default TS List] Transfer Syntax List for Vitrea Connection Retrieve Server AE

| Name List | UID List |
|---------------------------|---------------------|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

Vitrea Connection Query/Retrieve AE will propose Presentation Contexts as shown in the following table:

Proposed Presentation Contexts by the Vitrea Connection Query/Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|---|-----------------------------|-------------------|------|------------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |
| Patient Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | [Default TS List] | SCU | Relational |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | [Default TS List] | SCU | Relational |

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

2.2.2.4 Association Acceptance Policy

2.2.2.4.1 Activity - Handling Query and Retrieval Requests

Description and Sequencing of Activities

The Query/Retrieve Server AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted, the Association Request itself is rejected. It can be configured to only accept Associations from certain Application Entities.

If Query/Retrieve Server AE receives a query (C-FIND) request, the response(s) will be sent over the same Association used to send the C-FIND-Request.

If Query/Retrieve Server AE receives a retrieval (C-MOVE) request, the responses will be sent over the same Association used to send the C-MOVE-Request.

The Query/Retrieve Server AE will send the requested SOP Instances to the C-MOVE Destination over a newly created Association and report in the C-MOVE-Response any success or failure status of each attempt to send a Composite SOP Instance. The Query/Retrieve Server AE will not transcode information the stored transfer syntax to a different transfer syntax when sending the requested SOP Instances.

The Query/Retrieve Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|--------------|----------|-----------------|---|
| 2 - rejected | provider | 2 - local-limit | The (configurable) maximum number of simultaneous |

| | | | |
|------------------------|------|--|---|
| transient | | exceeded | associations has been reached. An association request with the same parameters may succeed at a later time. |
| 1 - rejected permanent | user | 2 - application context name not supported | The Association request contained an unsupported Application Context Name. An association request with the same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitreia Connection Query/Retrieve Server AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitrea Connection Query/Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
|---|-----------------------------|---------------------------|---------------------|------|------------|
| 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 |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Patient Root Q/R Information Model – FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Patient Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Relational |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Study Root Q/R Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| Study Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Relational |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

If the Called AET is not corresponding to the actual Query/Retrieve Server AET, only the Presentation Context for the Verification SOP Class will be accepted.

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Vitreia Connection Query/Retrieve Server provides standard conformance to the DICOM Verification Service Class as an SCP. The status code for the C-ECHO is described in the following table:

Vitrea Connection Query/Retrieve Server C-Echo Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------|------------|--------------------------------|
| Success | Success | 0000 | The C-ECHO request is accepted |

Specific Conformance for Query SOP Classes

The Query/Retrieve Server AE supports hierarchical queries and not relational queries. There are no attributes, which are always returned by default. Only those attributes requested in the query identifier are returned.

Query responses always return values from the Query/Retrieve Server database. Exported SOP Instances are always updated with the latest values kept in the database prior to export. Thus, a change in Patient demographic information will be contained in both the C-FIND Responses and any Composite SOP Instances exported to a C-MOVE Destination AE.

If no Issuer of Patient ID and Issuer of Patient ID Qualifiers Sequence is present, default configurable values are assumed.

Patient Root Information Model

All required search keys on the Patient and Study levels are supported.

Study Root Information Model

All the required search keys on the Study level are supported.

Patient Root C-FIND SCP Supported Elements

| SOP Common - Attribute Name | Tag | VR | Types of Matching |
|--|-----------|----|-------------------|
| Specific Character Set | 0008,0005 | CS | NONE |
| Instance Availability | 0008,0056 | CS | S,U |
| Patient Level - Attribute Name | Tag | VR | Types of Matching |
| Patient's Name | 0010,0010 | PN | S,W,U |
| Patient ID | 0010,0020 | LO | S,W,U |
| Issuer of Patient ID | 0010,0021 | LO | S,U |
| Issuer of Patient ID Qualifiers Sequence | 0010,0024 | SQ | S,U |
| >Universal Entity ID | 0040,0032 | UT | S |
| >University Entity ID Type | 0040,0033 | CS | S |
| Other Patient IDs Sequence | 0010,1002 | SQ | U |
| Patient's Birth Date | 0010,0030 | DA | S,U,R |
| Patient's Birth Time | 0010,0032 | TM | S,U,R |
| Patient's Sex | 0010,0040 | CS | S,U |
| Study Level - Attribute Name | Tag | VR | Types of Matching |
| Study Instance UID | 0020,000D | UI | S,L,U |
| Study ID | 0020,0010 | SH | S,W,U |
| Study Date | 0008,0020 | DA | S,W,U,R |

