NilRead 5.1.x DICOM Conformance Statement

Company Name: Hyland
Product Name: NilRead Enterprise Viewer
Product Version: 5.1.X
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1 Conformance Statement Overview

1.1 Overview

The NilRead enterprise viewer implements various DICOM native or web-based services that allow NilRead to view, receive, query/retrieve, send/export DICOM images and data sets from/to various DICOM network storage devices, removable medias or print to a network hardcopy device. This conformance claim refers to the conformance claim for the NilRead enterprise viewer for all such services.

1.2 Image storage SOP Classes:

The NilRead enterprise viewer is a level 2 SCP that is capable of storing, sending, querying, retrieving and displaying the following data:

- 12-lead ECG Waveform Storage
- Ambulatory ECG Waveform Storage
- Basic Text SR Storage
- Breast Projection X-Ray Image Storage - For Presentation
- Breast Projection X-Ray Image Storage - For Processing
- Breast Tomosynthesis Image Storage
- Cardiac Electrophysiology Waveform Storage
- Chest CAD SR Storage
- Color Softcopy Presentation State Storage SOP Class
- Comprehensive SR Storage
- Computed Radiography Image Storage
- CT Image Storage
- Digital Intra-oral X-Ray Image Storage – For Presentation
- Digital Intra-oral X-Ray Image Storage – For Processing
- Digital Mammography X-Ray Image Storage – For Presentation
- Digital Mammography X-Ray Image Storage – For Processing
- Digital X-Ray Image Storage – For Presentation
- Digital X-Ray Image Storage – For Processing
- Encapsulated CDA Storage
- Encapsulated PDF Storage
- Encapsulated STL Storage
- Enhanced CT Image Storage
- Enhanced MR Image Storage
- Enhanced SR Storage
- Enhanced US Volume Storage
- Enhanced XA Image Storage
- Enhanced XRF Image Storage
- General ECG Waveform Storage
- Grayscale Softcopy Presentation State Storage SOP Class

- Hardcopy Grayscale Image Storage SOP Class (Retired)
- Hardcopy Color Image Storage SOP Class (Retired)
- Hemodynamic Waveform Storage
- Key Object Selection Document Storage
- Mammography CAD SR Storage
- MR Image Storage
- Multi-frame Grayscale Byte Secondary Capture Image Storage
- Multi-frame Grayscale Word Secondary Capture Image Storage
- Multi-frame True Color Secondary Capture Image Storage
- Nuclear Medicine Image Storage (Retired)
- Nuclear Medicine Image Storage
- Ophthalmic Photography 16 Bit Image Storage
- Ophthalmic Photography 8 Bit Image Storage
- Ophthalmic Tomography Image Storage
- Positron Emission Tomography Image Storage
- RT Dose Storage
- RT Image Storage
- RT Ion Plan Storage
- RT Plan Storage
- RT Structure Set Storage
- Secondary Capture Image Storage
- Spatial Registration Storage
- Ultrasound Image Storage
- Ultrasound Image Storage (Retired)
- Ultrasound Multi-frame Image Storage
- Ultrasound Multi-frame Image Storage (Retired)
- Video Endoscopic Image Storage
- Video Microscopic Image Storage
- Video Photographic Image Storage
- VL Endoscopic Image Storage
- VL Microscopic Image Storage
- VL Photographic Image Storage
- VL Slide-Coordinates Microscopic Image Storage
- VL Whole Slide Microscopy Image Storage
- Wide Field Ophthalmic Photography Stereographic Projection Image Storage
- X-Ray 3D Angiographic Image Storage
- X-Ray 3D Craniofacial Image Storage
- X-Ray Angiographic Bi-Plane Image Storage (Retired)
- X-Ray Angiographic Image Storage
- X-Ray Radiation Dose SR Storage
- X-Ray Radiofluoroscopic Image Storage
- Stereometric Relationship Storage

1.2.1 Image pixel interpretations:

- Grayscale images (MONOCHROME1, MONOCHROME2)
- Palette color (PALETTE COLOR)
- Color (RGB, YBR_FULL, YBR_FULL_422, YBR_PARTIAL_422)

1.2.2 Transfer Syntaxes:

- Implicit VR Little Endian
- Explicit VR Little Endian
- Explicit VR Big Endian
- JPEG Lossy coding process 1, 2, 4
- JPEG Lossless coding process 14
- JPEG 2000 Lossy and Lossless
- RLE Lossless
- MPEG2 Main Profile, Main Level
- MPEG-4 AVC/H.264 High Profile / Level 4.1
- MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1

Table 1-1 Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
12-lead ECG Waveform Storage	Stored and viewed	Yes
Ambulatory ECG Waveform Storage	Stored and viewed	Yes
Basic Text SR Storage	Stored and viewed	Yes
Breast Projection X-Ray Image Storage - For Presentation	Stored and viewed	Yes
Breast Projection X-Ray Image Storage - For Processing	Stored and viewed	Yes
Breast Tomosynthesis Image Storage	Stored and viewed	Yes
Cardiac Electrophysiology Waveform Storage	Stored and viewed	Yes
Chest CAD SR Storage	Stored and viewed	Yes
Color Softcopy Presentation State Storage SOP Class	Stored and viewed	Yes
Comprehensive SR Storage	Stored and viewed	Yes
Computed Radiography Image Storage	Stored and viewed	Yes
CT Image Storage	Stored and viewed	Yes
Digital Intra-oral X-Ray Image Storage – For Presentation	Stored and viewed	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Digital Intra-oral X-Ray Image Storage – For Processing	Stored and viewed	Yes
Digital Mammography X-Ray Image Storage – For Presentation	Stored and viewed	Yes
Digital Mammography X-Ray Image Storage – For Processing	Stored and viewed	Yes
Digital X-Ray Image Storage – For Presentation	Stored and viewed	Yes
Digital X-Ray Image Storage – For Processing	Stored and viewed	Yes
Encapsulated CDA Storage	Stored and viewed	Yes
Encapsulated PDF Storage	Stored and viewed	Yes
Encapsulated STL Storage	Stored and viewed	Yes
Enhanced CT Image Storage	Stored and viewed	Yes
Enhanced MR Image Storage	Stored and viewed	Yes
Enhanced SR Storage	Stored and viewed	Yes
Enhanced US Volume Storage	Stored and viewed	Yes
Enhanced XA Image Storage	Stored and viewed	Yes
Enhanced XRF Image Storage	Stored and viewed	Yes
General ECG Waveform Storage	Stored and viewed	Yes
Grayscale Softcopy Presentation State Storage SOP Class	Stored and viewed	Yes
Hardcopy Grayscale Image Storage SOP Class (Retired)	Stored and viewed	Yes
Hardcopy Color Image Storage SOP Class (Retired)	Stored and viewed	Yes
Hemodynamic Waveform Storage	Stored and viewed	Yes
Key Object Selection Document Storage	Stored and viewed	Yes
Mammography CAD SR Storage	Stored and viewed	Yes
MR Image Storage	Stored and viewed	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Stored and viewed	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	Stored and viewed	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Multi-frame True Color Secondary Capture Image Storage	Stored and viewed	Yes
Nuclear Medicine Image Storage (Retired)	Stored and viewed	Yes
Nuclear Medicine Image Storage	Stored and viewed	Yes
Ophthalmic Photography 16 Bit Image Storage	Stored and viewed	Yes
Ophthalmic Photography 8 Bit Image Storage	Stored and viewed	Yes
Ophthalmic Tomography Image Storage	Stored and viewed	Yes
Positron Emission Tomography Image Storage	Stored and viewed	Yes
RT Dose Storage	Stored and viewed	Yes
RT Image Storage	Stored and viewed	Yes
RT Ion Plan Storage	Stored and viewed	Yes
RT Plan Storage	Stored and viewed	Yes
RT Structure Set Storage	Stored and viewed	Yes
Secondary Capture Image Storage	Stored and viewed	Yes
Spatial Registration Storage	Stored and viewed	Yes
Ultrasound Image Storage	Stored and viewed	Yes
Ultrasound Image Storage (Retired)	Stored and viewed	Yes
Ultrasound Multi-frame Image Storage	Stored and viewed	Yes
Ultrasound Multi-frame Image Storage (Retired)	Stored and viewed	Yes
Video Endoscopic Image Storage	Stored and viewed	Yes
Video Microscopic Image Storage	Stored and viewed	Yes
Video Photographic Image Storage	Stored and viewed	Yes
VL Endoscopic Image Storage	Stored and viewed	Yes
VL Microscopic Image Storage	Stored and viewed	Yes
VL Photographic Image Storage	Stored and viewed	Yes
VL Slide-Coordinates Microscopic Image Storage	Stored and viewed	Yes
VL Whole Slide Microscopy Image Storage	Stored and viewed	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	Stored and viewed	Yes
X-Ray 3D Angiographic Image Storage	Stored and viewed	Yes
X-Ray 3D Craniofacial Image Storage	Stored and viewed	Yes
X-Ray Angiographic Bi-Plane Image Storage (Retired)	Stored and viewed	Yes
X-Ray Angiographic Image Storage	Stored and viewed	Yes
X-Ray Radiation Dose SR Storage	Stored and viewed	Yes
X-Ray Radiofluoroscopic Image Storage	Stored and viewed	Yes
Stereometric Relationship Storage	Stored and viewed	Yes
Query/Retrieve		
Study Root Information Model FIND	Yes	Yes – Hierarchical
Patient Root Information Model FIND	Yes	Yes - Hierarchical
Study Root Information Model MOVE	Yes	Yes - Hierarchical
Patient Root Information Model MOVE	Yes	Yes = Hierarchical
WADO-URI - Retrieve Imaging Document	Yes	No
WADO-WS - Retrieve Imaging Document Set	Yes	No
WADO-RS - Retrieve Study	Yes	Yes
WADO-RS - Retrieve Series	Yes	Yes
WADO-RS Retrieve Instance	Yes	Yes
WADO-RS - Retrieve Frames	Yes	Yes
WADO-RS Retrieve Bulkdata	Yes	Yes
WADO-RS - Retrieve Metadata	Yes	Yes
STOW-RS Store Instances	Yes	Yes
QIDO-RS Search for Studies	Yes	Yes
QIDO-RS Search for Series	Yes	Yes
QIDO-RS Search for Instances	Yes	Yes
Workflow Management		

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Modality Worklist FIND	Yes	No
Storage Commitment Push Mode	Yes	Yes
Instance Availability Notification	Yes	No
Verification	Yes	Yes
Print Management		
Basic Grayscale Print Management	Yes	No

Table 1-2 Media Services

Media Storage Application Profile	Write Files (FSC/FSU)	Read Files (FSR)
General Purpose CD-R, DVD AND BD	No	Yes
General Purpose DVD with Compression	Yes* (FSC, ISO Image)	Yes
General Purpose USB and Flash Memory with Compression	Yes* (FSC, ISO Image)	Yes

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3 Introduction

This document is the DICOM Conformance Statement for the NilRead enterprise viewer application. It describes compliance with the DICOM Version 3.0 standard including supported DICOM Service Classes, Information Objects and Communication Protocols

3.1 Intended Audience

This document is written for individuals that need to understand how the NilRead enterprise viewer will integrate into their healthcare facility, including both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the products DICOM features.

3.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between NilRead DICOM connectivity modules and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard.

DICOM by itself does not guarantee interoperability. However, the Conformance Statement can facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

3.3 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for a non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for DICOM training and it makes simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used for the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles - which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in progress.

Two Application Entities may also communicate with each other by exchanging media (such as a USB/CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

3.4 Terms and Definitions

Abstract Syntax - the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title (AET) - the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context - the specification of the type of communication used between Application Entities. Example: DICOM network protocol.

Association - a network communication channel set up between Application Entities.

Attribute – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

C-FIND - the C-FIND service is used by a DIMSE-service-user to match a set of Attributes against the Attributes of a set of composite SOP Instances maintained by a peer DIMSE-service-user. It is a confirmed service.

C-STORE -the C-STORE service is used by a DIMSE-service-user to store a composite SOP Instance on a peer DIMSE-service-user. It is a confirmed service.

DIMSE -DICOM Message Service Element

Information Object Definition (IOD) – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module - a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation - first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context - the set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

Protocol Data Unit (PDU) - a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

Service Class Provider (SCP) - role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) - role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

Tag - a 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Abbreviations

AE Application Entity

AET Application Entity Title

DICOM Digital Imaging and Communications in Medicine

FSC File-Set Creator

FSU File-Set Updater

FSR File-Set Reader

IOD Information Object Definition

ISO International Organization for Standards

LUT Look-up Table

MWL Modality Worklist

PACS Picture Archiving and Communication System

PDU Protocol Data Unit

RIS Radiology Information System.

SC Secondary Capture

JPEG Joint Photographic Experts Group

OP Ophthalmic Photography

OPT Ophthalmic Tomography

SC Secondary Capture

SOP Service-Object Pair

WADO Web access to DICOM persistent Objects

STOW Store Over the Web by RESTful services

QIDO Query based on ID for DICOM Objects by RESTful Services

RS RESTful services

XML eXtensible Markup Language

IAN Instance Availability Notification

SCP Service Class Provider

SCU Service Class User

TLS Transport Layer Security

3.6 References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available at http://medical.nema.org

4 Networking

4.1 Implementation Model

4.1.1 Application Data Workflow

NilRead enterprise viewer is a multi-tenant ASP.NET Web application that provides a user interface, internal databases and a network listener that spawns additional threads as necessary to handle incoming connections. Conceptually, the network services may be modeled as the following separate AEs, though in fact all the AEs share a single AE Title in the scope of the same tenant.

