



---

# DICOM Conformance Statement

**FORUM<sup>®</sup> Hospital IT Integration Version 2.0**

**VNA Support Module Version 1.5**

**Carl Zeiss Meditec AG**

**Goeschwitzer Strasse 51-52**

**07745 Jena**

**Germany**

[www.zeiss.com/med](http://www.zeiss.com/med)

# 1 Conformance Statement Overview

The FORUM VNA Support Module addresses the problem of the ever growing storage demands for Ophthalmology departments by offloading DICOM data to a centralized DICOM storage architecture, such as a Vendor Neutral Archive, or PACS system. The VNA Support Module maintains one local storage cache only. The volume of data in the local cache can only grow to a customer defined level (e.g. 75 % of the disk). The VNA Support Module has a separate installer. It is an integrated application including a database which keeps records of the status of all SOP Instances and an application responsible for the VNA workflow and configuration management.

The minimum requirement for the VNA Support Module 1.5 is FORUM Archive 4.2.

Once activated, the VNA Support Module will process and archive all new incoming data. After a defined period of time all DICOM files are forwarded from the local storage location to the configured VNA. Once the available free storage space reaches a defined value, the VNA archived files are deleted from the local storage location. DICOM files can be retrieved from VNA on user request or via automatic pre-fetching.

This document is structured as suggested in the DICOM Standard (PS 3.2: Conformance).

**Table 1-1 Network Services Supported by FORUM AE (with VNA Support Module)**

The following Table only describes the delta between the Network Services Supported by FORUM AE of the FORUM DICOM Conformance Statement and the FORUM VNA Support Module DICOM Conformance Statement.

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<b>Verification</b>		
See FORUM DICOM Conformance Statement		
<b>Transfer Image Storage SOP Classes</b>		
See FORUM DICOM Conformance Statement		
<b>Transfer Video Image Storage SOP Classes</b>		
See FORUM DICOM Conformance Statement		
<b>Transfer Other Storage SOP Classes</b>		
See FORUM DICOM Conformance Statement		
<b>Workflow Management</b>		
Storage Commitment Push Model SOP Class	Yes	Yes
See FORUM DICOM Conformance Statement		
<b>Query / Retrieve</b>		
Study Root Query/Retrieve Information Model – FIND	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	Yes	Yes
See FORUM DICOM Conformance Statement		

## 2 Table of Contents

1	Conformance Statement Overview .....	2
2	Table of Contents .....	3
3	Introduction .....	4
3.1	Revision History .....	4
3.2	Audience .....	4
3.3	Remarks .....	4
3.4	Definitions and Terms .....	4
3.5	Abbreviations .....	7
3.6	References .....	7
4	Networking .....	8
4.1	Implementation Model .....	8
4.1.1	Application Data Flow .....	8
4.1.2	Functional Definition of AEs .....	9
4.1.2.1	Functional Definition of FORUM VNA Support Module .....	9
4.1.3	Sequencing of Real-World Activities .....	9
4.2	AE Specifications .....	14
4.2.1	FORUM Application Entity Specification .....	14
4.2.1.1	SOP Classes .....	14
4.2.1.2	Associations Policies .....	14
4.2.1.2.1	General .....	14
4.2.1.2.2	Number of Associations .....	14
4.2.1.2.3	Asynchronous Nature .....	14
4.2.1.2.4	Implementation Identifying Information .....	14
4.2.1.3	Association Initiation Policy .....	14
4.2.1.3.1	Activity – User Requests Verification (SCU) .....	14
4.2.1.3.2	Activity - FORUM issues a Study Root Query (SCU) .....	14
4.2.1.3.3	Activity - FORUM retrieves SOP Instance (SCU) .....	16
4.2.1.3.4	Activity – FORUM issues Storage Request (SCU) .....	17
4.2.1.3.5	Activity - FORUM issues Storage Commitment (SCU) .....	18
4.2.1.3.6	Activity - FORUM issues to delete local instances .....	18
4.2.1.4	Association Acceptance Policy .....	18
4.2.1.4.1	Activity – Remote AE Requests Verification (SCP) .....	18
4.2.1.4.2	Activity – FORUM issues Storage Commitment (SCU) .....	19
4.2.1.4.3	Activity – FORUM retrieves SOP Instance (SCP) .....	19
4.3	Network Interfaces .....	19
4.4	Configuration .....	20
4.4.1	AE Title/Presentation Address Mapping .....	20
4.4.2	Parameters .....	20
4.4.2.1	General Parameters .....	20
5	Media Interchange .....	22
6	Support of Character Sets .....	23
7	Security .....	24
8	Annexes .....	25

## 3 Introduction

### 3.1 Revision History

Document Version	Date	Author	Changes
I	2017-11-30	msmbe	Update for VNA Support Module version 1.5 <ul style="list-style-type: none"><li>- Support and configuration of Extended Negotiation and Relation Query Support</li><li>- Support of Hierarchical Queries</li><li>- White- and blacklist</li><li>- Application Entities can be configured for every Service Class</li><li>- Reassign of archived SOP Instances supported</li></ul>

### 3.2 Audience

This document is written for the people that need to understand how FORUM VNA Support Module will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

### 3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between FORUM VNA Support Module and an external Vendor Neutral DICOM Archive (VNA). The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

### 3.4 Definitions and Terms

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.