| | | | |
|--------------------------------------|------------|-----------|--------------------------|
| Study Time | 0008,0030 | TM | S,W,U,R |
| Accession Number | 0008,0050 | SH | S,W,U |
| Modalities In Study | 0008,0061 | CS | U |
| Study Description | 0008,1030 | LO | U |
| Referring Physician's Name | 0008,0090 | PN | U |
| Institution Name | 0008,0080 | LO | S,W,U |
| Procedure Code Sequence | 0008,1032 | SQ | S,U |
| Number of Study Related Series | 0020,1206 | IS | U |
| Number of Study Related Instances | 0020,1208 | IS | U |
| SOP Classes in Study | 0008,0062 | UI | U |
| Series Level - Attribute Name | Tag | VR | Types of Matching |
| Series Instance UID | 0020,000E | UI | S,U |
| Modality | 0008,0060 | CS | S,U |
| Series Date | 0008,0021 | DA | S,R,U |
| Series Time | 0008,0031 | TM | S,R,U |
| Series Description | 0008,103E | LO | S,W,U |
| Laterality | 0020,0060 | CS | S,U |
| Anatomic Region Sequence | 0008,2218 | SQ | U |
| Body Part Examined | 0018,0015 | CS | S,W,U |
| Manufacturer | 0008,0070 | LO | S,W,U |
| Manufacturer's Model Name | 0008,1090 | LO | S,W,U |
| Frame of Reference UID | 0020,0052 | UI | S,U |
| Performed Procedure Step Description | 0040,0254 | LO | S,W,U |
| Protocol Name | 0018,1030 | LO | S,W,U |
| Station Name | 0008,1010 | SH | S,W,U |
| Institutional Department Name | 0008,1040 | LO | S,W,U |
| Performing Physician's Name | 0008,1050 | PN | S,W,U |
| Performed Procedure Step Start Date | 0040,0244 | DA | S,R,U |
| Performed Procedure Step Start Time | 0040,0245 | TM | S,R,U |
| Corrected Image | 0028,0051 | LO | S,W,U |

| | | | |
|------------------------------------|------------|-----------|--------------------------|
| Date of Last Calibration | 0018,1200 | DA | U |
| Device Serial Number | 0018,1000 | LO | S,U |
| Institution Address | 0008,0081 | ST | S,U |
| Institutional Department Name | 0008,1040 | LO | S,W,U |
| Institution Name | 0008,0080 | LO | S,W,U |
| Operators' Name | 0008,1070 | PN | S,W,U |
| Performed Procedure Step Status | 0040,0252 | CS | S,W,U |
| Pixel Padding Value | 0028,0120 | US or SS | S,U |
| Presentation Intent Type | 0008,0068 | CS | S,W,U |
| Series Number | 0020,0011 | IS | S,U |
| Series Type | 0054,1000 | CS | S,W,U |
| Smallest Pixel Value In Series | 0028,0108 | US or SS | U |
| Software Version(s) | 0018,1020 | LO | S,W,U |
| Spatial Resolution | 0018,1050 | DS | S,W,U |
| Station Name | 0008,1010 | SH | S,W,U |
| Date of Last Calibration | 0018,1200 | DA | S,R,U |
| Time of Last Calibration | 0018,1201 | TM | S,R,U |
| Number of Series Related Instances | 0020,1209 | IS | U |
| SOP Level - Attribute Name | Tag | VR | Types of Matching |
| SOP Instance UID | 0008,0018 | UI | S,L,U |
| SOP Class UID | 0008,0016 | UI | S,U |
| Rows | 0028,0010 | US | S,U |
| Columns | 0028,0011 | US | S,U |
| Number of Frames | 0028,0008 | IS | S,U |
| Bits Allocated | 0028,0100 | US | S,U |
| Content Date | 0008,0023 | DA | S,R,U |
| Content Time | 0008,0033 | TM | S,R,U |
| Observation Date Time | 0040,A032 | DT | S,U |
| Concept Name Code Sequence | 0040,A043 | SQ | S,U |
| Content Label | 0070,0080 | CS | S,W,U |

| | | | |
|----------------------------|-----------|----|-------|
| Content Description | 0070,0081 | LO | S,W,U |
| Presentation Creation Date | 0070,0082 | DA | S,R,U |
| Presentation Creation Time | 0070,0083 | TM | S,R,U |
| Content Creator's Name | 0070,0084 | PN | S,W,U |
| Transfer Syntax UID | 0002,0010 | UI | S,U |
| Requested Procedure ID | 0040,1001 | SH | S,U |

Study Root C-FIND SCP Supported Elements

| SOP Common - Attribute Name | Tag | VR | Types of Matching |
|--|-----|----|-------------------|
| [All attributes from SOP Common Level of Patient Root Model] | | | |
| Study Level - Attribute Name | Tag | VR | Types of Matching |
| [All attributes from Patient and Study Levels of Patient Root Model] | | | |
| Series Level - Attribute Name | Tag | VR | Types of Matching |
| [All attributes from Series Level of Patient Root Model] | | | |
| SOP Level - Attribute Name | Tag | VR | Types of Matching |
| [All attributes from SOP Level of Patient Root Model] | | | |

Types of Matching:

The types of Matching supported by the C-FIND SCP. An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "W" indicates wildcard matching, a "U" indicates Universal Matching (i.e. return keys), and an "L" indicates that UID lists are supported for matching.

Cross-Enterprise Queries

If the C-FIND request includes an Issuer of Patient ID attribute, and Vitrea Connection is configured to recognize that Issuer as a Cross-Enterprise Issuer, Vitrea Connection will expand the query across all Issuers that the patient is known by (i.e. a cross-enterprise query) and will return the results of that expanded query.