- ECHO-SCP, which responds to verification requests
- ECHO-SCU, which sends verification requests
- STORAGE-SCP, which receives incoming composite instances
- STORAGE-SCU, which sends outbound composite instances
- COMMIT-SCU, which determines successful storage of DICOM instances
- COMMIT-SCP, which provides confirmation of storage of DICOM instances
- FIND-SCU, which queries remote AEs for lists of studies
- FIND-SCP, which processes incoming queries for lists of DICOM entities
- MOVE-SCU, which retrieves list of studies from the remote AEs
- MOVE-SCP, which responses for requests of DICOM entities retrievals
- Detached Interpretation Management Service Class as SCU, which gets/receives detached interpretation report and notifications.
- WADO-URI/WS/RS SCU, which retrieves imaging document/set studies/series/instances from remote AEs through WADO interface
- WADO-RS SCP, which provides studies/series/instances access to the remote AEs through WADO interface
- STOW-RS SCU, which stores instance to the remote AE through STOW-RS interface
- STOW-RS SCP, which provides STOW-RS storage service to remote AEs
- QIDO-RS SCU, which queries the remote AE with QIDO-RS interface
- QIDO-RS SCP, which provides QIDO-RS service to the remote AEs
- IAN-SCU, which provides notifications about availability of the SOP Instances

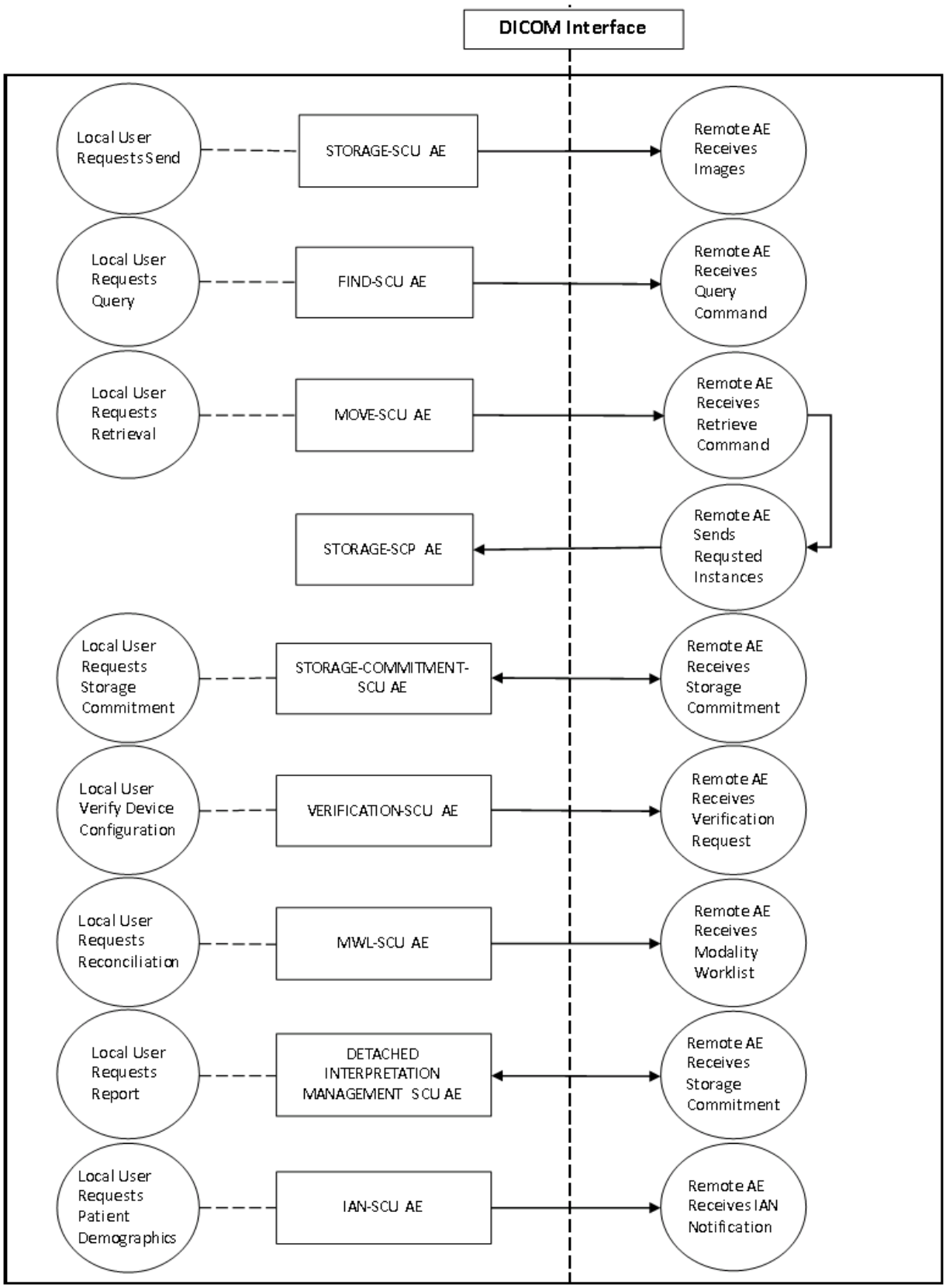
DICOM Interface
Local User Requests Send
STORAGE-SCU AE
Remote AE Receives Images
Local User Requests Query
FIND-SCU AE
Remote AE Receives Query Command
Local User Requests Retrieval
MOVE-SCU AE
Remote AE Receives Retrieve Command
STORAGE-SCP AE
Remote AE Sends Requsted Instances
Local User Requests Storage Commitment
STORAGE-COMMITMENT-SCU AE
Remote AE Receives Storage Commitment
Local User Verify Device Configuration
VERIFICATION-SCU AE
Remote AE Receives Verification Request
Local User Requests Reconciliation
MWL-SCU AE
Remote AE Receives Modality Worklist
Local User Requests Report
DETACHED INTERPRETATION MANAGEMENT SCU AE
Remote AE Receives Storage Commitment
Local User Requests Patient Demographics
IAN-SCU AE
Remote AE Receives IAN Notification

Figure 1 Application Data Flow Diagram, SCU

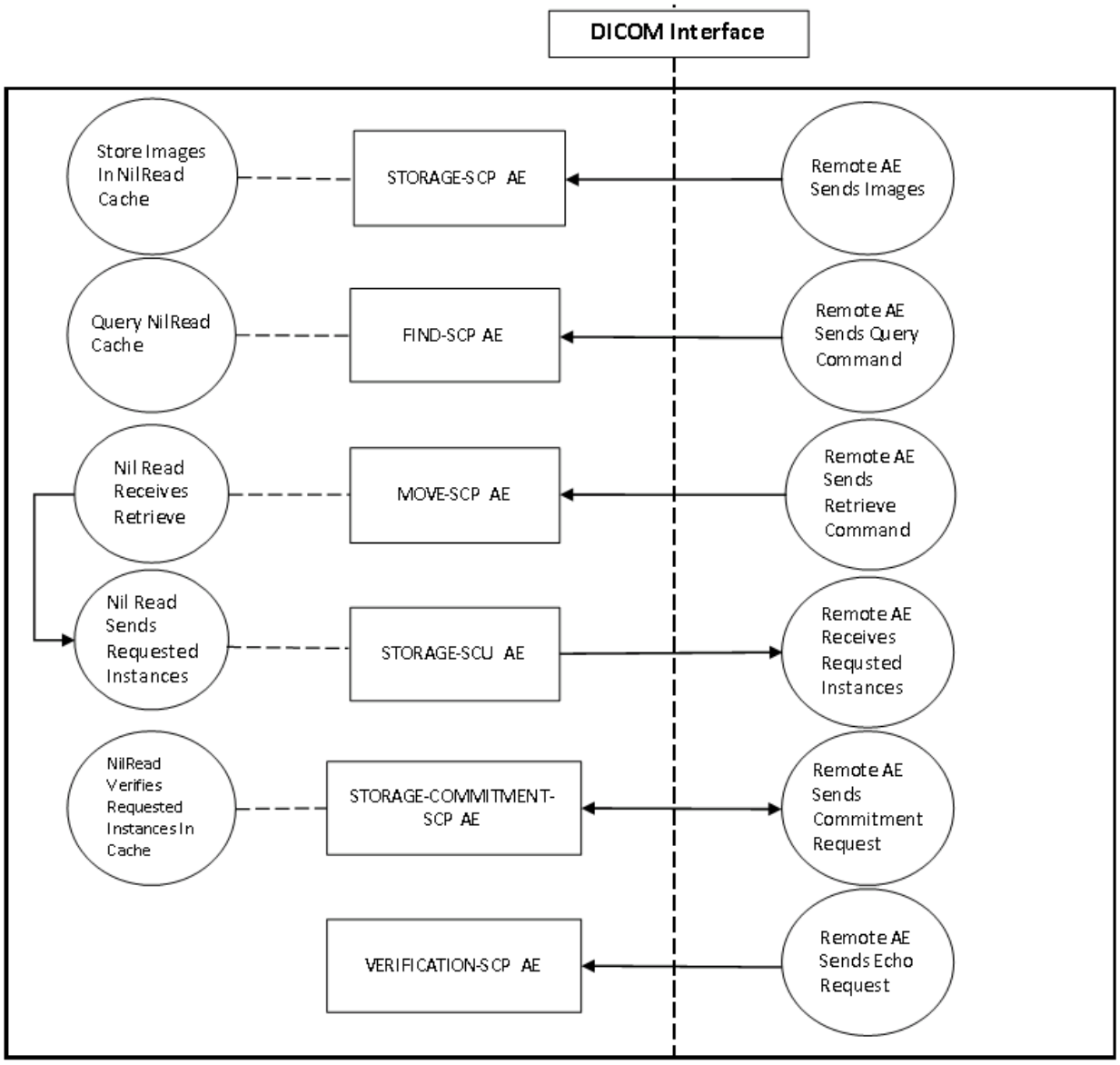

Figure 2 Application Data Flow Diagram, SCP

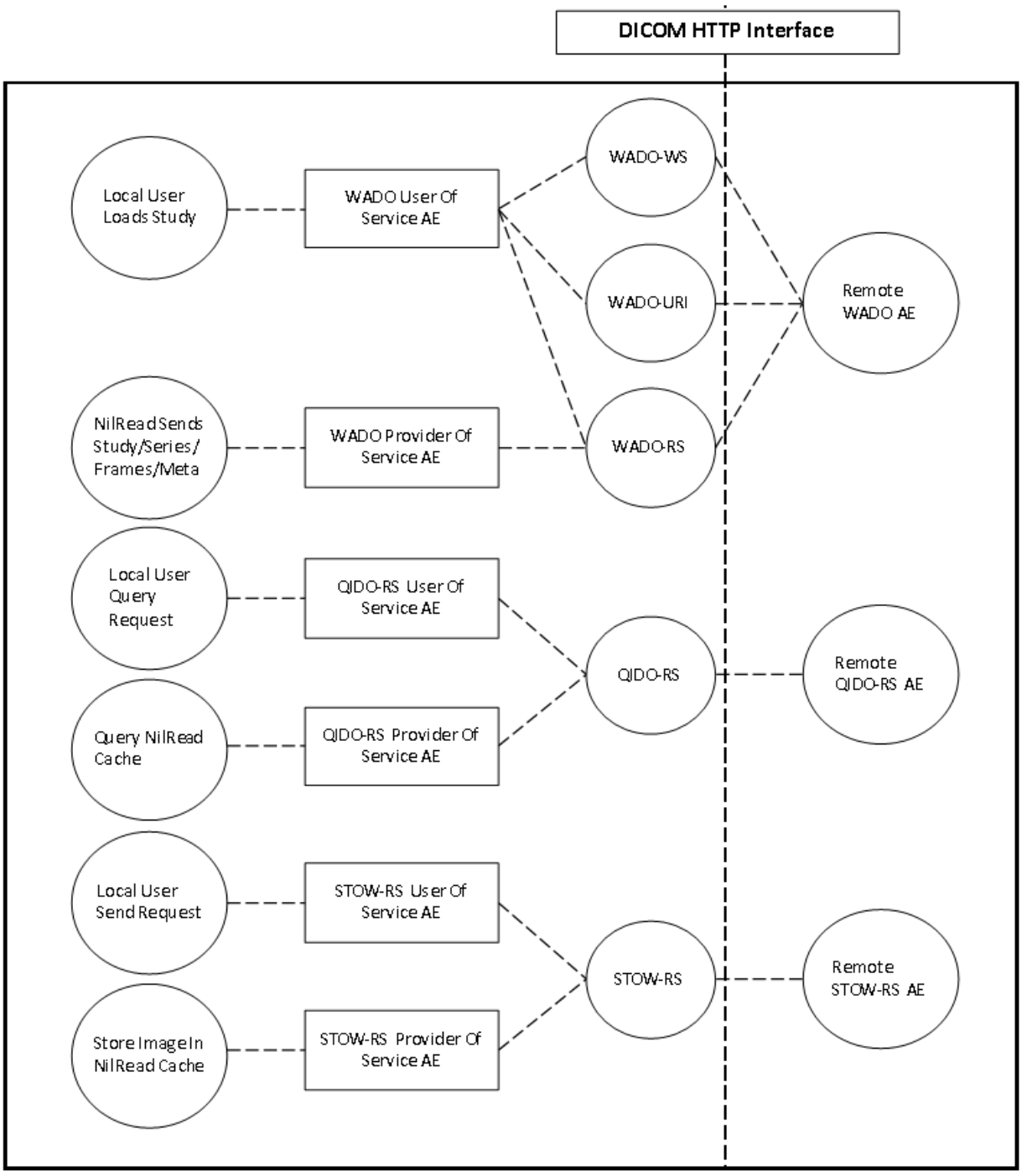

Figure 3 Application Data Flow Diagram, Web Service

4.1.2 Functional Definitions of AEs

4.1.2.1 Echo-SCP

ECHO-SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Verification Service Class, and will respond successfully to echo requests.

4.1.2.2 Echo-SCU

ECHO-SCU is activated through the user interface when a user selects a DICOM SCP device for DICOM connection verification in the configuration page. An association request is sent to the requested destination. Upon successful negotiation of a Presentation Context and receipt of the verification response, the verification response is reported back for display in the UI.

4.1.2.3 Storage-SCP

STORAGE-SCP waits in the background for connections, will accept associations with Presentation Contexts for SOP Classes of the Storage Service Class, and will store the received instances to the local database where they may subsequently be listed and viewed through the user interface.

4.1.2.4 Storage-SCU

STORAGE-SCU is activated through the user interface when a user selects studies from the local database and requests that they be sent to a remote AE (selected from a pre-configured DICOM AE list).

4.1.2.5 Find-SCU

FIND-SCU is activated through the user interface when a user clicks 'Refresh' button in 'Remote' view.

4.1.2.6 Move-SCU

MOVE-SCU is activated through the user interface when a user selects a study for retrieval. A connection to the remote AE is established to initiate the retrieval and the STORAGE-SCP AE receives the retrieved instances.

4.1.2.7 Detached Interpretation Management Service Class SCU

Detached Interpretation Management Service Class SCU is activated through UI when a user requests to check report status of a study, NilRead issues DIMSE N-GET requests to remote AE to request interpretation status for the requested study. NilRead also accepts association requests from the SCP to receive unsolicited notifications of detached interpretation status change events.

4.1.2.8 Storage Commitment SCU

Storage commitment SCU is activated when a requested study is sent to a remote Storage SCP that has Storage commitment service enabled.

4.1.2.9 Storage Commitment SCP

Storage commitment SCP is activated when storage commitment request is transmitted to Nil together with a list of references to one or more SOP Instances. Success or failure of storage commitment is subsequently indicated by a notification from the SCP to the SCU.

4.1.2.10 Find-SCP

FIND- SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Study Root Query/Retrieve Information Model – FIND Service Class or the Patient Root Query/Retrieve Information Model – FIND Service Class, and will respond successfully to query requests.

4.1.2.11 Move-SCP

MOVE-SCP waits in the background for connections, will accept associations with Presentation Contexts for the SOP Class of the Study Root Query/Retrieve Information Model – MOVE Service Class or the Patient Root Query/Retrieve Information Model – MOVE Service Class, and will respond successfully to retrieve requests by initiating storage of instances to the remote Application Entity.

4.1.2.12 WADO-RS SCP

The reception of a WADO-RS request will activate the AE. An internal request is sent to the search capabilities of the NilRead. This request is based upon the request parameters or the URL resource end point from the WADO request. The response is a list of all SOP instances stored on the NilRead that match the request parameters. If there are no matching instances, the AE will indicate this in the WADO response. If the request was for retrieval of instances, these instances will be returned.

4.1.2.13 STOW-RS SCP

The reception of a STOW-RS POST request will activate the STOW-RS Service. The storage request is based upon the accept headers in the STOW-RS POST request. The response includes an HTTP/1.1 status line, including a status-code and its associated textual phrase, followed by an XML message indicating success, warning, or failure for each instance stored by the STOW-RS service

4.1.2.14 QIDO-RS SCP

The reception of a QIDO-RS GET request will activate the QIDO-RS Provider. An internal query request is sent to the search capabilities of the associated AE. The search result is based upon the URL of the QIDO-RS GET request. The response is a status code indicating the success, warning, or failure of the search along with any matching results stored in the Remote AE.

4.1.2.15 WADO-RS/WS/URI SCU

NilRead can produce WDAO-RS/WS/URI requests to retrieve study/series/instance/frame/bulkdata/metadata when user initiates a study or report loading from DICOM-RS data sources.

4.1.2.16 STOW-RS SCU

NilRead can produce STOW-RS requests to the remote AE to store an SOP instance. All request messages are HTTP/1.1 multipart messages. The SOP Instances into message parts are encoded with the organization of one message part per DICOM Instance.

4.1.2.17 QIDO-RS SCU

NilRead can produce and send QIDO-RS requests to the remote AE for queries studies/ series/instances.

4.1.2.18 IAN SCU

NilRead can provide the DICOM instance availability notifications to the configured IAN SCP when new instances are created by NilRead.

