# DICOM Conformance Statement

# RETI-Port/Scan 21

**Number 01**

**Revision 01**

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## 1 CONFORMANCE STATEMENT OVERVIEW

The RETI-Port/Scan 21 implements the necessary DICOM services to download work lists from an information system, convert PDF documents with measured values, curves and derivatives into the DICOM format "Encapsulated PDF" and transfer them to a DICOM-enabled network storage device (typically a PACS).

Table B.1-1 provides an overview of the network services supported by RETI-Port/Scan 21.

**Table B.1-1**
**NETWORK SERVICES**

| SOP Classes | Use of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| Verification | Yes | Yes |
| **Transfer** | | |
| Encapsulated PDF Storage | Yes | No |
| **Workflow Management** | | |
| Modality Worklist | Yes | No |

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# 3 INTRODUCTION

## 3.1 AUDIENCE

This document is intended for people that need to understand how RETI-Port/Scan 21 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.

## 3.2 REMARKS

The scope of this DICOM Conformance Statement is to facilitate integration between RETI-Port/Scan 21 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 facilitates 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.

## 3.3 TERMS AND DEFINITIONS

Terms and definitions should be listed here. The following example may be used as a template:

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 (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). |

| | |
|---|---|
| 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 Class (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 Instance (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. |

### 3.4 BASICS OF DICOM COMMUNICATION

This section describes terminology used in this Conformance Statement for the non-specialist. This section is not a substitute for training about DICOM, and it makes many 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 several 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 on 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 process.

Two Application Entities may also communicate with each other by exchanging media (such as a 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.

### 3.5 ABBREVIATIONS, REFERENCES

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

Additional Abbreviations and terms are as follows:

| | |
|---|---|
| AE | DICOM Application Entity |
| AET | Application Entity Title |
| ASCII | American Standard Code for Information Interchange |
| CSE | Customer Service Engineer |
| DB | Database |
| DCS | DICOM Conformance Statement |
| DICOM | Digital Imaging and Communications in Medicine |
| FSC | File Set Creator |
| FSR | File Set Reader |
| FSU | File Set Updater |
| GSDF | Grayscale Standard Display Function |
| HIS | Hospital Information System |
| IHE | Integrating the Healthcare Enterprise |
| IOD | DICOM Information Object Definition |
| ISO | International Standard Organization |
| MPPS | Modality Performed Procedure Step |
| n. a. | not applicable |
| NEMA | National Electrical Manufacturers Association |
| PACS | Picture Archiving and Communication System |
| PDU | DICOM Protocol Data Unit |
| RIS | Radiology Information System |
| RP | Reference Point |
| SC | Secondary Capture |
| SCU | DICOM Service Class User (DICOM client) |
| SCP | DICOM Service Class Provider (DICOM Server) |
| SOP | DICOM Service-Object Pair |
| SPS | Scheduled Procedure Step |
| SR | Structured Report |
| TFT | Thin Film Transistor (Display) |
| TID | Template ID |
| UID | Unique Identifier |
| UTF-8 | Unicode Transformation Format-8 |
| VR | Value Representation |

### 3.6 REFERENCES

[NEMA PS3] Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/[1]

## 4 NETWORKING

### 4.1 IMPLEMENTATION MODEL

#### 4.1.1 Application Data Flow

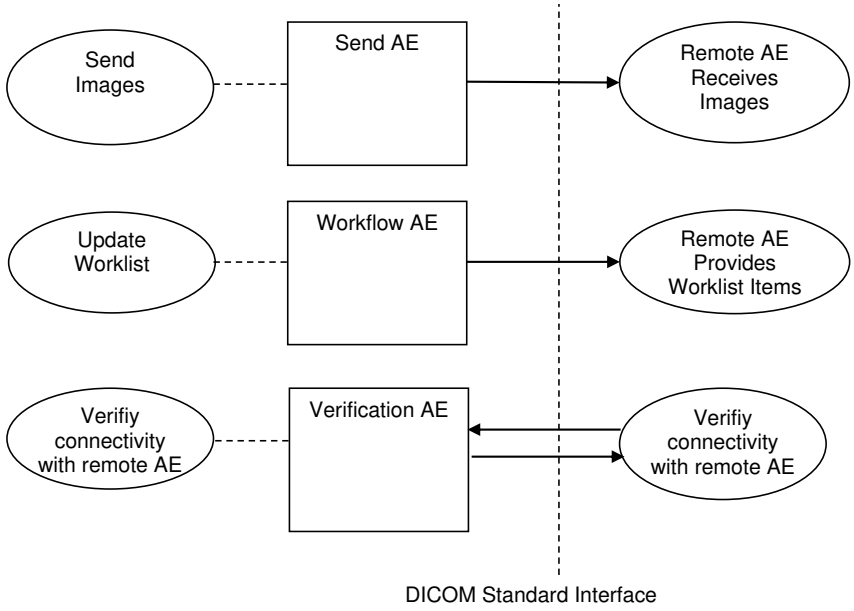


**Figure 4-1 RETI-Port/Scan 21 DATA FLOW DIAGRAM**

Conceptually the network services may be modeled as the following separate AEs, though in fact all the AEs share a single (configurable) AE Title:

The Send Application Entity sends Encapsulated PDF objects to a remote AE. It is associated with the real-world activity “Send Images” which is performed after completion of an exam.