Vitrea Connection Query/Retrieve Server C-FIND Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|--------------------|------------|---|
| Success | Success | 0000 | Matching is complete. No final identifier is supplied. |
| Error | Processing Failure | 0110 | This status is returned due to internal errors such as a processing failure response on a query of the Vitrea Connection database. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Cancel | Matching | FE00 | The C-FIND SCU sent a Cancel Request. This has been |

| | | | |
|---------|--|------|---|
| | terminated due to Cancel Request | | acknowledged and the search for matches has been halted.. Cancel indication message is output to the Service Log. |
| Pending | Matches are continuing and current match is supplied | FF00 | Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. Pending indication message is output to the Service Log. |

Specific Conformance for Retrieve SOP Classes

The Query/Retrieve Server AE supports hierarchical and relational retrieves.

Exported SOP Instances are always updated with the latest values kept in the database prior to export.

Vitrea Connection Query/Retrieve Server C-MOVE Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-------------------------------------|------------|---|
| Success | Success | 0000 | Matching is complete. No final identifier is supplied. |
| Error | Processing Failure | 0110 | This status is returned due to internal errors such as a processing failure response on a query of the Vitrea Connection database. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| Error | Unable to perform sub-operations | A702 | C-STORE sub-operations cannot be performed due to failure of an Association Request or a C-STORE Request. Error indication message is output to the Service Log. |
| Error | Move Destination unknown | A801 | The Destination Application Entity named in the C-MOVE Request is unknown to Query/Retrieve SCP AE. Error indication message is output to the Service Log. |
| Error | Identifier does not match SOP Class | A900 | The C-MOVE identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class or retrieval level. Error indication message is output to the Service Log. |
| Error | Unable to process | Cxxx | The Move Destination AET is missing in the C-MOVE Request. Error indication message is output to the Service Log. |
| Pending | Sub-operations are continuing | FF00 | A Response with this Status Code is sent every time a Composite SOP Instance has been successfully sent to the C-MOVE Destination AE. |

Vitrea Connection Query/Retrieve Server Service Communication Failure Behavior

| Exception | Behavior |
|--|--|
| Timeout expiry for an expected DICOM Message Request | The Association is aborted by issuing a DICOM A-ABORT. |

| | |
|--|--|
| (DIMSE level timeout). I.e. the Query/Retrieve Server SCP AE is waiting for the next C-FIND or C-MOVE Request on an open Association but the timer expires. | Error message is output to the Service Log. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). I.e. The Query/Retrieve Server AE is waiting for the next message PDU but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. |
| Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure) | Error message is output to the Service Log. |

2.2.3 Vitrea Connection MWL Server AE Specification

2.2.3.1 SOP Classes

Vitrea Connection MWL Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitrea Connection MWL Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|------------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | No | Yes |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | No | Yes |

2.2.3.2 Association Establishment Policy

2.2.3.2.1 General

The Vitrea Connection MWL Server AE can both accept and propose Association Requests. The Vitrea Connection MWL Server AE will accept Association Requests for the Verification and Modality Worklist Query Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection Query/Retrieve Server AE

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

2.2.3.2.2 Number of Associations

Vitrea Connection MWL Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the attribute "MaxClients" in the Application Server configuration.

Number of Associations accepted for Vitrea Connection MWL Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.3.2.3 Asynchronous Nature

Vitrea Connection MWL Server 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).

Asynchronous Nature as SCP for Vitrea Connection MWL Server AE

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

2.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection MWL Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.3.3 Association Acceptance Policy

2.2.3.3.1 Activity - Handling Query and Retrieval Requests

Description and Sequencing of Activities

The MWL Server AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted, the Association Request itself is rejected. It can be configured to only accept Associations from certain Application Entities.

If MWL Server AE receives a query (C-FIND) request, the response(s) will be sent over the same Association used to send the C-FIND-Request.

The MWL Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|------------------------|----------|--|---|
| 2 - rejected transient | provider | 2 - local-limit exceeded | The (configurable) maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time. |
| 1 - rejected permanent | user | 2 - application context name not supported | The Association request contained an unsupported Application Context Name. An association request with the same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitrea Connection Query/Retrieve Server AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitrea Connection Query/Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
|------------------------|-------------------|---------------------------|---------------------|------|-----------|
| 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 |
| | | Explicit VR Little | 1.2.840.10008.1.2.1 | | |

| | | Endian | | | |
|--|------------------------|---------------------------|---------------------|-----|------|
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

If the Called AET is not corresponding to the actual MWL Server AET, only the Presentation Context for the Verification SOP Class will be accepted.

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Vitreia Connection MWL Server provides standard conformance to the DICOM Verification Service Class as an SCP. The status code for the C-ECHO is described in the following table:

Vitreia Connection Query/Retrieve Server C-Echo Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------|------------|--------------------------------|
| Success | Success | 0000 | The C-ECHO request is accepted |

Specific Conformance for Query SOP Classes

The MWL Server AE supports modality worklist queries.