4.1.2.19 IOCM

NilRead accepts IHE IOCM Rejection notes from the data sources configured in IOCM settings page. The instances listed in the Rejection Note are permanently deleted from the Nil cache, Unless the Rejection Note title is "Data Retention Policy Expired", Nil will ignore the rejected instances if they are re-imported.

4.1.3 Sequencing of Real-World Activities

All SCP activities are performed asynchronously in the background and are not dependent on any sequencing.

All SCU activities are initiated through the user interface and are typically synchronous and blocking; STORAGE-SCU and MOVE-SCU activities are asynchronous and non-blocking.

4.2 AE Specifications

4.2.1 ECHO-SCP

4.2.1.1 SOP Classes

ECHO-SCP provides Standard Conformance to the following SOP classes:

Table 4-1 SOP CLASSES SUPPORTED BY ECHO SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1

4.2.1.2 Association Policies

4.2.1.2.1 General

ECHO-SCP accepts but never initiates associations.

Table 4-2 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR ECHO-SCP

Maximum PDU size received	114 KB (approximate)

4.2.1.2.1.1 Number of Associations

Table 4-3 NUMBER OF ASSOCIATIONS AS A SCP FOR ECHO-SCP

Maximum number of simultaneous associations	Unlimited

4.2.1.2.1.2 Asynchronous nature

ECHO-SCP will only allow a single outstanding operation on an Association. Therefore, ECHO-SCP will not perform asynchronous operations window negotiation.

4.2.1.2.1.3 Implementation Identifying Information

Table 4-4 DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO SCP

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.1.3 Association Initiation Policy

ECHO-SCP does not initiate associations.

4.2.1.4 Association Acceptance Policy

ECHO-SCP by default accepts any called AE title provided by SCU, however the called AE title validation can be enabled in NilRead configuration file.

When ECHO-SCP accepts an association, it will respond to echo request

4.2.1.4.1 Activity – Receive Echo Request

4.2.1.4.1.1 Description and Sequencing of Activities

As requests are received, they are responded to immediately.

4.2.1.4.1.2 Accepted Presentation Context

Table 4-5 ACCEPTABLE PRESENTATION CONTEXTS FOR ECHO-SCP AND RECEIVE ECHO REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Verification	See Table 4-1 SOP CLASSES SUPPORTED BY ECHO SCP	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.1.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.1.4.1.3 SOP Specific Conformance

4.2.1.4.1.3.1 SOP Specific Conformance to Verification SOP Class

ECHO-SCP provides standard conformance to the Verification Service Class.

4.2.1.4.1.3.2 Transfer Syntax Selection Policies

ECHO-SCP will select the first Transfer Syntax proposed by the client that is supported by the SCP, per Presentation Context.

ECHO-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.1 ECHO-SCU

4.2.1.1 SOP Classes

ECHO-SCU provides Standard Conformance to the following SOP classes:

Table 4-6 SOP CLASSES SUPPORTED BY ECHO-SCU

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1

4.2.1.2 Association Policies

4.2.1.2.1 General

ECHO-SCU initiates but never accepts associations.

Table 4-7 MAXIMUM PDU SIZE RECEIVED AS A SCU FOR ECHO-SCU

Maximum PDU size received	114 KB (approximate)

4.2.1.2.1.1 Number of Associations

Table 4-8 NUMBER OF ASSOCIATIONS AS A SCU FOR ECHO-SCP

Maximum number of simultaneous associations	Unlimited

4.2.1.2.1.2 Asynchronous nature

ECHO-SCU will only allow a single outstanding operation on an Association. Therefore, ECHO-SCU will not perform asynchronous operations window negotiation.

4.2.1.2.1.3 Implementation Identifying Information

Table 4-9 DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.1.3 Association Initiation Policy

When requested by user, ECHO-SCU attempts to initiate a new association for each verification request.

4.2.1.3.1 Activity – Request Echo Verification

4.2.1.3.1.1 Description and Sequencing of Activities

Once a DICOM Application Entity is configured in the NilRead, users can initiate a verification of communication request to the remote AE through the configuration interface. NilRead performs the request with a C-ECHO request to the remote AE. The remote DICOM AE issues a C-ECHO response confirmation, upon receipt of the confirmation, the SCU determines that verification is complete and the results are displayed in the UI.

4.2.1.3.1.2 Proposed Presentation Contexts

Table 4-10 PROPOSED PRESENTATION CONTEXTS FOR ECHO-SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Verification	See Table 4-6 SOP CLASSES SUPPORTED BY ECHO-SCU	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.1.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.1.3.1.3 SOP Specific Conformance

4.2.1.3.1.3.1 SOP Specific Conformance to Verification SOP Class

ECHO-SCU provides standard conformance to the Verification Service Class.

4.2.1.3.1.3.2 Presentation Context Acceptance Criterion

ECHO-SCU does not accept associations.

4.2.1.3.1.3.3 Transfer Syntax Selection Policies

If offered a choice of Transfer Syntaxes in the accepted Presentation Contexts, it will apply the following priority to the choice of Presentation Context to use for the C-ECHO operation:

- first encountered explicit Transfer Syntax
- default Transfer Syntax

4.2.2 STORAGE-SCP

4.2.2.1 SOP Classes

STORAGE-SCP provides Standard Conformance to the following SOP classes:

Table 4-11 SOP CLASSES SUPPORTED BY STORAGE-SCP

SOP Class Name	SOP Class UID
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Encapsulated STL Storage	1.2.840.10008.5.1.4.1.1.104.3
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1

SOP Class Name	SOP Class UID
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
Hardcopy Grayscale Image Storage SOP Class (Retired)	1.2.840.10008.5.1.1.29
Hardcopy Color Image Storage SOP Class (Retired)	1.2.840.10008.5.1.1.30
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1

SOP Class Name	SOP Class UID
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.5
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3

4.2.2.2 Association Policies

4.2.2.2.1 General

STORAGE-SCP accepts but never initiates associations.

Table 4-12 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR STORAGE-SCP

Maximum PDU size received	114 KB (approximate)

4.2.2.2.2 Number of Associations

Table 4-13 NUMBER OF ASSOCIATIONS AS A SCP FOR STORAGE-SCP

Maximum number of simultaneous associations	Unlimited

4.2.2.2.3 Asynchronous nature

STORAGE-SCP will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCP will not perform asynchronous operations window negotiation.

4.2.2.2.4 Implementation Identifying Information

Table 4-14 DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE SCP

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.2.3 Association Initiation Policy

STORAGE-SCP does not initiate associations.

4.2.2.4 Association Acceptance Policy

When STORAGE-SCP accepts an association, it responds to storage requests.

The association will be rejected if the Called AE Title does not match the configured AE Title.

STORAGE-SCP accepts association requests from any Calling AE Title.

4.2.2.4.1 Activity – Receive Storage Request

4.2.2.4.1.1 Description and Sequencing of Activities

As instances are received, NilRead stores the instances in the NilRead cache and updates the references in NilRead database. A newly arrived instance with the same SOP instance UID will overwrite the existing instance in the NilRead cache.

4.2.2.4.1.2 Accepted Presentation Context

Table 4-15 ACCEPTABLE PRESENTATION CONTEXTS FOR STORAGE-SCP AND RECEIVED STORAGE REQUEST

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4-11 SOP CLASSES SUPPORTED BY STORAGE-SCP	See Table 4-11 SOP CLASSES SUPPORTED BY STORAGE-SCP	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70	SCP	None
		JPEG 2000 Lossy	1.2.840.10008.1.2.4.90	SCP	None
		JPEG 2000 Lossless	1.2.840.10008.1.2.4.91	SCP	None
		RLE Lossless	1.2.840.10008.1.2.5	SCP	None
		MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	SCP	None
		MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	SCP	None
		MPEG2 Main Profile, Main Level	1.2.840.10008.1.2.4.100	SCP	None

4.2.2.4.1.2.1 Extended Negotiation

No extended negotiation is performed, though Nil STORAGE-SCP:

- Is a Level 2 Storage SCP (Full – does not discard any data elements)
- Does not support digital signatures
- Does not coerce any received data elements

4.2.2.4.1.3 SOP Specific Conformance

4.2.2.4.1.3.1 SOP Specific Conformance to Storage SOP Class

STORAGE-SCP provides standard conformance to the Storage Service Class.

4.2.2.4.1.3.2 Presentation Context Acceptance Criterion

STORAGE-SCP accepts any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.2.4.1.3.3 Transfer Syntax Selection Policies

STORAGE-SCP selects the first Transfer Syntax proposed by the client that is supported by the SCP, per Presentation Context.

STORAGE-SCP accepts duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.2.4.1.3.4 Response Status

STORAGE-SCP will behave as described in the Table below when generating the C-STORE response command message.

Table 4-16 RESPONSE STATUS FOR STORAGE-SCP AND RECEIVE STORAGE REQUEST

Service Status	Further Meaning	Status Codes	Reason
Failures	Processing Failure	0110	Sent when an error occurs trying to save the stored SOP instance to NilRead cache
	Out of Resources	A7xx	Sent when NilRead cache is full or nearly full.
	Missing Attribute	0120	Sent when mandatory attributes are missing from the instances received.
Success		0000	Sent as each SOP is stored

4.2.2.4.2 Activity – Receive IHE IOCM Rejection Note

4.2.2.4.2.1 Description and Sequencing of Activities

When an application entity sends an IHE IOCM rejection note to NilRead. NilRead applies the rejection note and delete the rejected instances. Any instance referred to by the rejection note that is not Nil repository is ignored and processing will continue. Any errors occurred in the process are logged in the Nil log.

Table 4-17 ACTIONS WHEN RECEIVES IOCM REJECTION NOTES

Rejection Note Title	Code	Action
Rejected for Quality Reasons	113001	Delete and block rejected instances*
Rejected for Patient Safety Reasons	113037	Delete and block rejected instances*

Rejection Note Title	Code	Action
Incorrect Modality Worklist Entry	113039	Delete and block rejected instances*
Data Retention Policy Expired	113039	Delete

*Nil returns status 'success' for the blocked rejected instances to avoid unnecessary auto-resending from the SCU side.

4.2.3 STORAGE-SCU

4.2.3.1 SOP Classes

STORAGE-SCU provides Standard Conformance to the following SOP classes:

Table 4-18 SOP CLASSES SUPPORTED BY STORAGE-SCU

SOP Class Name	SOP Class UID
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2

SOP Class Name	SOP Class UID
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Encapsulated STL Storage	1.2.840.10008.5.1.4.1.1.104.3
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
Hardcopy Grayscale Image Storage SOP Class (Retired)	1.2.840.10008.5.1.1.29
Hardcopy Color Image Storage SOP Class (Retired)	1.2.840.10008.5.1.1.30
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5

SOP Class Name	SOP Class UID
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.5

SOP Class Name	SOP Class UID
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3

4.2.3.2 Association Policies

4.2.3.2.1 General

STORAGE-SCU initiates but never accepts associations.

Table 4-19 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR STORAGE-SCU

Maximum PDU size received	114 KB (approximate)

4.2.3.2.2 Number of Associations

Table 4-20 NUMBER OF ASSOCIATIONS AS A SCP FOR STORAGE-SCU

Maximum number of simultaneous associations	10 per remote AE (default)

STORAGE-SCU may initializes by default up to 10 simultaneous associations with a remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.3.2.3 Asynchronous nature

STORAGE-SCU will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCU will not perform asynchronous operations window negotiation.

4.2.3.2.4 Implementation Identifying Information

Table 4-21 DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.3.3 Association Initiation Policy

When initiated by the user, STORAGE-SCU attempts to initiate a new association for each of the studies selected, e.g. one association per study.

4.2.3.3.1 Activity –Send Storage Request

4.2.3.3.1.1 Description and Sequencing of Activities

For each instance selected from the user interface to be transferred, a single attempt will be made to transmit it to the selected remote AE, if the send fails, no retry will be performed on the same association, and an attempt will be made to send the next instance.

If a send operation completes with failures, or if the association is aborted for any reason, NilRead may retry the send operation on a new association in a later time, the retry interval and number of the attempts are configurable. By default, NilRead will retry 3 times in 30 seconds interval followed by the previous failed attempt.

4.2.3.3.1.2 Proposed Presentation Context

Table 4-22 PROPOSED PRESENTATION CONTEXTS FOR STORAGE-SCU AND C-STORE REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4-18 SOP CLASSES SUPPORTED BY STORAGE-SCU	See Table 4-18 SOP CLASSES SUPPORTED BY STORAGE-SCU	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	SCU	None
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 Lossy	1.2.840.10008.1.2.4.90	SCU	None
		JPEG 2000 Lossless	1.2.840.10008.1.2.4.91	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5	SCU	None
		MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	SCU	None

Presentation Context Table					
		MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	SCU	None
		MPEG2 Main Profile, Main Level	1.2.840.10008.1.2.4.100	SCU	None

STORAGE-SCU examines all the Abstract Syntax/Transfer Syntax pairs in the instances to be stored, and applies the following algorithm when determining the Presentation Contexts to propose:

- For each Abstract Syntax/Transfer Syntax pair where the Transfer Syntax is uncompressed, a Presentation Context will be defined for the Abstract Syntax with both Explicit and Implicit Little-Endian Transfer Syntaxes only.
- For those Abstract Syntax/Transfer Syntax pairs where the Transfer Syntax is encapsulated (e.g. compressed), a Presentation Context is defined for the Abstract Syntax with the encapsulated Transfer Syntax.

For those Abstract Syntax/Transfer Syntax pairs where the Transfer Syntax is encapsulated and STORAGE-SCU is able to convert to an uncompressed Transfer Syntax (e.g. Explicit or Implicit Little Endian), an additional Presentation Context is defined for each such Abstract Syntax, with only Explicit and Implicit Little-Endian Transfer Syntaxes.

The implications of this algorithm are:

- STORAGE-SCU will never compress an instance in order to store it.
- Compressed instances will be stored as-is whenever possible, or failing that, in either Explicit or Implicit Little-Endian format. When STORAGE-SCU is incapable of decompressing an instance, it simply will not be stored and STORAGE-SCU will continue sending the remaining instances.

4.2.3.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.3.3.1.3 SOP Specific Conformance

4.2.3.3.1.3.1 SOP Specific Conformance to Storage SOP Class

STORAGE-SCU provides standard conformance to the Storage Service Class.

4.2.3.3.1.3.2 Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations.

4.2.3.3.1.3.3 Transfer Syntax Selection Policies

For encapsulated Transfer Syntaxes, STORAGE-SCU prefers to send each instance using its current Transfer Syntax and will find the first Presentation Context where the Transfer Syntax was accepted. In the case where the Transfer Syntax was not accepted by the remote STORAGE-SCP, STORAGE-SCU will check for the acceptance of Explicit VR Little Endian and Implicit VR Little Endian, in that order. If STORAGE-SCU cannot change the Transfer Syntax, the sub-operation will fail and it will not store the instance.

In the case of uncompressed Transfer Syntaxes, STORAGE-SCU has no real preference. It will store the instances in either Explicit VR Little Endian or Implicit VR Little Endian, depending on what was accepted by the SCP.

4.2.3.3.1.3.4 Response Status

STORAGE-SCU will behave as described in the Table below in responses to the status returned in the C-STORE response command message.

Table 4-23 RESPONSE STATUS FOR STORAGE-SCP AND RECEIVE STORAGE REQUEST

Service Status	Further Meaning	Status Codes	Reason
Failure	N/A	Any	Message shown in NilRead DICOM Activity UI, continues storing remaining instances.
Success	N/A	Any	Message shown in NilRead DICOM Activity UI, continues storing remaining instances.

4.2.4 FIND-SCU

4.2.4.1 SOP Classes

FIND-SCU provides Standard Conformance to the following SOP classes:

Table 4-24 SOP CLASSES SUPPORTED BY FIND-SCU

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1

4.2.4.2 Association Policies

4.2.4.2.1 General

FIND-SCU initiates but never accepts associations.