#### 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**

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).

**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.

**Picture Archive and Communication System (PACS)**

is a digital system for processing, administrating and archiving medical images and data.

**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.

**Query Key**

A input value for a query process. Query Keys denote the set of DICOM tags that are sent from the SCU to SCP and thus control the query result.

**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.

**Vendor Neutral Archive (VNA)**

A central storage for all data generated in a clinic

## 3.5 Abbreviations

Table 3-1 Abbreviations used in this document

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
EMR	Electronic Medical Record
HL7	Health Level Seven
ILE	Implicit Little Endian
IOD	Information Object Definition
MWL	Modality Worklist
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, union of a specific DICOM service and related IOD.
TCP/IP	Transmission Control Protocol / Internet Protocol
UI	User Interface
UID	Unique Identifier
VNA	Vendor Neutral Archive
XML	Extensible Markup Language

## 3.6 References

NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at <http://medical.nema.org/>)

DICOM Conformance Statements for FORUM (available free at [www.zeiss.com/dicom](http://www.zeiss.com/dicom))

HL7 Conformance Statements for FORUM (available free at [www.zeiss.com/hl7](http://www.zeiss.com/hl7))

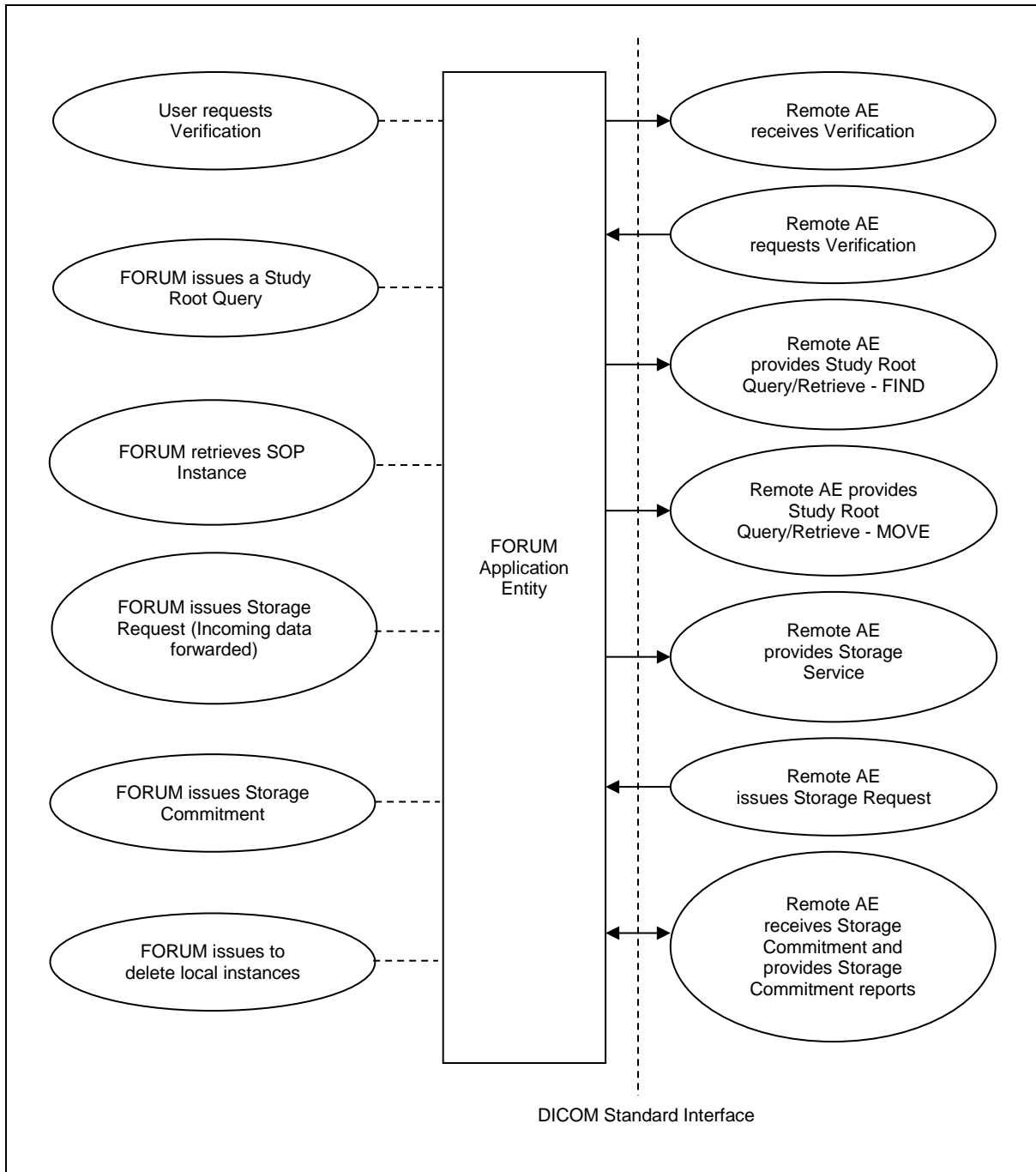
## 4 Networking

### 4.1 Implementation Model

#### 4.1.1 Application Data Flow

For FORUM Archive and FORUM Modality Worklist Functional Overview: See FORUM DICOM Conformance Statement