Query responses always return values from the MWL Server database

Modality Worklist C-FIND SCP Supported Elements

| SOP Common - Attribute Name | Tag | VR | Types of Matching |
|---|-----------|----|-------------------|
| Specific Character Set | 0008,0005 | CS | NONE |
| Scheduled Procedure Step - Attribute Name | Tag | VR | Types of Matching |
| Scheduled Procedure Step Sequence | 0040,0100 | SQ | U |
| >Scheduled Station AE Title | 0040,0001 | AE | S,U |
| >Scheduled Procedure Step Start Date | 0040,0002 | DA | S,R,U |
| >Scheduled Procedure Step Start Time | 0040,0003 | TM | S,R,U |
| >Modality | 0008,0060 | CS | S,U |
| >Scheduled Performing Physician's Name | 0040,0007 | PN | S,W,U |
| >Scheduled Station Name | 0040,0010 | SH | S,U |
| >Scheduled Procedure Step Location | 0040,0011 | SH | S,U |
| >Scheduled Protocol Code Sequence | 0040,0008 | SQ | U |
| >>Code Value | 0008,0100 | SH | U |
| >>Coding Scheme Designator | 0008,0102 | SH | U |

| >>Code Meaning | 0008,0104 | LO | U |
|--|------------|-----------|--------------------------|
| >Pre-Medication | 0040,0012 | LO | U |
| >Scheduled Procedure Step ID | 0040,0009 | SH | U |
| >Requested Contrast Agent | 0032,1070 | LO | U |
| >Scheduled Procedure Step Status | 0040,0020 | CS | S,U |
| Requested Procedure - Attribute Name | Tag | VR | Types of Matching |
| Requested Procedure ID | 0040,1001 | SH | S,U |
| Reason for the Requested Procedure | 0040,1002 | LO | U |
| Reason for the Requested Procedure Code Sequence | 0040,100A | SQ | U |
| >Code Value | 0008,0100 | SH | U |
| >Coding Scheme Designator | 0008,0102 | SH | U |
| >Code Meaning | 0008,0104 | LO | U |
| Requested Procedure Description | 0032,1060 | LO | U |
| Requested Procedure Code Sequence | 0032,1064 | SQ | U |
| >Code Value | 0008,0100 | SH | U |
| >Coding Scheme Designator | 0008,0102 | SH | U |
| >Code Meaning | 0008,0104 | LO | U |
| Study Instance UID | 0020,000D | UI | S,U |
| Requested Procedure Priority | 0040,1003 | SH | U |
| Patient Transport Arrangements | 0040,1004 | LO | U |
| Imaging Service Request - Attribute Name | Tag | VR | Types of Matching |
| Accession Number | 0008,0050 | SH | S,U |
| Requesting Physician | 0032,1032 | PN | U |
| Referring Physician's Name | 0008,0090 | PN | U |
| Placer Order Number | 0040,2016 | LO | U |
| Filler Order Number | 0040,2017 | LO | U |
| Reason for Imaging Service Request | 0040,2001 | LO | U |
| Order Entered By | 0040,2008 | PN | U |
| Order Enterer's Location | 0040,2009 | SH | U |
| Order Callback Phone Number | 0040,2010 | SH | U |

| Visit Identification - Attribute Name | Tag | VR | Types of Matching |
|--|-----------|----|-------------------|
| Admission ID | 0038,0010 | LO | U |
| Issuer of Admission ID | 0038,0011 | LO | U |
| Visit Status - Attribute Name | Tag | VR | Types of Matching |
| Current Patient Location | 0030,0300 | LO | U |
| Patient Identification - Attribute Name | Tag | VR | Types of Matching |
| Patient's Name | 0010,0010 | PN | S,W,U |
| Patient ID | 0010,0020 | LO | S,U |
| Issuer of Patient ID | 0010,0021 | LO | S,U |
| Ethnic Group | 0010,2016 | SH | U |
| Patient Demographics - Attribute Name | Tag | VR | Types of Matching |
| Patient's Birth Date | 0010,0030 | DA | S,R,U |
| Patient's Sex | 0010,0040 | CS | U |
| Confidentiality Constraint on Patient Data Description | 0040,3001 | LO | U |
| Region of Residence | 0010,2152 | LO | U |
| Military Rank | 0010,1080 | LO | U |
| Patient Medical - Attribute Name | Tag | VR | Types of Matching |
| Patient State | 0038,0500 | LO | U |
| Pregnancy Status | 0010,21C0 | US | U |
| Medical Alerts | 0010,2000 | LO | U |
| Allergies | 0010,2110 | LO | U |

Types of Matching:

The types of Matching supported by the C-FIND SCP. An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "W" indicates wildcard matching, a 'U' indicates Universal Matching (i.e. return keys), and an 'L' indicates that UID lists are supported for matching.

