DICOM
Conformance Statement

VioArchive 2.7

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Overview

VioArchive 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
Transfer			
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
Autorefraction 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
Hardcopy Color Image Storage (Retired)	Yes	Yes	No
Hardcopy Grayscale Image Storage (Retired)	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
Nuclear Medicine Image Storage (Retired)	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

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
Ultrasound Image Storage (Retired)	Yes	Yes	No
Ultrasound Multi-frame Storage	Yes	Yes	No
Ultrasound Multi-frame Storage (Retired)	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
VL Image Storage (Retired)	Yes	Yes	No
VL Microscopic Image Storage	Yes	Yes	No
VL Multiframe Image Storage (Retired)	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
X-Ray Angiographic Bi-Plane Image Storage (Retired)	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

Table of Contents

1 Introduction

1.1 Revision History

Document Version	Date	Author	Description
1.0	28 September 2017	Vital Images	Released with VioArchive 2.7.

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 VioArchive 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 VioArchive 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. Karos Health 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- 3.20, 2017c
- [IHE-TF] IHE Radiology Technical Framework, HIMSS/RSNA, Vol. I – IV, Revision 16.0, August 4, 2017
- [IHE-TF] IHE IT Infrastructure Technical Framework, HIMSS/RSNA, Vol. I – IV, Revision 14, July 21, 2017

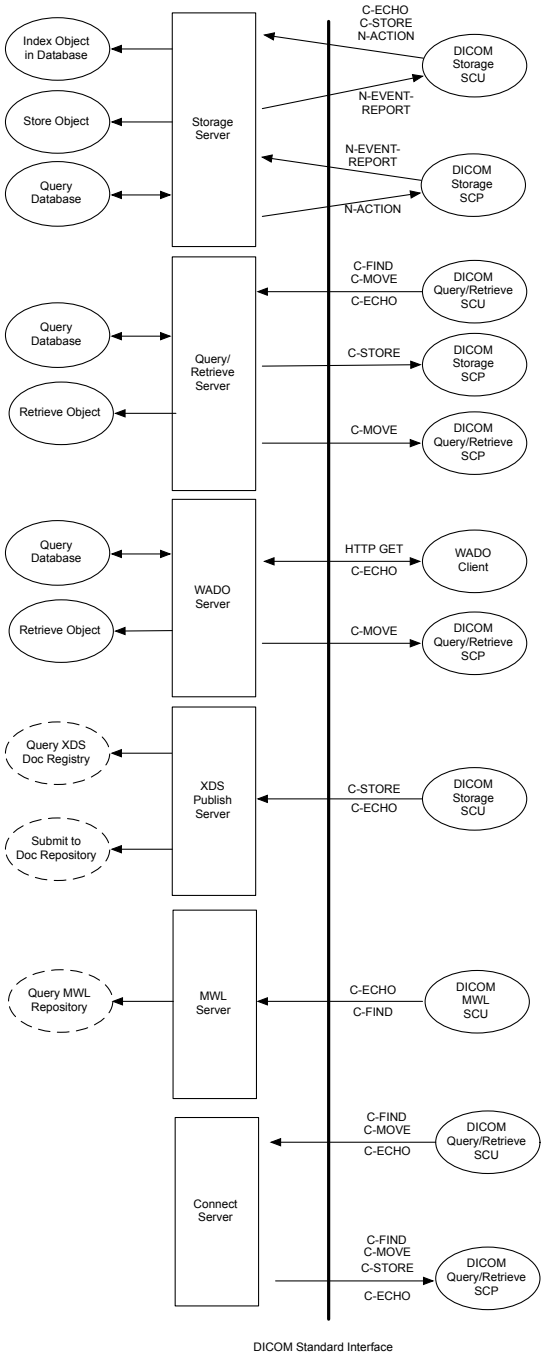
2 Networking

2.1 Implementation Model

2.1.1 Application Data Flow

VioArchive 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.

2.1.2 Functional Definitions of AEs

2.1.2.1 Functional Definition of VioArchive Storage Server AE

VioArchive 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. The Storage Server AE stores only the Study Instance UID, Series Instance UID and SOP Instance UIDs of the objects that it receives.