The Workflow Application Entity receives worklist information from a remote AE. It is associated with the real-world activity “Update Worklist”. Update Worklist is performed as a result of an operator request. The Workflow AE queries a remote AE for worklist items matching a query request defined by the operator (time range of scheduled examination, PACS id of patient or * for all open WLEs).

The Verification AE sends verification requests to and answers verification requests from a remote AE.

[1] *The DICOM Standard is under continuous maintenance, the current official version is available at http://dicom.nema.org*

## 4.2 Functional Definition of AE's

### 4.2.1 Functional Definition of Verification Application Entity

The DICOM Verification AE is used to check if the configuration of the remote AE is correct, and the remote AE is listening. The user can trigger the echo request. The Request is initiated in the DICOM window ("verify" button)

The result of the request is displayed immediately. Furthermore, the DICOM Verification AE responds to verification requests from remote AEs. Technically, this part is included in the system service, which is also hosting the Storage Service AE.

Technically, the Verification SCU is an integral component of all SCUs inside the RETI-Port/Scan 21, so every SCU can verify basic connectivity before putting a Service Class specific request towards the SCP.

### 4.2.2 Functional Definition of Send Application Entity

If a send-job is triggered for a file or a study, an association request is sent to the destination AE and upon successful negotiation of a Presentation Context, the document transfer is started. If the association cannot be opened or the transfer of the acquired documents fails for any other reason, the failed transfer attempt will be recorded in RETI-Port/Scan 21's database. A configurable number of retries will be executed in configurable time intervals until either the transfer succeeds or the maximum number of retries is reached.

The user can display the transfer protocol.

In case of failed transfers, a notification is displayed when the DICOM window is launched.

### 4.2.3 Functional Definition of Workflow Application Entity

The Workflow Application Entity attempts to download a Worklist from a remote node. If the Workflow AE establishes an Association to a remote AE, it will transfer all worklist items via the open Association. The results will be displayed in a separate list, which will be cleared with the next Worklist Update.

### 4.2.4 Sequencing of Real-World Activities

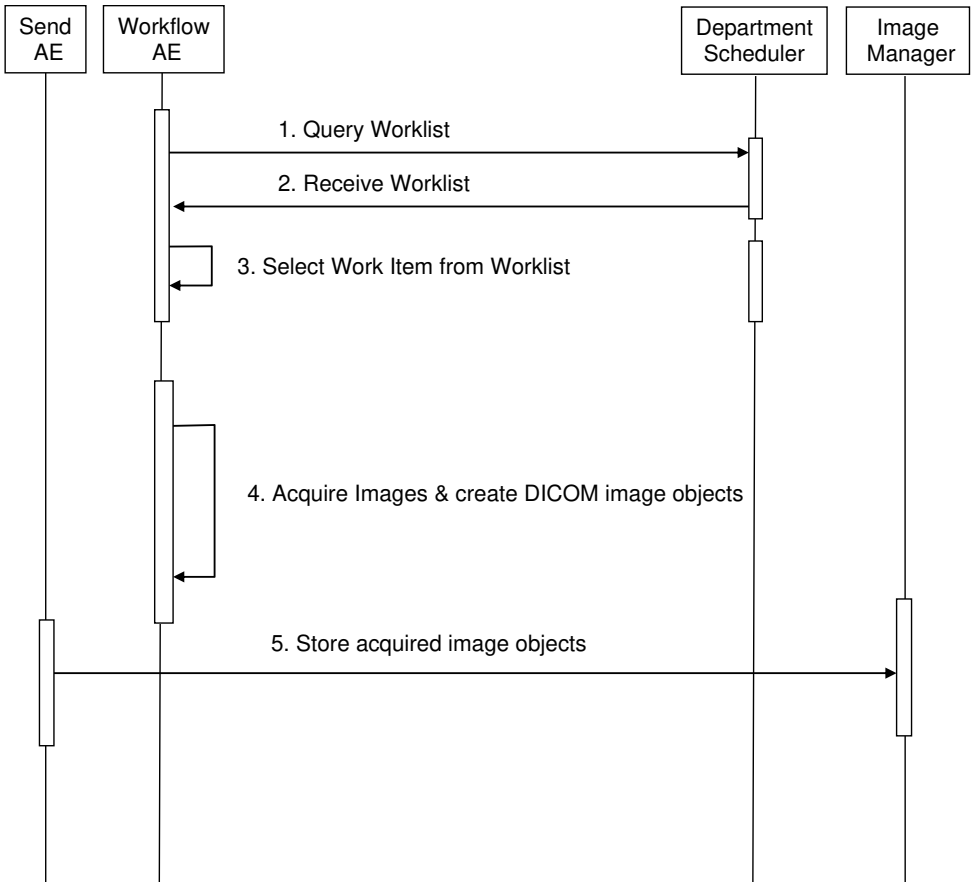


**Figure 4-2 SEQUENCE DIAGRAM – IMAGE ACQUISITION AND ARCHIVING TRIGGERED BY WORKLIST**

Figure 4-2 shows the sequence of activities to receive worklist items, create images and archive them. Other workflow situations (e.g., unscheduled procedure steps) will have other sequencing constraints.