Vitreia Connection MWL Server C-FIND Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|--------------------|------------|---|
| Success | Success | 0000 | Matching is complete. No final identifier is supplied. |
| Error | Processing Failure | 0110 | This status is returned due to internal errors such as a processing failure response on a query of the Vitrea |

| | | | |
|---------|--|------|---|
| | | | Connection database. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Cancel | Matching terminated due to Cancel Request | FE00 | The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.. Cancel indication message is output to the Service Log. |
| Pending | Matches are continuing and current match is supplied | FF00 | Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. Pending indication message is output to the Service Log. |

Vitreia Connection MWL Server Service Communication Failure Behavior

| Exception | Behavior |
|--|---|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. the Query/Retrieve Server SCP AE is waiting for the next C-FIND or C-MOVE Request on an open Association but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). I.e. The Query/Retrieve Server AE is waiting for the next message PDU but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. |
| Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure) | Error message is output to the Service Log. |

2.2.4 Vitreia Connection Connect Server AE Specification

2.2.4.1 SOP Classes

Vitreia Connection Connect Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitreia Connection Connect Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-----------------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | Yes |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | Yes |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | Yes |

2.2.4.2 Association Establishment Policy

2.2.4.2.1 General

The Vitrea Connection Connect Server AE can both accept and propose Association Requests. The Vitrea Connection Query/Retrieve Server AE will accept Association Requests for the Verification and Query/Retrieve Services. It will propose Associations for Verification and Query/Retrieve Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection Query/Retrieve Server AE

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

2.2.4.2.2 Number of Associations

Vitrea Connection Connect Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the attribute "MaxClients" in the Application Server configuration.

Number of Associations accepted for Vitrea Connection Query/Retrieve Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.4.2.3 Asynchronous Nature

Vitrea Connection Connect Server 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).

Asynchronous Nature as SCP for Vitrea Connection Query/Retrieve Server AE

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

2.2.4.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection Connect Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.4.3 Association Initiation Policy

2.2.4.3.1 Activity – Query/Retrieve Requested by an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection Connect AE will initiate a new Association when a valid C-FIND or C-MOVE Request has been performed by an external Peer. The Connect AE will send the Association Request one or more C-FIND or C-MOVE destination, and upon successful negotiation of the required Presentation Context original C-FIND or C-MOVE request will be forwarded on the new Association. The Association will be released when all the C-FIND or C-MOVE responses have been received.

Vitrea Connection Connect AE will propose Presentation Contexts as shown in the following table:

Proposed Presentation Contexts by the Vitrea Connection Query/Retrieve Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|------------------------|-------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |

| | | | |
|---|-----------------------------|-----|-----|
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | Yes |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | Yes |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | Yes |

Vitrea Connection Connect Server AE Communication Failure Behavior

| Exception | Behavior |
|--|--|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the C-FIND or C-MOVE Response. Error indication message is output to the Service Logs. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the C-FIND or C-MOVE Response. Error indication message is output to the Service Logs. |
| Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure). | The Association is aborted by issuing a DICOM A-ABORT. The appropriate Status will be sent in the C-FIND or C-MOVE Response. Error indication message is output to the Service Logs. |

2.2.4.4 Association Acceptance Policy

2.2.4.4.1 Activity - Handling Query and Retrieval Requests

Description and Sequencing of Activities

The Connect Server AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted, the Association Request itself is rejected. It can be configured to only accept Associations from certain Application Entities.

If Connect Server AE receives a query (C-FIND) request, the response(s) will be sent over the same Association used to send the C-FIND-Request.

Connect Server AE receives a retrieval (C-MOVE) request, the responses will be sent over the same Association used to send the C-MOVE-Request.

The Connect Server AE will forward the query or retrieval request to a newly created Association and report in the C-FIND or C-MOVE-Response any success or failure status of each forwarded request.

The Connect Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|------------------------|----------|--------------------------|---|
| 2 - rejected transient | provider | 2 - local-limit exceeded | The (configurable) maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time. |
| 1 - rejected | user | 2 - application | The Association request contained an unsupported |

| | | | |
|------------------------|------|-------------------------------------|---|
| permanent | | context name not supported | Application Context Name. An association request with the same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitreia Connection Connect AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitrea Connection Query/Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
|---|-----------------------------|--|--|------|------------|
| Name | UID | Name List | UID List | | |
| Verification SOP Class | 1.2.840.10008.1.1 | Implicit VR Little Endian Explicit VR Little Endian | 1.2.840.10008.1.2 1.2.840.10008.1.2.1 | SCP | None |
| Patient Root Q/R Information Model – FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian Explicit VR Little Endian | 1.2.840.10008.1.2 1.2.840.10008.1.2.1 | SCP | Relational |
| Patient Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian Explicit VR Little Endian | 1.2.840.10008.1.2 1.2.840.10008.1.2.1 | SCP | Relational |
| Study Root Q/R Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian Explicit VR Little Endian | 1.2.840.10008.1.2 1.2.840.10008.1.2.1 | SCP | Relational |
| Study Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian Explicit VR Little Endian | 1.2.840.10008.1.2 1.2.840.10008.1.2.1 | SCP | Relational |

If the Called AET is not corresponding to the actual Connect Server AET, only the Presentation Context for the Verification SOP Class will be accepted.

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Vitreia Connection Connect Server provides standard conformance to the DICOM Verification Service Class as an SCP. The status code for the C-ECHO is described in the following table:

Vitreia Connection Query/Retrieve Server C-Echo Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------|------------|--------------------------------|
| Success | Success | 0000 | The C-ECHO request is accepted |

Specific Conformance for Query SOP Classes

The Connect Server forwards query requests without modification.