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 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 VioArchive 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 VioArchive Query/Retrieve Server AE

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

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

The VioArchive 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

VioArchive 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

VioArchive 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

VioArchive 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

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

The MWL 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.

2.2 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
VOI LUT Box (Retired)	1.2.840.10008.5.1.1.22	[Default TS List]
Hardcopy Grayscale Image Storage (Retired)	1.2.840.10008.5.1.1.29	[Extended TS List]
Hardcopy Color Image Storage SOP Class (Retired)	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]
Ultrasound Multi-frame Image Storage (Retired)	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]
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	[Extended TS List]
Ultrasound Image Storage (Retired)	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]
X-Ray Angiographic Bi-Plane Image Storage (Retired)	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]
VL Image Storage (Retired)	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]
VL Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	[Extended TS List]
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	[Default TS List]
Autorefraction 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]
Comeal 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 VioArchive Storage Server AE Specification

2.2.1.1 SOP Classes

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

SOP Classes for VioArchive 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 VioArchive Storage Server AE can both accept and propose Association Requests. The VioArchive 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 VioArchive Storage Server AE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.1.2.2 Number of Associations

VioArchive 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 VioArchive Storage Server AE

Maximum number of simultaneous Associations	10 (Configurable)

2.2.1.2.3 Asynchronous Nature

VioArchive 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 VioArchive 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 VioArchive 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 VioArchive 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

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

Accepted Presentation Contexts for VioArchive Storage Server AE

Abstract Syntax			

Name	UID	Transfer Syntax	Role	Ext. Neg.
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

VioArchive 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:

VioArchive 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 VioArchive Storage Server AE will return a failure status if it is unable to store the received instance(s).

The VioArchive 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 VioArchive 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 VioArchive 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 VioArchive Storage Server database to support query and retrieval requests.

By default, the VioArchive 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 VioArchive Storage Server AE apply the following transcoding between transfer syntaxes when storing images. If the VioArchive Storage Server AE is unable to transcode an image that is being stored, the VioArchive Storage Server AE will store the image in its original format.

As an option, the VioArchive 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 VioArchive 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

VioArchive 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 VioArchive 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 VioArchive 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.

VioArchive 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 VioArchive 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 VioArchive Storage Server has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the peer AE system.

The VioArchive 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 VioArchive query/retrieve Server repository. As long as the Composite SOP Instance UIDs are present in the database, the VioArchive Storage Server AE will consider those Composite SOP Instance UIDs to be successfully archived. The VioArchive 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 VioArchive 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 VioArchive Storage Server AE will request a new Association with the peer AE that made the original N-ACTION Request.

The VioArchive 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 VioArchive 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 VioArchive Storage Server AE will not commit to responsibility for such SOP Instances.

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

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

VioArchive 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 VioArchive 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:

VioArchive 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 VioArchive Storage Server behavior in case of communication failure:

VioArchive 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 Association but the timer expires.	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, they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Log.
Timeout expiry for an expected DICOM PDU or TCP/ IP packet (Low-level timeout).	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, they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Request will still be fully processed.

	Error indication message is output to the Service Log.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure).	The TCP/IP socket is closed. 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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Log.

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 VioArchive 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. VioArchive 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 VioArchive 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 VioArchive 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. VioArchive 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 VioArchive Query/Retrieve Server AE Specification

2.2.2.1 SOP Classes

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

SOP Classes for VioArchive 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 VioArchive Query/Retrieve Server AE can both accept and propose Association Requests. The VioArchive 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 VioArchive Query/Retrieve Server AE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.2.2.2 Number of Associations

VioArchive 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 VioArchive Query/Retrieve Server AE

Maximum number of simultaneous Associations	10 (Configurable)

2.2.2.2.3 Asynchronous Nature

VioArchive 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 VioArchive 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 VioArchive 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 VioArchive 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 VioArchive 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 VioArchive Storage Server AE, the VioArchive Query/Retrieve Server AE will attempt the following transcodings.