## 4.3 AE SPECIFICATIONS

### 4.3.1 Send Application Entity Specification

#### 4.3.1.1 SOP Classes

The Send Application Entity provides Standard Conformance to the following SOP Class:

**Table 4.3-1 SOP CLASS FOR SEND AE**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | Yes | No |

#### 4.3.1.2 Association Policies

##### *4.3.1.2.1 General*

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

**Table 4.3-2 DICOM APPLICATION CONTEXT FOR SEND AE**

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

##### *4.3.1.2.2 Number of Associations*

The Send AE initiates one Association at a time for each destination to which a transfer request is being processed in the active job queue list. Only one job will be active at a time, the other remains pending until the active job is completed or failed.

**Table 4.3-3 NUMBER OF ASSOCIATIONS INITIATED FOR SEND AE**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

##### *4.3.1.2.3 Asynchronous Nature*

The Send AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 4.3-4 ASYNCHRONOUS NATURE AS A SCU FOR SEND AE**

| | |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |

##### *4.3.1.2.4 Implementation Identifying Information*

The implementation information for this Application Entity is:

**Table 4.3-5 DICOM IMPLEMENTATION CLASS AND VERSION FOR SEND AE**

| | |
|---|---|
| Implementation Class UID | 1.2.826.0.1.3680043.2.891.113 |
| Implementation Version Name | DICOM_CONNECT_25 |

#### 4.3.1.3 Association Initiation Policy

##### *4.3.1.3.1 Activity – Send Images*

###### 4.3.1.3.1.1 Description and Sequencing of Activities

A user can select image and non-image objects and request them to be sent to a configured destination. SOP instances of a specific study can be sent together or in different associations.

If a send-job is triggered for a file or a study, an association request is sent to the destination AE. Upon successful negotiation of a Presentation Context the object transfer is started and a C-STORE request is

initiated for each object selected for storage. If the association cannot be opened, an error is displayed to the user. For each file sent in a send-job, the C-STORE response is received. If one or more C-STORE operations fail, a message is displayed to the user. For files that could not be sent because either the association could not be established or the C-STORE response status differs from the status SUCCESS or WARNING, or the transfer of the acquired documents fails for any other reason, the failed transfer attempt will be recorded in RETI-Port/Scan 21's database. A configurable number of retries will be executed in configurable time intervals until either the transfer succeeds or the maximum number of retries is reached.

The Storage process is initiated from the "Printout" dialog. "Send to PACS" is used instead of "Printout" is the operator handles an open worklist request. After printing all documents (PDF format) the operator calls "finish and send to PACS" from the DICOM window.

Error reporting: See 4.2.2

After all files of a send-job are sent, the association is released.

#### 4.3.1.3.1.2 Proposed Presentation Contexts

The Send AE is capable of proposing the Presentation Contexts shown in the following table:

**Table 4.3-6 PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY SEND IMAGES**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU | None |

#### 4.3.1.3.1.3 SOP Specific Conformance for Image Storage SOP Classes

All Image SOP Classes supported by the Send AE exhibit the same behavior, except where stated, and are described together in this section.

1 If none of the proposed Presentation Contexts is accepted by the SCP, then the Association is aborted by the Send AE using A-ABORT and the send job is marked as failed. The job failure is logged and reported to the user. The Send AE will retry failed transfers as described in 4.3.1.3.1.1.

Any of the C-Store response failures become reported to the user and the whole Store procedure may be repeated or the error shall be reported to the Roland Consult service desk.

The behavior of Send AE when encountering status codes in a C-STORE response is summarized in the Table below:

**Table 4.3-7 STORAGE C-STORE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code | Behavior |
|---|---|---|---|
| Success | Success | 0000 | The SCP has successfully stored the SOP Instance.<br>If all SOP Instances in a send job have status success then the job is marked as complete. |

| | | | |
|---|---|---|---|
| Refused | Out of Resources | A700-A7FF | The Association is released using A-RELEASE-RQ and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user. This is a transient failure. |
| Error | Data Set does not match SOP Class | A900-A9FF | The Association is released using A-RELEASE-RQ and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application. |
| Error | Cannot Understand | C000-CFFF | The Association is released using A-RELEASE-RQ and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user. |
| Warning | Coercion of Data Elements | B000 | Image transmission is considered successful but the status meaning is logged. |
| Warning | Data Set does not match SOP Class | B007 | Image transmission is considered successful but the status meaning is logged. |
| Warning | Elements Discarded | B006 | Image transmission is considered successful but the status meaning is logged. |
| * | * | Any other status code. | The Association is released using A-RELEASE-RQ and the send job is marked as failed. The status code is logged and the job failure is reported to the user. |

The behavior of Storage AE during communication failure is summarized in the Table below:

**Table 4.3-8 STORAGE COMMUNICATION FAILURE BEHAVIOR**

| Exception | Behavior |
|---|---|
| Timeout | The Association is released using A-RELEASE-RQ and the send job is marked as failed. The reason is logged and the job failure is reported to the user. |
| Association aborted by the SCP or network layers | The send job is marked as failed. The reason is logged and the job failure is reported to the user. |

A failed send job Is automatically restarted in periodic intervals until the maximum number of retries is reached.