Figure 4-1 FORUM VNA Support Module – Functional Overview





## 4.1.2 Functional Definition of AEs

For FORUM Archive and FORUM Modality Worklist Functional Definition: See FORUM DICOM Conformance Statement

### 4.1.2.1 Functional Definition of FORUM VNA Support Module

The FORUM VNA Support Module addresses the problem of the ever growing storage demands for Ophthalmology departments by offloading DICOM data to a centralized DICOM storage architecture, such as a Vendor Neutral Archive, or PACS system. The VNA Support Module maintains one local storage cache only. The volume of data in the local cache can only grow to a customer defined level (e.g. 75 % of the disk). The VNA Support Module has a separate installer. It is an integrated application including a database which keeps records of the status of all SOP Instances and an application responsible for the VNA workflow and configuration management.

The minimum requirement for the VNA Support Module 1.5 is FORUM Archive 4.2.

Once activated, the VNA Support Module will process and archive all new incoming data. After a defined period of time all DICOM files are forwarded from the local storage location to the configured VNA. Once the available free storage space reaches a defined value, the VNA archived files are deleted from the local storage location. DICOM files can be retrieved from VNA on user request or via automatic pre-fetching.

The VNA Support Module allows the configuration of two different remote Application Entities:

#### **HUB AE (Primary Storage Node)**

The HUB AE is used as Storage SCP for external archiving and Query/Retrieve SCP. FORUM checks if an instance is already forwarded or communicates with the AE for object retrieval (only used as fall-back, if object not found on VNA AE)

#### **VNA AE**

The VNA AE is used as Query/Retrieve SCP to check if an instance is already forwarded or for object retrieval.

The VNA Support Module uses the functionality of the FORUM Application Entity described in the FORUM DICOM Conformance Statement. In addition FORUM AE has been extended to implement a Service Class User (SCU) for the following services:

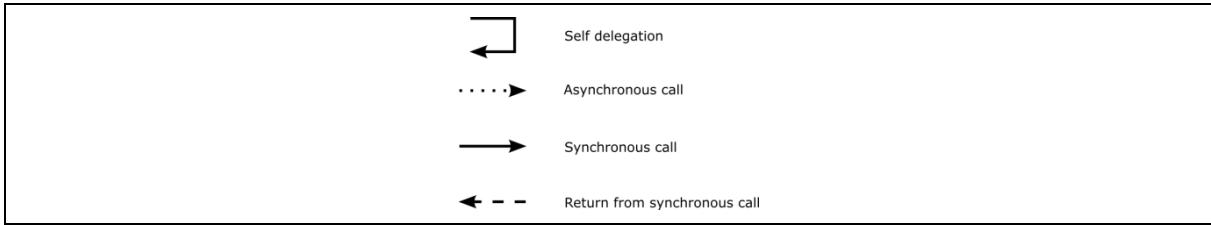
#### **The FORUM AE initiates an association and requests**

- Relational Study Root Query using SOP Instance UID as query key to check if an instance has been stored already in the VNA (Study Root Query/Retrieve Information Model – FIND)
- Relational Study Root Query using patient attributes and study date as query keys to check if there are instances on the VNA not known by FORUM (Study Root Query/Retrieve Information Model – FIND). This query is only used in combination with Pre-fetching. Pre-fetching allows to retrieve DICOM instances prior to a scheduled acquisition.
- the Storage of incoming instances (see FORUM DICOM Conformance Statement)
- Storage Commitment for forwarded instances. A successful Storage Commitment is a precondition to delete a DICOM file from FORUM Archive.
- the Retrieve of instances only stored on the VNA (Study Root Query/Retrieve Information Model – MOVE)

For the use of the VNA Support Module, it is required that the patient demographics are kept in sync with a leading patient management system.

## 4.1.3 Sequencing of Real-World Activities

To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



The diagrams use slightly modified UML symbols. The asynchronous call is not depicted as suggested in UML. Some objects do have more than one dashed line. It symbolizes more than one thread.

The only sequencing constraint that exists across FORUM and the corresponding Application Entities, is the fact that a Composite SOP Instance must be received by FORUM before Storage Commitment Push Model or Query-Retrieve Requests related to this SOP Instance can be successfully handled.