Table 4-25 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR FIND-SCU

Maximum PDU size received	114 KB (approximate)

4.2.4.2.1.1 Number of Associations

Table 4-26 NUMBER OF ASSOCATIONS AS A SCP FOR FIND-SCU

Maximum number of simultaneous associations	10 per remote AE (default)

FIND-SCU may initializes by default up to 10 simultaneous associations with a particular remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.4.2.1.2 Asynchronous nature

FIND-SCU will only allow a single outstanding operation on an Association. Therefore, FIND-SCU will not perform asynchronous operations window negotiation.

4.2.4.2.1.3 Implementation Identifying Information

Table 4-27 DICOM IMPLEMENTATION CLASS AND VERSION FOR FIND-SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.4.3 Association Initiation Policy

FIND-SCU attempts to initiate a new association when the user performs the query action from the user interface and may attempts to initiate new associations for the purpose of locating prior studies when the user opens a study for viewing, furthermore, if the user loads a study from a remote DICOM source, FIND-SCU may initiate new associations for querying the related instances for the study being loaded.

4.2.4.3.1 Activity –Query Remote AE

4.2.4.3.1.1 Description and Sequencing of Activities

A single attempt will be made to query the remote AE. If the query fails for whatever reason, no retry will be performed.

4.2.4.3.1.2 Proposed Presentation Context

Table 4-28 PROPOSED PRESENTATION CONTEXTS FOR FIND-SCU AND SEND QUERY REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4-24 SOP CLASSES SUPPORTED BY FIND-SCU	See Table 4-24 SOP CLASSES SUPPORTED BY FIND-SCU	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.4.3.1.3 Extended Negotiation

No extended negotiation is performed.

4.2.4.3.1.4 SOP Specific Conformance

4.2.4.3.1.4.1 SOP Specific Conformance to Query SOP Classes

FIND-SCU provides standard conformance to the Supported C-FIND Service Class.

FIND-SCU supports the Patient and Study root information model, may be used at the PATIENT, STUDY, SERIES levels.

All queries are initiated at the highest level of the information model (the STUDY level), and then for each response received, recursively repeated at the next lower levels (the SERIES and then IMAGE levels), in order to completely elucidate the "tree" of instances available on the remote AE (from which the user may subsequently request a retrieval at any level).

No CANCEL requests are ever issued.

CANCEL requests may be issued upon user requests.

Unexpected attributes returned in a C-FIND response (those not requested) are discarded. Requested return attributes not returned by the SCP are ignored. In general, non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally by the FIND-SCU and thus will still be presented in the UI, with the exception of Modalities in Study, which is filtered by the SCU.

Specific Character Set is not included in the C-FIND SCU request. If present in the response, Specific Character Set will be used to identify character sets other than the default character set for display of strings in the UI.

Retrieve AE Title is included in the C-FIND request at any level. If present in the response, it is ignored.

Table 4-29 STUDY ROOT REQUEST IDENTIFIER FOR FIND-SCU

NAME	TAG	TYPE OF MATCHING
Patient/Study Level		
Study Date	(0008,0020)	S,U,R
Study Time	(0008,0030)	S,U,R
Accession Number	(0008,0050)	S,*,U
Modalities in Study	(0008,0061)	S,U
SOP Classes in Study	(0008,0062)	S,U
Referring Physician's Name	(0008,0090)	S,*,U
Study Description	(0008,1030)	S,*,U
Procedure Code Sequence	(0008,1032)	U
Name of Physician(s) Reading Study	(0008,1060)	S,*,U
Admitting Diagnoses Description	(0008,1080)	U
Referenced Study Sequence	(0008,1100)	U
Referenced Patient Sequence	(0008,1120)	U
Patient's Name	(0010,0010)	S,*,U

NAME	TAG	TYPE OF MATCHING
Patient's ID	(0010,0020)	S,*,U
Issuer of Patient Id	(0010,0021)	S,*,U
Patient's Birth Date	(0010,0030)	S,U,R
Patient's Birth Time	(0010,0032)	S,U,R
Patient's Sex	(0020,0040)	S,*,U
Other Patient's Names	(0010,1001)	S,*,U
Other Patient's ID Sequence	(0010,1002)	U
Patient's Age	(0010,1010)	S,*,U
Patient's Size	(0010,1020)	S,*,U
Patient's Weight	(0010,1030)	S,*,U
Ethnic Group	(0010,2160)	S,*,U
Occupation	(0010,2180)	S,*,U
Additional Patient History	(0010,21B0)	S,*,U
Patient Comments	(0010,4000)	S,*,U
Study Instance UID	(0020,000D)	UNIQUE
Study Id	(0020,0010)	S,*,U
Other Study Numbers	(0020,1070)	U
Number of Study Related Series	(0020,1206)	U
Number of Study Related Instances	(0020,1208)	U
Series Level		
Series Date	(0008,0021)	S,U,R
Series Time	(0008,0031)	S,U,R
Modality	(0008, 0060)	S,U
Series Description	(0008,103E)	S,*,U
Body Part Examined	(0018,0015)	S,*,U
Study Instance UID	(0020,000D)	UNIQUE, L
Series Instance UID	(0020, 000E)	UNIQUE, L

NAME	TAG	TYPE OF MATCHING
Series Number	(0020,0011)	S,*,U
Number of Series Related Instances	(0020,1209)	U
Image Level		
N/A		
Common to All Query Levels		
Query Retrieve Level	(0008,0052)	S
Retrieve AE Title	(0008,0054)	N/A

Types of Matching:

An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "*" indicates wildcard matching, a "U" indicates Universal Matching, an "L" indicates that a UID list may be sent, and "UNIQUE" indicates that this is the Unique Key for that query level.

4.2.4.3.1.4.2 Presentation Context Acceptance Criterion

FIND-SCU does not accept associations.

4.2.4.3.1.4.3 Transfer Syntax Selection Policies

FIND-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.4.3.1.4.4 Response Status

FIND-SCU will behave as described in Table 4-30 in response to the status returned in the C-FIND response command message(s).

Table 4-30 RESPONSE STATUS FOR FIND-SCU AND QUERY REMOTE AE REQUEST

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown to user
Cancel	Matching terminated due to Cancel request	FE00	Association closed, message shown to user
Success	Matching is complete - No Final Identifier is supplied	0000	Association closed

4.2.5 MOVE-SCU

4.2.5.1 4.2.8.1 SOP Classes

MOVE-SCU provides Standard Conformance to the following SOP classes:

Table 4-31 SOP CLASSES SUPPORTED BY MOVE-SCU

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2

4.2.5.2 Association Policies

4.2.5.2.1 General

MOVE-SCU initiates but never accepts associations.

Table 4-32 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR MOVE-SCU

Maximum PDU size received	114 kB (approx.)

4.2.5.2.2 Number of Associations

Table 4-33 NUMBER OF ASSOCIATIONS AS A SCP FOR MOVE-SCU

Maximum number of simultaneous associations	10 per remote AE (default)

MOVE-SCU may initializes by default up to 10 simultaneous associations with a particular remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.5.2.3 Asynchronous Nature

MOVE-SCU will only allow a single outstanding operation on an Association. Therefore, MOVE-SCU will not perform asynchronous operations window negotiation.

4.2.5.2.4 Implementation Identifying Information

Table 4-34 DICOM IMPLEMENTATION CLASS AND VERSION FOR MOVE-SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.5.3 Association Initiation Policy

MOVE-SCU attempts to initiate a new association when the user performs the retrieve, load or data correction action on a study from a remote DICOM AE from the user interface.

4.2.5.3.1 Activity – Retrieve from Remote AE

4.2.5.3.1.1 Description and Sequencing of Activities

For the study selected from the user interface to be retrieved/loaded, a single attempt will be made to retrieve it from the selected remote AE. If the retrieve fails, for whatever reason, no retry will be performed.

4.2.5.3.1.2 Proposed Presentation Contexts

Table 4-35 PROPOSED PRESENTATION CONTEXTS FOR MOVE-SCU AND SEND TO REMOTE AE REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4-31 SOP CLASSES SUPPORTED BY MOVE-SCU	See Table 4-31 SOP CLASSES SUPPORTED BY MOVE-SCU	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.5.3.1.2.1 Extended Negotiation

No extended negotiation is performed; in particular, relational retrievals are not supported.

4.2.5.3.1.3 SOP Specific Conformance

4.2.5.3.1.3.1 SOP Specific Conformance to C-MOVE SOP Classes

MOVE-SCU provides standard conformance to the supported C-MOVE SOP Classes, with one exception: the retrieval is performed from the AE that was queried by FIND-SCU, rather than the AE specified in the Retrieve AE Title attribute of the C-FIND response.

Depends on the actions, the retrievals may be performed at the STUDY or SERIES level.

CANCEL requests may be issued upon user requests.

The instances are retrieved to the NilRead local database by specifying the Move Destination as the AE Title of the STORE-SCP AE of the Nil. This implies that the remote C-MOVE SCP must be preconfigured to determine the presentation address corresponding to the STORE-SCP AE. The Nil STORE-SCP AE will accept storage from all hosts, as long as the called AE Title is matched.

Table 4-36 STUDY ROOT REQUEST IDENTIFIER FOR MOVE-SCU

Name	Tag	Unique, Matching or Return Key
Study level		
Study Instance UID	(0020,000D)	UNIQUE
Series Level		
Series Instance UID	(0020,000E)	UNIQUE

4.2.5.3.1.3.2 Presentation Context Acceptance Criterion

MOVE-SCU does not accept associations.

4.2.5.3.1.3.2.1 Transfer Syntax Selection Policies

MOVE-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.5.3.1.3.3 Response Status

MOVE-SCU will behave as described in the Table below in response to the status returned in the C-MOVE response command message(s).

Table 4-37 RESPONSE STATUS FOR MOVE-SCU AND SEND TO REMOTE AE REQUEST

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown in Receive Queue UI
Cancel	Sub-operations terminated due to Cancel Indication	FEoo	Association closed, message shown in Receive Queue UI
Warning	N/A	Any	message shown in Receive Queue UI
Success	Sub-operations Complete - No Failures	oooo	Association closed

4.2.5.3.1.3.4 Sub-operation Dependent Behavior

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on another association, the question of failure of operations on the other association(s) must be considered.

With the exception of showing error messages in the Receive Queue UI, MOVE-SCU completely ignores whatever activities are taking place in relation to the STORAGE-SCP AE that is receiving the retrieved instances. Once the C-MOVE has been initiated it runs to completion (or failure) as described in the C-MOVE response command message(s). There is no attempt by MOVE-SCU to confirm that instances have actually been successfully received or locally stored.

Whether or not completely or partially successful retrievals are made available in the local database to the user is purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by MOVE-SCU.

Whether or not the remote AE attempts to retry any failed C-STORE sub-operations is beyond the control of MOVE-SCU.

If the association on which the C-MOVE was issued is aborted for any reason, whether or not the C-STORE sub-operations continue is dependent on the remote AE; the local STORAGE-SCP will continue to accept associations and storage operations regardless.

4.2.5.4 Association Acceptance Policy

MOVE-SCU does not accept associations.

4.2.6 Detached Interpretation Management Service Class SCU

4.2.6.1 SOP Classes

Detached Interpretation Management SCU provides standard conformance to the following SOP classes as a SCU role:

Table 4-38 SOP CLASSES SUPPORTED BY DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU

SOP Class Name	SOP Class UID
Detached Interpretation Management SOP Class (Retired)	1.2.840.10008.3.1.2.6.1

Note, only N-EVENT-REPORT and N-GET of the Detached Interpretation Management SOP Class are supported.

4.2.6.2 Association Policies

4.2.6.2.1 General

NilRead sends DIMSE N-GET requests to remote AE for querying detached interpretation (report) status and it accepts association requests for receiving N-EVENT-REPORT notification from a remote AE.

Table 4-39 MAXIMUM PDU SIZE SEND AS A DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU

Maximum PDU size received	114 KB (approximate)

4.2.6.2.2 Number of Associations

Table 4-40 NUMBER OF ASSOCIATIONS AS A DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU

Maximum number of simultaneous associations	10 per remote AE (default)

Detached Interpretation Management SCU may initializes by default up to 10 simultaneous associations with a particular remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.6.2.3 Asynchronous nature

NilRead will not perform asynchronous operations.

4.2.6.2.4 Implementation Identifying Information

Table 4-41 DICOM IMPLEMENTATION CLASS AND VERSION FOR DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.6.3 Association Initiation Policy

NilRead initiates associations upon user's requests to query detached interpretation status on a specified remote AE.

4.2.6.4 Association Acceptance Policy

NilRead accepts association requests from remote AEs for receiving the interpretation status notification.

4.2.6.4.1 Activity – sends DIMSE N-GET request

4.2.6.4.1.1 Description and Sequencing of Activities

Upon user's requests, Nil read will send DIMSE N-GET request to remote AE for querying detached interpretation status of a specific study.

4.2.6.4.1.2 Proposed Presentation Context

Table 4-42 PROPOSED PRESENTATION CONTEXTS FOR DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Detached Interpretation Management SOP Class	1.2.840.10008.3.1.2.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.6.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.6.4.1.3 SOP Specific Conformance

4.2.6.4.1.3.1 SOP Specific Conformance to Detached Interpretation Management Service Class SCU

NilRead specifies the following Interpretation Management SOP Class Attributes in its N-GET request:

Table 4-43 DIMSE N-GET REQUEST FOR DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU

NAME	TAG
Specific Character Set	(0008,0005)
Referenced Results Sequence	(0008,1100)
Interpretation Text	(4008,010B)
Interpretation ID	(4008,0200)
Interpretation Type ID	(4008,0210)
Interpretation Status ID	(4008,0212)
Interpretation Diagnosis Description	(4008,0115)

Note, the requested SOP instance UID that specifies the SOP Instance (study) for which Attribute Values are to be retrieved is specified in standard N-GET command parameters.

By default, NilRead loads the report from attribute 'Interpretation Text, however it can be configured to read from 'Interpretation Diagnosis Description' attribute instead.

4.2.6.4.2 Activity – Receive N-EVENT-REPORT notification

4.2.6.4.2.1 Description and Sequencing of Activities

As the notifications are received, they are responded to immediately.

4.2.6.4.2.2 Accepted Presentation Context

Table 4-44 ACCEPTABLE PRESENTATION CONTEXTS FOR DETACHED INTERPRETATION MANAGEMENT SERVICE CLASS SCU REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Detached Interpretation Management SOP Class	1.2.840.10008.3.1.2.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.6.4.2.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.6.4.2.3 SOP Specific Conformance.

4.2.6.4.2.3.1 Transfer Syntax Selection Policies

Detached Interpretation Management SCU will select the first Transfer Syntax that is accepted by the SCP, per Presentation Context.

NilRead supports the following event types:

- Interpretation Recorded – Interpretation has been dictated and is ready for transcription
- Interpretation Transcribed – Interpretation has been transcribed and is ready for approval
- Interpretation Approved – Interpretation is complete and approved report status in NilRead database will be marked as available and user will be able to review the report from NilRead UI.

4.2.7 STORAGE COMMITMENT SCU

4.2.7.1 SOP Classes

STORAGE COMMITMENT SCU provides Standard Conformance to the following SOP classes:

Table 4-45 SOP CLASSES SUPPORTED BY STORAGE COMMITMENT SCU

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

4.2.7.2 Association Policies

4.2.7.2.1 General

STORAGE COMMITMENT SCU initiates associations for sending storage commitment N-ACTION requests and accepts associations for receiving storage commitment N-EVENT-REPORT.

Table 4-46 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR STORAGE COMMITMENT SCU

Maximum PDU size receives	114kB (approx.)

4.2.7.2.2 Number of Associations

Table 4-47 NUMBER OF ASSOCIATIONS AS A SCP FOR STORAGE COMMITMENT SCU

Maximum number of simultaneous associations	10 pre remote AE (default)

STORAGE COMMITMENT SCU may initializes by default up to 10 simultaneous associations with a particular remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.7.2.3 Asynchronous Nature

STORAGE COMMITMENT SCU will only allow a single outstanding operation on an Association. Therefore, STORAGE COMMITMENT SCU will not perform asynchronous operations window negotiation.