The contents of all Image Storage SOP Instances created by RETI-Port/Scan 21 conform to the DICOM IOD definitions and are described in section 8.1.

### 4.3.2 Workflow Application Entity Specification

#### 4.3.2.1 SOP Classes

The Workflow AE provides Standard Conformance to the following SOP Class:

**Table 4.3-9 SOP CLASSES FOR WORKFLOW AE**

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

#### 4.3.2.2 Association Policies

##### *4.3.2.2.1 General*

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

**Table 4.3-10 DICOM APPLICATION CONTEXT FOR WORKFLOW AE**

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

##### *4.3.2.2.2 Number of Associations*

The Workflow AE initiates one Association at a time for a Worklist request.

**Table 4.3-11 NUMBER OF ASSOCIATIONS INITIATED FOR WORKFLOW AE**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

The Workflow AE does not accept Association Requests by remote AEs.

##### *4.3.2.2.3 Asynchronous Nature*

The Workflow AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 4.3-12 ASYNCHRONOUS NATURE AS A SCU FOR WORKFLOW AE**

| | |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |

##### *4.3.2.2.4 Implementation Identifying Information*

The implementation information for this Application Entity is:

**Table 4.3-13 DICOM IMPLEMENTATION CLASS AND VERSION FOR WORKFLOW AE**

| | |
|---|---|
| Implementation Class UID | 1.2.826.0.1.3680043.2.891.113 |
| Implementation Version Name | DICOM_CONNECT_25 |

#### 4.3.2.1 Association Initiation Policy

The Workflow AE will initiate an Association in order to issue a C-FIND request according to the Modality Worklist Information Model

##### *4.3.2.1.1 Activity – Worklist Update*

###### 4.3.2.1.1.1 Description and Sequencing of Activities

The request for a Worklist Update is initiated by user interaction. A user can select different search criteria, i.e. Scheduled Procedure Step Start Date, Modality and Scheduled Station AE Title (always set by default).

Parameters: Examination time range, patients PACS id (or * for all patients scheduled for this AET)

Upon initiation of the request, the Workflow AE will build a Request Identifier for the C-FIND request, initiate an Association to send the request with the search criteria and will wait for the Worklist responses. To protect the system from overflow, the Workflow AE can limit the number of processed worklist responses to a configurable maximum. By default, no limit is configured. Worklist items of the last request are temporarily stored and every worklist request updates the current list of open requests. So the requests can be transferred among the different RETI applications During receiving the worklist response items are counted and the query processing is canceled by issuing a C-FIND-CANCEL if the configurable limit of items is reached. The results will be displayed in a list, which will be cleared with the next worklist update.

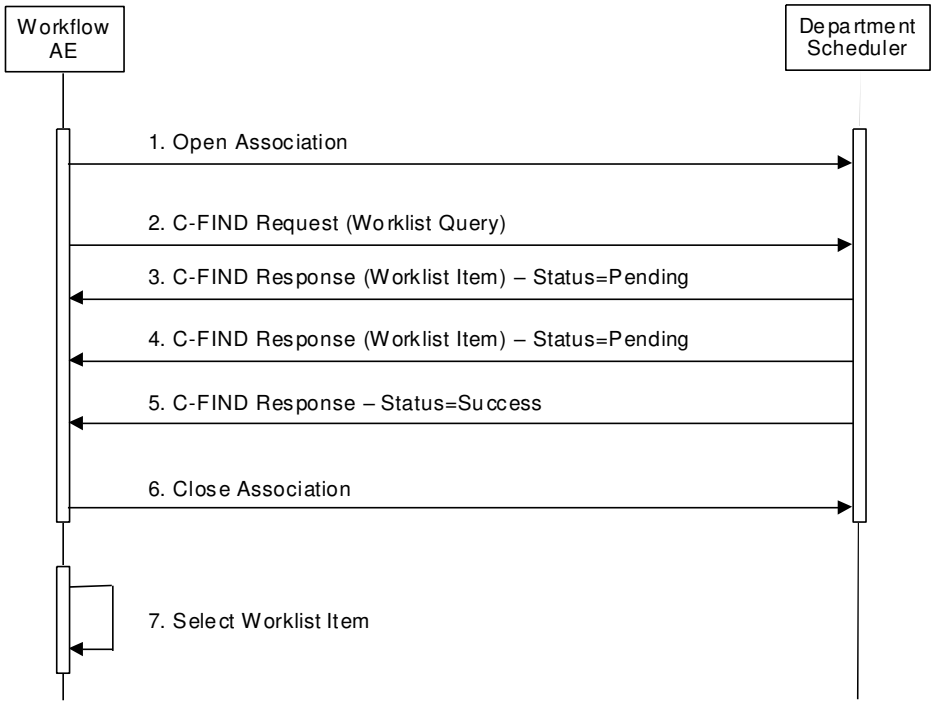


**Figure 4-3 SEQUENCING OF ACTIVITY – WORKLIST UPDATE**

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the Modality Worklist SOP Class as a SCP) is illustrated in the Figure above:

1. The Workflow AE opens an association with the Departmental Scheduler

2. The Workflow AE sends a C-FIND request to the Departmental Scheduler containing the Worklist Query attributes.
3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.
4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.
5. The Departmental Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes that only 2 Worklist items match the Worklist Query.
6. The Workflow AE closes the association with the Departmental Scheduler.
7. The user selects a Worklist Item from the Worklist and prepares to acquire new images.