Transcode from Transfer Syntax	Transcode to Transfer Syntax
1.2.840.10008.1.2.4.80 (JPEG-LS Lossless Image Compression)	1.2.840.10008.1.2 (Implicit VR Little Endian)

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].

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

Proposed Presentation Contexts by the VioArchive 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:

VioArchive 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.

VioArchive 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 VioArchive 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 VioArchive 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

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

Proposed Presentation Contexts by the VioArchive 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 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

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

Accepted Presentation Contexts for VioArchive 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	None
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	None
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 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

VioArchive 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:

VioArchive 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	0040,033	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 VioArchive is configured to recognize that Issuer as a Cross-Enterprise Issuer, VioArchive 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.

VioArchive 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 VioArchive 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.

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.

VioArchive 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 VioArchive 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.

VioArchive Query/Retrieve 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.

2.2.3 VioArchive MWL Server AE Specification

2.2.3.1 SOP Classes

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

SOP Classes for VioArchive 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 VioArchive MWL Server AE can both accept and propose Association Requests. The VioArchive 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 VioArchive Query/Retrieve Server AE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.3.2.2 Number of Associations

VioArchive 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 VioArchive MWL Server AE

Maximum number of simultaneous Associations	10 (Configurable)

2.2.3.2.3 Asynchronous Nature

VioArchive 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 VioArchive 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 VioArchive 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

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

Accepted Presentation Contexts for VioArchive 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
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

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

VioArchive 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:

VioArchive 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.

VioArchive 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 VioArchive 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.

VioArchive 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 VioArchive Connect Server AE Specification

2.2.4.1 SOP Classes

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

SOP Classes for VioArchive 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 VioArchive Connect Server AE can both accept and propose Association Requests. The VioArchive 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 VioArchive Query/Retrieve Server AE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.4.2.2 Number of Associations

VioArchive 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 VioArchive Query/Retrieve Server AE

Maximum number of simultaneous Associations	10 (Configurable)

2.2.4.2.3 Asynchronous Nature

VioArchive 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 VioArchive 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 VioArchive 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 VioArchive 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.

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

Proposed Presentation Contexts by the VioArchive 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

VioArchive 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 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

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

Accepted Presentation Contexts for VioArchive 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 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

VioArchive 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:

VioArchive 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 VioArchive WADO Server AE Specification

VioArchive 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 VioArchive 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 VioArchive 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

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

Proposed Presentation Contexts by the VioArchive 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 VioArchive XDS Publish Server AE Specification

2.2.6.1 SOP Classes

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

SOP Classes for VioArchive 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 VioArchive XDS Publish Server AE can accept Association Requests. The VioArchive 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 VioArchive XDS Publish Server AE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.6.2.2 Number of Associations

VioArchive 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 VioArchive XDS Publish Server AE

Maximum number of simultaneous Associations	10 (Configurable)

2.2.6.2.3 Asynchronous Nature

VioArchive 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 VioArchive 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 VioArchive 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 VioArchive 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

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

Accepted Presentation Contexts for VioArchive 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

VioArchive 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:

VioArchive 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 VioArchive 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

VioArchive 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 VioArchive 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 VioArchive 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.

VioArchive 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 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 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.

2.3 Network Interfaces

2.3.1 Supported Communication Stacks

DICOM Upper Layer over TCP/IP is supported.

2.3.1.1 TCP/IP Stack

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

2.3.2 Physical Network Interface

VioArchive 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 VioArchive configuration interface.

AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
VioArchive Storage Server	RIALTO	4104
VioArchive Query/Retrieve Server	RIALTO	4104
VioArchive XDS Publish Server	RIALTO	4106
VioArchive WADO Server	RIALTO	8080

2.4.1.2 Remote AE Titles

Remote AE Titles, TCP/IP Addresses and ports can be configured through the VioArchive 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 VioArchive configuration parameters relevant to DICOM communication. Refer to the VioArchive 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

VioArchive does not support Media Storage.

4 Support of Extended Character Sets

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

5 Security

5.1 Security Profiles

VioArchive 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

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