**Figure 4-2 Verification**

See FORUM DICOM Conformance Statement

**Figure 4-3 FORUM VNA Support Module – VNA only uses one Application Entity (VNA AE)**

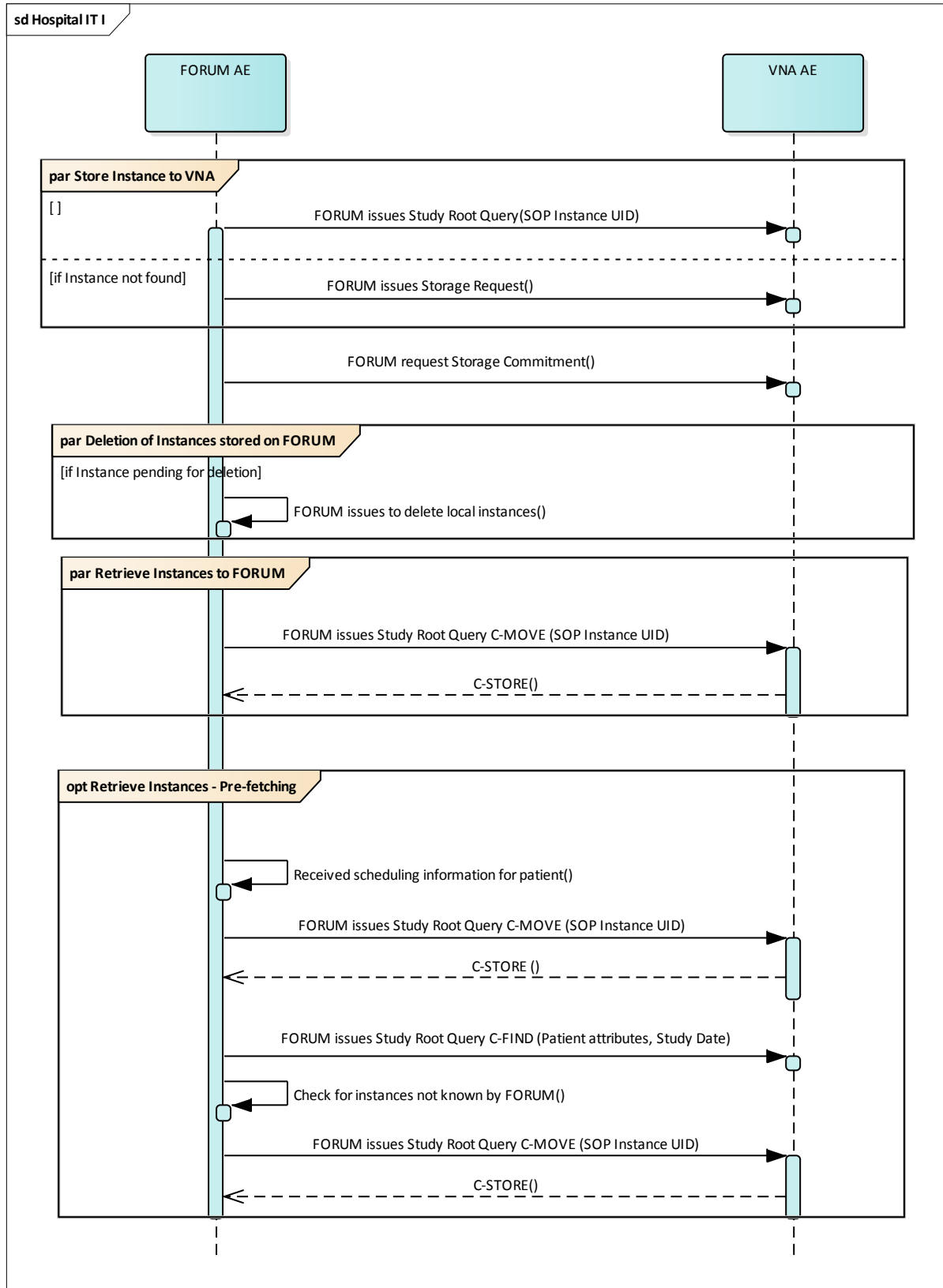