#### 4.3.2.1.1.2 Proposed Presentation Contexts

The Workflow AE will propose Presentation Contexts as shown in the following table:

**Table 4.3-14 PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY WORKLIST UPDATE**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Modality Worklist Information Model – FIND | 1.2.840.10008.5.1.4.31 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU | None |

#### 4.3.2.1.1.3 SOP Specific Conformance for Modality Worklist

The Table below provides a description of the RETI-Port/Scan 21s Worklist Request Identifier and specifies the attributes that are copied into the images. Unexpected attributes returned in a C-FIND response are ignored.

Requested return attributes not supported by the SCP are set to have no value. Non-matching responses returned by the SCP due to unsupported optional matching keys are handled like matches of the request identifier. No attempt is made it filter out possible duplicate entries.

If an extended character set is used in the Request Identifier, Specific Character Set (0008,0005) will be included in the Identifier (see section 6 for supported values). Otherwise, Specific Character Set (0008,0005) will not be sent

The table below should be read as follows:

**Attribute Name** Attributes supported to build an RETI-Port/Scan 21 Worklist Request Identifier. RETI-Port/Scan 21 will supply this attribute as Return Key with zero length for Universal Matching, if it is not supplied as a matching key otherwise.

**Tag** DICOM tag for this attribute.

**Match** Type of matching supported for this attribute by RETI-Port/Scan 21. Matching keys for Worklist Update. A "S" will indicate that RETI-Port/Scan 21 will supply an attribute value for Single Value Matching, a "R" will indicate Range Matching and a "*" will denote wild card matching.

**Query** An "x" " will indicate that that RETI-Port/Scan 21 will supply this attribute as matching key automatically. An (x) will indicate that this matching key is provided only, if entered in the Query Patient Worklist dialog.

**Display** Displayed keys. An "x" indicates that this worklist attribute is displayed to the user during a patient registration dialog. For example, Patient Name will be displayed when registering the patient prior to an examination.

**IOD** An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

**Table 4.3-15: MODALITY WORKLIST - FIND SOP Class - C-FIND REQUEST IDENTIFIER**

| Attribute Name | Tag | Match | Query | Display | IOD | Note |
|---|---|---|---|---|---|---|
| **Scheduled Procedure Step** | | | | | | |
| Scheduled Procedure Step Sequence | (0040,0100) | | | | | Only one item allowed |
| > Scheduled Station AE Title | (0040,0001) | S | x | x | | |
| > Scheduled Procedure Step Start Date | (0040,0002) | S,R | (x) | x | | |
| > Scheduled Procedure Step Start Time | (0040,0003) | S,R | (x) | x | | |
| > Modality | (0008,0060) | S | (x) | | | |
| > Scheduled Physicians Name | (0040,0006) | S,* | (x) | x | x | Set as Performing Physician in IOD |
| > Scheduled Procedure Step Description | (0040,0007) | | | x | | |
| > Scheduled Protocol Code Sequence | (0040,0008) | | | | | |
| >> Code Value | (0008,0100) | | | | | |
| >> Coding Scheme Designator | (0008,0102) | | | | | |
| >> Code Meaning | (0008,0104) | | | x | | |
| > Scheduled Procedure Step ID | (0040,0009) | | | | | |
| > Scheduled Station Name | (0040,0010) | S | (x) | x | | |
| > Scheduled Procedure Step Location | (0040,0011) | S | (x) | x | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| > Pre-Medication | (0040,0012) | | | x | | |
| > Requested Contrast Agent | (0032,1070) | | | x | | |
| **Requested Procedure** | | | | | | |
| Requested Procedure ID | (0040,1001) | S | (x) | | x | Set as Study ID in IOD |
| Requested Procedure Description | (0032,1060) | | | x | x | Set as Study Description in IOD |
| Requested Procedure Code Sequence | (0032,1064) | | | | | Only one item allowed. |
| > Code Value | (0008,0100) | | | | | |
| > Coding Scheme Designator | (0008,0102) | | | | | |
| > Code Meaning | (0008,0104) | | | x | | |
| Study Instance UID | (0020,000D) | | | | x | |
| Patient Transport Arrangements | (0040,1004) | | | x | | |
| Reason for the Requested Procedure | (0040,1002) | | | | | |
| Reason for Requested Procedure Code Sequence | (0040,100A) | | | | | |
| > Code Value | (0008,0100) | | | | | |
| > Coding Scheme Designator | (0008,0102) | | | | | |
| > Code Meaning | (0008,0104) | | | | | |
| Requested Procedure Priority | (0040,1003) | | | | | |
| Names Of Intended Recipients Of Results | (0040,1010) | | | | | |
| Requested Procedure Comments | (0040,1400) | | | | | |
| **Imaging Service Request** | | | | | | |
| Accession Number | (0008,0050) | S | (x) | x | x | |
| Referring Physician's Name | (0008,0090) | | | x | x | |
| Requesting Physician | (0032,1032) | | | x | | |
| Imaging Service Request Comments | (0040,2400) | | | | | |
| **Visit Identification** | | | | | | |
| Admission ID | (0038,0010) | | | | x | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Institution Name | (0008,0080) | | | | x | |
| Institution Address | (0008,0081) | | | | x | |
| Institutional Department Name | (0008,1040) | | | | x | |
| **Visit Status** | | | | | | |
| Current Patient Location | (0038,0300) | | | | | |
| **Patient Identification** | | | | | | |
| Patient's Name | (0010,0010) | S,* | (x) | x | x | |
| Patient ID | (0010,0020) | S | (x) | x | x | |
| Issuer of Patient ID | (0010,0021) | S | (x) | x | x | |
| **Patient Demographic** | | | | | | |
| Patient's Birth Date | (0010,0030) | | | x | x | |
| Patient's Sex | (0010,0040) | | | x | x | |
| Patient's Size | (0010,1020) | | | x | x | |
| Patient's Weight | (0010,1030) | | | x | x | |
| **Patient Medical** | | | | | | |
| Patient State | (0038,0500) | | | x | | |
| Pregnancy Status | (0010,21C0) | | | x | | |
| Medical Alerts | (0010,2000) | | | x | | |
| Allergies | (0010,2110) | | | x | | |
| Special Needs | (0038,0050) | | | x | | |
| Patient Comments | (0010,4000) | | | x | x | |
| Ethnic Group | (0010,2160) | | | x | x | |
| Additional Patient History | (0010,21B0) | | | x | | |
| Confidentiality Constraint on Patient Data Description | (0040,3001) | | | x | | |