Specific Conformance for Retrieve SOP Classes

The Connect Server forwards retrieve requests without modification.

2.2.5 Vitrea Connection WADO Server AE Specification

Vitrea Connection includes a WADO Server Application Entity that can be used to provide access to DICOM objects via a web based interface. The following table describes the configurable attributes of the WADO Server AE

WADO Configuration Parameters

| Parameter | Configurable (Yes/No) | Default Value |
|---------------|-----------------------|---|
| Listening URL | Yes | http://localhost:8080/WADO |

The following table describes the supported MIME types of the WADO Server AE.

WADO MIME TYPES

| MIME Type | Description |
|-------------------|---|
| application/dicom | The body content will be a "Part 10 File" that includes the meta-header. The returned DICOM object will be encoded using one the transfer syntaxes specified in the transfer syntax query parameter as defined below. By default, the transfer syntax shall be "Explicit VR Little Endian". |
| image/jpeg | The body content will be a JPEG image. The size and quality of the image will depend on the query parameters as defined below. |

The following table describes the query parameters that can be passed to the WADO Server AE.

WADO Query Parameters

| Query Parameters | Required (Yes/No) | Description |
|------------------|-------------------|---|
| requestType | Yes | The value must be "WADO". |
| studyUID | Yes | The Study Instance UID identifying the DICOM object. The value must be present and encoded as a UID, except that it shall not be padded to even length with a NULL character. |
| seriesUID | Yes | The Series Instance UID identifying the DICOM object. The value must be present and encoded as a UID, except that it shall not be padded to even length with a NULL character. |
| objectUID | No | The SOP Instance UID identifying the DICOM object. If present, the value must be encoded as a UID, except that it shall not be padded to even length with a NULL character. If not present, the service will return a representative object (i.e. middle) from the series and study that are specified. |
| contentType | No | Can be one of application/dicom or image/jpeg. |

| | | |
|----------------|----|---|
| transferSyntax | No | The Transfer Syntax to be used within the DICOM object. This parameter is optional and shall not be present if the contentType is other than application/dicom. |
| rows | No | The maximum number of rows returned. Only valid for contentType image/jpeg. |
| columns | No | The maximum number of columns returned. Only valid for contentType image/jpeg. |

2.2.5.1 Association Initiation Policy

2.2.5.1.1 Activity - Retrieve Images Requested by an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection WADO AE will initiate a new Association when a valid WADO Request has been performed by an external Peer but one or more of the requested objects is not found in local storage. The WADO AE will send an Association Request to the AE that originally stored the objects, and upon successful negotiation of the required Presentation Context a retrieve request is started. The Association will be released when all the images have been sent.

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. The default Transfer Syntaxes are the Transfer Syntax of the originally received instance plus the [Default TS List].

The following Transfer Syntaxes are represented by the term [Default TS List]:

[Default TS List] Transfer Syntax List for Vitrea Connection Retrieve Server AE

| Name List | UID List |
|---------------------------|---------------------|
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

Vitrea Connection Query/Retrieve AE will propose Presentation Contexts as shown in the following table:

Proposed Presentation Contexts by the Vitrea Connection Retrieve Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|---|-----------------------------|-------------------|------|------------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |
| Patient Root Q/R Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | [Default TS List] | SCU | Relational |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | [Default TS List] | SCU | Relational |

SOP Specific Conformance

Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

2.2.6 Vitrea Connection XDS Publish Server AE Specification

2.2.6.1 SOP Classes

Vitrea Connection XDS Publish Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitrea Connection XDS Publish Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|--------------------------|-------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| [Default SOP Class List] | | No | Yes |

2.2.6.2 Association Establishment Policy

2.2.6.2.1 General

The Vitrea Connection XDS Publish Server AE can accept Association Requests. The Vitrea Connection XDS Publish Server AE will accept Association Requests for the Verification and Storage Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection XDS Publish Server AE

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

2.2.6.2.2 Number of Associations

Vitrea Connection XDS Publish Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the configuration GUI.

Table 4. Number of Associations accepted by Vitrea Connection XDS Publish Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.6.2.3 Asynchronous Nature

Vitrea Connection XDS Publish Server 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).

Asynchronous Nature as SCP for Vitrea Connection XDS Publish Server AE

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

2.2.6.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection XDS Publish Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.6.3 Association Acceptance Policy

2.2.6.3.1 Activity - Receive Images

Description and Sequencing of Activities

A remote peer DICOM Application Entity, acting as a Storage SCU, establishes an association with Vitrea Connection XDS Publish Server that accepts these Associations for the purpose of receiving supported SOP Class Instances requests.

In the default configuration any Calling and Called AET will be accepted. If the Called AET does not correspond to the actual XDS Publish Server AET, only a Presentation Context for the Verification SOP Class will be accepted and the SCU can only verify the DICOM Association, but cannot invoke any other related DICOM service.