Figure 4-4 FORUM VNA Support Module – VNA uses HUB AE and VNA AE

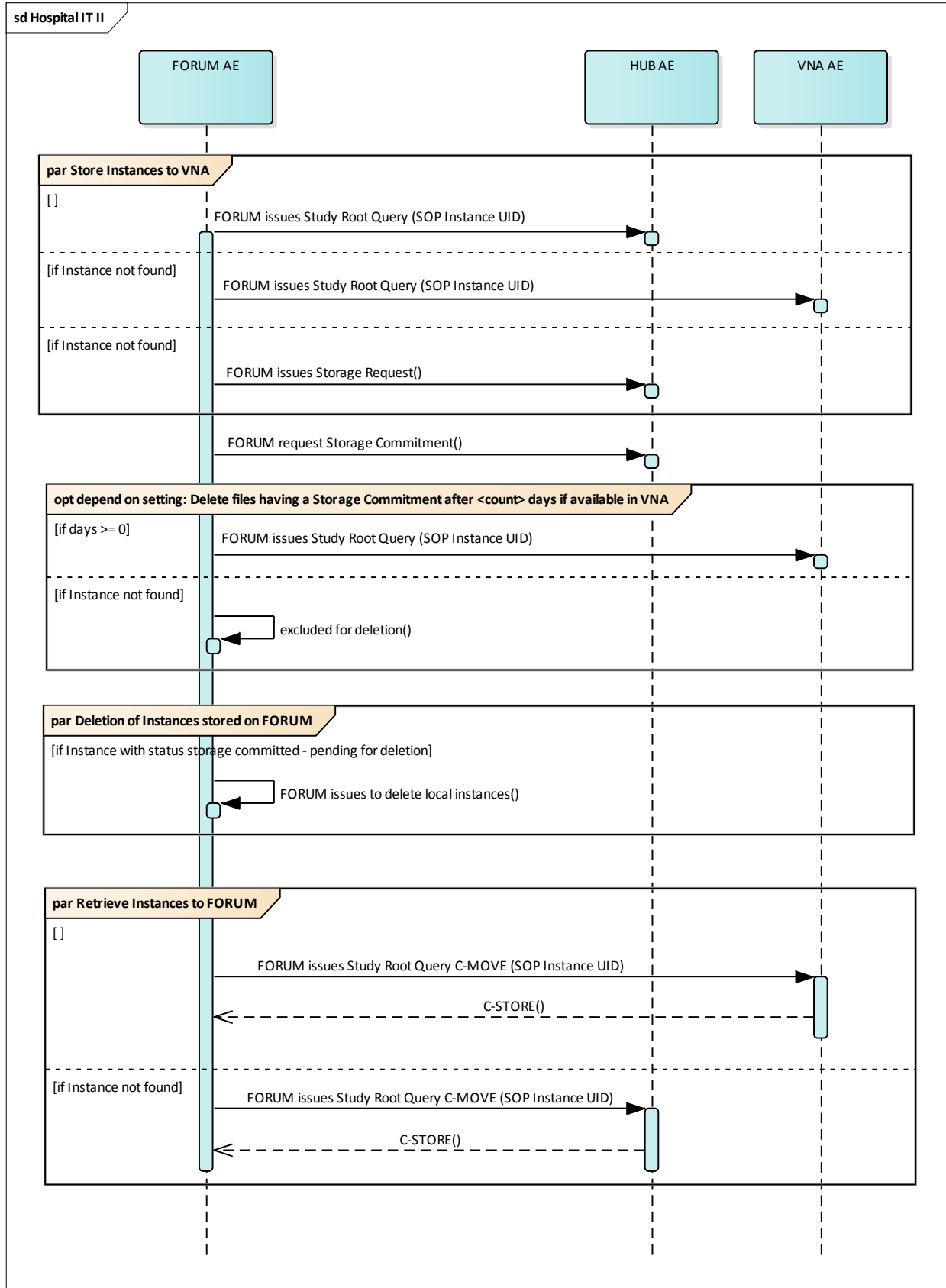
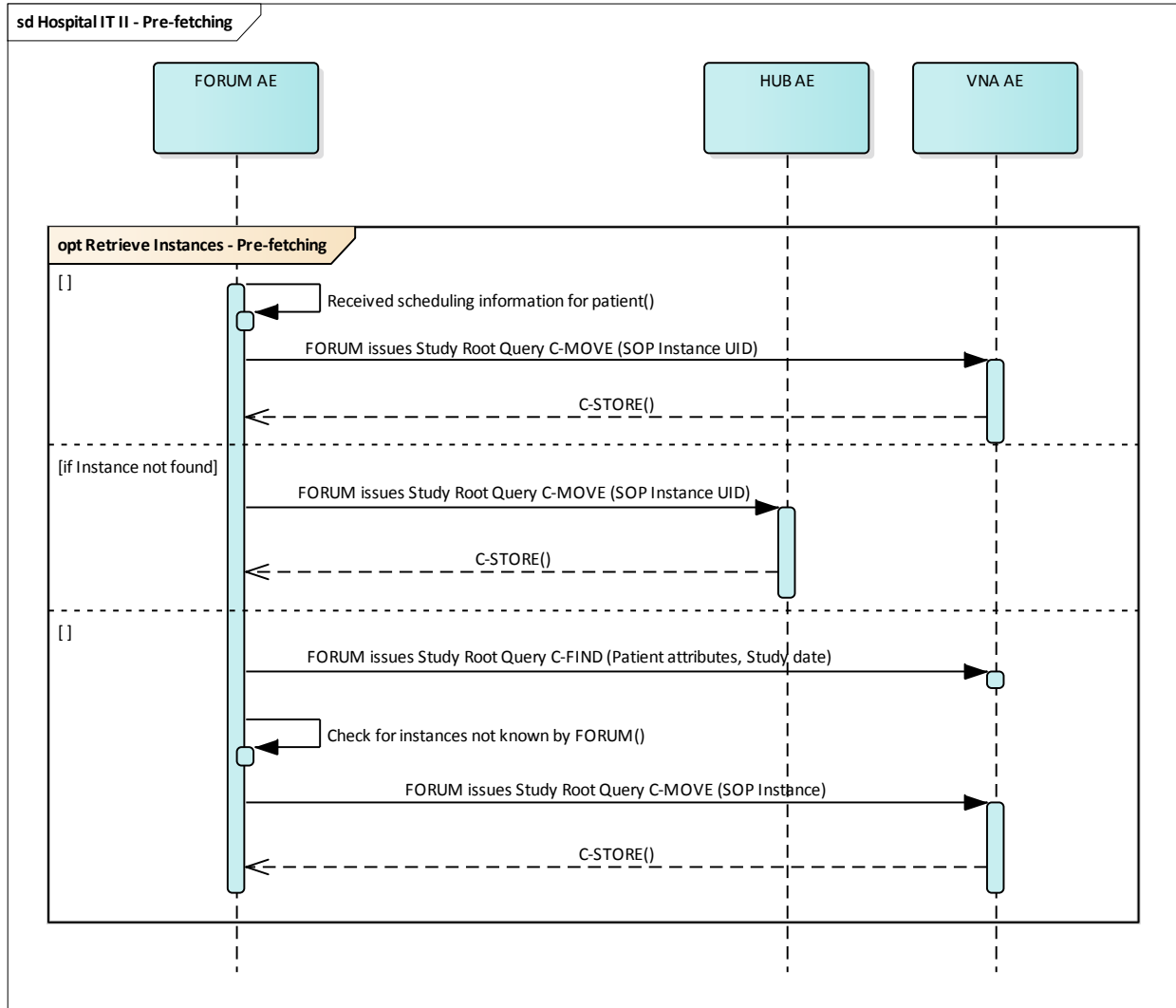