The behavior of The Workflow AE, when encountering status codes in a Modality Worklist C-FIND response is summarized in the Table below. If any other SCP response status than "Success" or "Pending" is received by The Workflow AE, a message "query failed" will appear on the user interface.

**Table 4.3-16 MODALITY WORKLIST C-FIND RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code | Behavior |
|---|---|---|---|
| Success | Matching is complete | 0000 | The SCP has completed the matches. Worklist items are available for display or further processing. |
| Refused | Out of Resources | A700 | The Association is released using A-RELEASE-RQ and the worklist query is marked as failed. The status meaning is logged and reported to the user. Any additional error information in the Response will be logged. |
| Failed | Identifier does not match SOP Class | A900 | The Association is released using A-RELEASE-RQ and the worklist query is marked as failed. The status meaning is logged and reported to the user. Any additional error information in the Response will be logged. |
| Failed | Unable to Process | C000 – CFFF | The Association is released using A-RELEASE-RQ and the worklist query is marked as failed. The status meaning is logged and reported to the user. Any additional error information in the Response will be logged. |
| Cancel | Matching terminated due to Cancel request | FE00 | Worklist items are available for display or further processing. The status meaning is logged. |
| Pending | Matches are continuing | FF00 | The worklist item contained in the Identifier is collected for later display or further processing. |
| * | * | Any other status code. | The Association is released using A-RELEASE-RQ and the worklist is marked as failed. The status meaning is logged and reported to the user. Any additional error information in the Response will be logged. |

The behavior of The Workflow AE during communication failure is summarized in the Table below.

**Table 4.3-17 MODALITY WORKLIST COMMUNICATION FAILURE BEHAVIOR**

| Exception | Behavior |
|---|---|
| Timeout | The Association is aborted using A-ABORT and the worklist query marked as failed. The reason is logged and reported to the user if an interactive query. |
| Association aborted by the SCP or network layers | The worklist query is marked as failed. The reason is logged and reported to the user if an interactive query. |

Acquired images will always use the Study Instance UID specified for the Scheduled Procedure Step (if available). If an acquisition is unscheduled, a Study Instance UID will be generated locally.

#### 4.3.2.1.1.4 Association Acceptance Policy

The Workflow AE does not accept Associations.

### 4.3.3 Verification Application Entity

#### 4.3.3.1 SOP Classes

The Verification Application Entity provides Standard Conformance to the following SOP Class:

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

#### 4.3.3.2 Association Policies

The Verification AE can both accept and propose Association Requests for the Verification Service. The Verification AE will accept associations from any AET, no pre-configuration of known AEs is required. However, the Verification AE will reject associations if the called AE Title does not match the preconfigured AET of RETI-Port/Scan 21

##### *4.3.3.2.1 General*

The DICOM standard Application Context Name for DICOM 3.0 is always accepted and proposed

**Table 4.3-18 DICOM APPLICATION CONTEXT FOR VERIFICATION AE**

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

##### *4.3.3.2.2 Number of Associations*

The Verification AE initiates one Association at a time for each destination that DICOM connectivity shall be verified.

The association will be rejected if the maximum allowable number of associations is exceeded.