The XDS Publish Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|------------------------|----------|--|---|
| 2 - rejected transient | provider | 2 - local-limit exceeded | The (configurable) maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time. |
| 1 - rejected permanent | user | 2 - application context name not supported | The Association request contained an unsupported Application Context Name. An association request with the same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitrea Connection XDS Publish Server AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitrea Connection XDS Publish Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|--------------------------|-------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCP | None |
| [Default SOP Class List] | | | SCP | None |

The preferred (default) Transfer Syntax is Explicit VR Little Endian.

If the Called AET is not corresponding to the actual XDS Publish Server AET, only the Presentation Context for the Verification SOP Class will be accepted.

SOP Specific Conformance

Specific Conformance for the Verification SOP Class

Vitrea Connection XDS Publish Server provides standard conformance to the DICOM Verification Service Class as an SCP. The status code for the C-ECHO is described in the following table:

Vitrea Connection XDS Publish Server C-Echo Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------|------------|--------------------------------|
| Success | Success | 0000 | The C-ECHO request is accepted |

Specific Conformance for the Storage SOP Classes

The associated activity with the XDS Publish Server is the creation of Key Object Selection (KOS) documents and the publication of those documents to an XDS Document Repository. After the document has been published, the XDS Publish Server may purge the stored images.

The Vitrea Connection XDS Publish Server 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.

XDS Publish Server AE C-STORE Response

Vitrea Connection XDS Publish Server C-STORE 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 Vitrea Connection database or a file system operation. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Error | Duplicate SOP Instance UID | D000 | This status is returned if the instance already exists in the database and the Vitrea Connection XDS Publish Server AE is configured to refuse duplicate instances. The appropriate Status will be sent in the C-STORE Response. Error 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. |

Vitrea Connection XDS Publish Server Service Communication Failure Behavior

| Exception | Behavior |
|---|--|
| Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The XDS Publish Server SCP AE is | The Association is aborted by issuing a DICOM A-ABORT. |

| | |
|--|---|
| waiting for the next C-STORE Request on an open Association but the timer expires. | Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received, they are maintained in the database. They are not automatically discarded because of a later failure. Error message is output to the Service Log. |
| Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout). I.e. The XDS Publish Server SCP AE is waiting for the next C-STORE Data Set PDU but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. If a C-STORE Data Set has not been fully received, the data already received is discarded. If some Composite SOP Instances have already been successfully received over the Association, they are maintained in the database. Error message is output to the Service Log. |
| Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure) | Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received, they are maintained in the database. They are not automatically discarded because of a later failure. |

2.2.7 Vitrea Connection Proxy Server AE Specification

2.2.7.1 SOP Classes

Vitrea Connection Proxy Server Application Entity provides Standard Conformance to the following SOP Classes:

SOP Classes for Vitrea Connection Proxy Server AE

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|-----------------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | Yes |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | Yes |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | Yes |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | Yes |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Yes | Yes |
| [Default SOP Class List] | | Yes | Yes |

2.2.7.2 Association Establishment Policy

2.2.7.2.1 General

The Vitrea Connection Proxy Server AE can both accept and propose Association Requests. The Vitrea Connection Storage Server AE will accept and propose Association Requests for the Verification, Storage, Query/Retrieve and Modality Worklist Query Services.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

DICOM application context name for Vitrea Connection Proxy Server AE

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

2.2.7.2.2 Number of Associations

Vitreia Connection Proxy Server can support multiple simultaneous Associations requested by peer AEs. Default is 10. This value can be configured through the configuration GUI.

Number of Associations accepted by Vitrea Connection Proxy Server AE

| | |
|---|-------------------|
| Maximum number of simultaneous Associations | 10 (Configurable) |
|---|-------------------|

2.2.7.2.3 Asynchronous Nature

Vitreia Connection Proxy Server 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).

Asynchronous Nature as SCP for Vitrea Connection Proxy Server AE

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

2.2.7.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

DICOM Implementation Class and Version for Vitrea Connection Proxy Server AE

| | |
|-----------------------------|-------------------|
| Implementation Class UID | 2.16.124.113638.2 |
| Implementation Version Name | rialto-dcm4che2 |

2.2.7.3 Association Acceptance Policy

2.2.7.3.1 Activity - Receive Images

Description and Sequencing of Activities

A remote peer DICOM Application Entity, acting as an SCU, establishes an association with the Proxy Server AE that accepts these Associations for the purpose of receiving supported SOP Class Instances requests.

In the default configuration any Calling and Called AET will be accepted. If the Called AET does not correspond to the actual Proxy Server AET, only a Presentation Context for the Verification SOP Class will be accepted and the SCU can only verify the DICOM association but cannot invoke any other related DICOM service.

The Proxy Server AE may reject Association attempts as shown in the table below. The Result, Source and Reason / Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8).

Association Rejection Reasons

| Result | Source | Reason / Diag | Description |
|------------------------|----------|----------------------------------|---|
| 2 - rejected transient | provider | 2 - local-limit exceeded | The (configurable) maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed at a later time. |
| 1 - rejected | user | 2 - application context name not | The Association request contained an unsupported Application Context Name. An association request with the |

| | | | |
|------------------------|------|-------------------------------------|---|
| permanent | | supported | same parameters will NOT succeed at a later time. |
| 1 - rejected permanent | user | 3 – calling AE title not recognized | The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed at a later time unless configuration changes are made. |

Accepted Presentation Contexts

Vitreia Connection Proxy Server AE will accept Presentation Contexts as shown in the following table:

Accepted Presentation Contexts for Vitrea Connection Proxy Server AE

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|--|-----------------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCP | None |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | [Default TS List] | SCP | None |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | [Default TS List] | SCP | None |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | [Default TS List] | SCP | None |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | [Default TS List] | SCP | None |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | [Default TS List] | SCP | None |
| [Default SOP Class List] | | | SCP | None |

The preferred (default) Transfer Syntax is Explicit VR Little Endian.