Figure 4-5 FORUM VNA Support Module – VNA uses HUB AE and VNA AE – Pre-fetching



**Pre-fetching**

Pre-fetching is an optional activity which can be enabled in the Service Tool - VNA Support Module settings. By default pre-fetching (Option: “For MWL orders, retrieve all SOP Instances of Patients”) is not enabled. In this case files are not loaded until they are requested by the user, independent of whether a requested procedure exists for the patient or not. In case the patient’s data files are no longer on the local storage, FORUM starts retrieving them from the attached VNA only at the time of user interaction, which will lead to longer loading times.

In case the option “For MWL orders, retrieve all SOP Instances of Patients” is enabled, the system pre-fetches prior studies for patients with procedure requests. Once a requested procedure for a patient is generated in FORUM or arrives via external interface, DICOM data for the affected patient which is no longer available at the local storage location will get automatically pre-fetched from the VNA. This shortens loading times when opening documents in the FORUM Viewer, instruments and plug-ins.

SOP Instances are pre-fetched immediately if a procedure request is generated for the current day. Files for procedure requests scheduled for a later point in time are loaded around midnight of the scheduled day.

SOP instances are retrieved when the following conditions are fulfilled:

- DICOM instances indexed in FORUM database

- DICOM instances unknown to FORUM which have a Study Date which is newer than the configured value (VNA Support Module setting)
- DICOM instances unknown to FORUM with a known DICOM UID Root (VNA Support Module setting)

## 4.2 AE Specifications

### 4.2.1 FORUM Application Entity Specification

#### 4.2.1.1 SOP Classes

**Table 4-1 SOP Classes for FORUM AE and FORUM MWL AE**

See FORUM DICOM Conformance Statement. The corresponding Activities are not part of this Integration DICOM Conformance Statement.

The following Table only describes the delta between the SOP Classes Supported by FORUM AE of the FORUM DICOM Conformance Statement and the FORUM VNA Support Module DICOM Conformance Statement

**Table 4-2 SOP Classes for FORUM AE (with VNA Support Module)**

SOP Class Name	SOP Class UID	SCU	SCP
See FORUM DICOM Conformance Statement			
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	Yes

#### 4.2.1.2 Associations Policies

##### 4.2.1.2.1 General

See FORUM DICOM Conformance Statement.

##### 4.2.1.2.2 Number of Associations

See FORUM DICOM Conformance Statement.

##### 4.2.1.2.3 Asynchronous Nature

See FORUM DICOM Conformance Statement.

##### 4.2.1.2.4 Implementation Identifying Information

See FORUM DICOM Conformance Statement.

#### 4.2.1.3 Association Initiation Policy

##### 4.2.1.3.1 Activity – User Requests Verification (SCU)

See FORUM DICOM Conformance Statement.

##### 4.2.1.3.2 Activity - FORUM issues a Study Root Query (SCU)

#### 4.2.1.3.2.1 Description and Sequencing of Activities

A Study Root Query is used to check if a certain SOP Instance can be found on the VNA. Therefore a relational query by SOP Instance UID is triggered.

#### VNA solution uses two Remote AE's (HUB AE and VNA AE)

FORUM triggers first a C-FIND-RQ with the SOP Instance UID directed to the HUB AE. In case the SOP Instance is not found, FORUM will trigger another C-FIND-RQ with the SOP Instance UID directed to the VNA AE.

#### Pre-fetching activated

As soon as a Modality Worklist entry is manually created in FORUM or an order is received via external interface, all instances belonging to the scheduled patient which are known by FORUM will be retrieved for that patient. Additionally a relational query by patient demographics and study date is used to search for SOP Instances on the VNA that are not known by FORUM.

#### 4.2.1.3.2.2 Proposed Presentation Contexts

Table 4-3 Proposed Presentation Contexts for Activity "FORUM issues a Study Root Query (SCU)"

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	ILE	1.2.840.10008.1.2	SCU	Yes <sup>1</sup>

<sup>1</sup>: Use of Extended Negotiation is configurable in the Service Tool (VNA Support Module). Default: "Extended Negotiation disabled"

#### 4.2.1.3.2.3 SOP Specific Conformance – Find Objects

The FORUM AE provides standard conformance to the DICOM Query/Retrieve Service Class as an SCU. The FORUM AE uses relational-queries. The following tables contain detailed information on matching and return keys.