4.2.7.2.4 Implementation Identifying Information

Table 4-48 DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE COMMITMENT SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.7.3 Association Initiation Policy

STORAGE COMMITMENT SCU attempts to initiate a new association after a study is sent to a remote storage SCP successfully and the remote storage SCP is configured with the storage commitment support enabled.

4.2.7.3.1 Activity – Send Storage Commitment N-ACTION-RQ Request

4.2.7.3.1.1 Description and Sequencing of Activities

If configured, for each study that has been successfully sent to a remote storage SCP, NilRead will initiate a new association and send a commitment N-ACTION request for the study to the configured storage commitment SCP, the request contains all SOP instance UID of the images of the study.

4.2.7.3.1.1.1 Proposed Presentation Contexts

Table 4-49 PROPOSED PRESENTATION CONTEXTS FOR STORAGE COMMIEMENT SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Table 4-45 SOP CLASSES SUPPORTED BY STORAGE COMMITMENT SCU		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.7.3.1.1.1.1 Extended Negotiation

No extended negotiation is performed.

4.2.7.3.1.2 SOP Specific Conformance

4.2.7.3.1.2.1 SOP Specific Conformance to STORAGE COMMIEMENT PUSH MODEL SOP Classes

The STORAGE COMMITMENT SCU will initiate an association and send the N-ACTION-RQ message to the configured storage commitment SCP. NilRead supports the standard DICOM elements for Storage Commitment Push Model SOP Class as an SCU as listed in the table below:

Table 4-50 STORAGE COMMITMENT SCU N-ACTION REQUEST DICOM ATTRIBUTES

Name	Tag	Remarks

Transaction UID	(0008,1195)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

4.2.7.4 Association Acceptance Policy

If configured, STORAGE COMMITMENT SCU accepts associations initiated from STORAGE COMMITMENT SCP for receiving storage commitment N-EVENT-REPORT notification in response to the storage commitment requests it sent before.

4.2.7.4.1 Activity – Receive Storage Commitment N-EVENT-REPORT Notification

4.2.7.4.1.1 Description and Sequencing of Activities

If configured, NilRead will accept associations initiated from storage commitment SCP for receiving Storage Commitment N-EVENT-REPORT notifications, if a notification with failure status is received, the requested study will be put in an internal retry queue and a new storage attempt will be made for the study up to N times (N is configurable), if after N times the study is still not stored successfully, the send operation will be marked as 'Failed' in Nil database.

4.2.7.4.1.2 Accepted Presentation Contexts

Table 4-51 ACCEPTED PRESENTATION CONTEXTS FOR STORAGE COMMIEMENT SCU TO REMOTE AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Table 4-45 SOP CLASSES SUPPORTED BY STORAGE COMMITMENT SCU		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.7.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.7.4.1.3 SOP Specific Conformance

4.2.7.4.1.3.1 SOP Specific Conformance to STORAGE COMMITMENT PUSH MODEL SOP Classes

NilRead supports the standard DICOM elements for Storage Commitment Push Model SOP Class as an SCU as listed in the table below:

Table 4-52 STORAGE COMMITMENT SCU N-EVENT-REPORT NOTIFICATION DICOM ATTRIBUTES - Success

Name	Tag	Remarks
Transaction UID	(0008,1195)	
Retrieve AE Title	(0008,0054)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

Table 4-53 STORAGE COMMITMENT SCU N-EVENT-REPORT NOTIFICATION DICOM ATTRIBUTES - Failure

Name	Tag	Remarks
Transaction UID	(0008,1195)	
Retrieve AE Title	(0008,0054)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Failed SOP Sequence	(0008,1198)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

4.2.7.4.1.3.2 Presentation Context Acceptance Criterion

STORAGE COMMITEMENT SCU always accepts associations for receiving storage commitment N-EVENT-REPORT, but only the notifications with known transaction UIDs (0008, 1195) will be processed.

4.2.7.4.1.3.3 Transfer Syntax Selection Policies

STORAGE COMMITMENT SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.7.4.1.3.4 Response Status

No Service Class specific status values are defined for the STORAGE COMMITMENT N-ACTION Service. See DICOM Standard PS 3.7 for general response status codes.

4.2.8 MWL-SCU

4.2.8.1 SOP Classes

MWL-SCU provides Standard Conformance to the following SOP classes as an SCU role:

Table 4-54 SOP CLASSES SUPPORTED BY MWL-SCU

SOP Class Name	SOP Class UID
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31

4.2.8.2 Association Policies

4.2.8.2.1 General

MWL-SCU initiates but never accepts associations.

Table 4-55 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR FIND-SCU

Maximum PDU size received	114 KB (approximate)

4.2.8.2.2 Number of Associations

Table 4-56 NUMBER OF ASSOCIATIONS AS A SCP FOR MWL- SCU

Maximum number of simultaneous associations	10 pre remote AE (default)

MWL-SCU may initializes by default up to 10 simultaneous associations with a particular remote AE, the value is configurable in the NilRead DICOM settings page on a per-AE basis.

4.2.8.2.3 Asynchronous nature

MWL-SCU will only allow a single outstanding operation on an Association. Therefore, MWL-SCU will not perform asynchronous operations window negotiation.

4.2.8.2.4 Implementation Identifying Information

Table 4-57 DICOM IMPLEMENTATION CLASS AND VERSION FOR MWL-SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.8.3 Association Initiation Policy

MWL-SCU attempts to initiate a new association for each MWL query requests

4.2.8.3.1 Activity –Send MWL to Remote MWL SCP AE

4.2.8.3.1.1 Description and Sequencing of Activities

The MWL query requests are initiated from the NilRead patient reconciliation UI when a user queries the configured MWL AE for the patient demographics, upon receiving the request, NilRead

- initiates an Association to each of the MWL SCP AE
- issues the C-FIND request according to the Modality Worklist Information Model
- interprets responses and display the findings

4.2.8.3.1.2 Proposed Presentation Context

Table 4-58 PROPOSED PRESENTATION CONTEXTS FOR MWL-SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Table 4-54 SOP CLASSES SUPPORTED BY MWL-SCU		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.8.3.1.3 Extended Negotiation

No extended negotiation is performed.

4.2.8.3.1.4 SOP Specific Conformance

4.2.8.3.1.4.1 SOP Specific Conformance to Query SOP Classes

The behavior of NilRead when encountering status codes from a Modality Worklist C-FIND response is summarized in the Table 4-59 RESPONSE STATUS FOR MWL-SCU.

If NilRead receives any SCP response status other than "Success" or "Pending", NILREAD will log the event, and a warning message will appear on the user interface.

4.2.8.3.1.4.2 Presentation Context Acceptance Criterion

MWL-SCU does not accept associations.

4.2.8.3.1.4.3 Transfer Syntax Selection Policies

MWL-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.8.3.1.4.4 Response Status

MWL-SCU will behave as described in Table 4-58 PROPOSED PRESENTATION CONTEXTS FOR MWL-SCU in response to the status returned in the C-FIND response command message(s).

Table 4-59 RESPONSE STATUS FOR MWL-SCU

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown to user
Success	N/A	0000	Association closed

NilRead limits the number of processed worklist responses to a configurable maximum value. NilRead will issue a C-FIND-CANCEL if the configurable limit of responses is reached.

If NilRead does not receive a response on an association in a configurable period of time (15 seconds by default), NilRead logs the event and aborts the association using A-ABORT. An error message will appear in the UI.

If an association is aborted by the SCP or network layers, the reason is logged and the status is reported to the user. Unexpected attributes returned in a C-FIND response are ignored.

No attempt is made to filter out non-matching responses (e.g. due to unsupported optional matching keys) and possible duplicate entries returned by the SCP.

Table 4-60 MWL-SCU Modality Worklist Request Identifier

Module Name				
Attribute Name	**Tag**	**VR**	**R**	**Q**
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	SQ		
>Modality	(0008,0060)	CS	x	**x**
>Scheduled Station AE Title	(0040,0001)	AE	x	
>Scheduled Procedure Step Start Date	(0040,0002)	DA	x	
>Scheduled Procedure Step Start Time	(0040,0003)	TM	x	
>Scheduled Performing Physician's Name	(0040,0006)	PN	x	**x**
>Scheduled Procedure Step Description	(0040,0007)	LO	x	
>Scheduled Procedure Step ID	(0040,0009)	SH	x	
>Scheduled Procedure Step Location	(0040,0011)	SH	x	
>Pre-Medication	(0040,0012)	LO	x	
>Scheduled Procedure Step ID	(0040,0009)	SH	x	
>Requested Contrast Agent	(0032,1070)	LO	x	
Requested Procedure				
Study Instance UID	(0020,000D)	UI	x	
Requested Procedure Description	(0032,1060)	LO	x	
Requested Procedure Code Sequence	(0032,1064)	SQ	x	
Requested Procedure ID	(0040,1001)	SH	x	**x**
Requested Procedure Priority	(0040,1003)	SH	x	
Patient Transport Arrangements	(0040,1004)	LO	x	
Imaging Service Request				

Accession Number	(0008,0050)	SH	x	**x**
Referring Physician's Name	(0008,0090)	PN	x	**x**
Requesting Physician	(0032,1032)	PN	x	
Imaging Service Request Comments	(0040,2400)	LT	x	
Patient Identification				
Patient's Name	(0010,0010)	PN	x	**x**
Patient ID	(0010,0020)	LO	x	**x**
Patient Demographic				
Patient's Birth Date	(0010,0030)	DA	x	**x**
Patient's Birth Time	(0010,0032)	TM	x	
Patient's Sex	(0010,0040)	CS	x	**x**
Patient's Weight	**(0010,1030)**	**DS**	**x**	

Note: The attribute Specific Character Set (0008,0005) and Time zone Offset from UTC (0008,0201) are not sent.

The above tables should be read as follows:

- **Module Name** The name of the associated module for supported worklist attributes.
- **Attribute Name** Attributes supported to build an MLW-SCU Request Identifier.
- **Tag** DICOM tag for this attribute.
- **VR** DICOM VR for this attribute.
- **R** Return keys. An "x" will indicate that MWL-SCU will supply this attribute as Return Key with zero length for Universal Matching. The MWL-SCU does not support retired date format (yyyy.mm.dd) for "Patient's Birth Date" and "Scheduled Procedure Step Start Date" in the response identifiers. For "Scheduled Procedure Step Start Time" also, the retired time format as well as unspecified time components are not supported.
- **Q** Query Key. An "x" " indicates that MWL-SCU will supply this attribute as matching key with the values entered form the NilRead UI. For example, the Patient Name can be entered thereby restricting Worklist responses to Procedure Steps scheduled for the patient.

4.2.9 IAN-SCU

4.2.9.1 SOP Classes

IAN-SCU provides Standard Conformance to the following SOP classes as an SCU role:

Table 4-61 SOP CLASSES SUPPORTED BY IAN-SCU

SOP Class Name	SOP Class UID
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33

4.2.9.2 Association Policies

4.2.9.2.1 General

IAN-SCU initiates but never accepts associations.

Table 4-62 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR FIND-SCU

Maximum PDU size received	114 KB (approximate)

4.2.9.2.2 Asynchronous nature

IAN-SCU will only allow a single outstanding operation on an Association. Therefore, IAN-SCU will not perform asynchronous operations window negotiation.

4.2.9.2.3 Implementation Identifying Information

Table 4-63 DICOM IMPLEMENTATION CLASS AND VERSION FOR IAN-SCU

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.9.3 Association Initiation Policy

IAN-SCU attempts to initiate a new association when the new instances become available.

4.2.9.3.1 Activity –Send IAN to Remote AE

4.2.9.3.1.1 Description and Sequencing of Activities

A single attempt will be made to send the instance availability notification, if the request fails for whatever reason, no retry will be performed and an error will be logged in the system.

4.2.9.3.1.2 Proposed Presentation Context

Table 4-64 PROPOSED PRESENTATION CONTEXTS FOR IAN-SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4.2.19.1	See Table 4.2.19.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.9.3.1.3 Extended Negotiation

No extended negotiation is performed.

4.2.9.3.1.4 SOP Specific Conformance

4.2.9.3.1.4.1 SOP Specific Conformance to Query SOP Classes

The following condition will trigger sending of an IAN to remote AEs configured in IOCM settings.

- A new set of instances are generated by Nil data correction operation, e.g. Edit Patient/Study, merge Patient/Study, split study.

Nil always sends 'ONLINE' for the new instances, meaning the instances are available and can be retrieved.

The retrieve AE title is included in the IAN notification.

4.2.9.3.1.4.2 Presentation Context Acceptance Criterion

IAN-SCU does not accept associations.

4.2.9.3.1.4.3 Transfer Syntax Selection Policies

IAN-SCU prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.9.3.1.4.4 Response Status

IAN-SCU will behave as described in Table 4.2.19-5 in response to the status returned in the C-FIND response command message(s).

Table 4-65 RESPONSE STATUS FOR IAN-SCU

Service Status	Further Meaning	Status Codes	Behavior
Failure	N/A	Any	Association closed, message shown to user
Success	N/A	0000	Association closed

4.2.10 STORAGE COMMITMENT SCP

4.2.10.1 SOP Classes

STORAGE COMMITMENT SCP provides Standard Conformance to the following SOP classes:

Table 4-66 SOP CLASSES SUPPORTED BY STORAGE COMMITMENT SCP

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

4.2.10.2 Association Policies

4.2.10.2.1 General

STORAGE COMMITMENT SCP accepts associations for receiving storage commitment N-ACTION requests and initiates associations for sending storage commitment N-EVENT-REPORT notifications.

Table 4-67 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR STORAGE COMMITMENT SCP

Maximum PDU size receives	114 kB (approximate)

4.2.10.2.2 Number of Associations

Table 4-68 NUMBER OF ASSOCIATIONS AS A SCP FOR STORAGE COMMITMENT SCP

Maximum number of simultaneous associations	Unlimited

4.2.10.2.3 Asynchronous Nature

STORAGE COMMITMENT SCP will only allow a single outstanding operation on an Association. Therefore, STORAGE COMMITMENT SCP will not perform asynchronous operations window negotiation.

4.2.10.2.4 Implementation Identifying Information

Table 4-69 DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE COMMITMENT SCP

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.10.3 Association Initiation Policy

If STORAGE COMMITMENT SCU is configured to receive N-EVENT-REPORT notification on a separate association, STORAGE COMMITMENT SCP will attempt to initiate a new association to send storage commitment N-EVENT-REPORT notification to the SCU.

4.2.10.4 Activity – Send Storage Commitment N-EVENT-REPORT Notification

4.2.10.4.1.1 Description and Sequencing of Activities

When STORAGE COMMITMENT SCP receives a storage commitment request from SCU, it will check storage status for the requested DICOM instances in database and send the status back to SCU in a storage commitment N-EVENT-REPORT notification.

4.2.10.4.1.2 Proposed Presentation Contexts

Table 4-70 PROPOSED PRESENTATION CONTEXTS FOR STORAGE COMMIEMENT SCP TO REMOTE AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Table 4-66 SOP CLASSES SUPPORTED BY STORAGE COMMITMENT SCP		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.10.4.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.10.4.1.3 SOP Specific Conformance

4.2.10.4.1.3.1 SOP Specific Conformance to STORAGE COMMIEMENT PUSH MODEL SOP Classes

The STORAGE COMMITMENT SCP will initiate an association and send the N-EVENT-REPORT notification to the requesting SCU. NilRead supports the standard DICOM elements for Storage Commitment Push Model SOP Class as an SCP as listed in the table below:

Table 4-71 STORAGE COMMITMENT SCP N-EVENT-REPORT NOTIFICATION DICOM ATTRIBUTES - Success

Name	Tag	Remarks
Transaction UID	(0008,1195)	
Retrieve AE Title	(0008,0054)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

Table 4-72 STORAGE COMMITMENT SCP N-EVENT-REPORT NOTIFICATION DICOM ATTRIBUTES - Failure

Name	Tag	Remarks
Transaction UID	(0008,1195)	
Retrieve AE Title	(0008,0054)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Failed SOP Sequence	(0008,1198)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

4.2.10.5 Association Acceptance Policy

STORAGE COMMITMENT SCP accepts associations initiated from STORAGE COMMITMENT SCU for receiving storage commitment N-ACTION-RQ message.