**Table 4.3-19 NUMBER OF SIMULTANEOUS ASSOCIATIONS FOR VERIFICATION AE**

| | |
|---|---|
| Maximum number of simultaneous Associations accepted by the Verification AE | Unlimited (not configurable) |
| Maximum number of simultaneous Associations initiated by the Verification AE | 1 (not configurable) |

##### *4.3.3.2.3 Asynchronous Nature*

The Verification AE does not support asynchronous communication (multiple outstanding transactions over a single Association).

**Table 4.3-20 ASYNCHRONOUS NATURE AS A SCU FOR VERIFICATION AE**

| | |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |

##### *4.3.3.2.4 Implementation Identifying Information*

The implementation information for this Application Entity is:

**Table 4.3-21 DICOM IMPLEMENTATION CLASS AND VERSION FOR VERIFICATION AE**

| | |
|---|---|
| Implementation Class UID | 1.2.826.0.1.3680043.2.891.113 |
| Implementation Version Name | DICOM_CONNECT_25 |

#### 4.3.3.3 Association Initiation and Acceptance Policy

Due to the trivial functionality of the Verification SOP class, both, association initiation and acceptance policy are combined in this chapter. In Chapter 4.1.1 it is shown that “Verify connectivity with remote AE” is a symmetric activity which is executed by the local Verification AE and any remote AE in the same manner.

When the Verification AE accepts an association, it will respond to storage requests. The Verification AE will accept associations from any AET; no pre-configuration of known AEs is required. However, the Verification AE will reject associations if the Called AE Title does not match the preconfigured AET of the RETI-Port/Scan 21. The Verification AE may reject association requests for other reasons also. See 8.3 for details.

##### *4.3.3.3.1 Activity: Verify connectivity with remote AE*

###### 4.3.3.3.1.1 Description and Sequencing of Activity

The Verification AE will initiate a new Association each time the user selects to verify connectivity for a specific AE.

Furthermore, it will respond to verification requests issued by a remote AE. Both scenarios are illustrated in Figure 4-4.

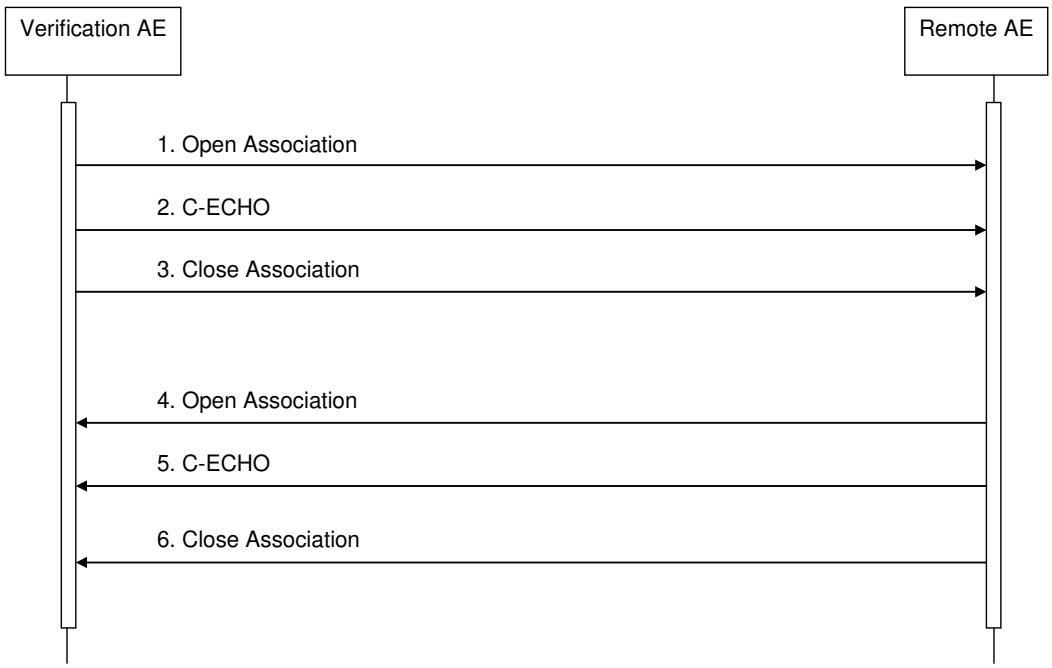


**Figure 4-4 SEQUENCING OF ACTIVITY: VERIFY CONNECTIVITY WITH REMOTE AE**

RETI-Port/Scan 21 verifies the connectivity to a Remote AE

1. The Verification AE opens an Association with the Remote AE

2. The Verification AE sends a C-ECHO-Request to the remote AE. It awaits the C-ECHO-Response and propagates the result of the verification (successful/unsuccessful) to the user
3. The Verification AE closes the association

A Remote AE verifies the connectivity to RETI-Port/Scan 21

4. The Remote AE opens an Association with the Verification AE
5. The Remote AE sends a C-ECHO-Request to the Verification AE. The Verification AE will send a SUCCESSful response
6. The Remote AE closes the Association.