Table 4-4 Matching Types

Abbreviation	Description
S	Single Value Matching
R	Range Matching
UNIQUE	Unique query key for the respective level

Table 4-5 STUDY level keys for the Study Root Query/Retrieve Information Model (request and response)

Description	Tag	Query key
Study Date	(0008,0020)	R
Patient's Name	(0010,0010)	return key only
Patient ID	(0010,0020)	S
Issuer of Patient ID	(0010,0021)	S
Patient's Birth Date	(0010,0030)	S
Patient's Sex	(0010,0040)	S

**Table 4-6 Instance Level Attributes**

Description	Tag	Query key
SOP Instance UID	(0008,0018)	UNIQUE
SOP Class UID	(0008,0016)	return key only

**Table 4-7 Query C-FIND Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
Success	Matching is complete – No final Identifier is supplied	0000	The Software Application stops receiving responses.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and / or matching for this Identifier.	FF01	Log error message with status and patient ID
	All other responses code meaning	All other responses code	Log error message with status and patient ID

**4.2.1.3.3 Activity - FORUM retrieves SOP Instance (SCU)**

This activity is triggered whenever the operator selects a patient from the Patient Directory and opens Document Display to display DICOM instances which are not anymore available on local storage but only on VNA.

This activity is also triggered automatically in case pre-fetching functionality is activated.

In both situations a C-MOVE request on IMAGE level using the SOP Instance UID as Query key is used to retrieve a DICOM file.

**VNA solution uses two Remote AE's (HUB AE and VNA AE)**

FORUM will trigger first a C-MOVE-RQ of the SOP Instance UID on the VNA AE.

In case the SOP Instance is not found, FORUM will trigger another C-MOVE-RQ on the SOP Instance UID on the HUB AE (fall-back).

In case there are differences in patient demographics of instances stored in FORUM and the VNA, the DICOM header of the retrieved instances will get updated with the patient demographics stored in FORUM database.



The update of the DICOM header applies to

- Patient demographics
  - Issuer of Patient ID
  - Patient ID
  - Patient's Name
  - Patient's Sex
  - Patient's Birth Date
- Study Instance UID
- Series Instance UID

#### 4.2.1.3.3.1 Description and Sequencing of Activities

#### 4.2.1.3.3.2 Proposed Presentation Contexts

**Table 4-8 Proposed Presentation Contexts for Activity “FORUM retrieves SOP Instance (SCU)”**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	ILE	1.2.840.10008.1.2	SCU	Yes <sup>1</sup>

<sup>1</sup>: Use of Extended Negotiation is configurable in the Service Tool (VNA Support Module).  
Default: “Extended Negotiation disabled”

#### 4.2.1.3.3.3 SOP Specific Conformance – Move Objects

The following tables contain detailed information on supported matching keys:

**Table 4-9 Instance Level Attributes, Query/Retrieve Level: IMAGE**

Description	Tag	Matching Type
SOP Instance UID	(0008,0018)	UNIQUE

#### 4.2.1.3.4 Activity – FORUM issues Storage Request (SCU)

See chapter 4.4.2.1 General Parameters (setting: “Delay forwarding of SOP Instances for <count> days”) and FORUM DICOM Conformance Statement.

**Table 4-10 C-STORE Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
SUCCESS		0000	None
Duplicate SOP Instance		0111	None
Other than SUCCESS and Duplicate SOP Instance		> 0000 < 0111 > 0111	Log error message including Status Code and retry until the maximum number of retries exceeded

#### 4.2.1.3.5 Activity - FORUM issues Storage Commitment (SCU)

The FORUM VNA Support Module will request storage commitment for all provided instances if the remote VNA is configured as Storage Commitment Provider and a presentation context for the Storage Commitment Push Model has been accepted.

Storage commitment N-ACTION will be requested for documents, which exist on the VNA (either on HUB or VNA AE). If HUB services are used, the N-ACTION request is sent to the configured HUB AE for N-ACTION. If no HUB services are used, the N-ACTION request is sent directly to the VNA AE configured for N-ACTION.

##### 4.2.1.3.5.1 Description and Sequencing of Activities

The FORUM AE issues an N-ACTION requests.

##### 4.2.1.3.5.2 Proposed Presentation Contexts

The FORUM AE may request the following Presentation Contexts listed in the following table.

**Table 4-11 Proposed Presentation Contexts for Activity “FORUM issues Storage Commitment (SCU)”**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCU	No

##### 4.2.1.3.5.3 SOP Specific Conformance – Storage Commitment

The FORUM AE expects at any time the asynchronous N-EVENT report in a separate association. The behavior of FORUM AE when encountering status codes in an N-ACTION response is summarized in the table below:

**Table 4-12 Storage Commitment N-ACTION Response Status Handling Behavior**

Service Status	Further Meaning	Status Code	Behavior
Failure	All available status codes with different code meanings.		The N-ACTION-RQ will be repeated.

##### 4.2.1.3.6 Activity - FORUM issues to delete local instances

This activity automatically removes instances from local data storage only in case a successful storage commitment has happened. The deletion of the instances will be triggered depending on the VNA configuration settings.

#### 4.2.1.4 Association Acceptance Policy

FORUM accepts only associations from registered AE titles.

##### 4.2.1.4.1 Activity – Remote AE Requests Verification (SCP)

See FORUM DICOM Conformance Statement.

#### 4.2.1.4.2 Activity – FORUM issues Storage Commitment (SCU)

##### 4.2.1.4.2.1 Description and Sequencing of Activities

Storage commitment N-EVENT reports will be received. This should be a result to the N-ACTION Request of the FORUM AE.