4.2.10.5.1 Activity – Response to Storage Commitment N-ACTION-RQ request

4.2.10.5.1.1 Description and Sequencing of Activities

Upon receiving of Storage Commitment N-ACTION-RQ request, STOREAGE COMMITMENT SCP will check storage status of the requested DICOM instances in database and send a storage commitment N-EVENT-REPORT response in the same or a new association depends on server configuration.

4.2.10.5.1.2 Accepted Presentation Contexts

Table 4-73 ACCEPTED PRESENTATION CONTEXTS FOR STORAGE COMMIEMENT SCP FROM REMOTE AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
Table 4-67 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR STORAGE COMMITMENT SCP		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.10.5.1.2.1 Extended Negotiation

No extended negotiation is performed.

4.2.10.5.1.3 SOP Specific Conformance

4.2.10.5.1.3.1 SOP Specific Conformance to STORAGE COMMIEMENT PUSH MODEL SOP Classes

NilRead supports the standard DICOM elements for Storage Commitment Push Model SOP Class as an SCU as listed in the table below:

Table 4-74 STORAGE COMMITMENT SCU N-ACTION REQUEST DICOM ATTRIBUTES

Name	Tag	Remarks
Transaction UID	(0008,1195)	
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

4.2.10.5.1.3.2 Presentation Context Acceptance Criterion

STORAGE COMMITEMENT SCP always accepts associations that with correct called AE title.

4.2.10.5.1.3.3 Transfer Syntax Selection Policies

STORAGE COMMITMENT SCP prefers Explicit VR Little Endian Transfer Syntax, which is always first in the proposed Presentation Context.

4.2.10.5.1.3.4 Response Status

No Service Class specific status values are defined for the STORAGE COMMITMENT N-ACTION Service. See DICOM Standard PS 3.7 for general response status codes.

4.2.11 FIND-SCP

4.2.11.1 SOP Classes

FIND-SCP provides Standard Conformance to the following SOP classes:

Table 4-75 SOP CLASSES SUPPORTED BY FIND-SCP

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model–FIND	1.2.840.10008.5.1.4.1.1.12.1
Patient Root Query/Retrieve Information Model–FIND	1.2.840.10008.5.1.4.1.1.12.2

4.2.11.2 Association Policies

4.2.11.2.1 General

FIND-SCP accepts but never initiates associations.

Table 4-76 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR FIND-SCP

Maximum PDU size received	114 KB (approximate)

4.2.11.2.2 Number of Associations

Table 4-77 NUMBER OF ASSOCIATIONS AS A SCP FOR FIND-SCP

Maximum number of simultaneous associations	Unlimited

4.2.11.2.3 Asynchronous nature

FIND-SCP will only allow a single outstanding operation on an Association. Therefore, FIND-SCP will not perform asynchronous operations window negotiation.

4.2.11.2.4 Implementation Identifying Information

Table 4-78 DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE SCP

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.11.3 Association Initiation Policy

FIND-SCP does not initiate associations.

4.2.11.4 Association Acceptance Policy

When FIND-SCP accepts an association, it will respond to query requests. The association will be rejected if:

- The Called AE Title does not match the AE Title shared by all the SCPs of the application.
- The Calling AE Title is not in the application's pre-configured list.

4.2.11.4.1 Activity – Receive Query Request

4.2.11.4.1.1 Description and Sequencing of Activities

When a query is received, the local database is queried for the result set.

4.2.11.4.1.2 Accepted Presentation Context

Table 4-79 ACCEPTABLE PRESENTATION CONTEXTS FOR FIND-SCP AND RECEIVED QUERY REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		None
See Table 4-75	See Table 4-75	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.11.4.1.2.1 Extended Negotiation

No extended negotiation is performed and in particular, relational queries are not supported.

4.2.11.4.1.3 SOP Specific Conformance

4.2.11.4.1.3.1 SOP Specific Conformance to C-FIND SOP Class

FIND-SCP provides standard conformance to the supported C-FIND SOP Classes with one exception: all matching is case-insensitive, which is not in strict compliance with DICOM PS 3.4. This was a conscious decision, as case-sensitive matching is not intuitive and most users would be completely unaware of the fact that it even matters, causing many expected query matches to not be returned.

Only those attributes that are requested are returned in a C-FIND response. Some optional requested attributes will be returned as per Table 4-80

Table 4-80 STUDY ROOT RESPONSE IDENTIFIER FOR FIND-SCP

NAME	TAG	TYPE OF MATCHING
Patient/Study Level		
Study Instance UID	(0020,000D)	UNIQUE,L
Patient's Name	(0010,0010)	S,*,U
Patient's ID	(0010,0020)	S,*,U

NAME	TAG	TYPE OF MATCHING
Patient's Birth Date	(0010,0030)	S,U,R
Patient's Sex	(0010,0040)	S,U
Study ID	(0020,0010)	S,*,U
Referring Physician's Name	(0008,0090)	S,*,U
Study Description	(0008,1030)	S,*,U
Modalities In Study	(0008,0061)	S,U
Study Date	(0008,0020)	S,U,R
Study Time	(0008,0030)	S,U,R
Accession Number	(0008,0050)	S,*,U
Number of Study Related Instances	(0020,1208)	U
Series Level		
Series Instance UID	(0020, 000E)	UNIQUE,L
Modality	(0008, 0060)	U
Number of Series Related Instances	(0020,1209)	U
Image Level		
Instance Number	(0020,0013)	S,*,U
SOP Instance UID	(0008,0018)	S,U,L
SOP Class UID	(0008,0016)	S,U,L
Common to All Query Levels		
Specific Character Set	(0008,0005)	N/A
Retrieve AE Title	(0008,0054)	U

Table 4-81 PATIENT ROOT RESPONSE IDENTIFIER FOR FIND-SCP

NAME	TAG	TYPE OF MATCHING
Patient Level		
Patient's Name	(0010,0010)	S,*,U
Patient's ID	(0010,0020)	UNIQUE

NAME	TAG	TYPE OF MATCHING
Patient's Birth Date	(0010,0030)	S,U,R
Patient's Sex	(0010,0040)	S,U
Study Level		
Study Instance UID	(0020,000D)	UNIQUE,L
Study ID	(0020,0010)	S,*,U
Referring Physician's Name	(0008,0090)	S,*,U
Study Description	(0008,1030)	S,*,U
Modalities in Study	(0008,0061)	S,U
Study Date	(0008,0020)	S,U,R
Study Time	(0008,0030)	S,U,R
Accession Number	(0008,0050)	S,*,U
Number of Study Related Instances	(0020,1208)	U
Series Level		
Series Instance UID	(0020, 000E)	UNIQUE,L
Modality	(0008, 0060)	U
Number of Series Related Instances	(0020,1209)	U
Image Level		
Instance Number	(0020,0013)	S,*,U
SOP Instance UID	(0008,0018)	S,U,L
SOP Class UID	(0008,0016)	S,U,L
Common to All Query Levels		
Specific Character Set	(0008,0005)	N/A
Retrieve AE Title	(0008,0054)	NONE

Types of Matching:

An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "*" indicates wildcard matching, a „U" indicates Universal Matching, and an „L" indicates that a UID list is sent. "NONE" indicates that no matching is supported, but that values for this Element are returned when requested (i.e. universal matching), and "UNIQUE" indicates that this is the Unique Key for that

query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

4.2.11.4.1.3.2 Presentation Context Acceptance Criterion

FIND-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.11.4.1.3.3 Transfer Syntax Selection Policies

FIND-SCP will always select the first Transfer Syntax proposed by the client that is supported by the SCP, per Presentation Context.

FIND-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.11.4.1.3.4 Response Status

FIND-SCP will behave as described in the Table below when generating the C-FIND response command message.

Table 4-82 RESPONSE STATUS FOR FIND-SCP AND RECEIVE QUERY REQUEST

Service Status	Further Meaning	Status Codes	Reason
Failure	Identifier does not match SOP Class	A900	Sent when the Query/Retrieve Level in the C-FIND request is not present or valid
	Unable to process	Cxxx	Sent if internal query is unsuccessful
Pending	Matches are continuing	FF00	
Success	All sub-operations complete	0000	

4.2.12 MOVE-SCP

4.2.12.1 SOP Classes

MOVE-SCP provides Standard Conformance to the following SOP classes:

Table 4-83 SOP CLASSES SUPPORTED BY MOVE-SCP

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Information Model–MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient Root Query/Retrieve Information Model–MOVE	1.2.840.10008.5.1.4.1.2.1.2

4.2.12.2 Association Policies

4.2.12.2.1 General

MOVE-SCP accepts but never initiates associations.

Table 4-84 MAXIMUM PDU SIZE RECEIVED AS A SCP FOR MOVE-SCP

Maximum PDU size received	114 KB (approximate)

4.2.12.2.2 Number of Associations

Table 4-85 NUMBER OF ASSOCIATIONS AS A SCP FOR MOVE-SCP

Maximum number of simultaneous associations	Unlimited

4.2.12.2.3 Asynchronous nature

MOVE-SCP will only allow a single outstanding operation on an Association. Therefore, MOVE-SCP will not perform asynchronous operations window negotiation.

4.2.12.2.4 Implementation Identifying Information

Table 4-86 DICOM IMPLEMENTATION CLASS AND VERSION FOR MOVE-SCP

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

4.2.12.3 Association Initiation Policy

MOVE-SCP initiates an association with the AE specified as the Move Destination in the MOVE request, in order to store the requested instances. The remote AE must be in NilRead pre-configured AE list.

4.2.12.4 Association Acceptance Policy

When MOVE-SCP accepts an association, it will respond to query requests. The association will be rejected if:

- The Called AE Title does not match the AE Title shared by all the SCPs of the application.
- The move destination AE Title is not in the application's pre-configured list.

4.2.12.4.1 Activity – Receive MOVE Request

4.2.12.4.1.1 Description and Sequencing of Activities

As requests are received, a STORAGE-SCU operation is initiated to send the requested instances to the specified remote AE.

4.2.12.4.1.2 Accepted Presentation Context

Table 4-87 ACCEPTABLE PRESENTATION CONTEXTS FOR MOVE-SCP AND RECEIVED MOVE REQUEST

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation None
Name	UID	Name	UID		
See Table 4-83	See Table 4-83	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.12.4.1.2.1 Extended Negotiation

No extended negotiation is performed and in particular, relational retrievals are not supported.

4.2.12.4.1.3 SOP Specific Conformance

4.2.12.4.1.3.1 SOP Specific Conformance to C-MOVE SOP Class

MOVE-SCP provides standard conformance to the supported C-MOVE SOP Classes.

The move is performed to the destination AE Title specified in the original request. If the destination AE does not exist in NilRead pre-configured list, the store operations are not performed.

Table 4-88 STUDY ROOT REQUEST IDENTIFIER FOR MOVE-SCP

NAME	TAG	TYPE OF MATCHING
Study Level		
Study Instance UID	(0020,000D)	UNIQUE, L
Series Level		
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020, 000E)	UNIQUE,L
Image Level		
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020, 000E)	UNIQUE
SOP Instance UID	(0008,0018)	UNIQUE,L

Table 4-89 PATIENT ROOT REQUEST IDENTIFIER FOR MOVE-SCP

NAME	TAG	TYPE OF MATCHING
Patient Level		

NAME	TAG	TYPE OF MATCHING
Patient's ID	(0010,0020)	UNIQUE
Study Level		
Patient's ID	(0010,0020)	UNIQUE
Patient's ID	(0010,0020)	UNIQUE
Study Instance UID	(0020,000D)	UNIQUE,L
Series Level		
Patient's ID	(0010,0020)	UNIQUE
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020, 000E)	UNIQUE,L
Image Level		
Patient's ID	(0010,0020)	UNIQUE
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020, 000E)	UNIQUE
SOP Instance UID	(0008,0018)	UNIQUE,L

4.2.12.4.1.3.2 Presentation Context Acceptance Criterion

MOVE-SCP only accepts a Presentation Context compatible with the one listed in Table 4-87.

4.2.12.4.1.3.3 Transfer Syntax Selection Policies

MOVE-SCP will always select the first Transfer Syntax proposed by the client that is supported by the SCP, per Presentation Context.

MOVE-SCP will accept duplicate Presentation Contexts; that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same method for selecting a Transfer Syntax for each.

4.2.12.4.1.3.4 Response Status

FIND-SCP will behave as described in the Table below when generating the C-FIND response command message.

Table 4-90 RESPONSE STATUS FOR MOVE-SCP AND RECEIVE MOVE REQUEST

Service Status	Further Meaning	Status Codes	Reason
Failure	Refused: Move Destination unknown	A801	Destination AE title is not configured in NilRead

Service Status	Further Meaning	Status Codes	Reason
	Identifier does not match SOP Class	A900	Sent when the Query/Retrieve Level in the request is not present or valid
	Unable to process	Cxxx	Sent if internal query is unsuccessful
Warning	Sub-operations complete with one or more failures	B000	At least one storage sub-operation has failed
Pending	Sub-operations are continuing	FF00	Storage sub-operations are in progress
Success	All sub-operations complete will no warnings or failures	0000	

4.2.12.5 Sub-operation Dependent Behavior

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on a separate association, the question of failure of operations on the other association(s) must be considered.

MOVE-SCP initiates a C-STORE sub-operation for each SOP instance that matches the information supplied in the C-MOVE request (for example, all SOP instances in a study). The responses from the MOVE-SCP are purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by MOVE-SCP.

Whether or not the remote AE accepts the C-STORE sub-operations is beyond the control of MOVE-SCP.

If the association on which the C-MOVE was issued is aborted for any reason, the C-STORE sub-operations will continue.

If the C-MOVE operation is canceled by the remote AE, MOVE-SCP will attempt to cancel the remaining C-STORE sub-operation(s) and close the association.

4.2.13 WADO-RS SCP

This AE complies with Chapter 6 in PS3.18, specifications for DICOM-RS access.

4.2.13.1 Retrieve Study/Series/Instances/Bulk Data/Frames

4.2.13.1.1 Data Type Supported

- image/dicom+jpeg
- image/dicom+rle
- image/dicom+jp2
- application/dicom
- application/octet-stream

4.2.13.1.2 Transfer Syntaxes Supported

Table 4-91 TRANSFER SYNTAXES SUPPORTED BY WADO-RS SCP

Transfer Syntax Name	Transfer Syntax UID
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 2000 Lossy	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless	1.2.840.10008.1.2.4.91
RLE Lossless	1.2.840.10008.1.2.5
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
MPEG2 Main Profile, Main Level	1.2.840.10008.1.2.4.100

4.2.13.1.3 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.13.1.4 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.13.2 Retrieve Metadata

4.2.13.2.1 Data Type Supported

- application/dicom+json
- application/dicom+xml

4.2.13.2.2 Accept-Encoding

Restricted to gzip, deflate, or identity (the use of no transformation whatsoever). SeeW3C RFC 2616 Protocol Parameters Section 3.5 for more information (http://www.w3.org/Protocols/rfc2616/rfc2616-sec3.html).

4.2.13.2.3 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.13.2.4 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.13.3 Connection Policies

4.2.13.3.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.13.3.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.13.3.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.2.14 STOW-RS SCP

This AE complies with Section 6.6 "STOW-RS Request/Response" in PS3.18, specification for STOW-RS storage.