SOP Specific Conformance

Vitreia Connection Proxy Server AE will forward the request to a single remote DICOM AE and return the response received from the remote DICOM AE. Therefore, all SOP specific conformances are inherited from the remote DICOM AE.

2.2.7.4 Association Initiation Policy

2.2.7.4.1 Activity – Synchronize Objects with an External Peer AE

Description and Sequencing of Activities

The Vitrea Connection Proxy Server AE will initiate a new Association when it receives an Association request from a remote DICOM AE.

Proposed Presentation Contexts

A list of Transfer Syntaxes can be configured for each AET. Vitrea Connection Proxy Server AE will propose Presentation Contexts as shown in the following table:

| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
|------------------------|-------------------|-------------------|------|-----------|
| Name | UID | | | |
| Verification SOP Class | 1.2.840.10008.1.1 | [Default TS List] | SCU | None |

| | | | | |
|--|-----------------------------|-------------------|-----|------|
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | [Default TS List] | SCU | None |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | [Default TS List] | SCU | None |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | [Default TS List] | SCU | None |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.2 | [Default TS List] | SCU | None |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | [Default TS List] | SCU | None |
| [Default SOP Class List] | | | SCU | None |

SOP Specific Conformance

Vitreia Connection Proxy Server AE will forward the request to a single remote DICOM AE and return the response received from the remote DICOM AE. Therefore, all SOP specific conformances are inherited from the remote DICOM AE.

2.3 Network Interfaces

2.3.1 Supported Communication Stacks

DICOM Upper Layer over TCP/IP is supported.

2.3.1.1 TCP/IP Stack

Vitreia Connection inherits its TCP/IP stack from the installed Java Runtime Environment.

2.3.2 Physical Network Interface

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

2.4 Configuration

2.4.1 AE Title/Presentation Address Mapping

2.4.1.1 Local AE Titles

The local AE Titles and TCP ports are configurable through the Vitreia Connection configuration interface.

AE Title Configuration Table

| Application Entity | Default AE Title | Default TCP/IP Port |
|--|------------------|---------------------|
| Vitreia Connection Storage Server | RIALTO | 11113 |
| Vitreia Connection Query/Retrieve Server | RIALTO | 11112 |
| Vitreia Connection XDS Publish Server | RIALTO | 11111 |
| Vitreia Connection WADO Server | RIALTO | 8080 |
| Vitreia Connection Connect Server | RIALTO | 11114 |
| Vitreia Connection MWL Server | RIALTO | 11115 |
| Vitreia Connection Proxy Server | RIALTO | 11116 |

2.4.1.2 Remote AE Titles

Remote AE Titles, TCP/IP Addresses and ports can be configured through the Vitrea Connection configuration interface. In the default configuration, Association Requests with any Calling AET will be accepted.

2.4.2 Configuration Parameters

The following table shows the Vitrea Connection configuration parameters relevant to DICOM communication. Refer to the Vitrea Connection Service Manual for details on general configuration capabilities.

Configuration Parameter Table

| Parameter | Configurable (Yes/No) | Default Value |
|--|-----------------------|---------------|
| General | | |
| Maximum number of simultaneous Associations | Yes | 10 |
| Time-out waiting for A-ASSOCIATE RQ on open TCP/IP connection (ARTIM timeout) | Yes | 5s |
| Time-out waiting on an open association for the next message (DIMSE timeout) | Yes | 1h |
| Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout) | No | no timeout |
| Time-out waiting on an open association for the next message after sending A-RELEASE RSP or A-ABORT RQ (Closing timeout) | Yes | 500ms |
| Maximum PDU size the AE can receive | Yes | 16352 |
| Maximum PDU size the AE can send | No | 65535 |
| Pack Command and Data PDVs in one PDU | Yes | false |
| Support for the Basic TLS Secure Transport Connection Profile | Yes | off |
| Accepted TLS Ciphers | Yes | - |

3 Media Interchange

Vitreia Connection does not support Media Storage.

4 Support of Extended Character Sets

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

5 Security

5.1 Security Profiles

Vitreia Connection supports secure DICOM communication in conformance with the Basic TLS Secure Transport Connection Profile. At default configuration, the TLS option is deactivated.

5.2 Association Level Security

Vitreia Connection can be configured to accept Association Requests from only 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 corresponding to any of the actual DICOM server AETs, only acceptance of the Presentation Context for Verification SOP Class will be returned in the Association Acceptance Response (A-ASSOCIATE AC).

5.3 Application Level Security

The Vitreia Connection web based administration module can be configured to require user authentication in order to access the user interface functionalities.