##### 4.2.1.4.2.2 Accepted Presentation Contexts

**Table 4-13 Acceptable Presentation Context for Activity “FORUM issues Storage Commitment (SCU)”**

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Storage Commitment Push Model	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCU	No

##### 4.2.1.4.2.3 SOP Specific Conformance - Storage Commitment

FORUM Archive has to receive a successful storage commitment to be able to delete the corresponding DICOM files on local archive.

##### 4.2.1.4.2.3.1 Storage Commitment Operations (N-EVENT-REPORT)

FORUM AE is capable of receiving an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push.

The behavior of FORUM AE when receiving Event Types within the N-EVENT-REPORT is summarized in the table below.

**Table 4-14 Storage Commitment N-EVENT-REPORT Request Failure Reasons**

Service Status	Further Meaning	Failure Reason	Behavior
Failure		All Failure Reasons	The SOP Instance is also considered as not being committed. The Failure Reason will not be interpreted by FORUM.

#### 4.2.1.4.3 Activity – FORUM retrieves SOP Instance (SCP)

##### 4.2.1.4.3.1 Description and Sequencing of Activities

This chapter describes the aspect of association acceptance of the activity “FORUM retrieves SOP Instance from remote AE”. The VNA initiates a C-STORE-RQ to FORUM AE.

##### 4.2.1.4.3.2 Accepted Presentation Contexts

See FORUM DICOM Conformance Statement.

##### 4.2.1.4.3.3 SOP Specific Conformance – Store Objects

The FORUM AE provides standard conformance.

## 4.3 Network Interfaces

See FORUM DICOM Conformance Statement.

## 4.4 Configuration

See FORUM DICOM Conformance Statement.

### 4.4.1 AE Title/Presentation Address Mapping

See FORUM DICOM Conformance Statement.

### 4.4.2 Parameters

#### 4.4.2.1 General Parameters

The general parameters are shared for associations to any of the configured AE.

See FORUM DICOM Conformance Statement for the standard parameters.

**Table 4-15 Configuration Parameters Table for the FORUM VNA Support Module**

Parameter	Configurable (Yes/No)	Default Value
<b>Vendor Neutral Archive (VNA) Support Module</b>		
Delete deletion candidates after <count> days	Yes Range: 0 – 100 000	11000
Delete retrieved SOP Instances after <count> days	Yes Range: 0 – 100 000	7
Delay forwarding of SOP Instances for <count> days	Yes Range 0 – 100 000	7
Blacklist/Whitelist configuration	Yes Value: List of DICOM tags	Empty
Deletion threshold based on free storage space in percent	Yes Range: 0 – 100 (integer)	0
Number of SOP Instances to be processed within one status checking interval (limits the corresponding database queries)	Yes	1000
Status checking interval in <seconds> for the defined number of SOP Instances	Yes Range: 0 – x (integer)	300
Maximum <count> of archiving attempts (C-STORE)	Yes Range: 0 – x	10
Ensure availability (C-FIND) in VNA before deletion of local SOP Instance after <count> days	Yes Range: EMPTY or 0 – 100 000	EMPTY (not enabled)
Request storage commitment for pending requests after <count> days	Yes Range: EMPTY or 0 – 100 000	EMPTY (not enabled)
For MWL orders, retrieve all SOP Instances of patients	Yes	Unchecked (pre-fetch disabled)
For MWL orders, only retrieve unknown SOP Instances newer than <count> days	Yes Range: EMPTY or 0 – 100 000 days	EMPTY (not enabled)
For MWL orders, only retrieve unknown SOP Instances of non-ZEISS instruments with the UID prefixes	Yes List of UID prefixes separated by “,”	EMPTY
Activate VNA support	Yes	Unchecked (disabled)

HUB AE for C-FIND	Yes To be configured with "AET@host:port" only if HUB services are used	EMPTY
HUB AE for C-MOVE	Yes To be configured with "AET@host:port" only if HUB services are used	EMPTY
HUB AE for C-STORE	Yes To be configured with "AET@host:port" only if HUB services are used	EMPTY
HUB AE for N-ACTION (Storage Commitment)	Yes To be configured with "AET@host:port" only if HUB services are used	EMPTY
Activate communication to VNA	Yes To temporarily disable the communication to VNA for maintenance purposes	Checked (activated)
Use Extended Negotiation	Yes	Unchecked (disabled)
Use Relational Queries	Yes	Checked (Enabled)
VNA AE for C-FIND	Yes	VNA_QR_AET@localhost:11135
VNA AE for C-MOVE	Yes	VNA_QR_AET@localhost:11135
VNA AE for C-STORE	Yes	VNA_QR_AET@localhost:11135
VNA AE for N-ACTION (Storage Commitment)	Yes	VNA_QR_AET@localhost:11135

## 5 Media Interchange

See FORUM DICOM Conformance Statement.

## 6 Support of Character Sets

See FORUM DICOM Conformance Statement.

## 7 Security

See FORUM DICOM Conformance Statement.



## 8 Annexes

See FORUM DICOM Conformance Statement.



Carl Zeiss Meditec AG  
Goeschwitzer Strasse 51-52  
07745 Jena  
Germany  
<http://www.zeiss.com/forum>  
<http://www.zeiss.com/dicom>  
<http://www.zeiss.com/med>