4.2.14.1 Store Instance

4.2.14.1.1 Data Type Supported

- multipart/related; type=application/dicom

4.2.14.1.2 Transfer Syntaxes Supported

Table 4-92 TRANSFER SYNTAXES SUPPORTED BY STOW-RS SCP

Transfer Syntax Name	Transfer Syntax UID
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 2000 Lossy	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless	1.2.840.10008.1.2.4.91
RLE Lossless	1.2.840.10008.1.2.5

4.2.14.1.3 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.14.1.4 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.14.2 Connection Policies

4.2.14.2.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.14.2.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.14.2.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.2.15 QIDO-RS SCP

This AE complies with Section 6.7 in PS3.18, specification for QIDO-RS.

4.2.15.1 Search for Studies

4.2.15.1.1 Data Type Supported

- application/dicom+xml
- application/dicom+json

4.2.15.1.2 Matching Attributes

- Accession Number
- Modalities in Study
- Referring Physician's Name
- Patient's Name
- Patient Id
- Study Id
- Study Instance UID
- Study Date
- Patients Birth Date

4.2.15.1.3 Return Attributes

- Specific Character Set
- Study Date
- Study Time
- Accession Number
- Referring Physicians Name
- Time zone Offset From UTC
- Patients Name
- Patient Id
- Patients Birth Date

- Patients Sex
- Study Id
- Study Instance UID
- Instance Availability
- Modalities in Study
- Number of Study Related Series
- Number of Study Related Instances
- Retrieve URL

4.2.15.1.4 Limit and Offset Support

Not Supported

4.2.15.1.5 Person Name Matching

Support literal and case insensitive matching

4.2.15.2 Search for Series

4.2.15.2.1 Data Type Supported

- application/dicom+xml
- application/dicom+json

4.2.15.2.2 Matching Attributes

- Study Instance UID
- Modality
- Series Number
- Series Instance UID

4.2.15.2.3 Return Attributes

- Specific Character Set
- Modality
- Time zone Offset From UTC
- Series Description
- Series Number
- Series Instance UID
- Performed Procedure Step Start Date
- Performed Procedure Step Start Time
- Request Attributes Sequence
- Instance Availability
- Number of Series Related Instances
- Retrieve URL

4.2.15.2.4 Limit and Offset Support

Not Supported

4.2.15.2.5 Relational Query Supported

Not Supported

4.2.15.3 Search for Instances

4.2.15.3.1 Data Type Supported

- application/dicom+xml
- application/dicom+json;

4.2.15.3.2 Matching Attributes

- Study Instance UID
- Modality
- Series Number
- Series Instance UID

4.2.15.3.3 Return Attributes

- Specific Character Set
- SOP Class UID
- SOP Instance UID
- Time zone Offset From UTC
- Instance Number
- Rows
- Columns
- Bits Allocated
- Bits Stored
- Number of Frames
- Instance Availability
- Retrieve URL

4.2.15.3.4 Limit and Offset Support

Not Supported

4.2.15.3.5 Relational Query Supported

Not Supported

4.2.15.4 Connection Policies

4.2.15.4.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.15.4.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.15.4.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.2.16 WADO-RS SCU

This AE complies with Chapter 6 in PS3.18, specifications for WADO-RS access.

4.2.16.1 Retrieve Study/Series/Instances/Bulk Data/Frames

4.2.16.1.1 Data Type Supported

- Image/dicom+jpeg
- Image/dicom+rle
- Image/dicom+jp2
- application/dicom
- application/octet-stream

4.2.16.1.2 Transfer Syntaxes Supported

Table 4-93 TRANSFER SYNTAX SUPPORTED BY WADO-RS SCU

Transfer Syntax Name	Transfer Syntax UID
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 2000 Lossy	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless	1.2.840.10008.1.2.4.91
RLE Lossless	1.2.840.10008.1.2.5
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
MPEG2 Main Profile, Main Level	1.2.840.10008.1.2.4.100

4.2.16.1.3 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.16.1.4 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.16.2 Retrieve Metadata

4.2.16.2.1 Data Type Supported

- application/dicom+json
- application/dicom+xml

4.2.16.2.2 Accept-Encoding

Restricted to gzip, deflate, or identity (the use of no transformation whatsoever). SeeW3C RFC 2616 Protocol Parameters Section 3.5 for more information (http://www.w3.org/Protocols/rfc2616/rfc2616-sec3.html).

4.2.16.2.3 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.16.2.4 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.16.3 Connection Policies

4.2.16.3.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.16.3.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.16.3.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.2.17 WADO-WS SCU

This AE complies with Chapter 6 in PS3.18, specifications for WADO-WS access.

4.2.17.1 Retrieve Imaging Document Set

This action corresponds to the IHE XDS-I.b transaction RAD-69

4.2.17.1.1 Request

NilRead uses the Web Services parameters and WSAL definition as defined in DICOM Standard PS3.18 section 6.4.4.1 WS – RetrieveImagingDocumentSet Request.

4.2.17.1.2 List of Character Sets Supported

The "Accept-charset" field of the GET method is not present.

4.2.17.2 Connection Policies

4.2.17.2.1 General

All standard WADO-WS connection policies apply. There are no extensions for WADO-WS options.

4.2.17.2.2 Number of Connections

NilRead does not limit the number of simultaneous WADO-WS requests.

4.2.18 WADO-URI SCU

4.2.18.1 Retrieve Objects

4.2.18.1.1 Data Type Supported

- application/dicom

4.2.18.1.2 Parameters of the HTTP Request

The parameters of the query component of the Request-URI to be sent to the web Server through the HTTP GET method request are encoded as defined in IETF RFC3986.

4.2.18.1.3 List of Character Sets Supported

The "Accept-charset" field of the GET method is not present.

4.2.18.2 Connection Policies

4.2.18.2.1 General

All standard URI connection policies apply. There are no extensions for URI options.

4.2.18.2.2 Number of Connections

NilRead does not limit the number of simultaneous WADO-URI requests.

4.2.19 STWO-RS SCU

This AE complies with Chapter 6 in PS3.18, specifications for STOW-RS access.

4.2.19.1 Store Instances

4.2.19.1.1 Data Type Supported

- multipart/related; type=application/dicom

4.2.19.1.2 SOP Class Restrictions

Restricted to the SOP classes supported by NilRead, see full list in Table 4-11.

4.2.19.1.3 Size Restriction

Restricted to size supported by NilRead hosting environment.

4.2.19.2 Connection Policies

4.2.19.2.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.19.2.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.19.2.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.2.20 QIDO-RS SCU

This AE complies with Section 6.7 in PS3.18, specification for QIDO-RS.

4.2.20.1 Search for Studies

4.2.20.1.1 Data Type Supported

- application/dicom+xml
- application/dicom+json

4.2.20.1.2 Matching Attributes

- Patient Id
- Patient Name
- Patient Sex
- Patient Birth Date
- Accession Number
- Referring Physician
- Study UID
- Study ID
- Study Description
- Study Date
- Modalities In Study

4.2.20.1.3 Limit and Offset Support

Not Supported

4.2.20.1.4 Person Name Matching.

Support literal and case insensitive matching

4.2.20.2 Search for Series

4.2.20.2.1 Data Type Supported

- application/dicom+xml
- application/dicom+json;

4.2.20.2.2 Matching Attributes

- Study Instance UID
- Modality
- Series Number
- Series Instance UID
- Performed Procedure Step Start Date
- Performed Procedure Step Start Time
- Scheduled Procedure Step Id
- Requested Procedure Id

4.2.20.2.3 Limit and Offset Support

Not Supported

4.2.20.2.4 Relational Query Supported

Not Supported

4.2.20.3 Search for Instances

4.2.20.3.1 Data Type Supported

- application/dicom+xml
- application/dicom+json;

4.2.20.3.2 Matching Attributes

- SOP Class UID
- SOP Instance UID
- Instance Number

4.2.20.3.3 Limit and Offset Support

Not Supported

4.2.20.3.4 Relational Query Supported

Not Supported

4.2.20.4 Connection Policies

4.2.20.4.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.20.4.2 Number of Connections

NilRead does not limit the number of simultaneous RS requests.

4.2.20.4.3 Asynchronous Nature

NilRead does not support RS asynchronous response.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The application is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

4.3.2 Additional Protocols

When host names rather than IP addresses are used in the configuration properties to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system.

4.3.3 IPv4 and IPv6 Support

By default, this product supports IPv4. When configured, it will also support IPv6. It does not utilize any of the optional configuration identification or security features of IPv6.

4.4 Configuration

All configuration of the application is performed through the use of NilRead application DICOM Configuration View or Nil DICOM Service configuration file stored in the same directory with the Nil application executable.

4.4.1 AE Title/Presentation Address Mapping

The Calling AE Title of the local application is configurable in the NilRead DICOM Configuration View. The Called AE Title is configured on the per tenant basis in Nil Hub Site Configuration View, note the Called AE Title is shared by multiple SCP roles in a tenant scope.

Titles as well as presentation address (hostname or IP address and port number) are configurable in the Nil Hub Configuration View and stored in the internal databases/configuration files.

4.4.1.1 Parameters

Table 94 CONFIGURATION PARAMETERS TABLE

Parameter	Configurable	Default Value
General Parameters		
Maximum PDU size	Yes	116,794
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes	1 hour
General DIMSE level time-out values	No	30 seconds
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	Yes	10 seconds

Parameter	Configurable	Default Value
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	Yes	30 seconds
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	Yes	30 seconds
Send Buffer Size (TCP/IP socket)	Yes	118341 bytes
Receive Buffer Size (TCP/IP socket)	Yes	118341 bytes
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	None
AE Specific Parameters (all AEs)		
Size constraint in maximum object size	No	None
Maximum PDU size the AE can receive	Yes	116794 bytes
Maximum PDU size the AE can send	Yes	116794 bytes
AE specific DIMSE level time-out values	No	30 seconds
Number of simultaneous Associations by Service and/or SOP Class	No	10

4.4.1.2 RS Interface

The NilRead can respond on two ports (configurable), one for unprotected HTTP traffic and one for TLS protected traffic. The TLS port will refuse any connection from a system that is not recognized as authenticated by a known authority.

4.4.1.2.1 WADO-RS SCP

Access point: {NIL server base URL}/dicom-rs/wado

4.4.1.2.2 STOW-RS SCP

Access point: {NIL server base URL}/dicom-rs/stow

4.4.1.2.3 QIDO-RS SCP

Access Point: {NIL server base URL}/dicom-rs/qido

5 Media Interchange

5.1 Implementation Model

5.1.1 Application Data Flow Diagram

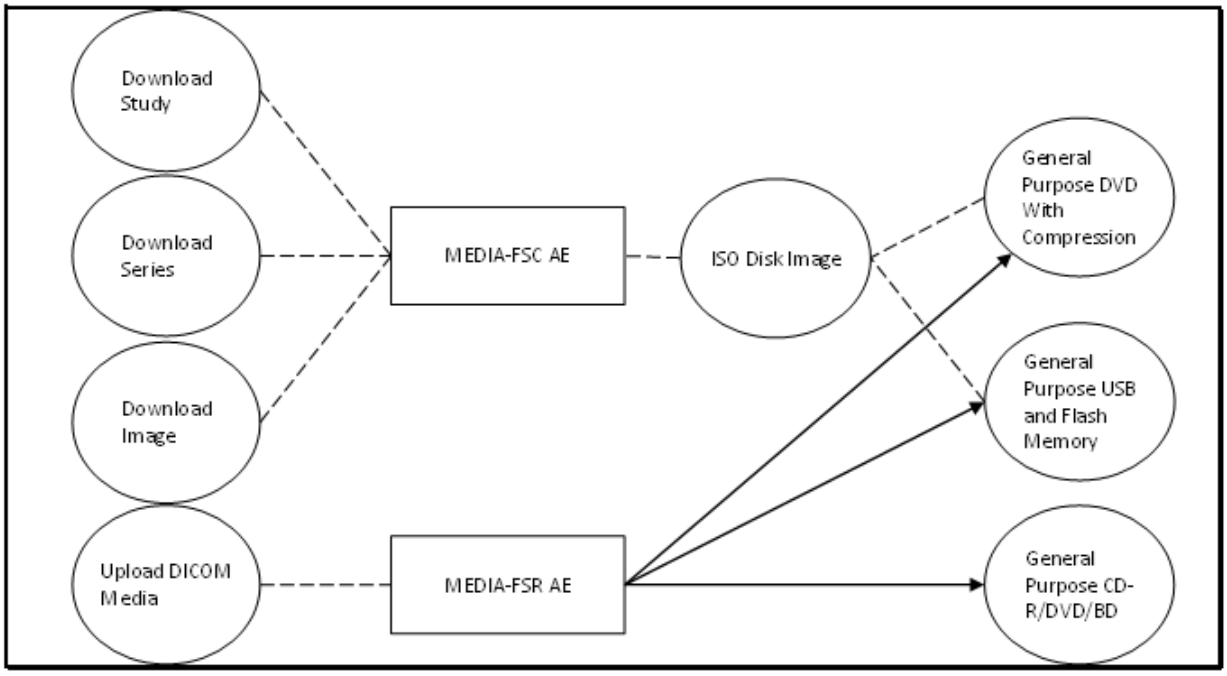

Figure 4 Media Interchange Implementation Model

NilRead provides the UI and media support as a File Set Creator (FSC) and a File Set Reader (FSR). The DICOM Application Entity is associated with the local real-word activity "Download Study/Series/Image" and "Upload DICOM Media" requests.

Conceptually it may be modeled as the following Application Entities:

MEDIA-FSC, NilRead export the selected study/series/image as a DICOM file set in ISO disk image format. User is required to specify the path to the media where the DICOM file set to export.

MEDIA-FSR, NilRead loads user-selected PS3.10 compliant files, either from the local file system or from PS3.12 compliant media according to one of the General-Purpose Media Application Profiles of PS3.11 (CD-R or DVD-RAM).

In effect, NilRead is media-neutral, since the user is required to browse and locate the DICOM file set. Furthermore, any DICOM image or object encoded in one of the supported Transfer Syntaxes defined in Table 4-15 may be loaded.

5.1.2 Functional Definition of AEs

5.1.2.1 MEDIA-FSC

MEDIA-FSC is activated through the user interface to select studies/series/image to download with "Export as DICOM CD" option.

5.1.2.2 MEDIA-FSR

MEDIA-FSR is activated through the user interface using the "Upload DICOM Media" feature to import the selected DICOM file set for display.

5.1.3 Sequencing of Read-World Activities

All FSC/FSR activities are sequentially initiated in the user interface, and another activity may not be initiated until the prior activity has completed.

5.1.4 File Meta Information Options

The implementation information written to the File Meta Header in each file is:

Table 95 DICOM Implementation Class and Version for Media Storage

Implementation Class UID	1.2.826.0.1.3680043.214.1
Implementation Version Name	WIF 2.1.17

5.2 AE Specifications

5.2.1 MEDIA-FSC Application Entity

The MEDIA-FSC Application Entity provides standard conformance to the Media Storage Service Class. The Application Profiles and roles are listed below:

Table 96 APPLICATION PROFILES SUPPORTED AS FSC

Application Profiles Supported	Role
STD-GEN-DVD-JPEG	**FSC**
STD-GEN-DVD-J2K	FSC
STD-GEN-USB-JPEG	**FSC**
STD-GEN-USB-J2K	**FSC**
STD-GEN-MMC-JPEG	**FSC**
STD-GEN-MMC-J2K	**FSC**
STD-GEN-CF-JPEG	**FSC**
STD-GEN-SD-JPEG	**FSC**
STD-GEN-SD-J2K	FSC

Note

NilRead is media neutral and dependent on the underlying hardware. Any (non-secure) General Purpose Profile can be supported.

5.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is configurable (see Section 5.4).

5.2.1.2 Real-World Activities

5.2.1.2.1 Activity "Download Study/Series/Image"

The MEDIA-FSC Application Entity acts as an FSC when requested to export the selected SOP Instances to a Medium.

NILREAD allows the user to specify the path to the Storage Medium and export the selected SOP instances as a DICOM file-set along with a DICOM Basic Directory object (DICOMDIR) that contains Patient, Study, Series and Image records.

5.2.2 MEDIA-FSR Application Entity

The MEDIA-FSR Application Entity provides standard conformance to the Media Storage Service Class. The Application Profiles and roles are listed below:

Table 97 APPLICATION PROFILES SUPPORTED AS FSR

Application Profiles Supported	Role
STD-GEN-DVD-JPEG	FSR
STD-GEN-DVD-J2K	FSR
STD-GEN-USB-JPEG	FSR
STD-GEN-USB-J2K	FSR
STD-GEN-MMC-JPEG	FSR
STD-GEN-MMC-J2K	FSR
STD-GEN-CF-JPEG	FSR
STD-GEN-SD-JPEG	FSR
STD-GEN-SD-J2K	FSR
STD-GEN-CD	FSR
STD-GEN-DVD-RAM	FSR
STD-GEN-BD	FSR

Note

NilRead is media neutral and dependent on the underlying hardware. Any (non-secure) General Purpose Profile can be supported.

5.2.2.1 File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is configurable (see Section 5.4).

5.2.2.2 Real-World Activities

5.2.2.2.1 Activity "Download Study/Series/Image"

The MEDIA-FSR Application Entity acts as an FSR when requested to upload the selected SOP Instances to NilRead from a Storage Medium.

5.3 Augmented and Private Application Profiles

The MEDIA-FSC and MEDIA-FSR Application Entity do not support any augmented for private application profiles

5.4 Media Configuration

MEDIA-FSC Application Entity shares the same AE Title as other Nil Read Application Entities which is configurable through the Nil Hub site configuration interface.

6 Support of Character Sets

6.1 Overview

The system supports all extended character sets defined in the DICOM 2008 standard, including single-byte and multi-byte character sets as well as code extension techniques using ISO 2022 escapes.

Support extends to correctly decoding and displaying the correct symbol for all names and strings found in storage instances from media and received over the network, and in the local database.

6.2 Character Sets

In addition to the default character repertoire, the Defined Terms for Specific Character Set in Table 98 are supported:

Table 98 SUPPORTED SPECIFIC CHARACTER SET DEFINED TERMS

Character Set Description	Defined Term
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127

Character Set Description	Defined Term
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Latin alphabet No. 5	ISO_IR 148
Japanese	ISO_IR 13
Thai	ISO_IR 166
Unicode in UTF-8	ISO_IR 192
Default repertoire	ISO 2022 IR 6
Latin alphabet No. 1	ISO 2022 IR 100
Latin alphabet No. 2	ISO 2022 IR 101
Latin alphabet No. 3	ISO 2022 IR 109
Latin alphabet No. 4	ISO 2022 IR 110
Cyrillic	ISO 2022 IR 144
Arabic	ISO 2022 IR 127
Greek	ISO 2022 IR 126
Hebrew	ISO 2022 IR 138
Latin alphabet No. 5	ISO 2022 IR 148
Thai	ISO 2022 IR 166
Japanese	ISO 2022 IR 87
Japanese	ISO 2022 IR 159
Japanese	ISO 2022 IR 149
Chinese (Simplified) Extended	GB18030
Japanese	ISO 2022 IR 13

6.3 Character Set Configuration

Whether or not characters are displayed correctly depends on the presence of font support in the underlying operating system. It may be necessary for the user to add one of the "all Unicode" fonts to their system configuration in order to correctly display characters that would not typically be used in the default locale.

7 Security

7.1 Supported Security Profiles

7.1.1 Basic TLS Secure Transport Connection Profile

NilRead supports Basic TLS Secure Transport Connection profile, it's able to establish DICOM associations over the secure TLS channels.

NilRead provides options for each remote AE to enable the TLS connection and specify the client certificate thumbprint if required, the configuration can be changed in NilRead DICOM configuration page on a per remote AE basis.

Through NilRead Hub management interface, NilRead can enable a TLS port (2762 by default) for all NilRead SCP AEs, and a TLS port (2763 by default) for Nil DICOM storage streaming service.

NilRead uses certificate thumbprints to load the required certificates from the Windows certificates stores.

The DICOM association will be aborted on TLS handshake failures.

7.1.2 Secure Use Profiles

NilRead complies with the following Audit Trail profiles, user can configure the Audit Trail through Nil's configuration files and view the Audit Trail entries in Settings->Analytics->Event Audit Trail page.

7.1.2.1 Audit Trail Message Format Profile

NilRead formats audit trail messages in accordance with the XML schema specified in DICOM PS3.15 A.5.1 and the general conventions specified in Section A.5.2. NilRead detects and reports the following events:

- Audit Log Used
- Begin Transferring DICOM Instances
- DICOM Instances Accessed
- DICOM Instances Transferred
- DICOM Study Deleted
- Export
- Import
- Network Entry
- Order Record
- Patient Record
- Procedure Record
- Query
- Security Alert
- User Authentication

7.1.2.2 Audit Trail Message Transmission Profile - SYSLOG-TLS

NilRead supports IHE ATNA integration profile and can communicate with an audit record repository to create audit log entries through Syslog protocol over the TLS connection.

7.1.2.3 Audit Trail Message Transmission Profile - SYSLOG-UDP

NilRead supports IHE ATNA integration profile and communicates with an audit record repository to create audit log entries through Syslog protocol over the UDP connection.

7.1.3 Attribute Confidentiality Profiles

The following confidentiality profiles are supported, user can review or change profile settings or create custom profiles in Settings->Preferences->Confidentiality Profiles page.

7.1.3.1 Application Level Confidentiality Profiles

NilRead complies with the Application Level Confidentiality Profiles as a de-identifier, it can create de-identified version of an existing data set for viewing and exporting. The de-identification process protects all attributes specified in DICOM PS3.15 2015c "Table E.1-1. Application Level Confidentiality Profile Attributes".

7.1.3.2 Basic Application Level Confidentiality Profile and Options

NilRead complies with the Basic Application Level Confidentiality Profile with the following options:

- Clean Pixel Data Option
- Clean Recognizable Visual Features Option
- Clean Graphics Option
- Clean Structured Content Option
- Clean Descriptors Option
- Retain Longitudinal Temporal Information Options
- Retain Patient Characteristics Option
- Retain Device Identity Option
- Retain UIDs Option
- Retain Safe Private Option

7.2 Association Level Security

The STORAGE-SCP checks the following DICOM values when determining whether to accept Association Open Requests:

Called AE Title, Application Context

The MOVE-SCP checks the following DICOM values when determining whether to accept Association Open Requests:

Called AE Title, Calling AE Title, Application Context

Each SCP AE checks that the Association requestor specifies the correct Called AE Title for the SCP.

7.3 Transport Level Security

NilRead supports transport level security measures for RS access.

NilRead supports the following transport level security measures:

- None
- HTTP BASIC Authentication over SSL
- SSL Client Certificates
- HTTP Forms Authentication over SSL

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instances

The following tables use a number of abbreviations.

- ALWAYS: Attribute is always present with a non-zero-length value
- ANAP: Attribute is not always present
- NEVER: Attribute is never included
- VNAP: Value not always present (attribute sent zero-length if no value)

The abbreviations indicating the "Source" of the values are:

- AUTO: The attribute value is generated automatically or indirectly from previous user input
- COPY: The attribute value is copied verbatim from the referenced SOP instances
- USER: The attribute value is taken directly from user input

The 'reference' column refers to sections in DICOM standard P.S 3.3 -2009

8.1.1.1 Key Object Selection Document IOD

Table 99 IOD OF CREATED GRAYSCALE SOFTCOPY PRESENTATION STATE SOP INSTANCES

IE	Module	Reference	Presence of Module	Source
Patient	Patient	C.7.1.1	VNAP	COPY
	Clinical Trial Subject	C.7.1.3	ANAP	COPY
Study	General Study	C.7.2.1	ALWAYS	COPY
	Patient Study	C.7.2.2	ANAP	COPY
	Clinical Trial Study	C.7.2.3	ANAP	COPY
Series	General Series	C.7.3.1	ALWAYS	AUTO
	Clinical Trial Series	C.7.3.2	NEVER	N/A

IE	Module	Reference	Presence of Module	Source
	Key Object Document Series	C.17.6.1	ALWAYS	AUTO
Equipment	General Equipment	C.7.5.1	ALWAYS	AUTO
Document	Key Object Document	C.17.6.2	ALWAYS	AUTO
	SR Document Content	C.17.3	ALWAYS	AUTO
	SOP Common	C.12.1	ALWAYS	AUTO

8.1.1.2 Secondary Capture Image IOD

Table 100 IOD OF CREATED SECONDARY CAPTURE IMAGE SOP INSTANCES

IE	Module	Reference	Presence of Module	Source
Patient	Patient	C.7.1.1	VNAP	COPY
	Clinical Trial Subject	C.7.1.3	ANAP	COPY
Study	General Study	C.7.2.1	ALWAYS	COPY
	Patient Study	C.7.2.2	ANAP	COPY
	Clinical Trial Study	C.7.2.3	ANAP	COPY
Series	General Series	C.7.3.1	ALWAYS	COPY
	Clinical Trial Series	C.7.3.2	NEVER	N/A
Equipment	General Equipment	C.7.5.1	ALWAYS	AUTO
	SC Equipment	C.8.6.1	ALWAYS	AUTO
Image	General Image	C.7.6.1	ALWAYS	AUTO
	Image Pixel	C.7.6.3	ALWAYS	AUTO
	Device	C.7.6.12	NEVER	N/A
	SC Image	C.8.6.2	ALWAYS	AUTO
	Overlay Plane	C.9.2	NEVER	N/A
	Modality LUT	C.11.1	NEVER	N/A
	VOI LUT	C.11.2	NEVER	N/A
	SOP Common	Table 8.1-27	ALWAYS	AUTO

8.1.1.3 Grayscale Softcopy Presentation State IOD

Masks in the softcopy presentation state are not supported by the application.

Table 101 IOD OF CREATED GRAYSCALE SOFTCOPY PRESENTATION STATE SOP INSTANCES

IE	Module	Reference	Presence of Module	Source
Patient	Patient	Table 8.1-6	VNAP	COPY
	Clinical Trial Subject	Table 8.1-7	ANAP	COPY
Study	General Study	Table 8.1-8	ALWAYS	COPY
	Patient Study	Table 8.1-9	ANAP	COPY
	Clinical Trial Study	Table 8.1-10	ANAP	COPY
Series	General Series	Table 8.1-12	ALWAYS	COPY
	Presentation Series	Table 8.1-13	NEVER	N/A
Equipment	General Equipment	Table 8.1-11	ALWAYS	AUTO
	Presentation State Identification	Table 8.1-14	ALWAYS	AUTO
GSPS	Presentation State Relationship	Table 8.1-15	ALWAYS	AUTO
	Presentation State Shutter	Table 8.1-16	NEVER	N/A
	Presentation State Mask	Table 8.1-25	NEVER	N/A
	Display Shutter	Table 8.1-17	NEVER	N/A
	Bitmap Display Shutter	Table 8.1-18	NEVER	N/A
	Overlay Plane	Table 8.1-19	NEVER	N/A
	Overlay Activation	Table 8.1-20	NEVER	N/A
	Displayed Area	Table 8.1-21	NEVER	N/A
	Graphic Annotation	Table 8.1-22	ALWAYS	AUTO
	Spatial Transformation	Table 8.1-23	NEVER	N/A
	Graphic Layer	Table 8.1-24	ALWAYS	N/A
	Softcopy VOI LUT	Table 8.1-26	NEVER	N/A
	Softcopy Presentation LUT	Table 8.1-27	NEVER	N/A
	SOP Common	Table 8.1-28	ALWAYS	N/A

8.1.1.4 Encapsulated PDF IOD

Table 102 IOD OF CREATED ENCAPSULATED PDF SOP INSTANCES

IE	Module	Reference	Presence of Module	Source
Patient	Patient	Table 8.1-6	ALWAYS	AUTO
	Clinical Trial Subject	Table 8.1-7	NEVER	N/A
Study	General Study	Table 8.1-8	ALWAYS	AUTO
	Patient Study	Table 8.1-9	NEVER	N/A
	Clinical Trial Study	Table 8.1-10	NEVER	N/A
Series Equipment	Encapsulated Document Series	Table 8.1-38	ALWAYS	AUTO
	General Equipment	Table 8.1-11	ALWAYS	AUTO
Encapsulated Document	SC Equipment	Table 8.1-39	NEVER	N/A
	Encapsulated Document	Table 8.1-40	ALWAYS	AUTO
	SOP Common	Table 8.1-41	ALWAYS	AUTO

8.2 Data Dictionary of Private Attributes

Table 103 Data Dictionary of Private Attributes

Tag	Attribute Name	VR	VM
(0A57,0010)	Withinsight Private Creator Data	LO	1
(0A57,1040)	Withinsight Graphic Annotation Type Tag	LO	1
(0A57,1041)	Withinsight Graphic Annotation Is MeasurementTag	SH	1
(0A57,1042)	Withinsight Graphic Annotation Font Tag	LT	1
(0A57,1043)	Withinsight Graphic Annotation Color Tag	LT	1
(0A57,1044)	Withinsight Graphic Annotation Line Weight Tag	IS	1
(0A57,1045)	Withinsight Graphic Annotation Alias Tag	LO	1
(0A57,1046)	Withinsight Embedded Collage	OB	1
(0A57,1047)	Withinsight Embedded Collage Dependencies	LT	1
(0A57,1048)	Withinsight Original Pixel Data Size	IS	1
(0A57,1049)	Withinsight Compound UID Tag	ST	1

Tag	Attribute Name	VR	VM
(0A57,1050)	Withinsight Custom Grouping Group Moniker	LT	1
(0A57,1051)	Withinsight Custom Grouping Image Moniker	LT	1
(0A57,1052)	Withinsight Custom Key Image Flag	CS	1
(0A57,1053)	Withinsight Custom Grouping Image Index	IS	1
(0A57,1054)	Withinsight Tissue Base ARGB	UL	1
(0A57,1055)	Withinsight Tissue Glass FX ARGB	UL	1
(0A57,1056)	Withinsight Tissue LUT	OB	1
(0A57,1057)	Withinsight Tissue Bit Vol Content	OB	1
(0A57,1058)	Withinsight Tissue Is Hidden	UL	1
(0A57,105)	Withinsight Tissue Is Mask	UL	1
(0A57,105A)	Withinsight Tissue Hint	UL	1
(0A57,105B)	Withinsight Mime Type Of Encapsulated Document	ST	1
(0A57,105C)	Withinsight Object	OB	1
(0A57,105D)	Withinsight WithinsightObjectVersion	ST	1
(0A57,105E)	Withinsight Object Metadata	UN	1
(0A57,105F)	Withinsight Bookmark	OB	1
(0A57,106F)	Withinsight GSPS Item	UT	1
(0A57,107F)	Withinsight GSPS Sequence	SQ	1
(0A57,108F)	Withinsight Bookmark V2	UT	1
(0033,1099)	Source Database	LO	1
(0033,3002)	Target Database	LO	1
(0A57,1090)	Withinsight Video Fragment Start Time	UL	1
(0A57,1091)	Withinsight Reconciliation Record Sequence	SQ	1

8.3 Coded Terminology and Templates

Not Applicable

8.4 Greyscale Image Consistency

NilRead renders the greyscale images with the DICOM standard rendering pipeline, i.e., the Modality LUT, VOI LUT, Presentation LUT are applied as required.

A calibration mechanism is provided on mobile devices to improve the luminance response curve of the mobile devices in accordance to DICOM Greyscale Standard Display Function (DICOM PS 3.14 GSDF).

8.5 Standard Extended or Specialized Private SOP Classes

No standard extended, specialized or private SOP classes are used.

8.6 Private Transfer Syntaxes

No private transfer syntaxes are used.