#### 4.3.3.3.1.2 Proposed / Accepted Presentation Contexts

The Verification AE will propose and accept Presentation Contexts as shown in the following table:

**Table 4.3-22 PROPOSED PRESENTATION CONTEXTS FOR VERIFICATION AE**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Ext. Neg.** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCU / SCP | None |

#### 4.3.3.3.1.3 SOP Specific Conformance for Verification SOP Class

The Verification AE provides standard conformance to the Verification SOP Class as an SCP and as an SCU. Technically, the Verification SCP is included in the system service process that is also hosting the Send AE. This means, that Verification requests can be handled as soon as the system service is started.

If the C-ECHO request was successfully received, a 0000 (Success) status code will be returned in the C-ECHO response. Otherwise, a C000 (Error - Cannot Understand) status code will be returned in the C-ECHO response.

In turn, the Verification AE treats a successfully received C-ECHO response with 0000 (Success) status code as a successful verification. Any other result will be treated as a verification failure.

## 4.4 NETWORK INTERFACES

### 4.4.1 Physical Network Interface

The DICOM Interface of the RETI-Port/Scan 21 provides DICOM TCP/IP Network Communication Support and uses the TCP/IP protocol stack from the operating system. It uses the Merge DICOM Toolkit subroutine library. All available Ethernet interfaces are supported.

### 4.4.2 Additional Protocols

Not applicable.

# 5 CONFIGURATION

## 5.1 AE Title/Presentation Address Mapping

### 5.1.1 Local AE Titles

AE Title can be configured via the configuration interface. The default AE Title is RETI. All local AE's are using the same local AE Title.

**Table 5.1-1 AE TITLE CONFIGURATION TABLE**

| Application Entity | Default AE Title | Default TCP/IP Port |
|---|---|---|
| Send | (must be configured) | Not Applicable |
| Storage Service | | (must be configured) |
| Workflow | | Not Applicable |
| Verification | | (must be configured) |

## 5.2 Parameters

A large number of parameters related to acquisition and general operation can be configured using the Service/Installation Tool or through editing configuration files manually. The Table below only shows those configuration parameters relevant to DICOM communication.

**Table 5.2-1 CONFIGURATION PARAMETERS TABLE**

| Parameter | Configurable (Yes/No) | Default Value |
|---|---|---|
| **General Parameters** | | |
| Max PDU Receive Size | Yes | 64234 Bytes |
| Max PDU Send Size<br>(larger PDUs will never be sent, even if the receiver supports a larger Max PDU Receive Size.<br>If the receiver supports a smaller Max PDU Receive Size then the Max PDU Send Size will be reduced accordingly for the duration of the Association.<br>Max PDU Receive Size information is exchanged during DICOM Association Negotiation in the Maximum Length Sub-Item of the A-ASSOCIATION-RQ and A-ASSOCIATE-AC) | Yes | 64234 Bytes |
| Time-out waiting for association request or waiting for the peer to shut down an association. (ARTIM Timeout) | Yes | 30 s |
| Time-out awaiting a reply to associate request | Yes | 15 s |
| Time-out awaiting a reply to associate release | Yes | 15 s |
| Time-out awaiting a network-write to be accepted. | Yes | 15 s |
| Time-out awaiting a network-connect to be accepted. | Yes | 15 s |
| **Localization Parameters** | | |
| Specific Character Set used in messages | Yes | ISO_IR 6 |

| Parameter | Configurable (Yes/No) | Default Value |
|---|---|---|
| **Retry of Failed Transfer Parameters** | | |
| Maximum number of DICOM objects transferred in a single association | Yes | 100 |
| Maximum number of transfer attempts until the transfer is considered as “failed” | Yes | 5 |
| Time Interval Between 2 Transfer Attempts for an SOP Instance | Yes | 1 hour |

## 6 SUPPORT OF CHARACTER SETS

RETI-Port/Scan 21 support character sets

ISO_IR 6 (ISO 646 Default repertoire)ISO_IR 100 (ISO 8859-1 Latin Alphabet No. 1 supplementary set)
ISO_IR 101 (ISO 8859-2 Latin Alphabet No. 2 supplementary set)
ISO_IR 109 (ISO 8859-3 Latin Alphabet No. 3 supplementary set)
ISO_IR 110 (ISO 8859-4 Latin Alphabet No. 4 supplementary set)
ISO_IR 148 (ISO 8859-9 Latin Alphabet No. 5 supplementary set)
ISO_IR 144 (ISO 8859-5 Cyrillic Alphabet supplementary set)
ISO_IR 127 (ISO 8859-6 Arabic Alphabet supplementary set)
ISO_IR 126 (ISO 8859-7 Greek Alphabet supplementary set)
ISO_IR 138 (ISO 8859-8 Hebrew Alphabet supplementary set)
ISO_IR 13 (JIS X 0201: Katakana)
ISO_IR 166 (TIS 620-2533: Thai)
ISO_IR 192 (Unicode in UTF-8 for Chinese Alphabet)
GB18030
GBK

RETI-Port/Scan 21 does not support code extension techniques as described in ISO/IEC 2022:1994

## 7 SECURTIY

RETI-Port/Scan 21 does not support any specific security measures.

It is assumed that RETI-Port/Scan 21 is used within a secured environment. It is assumed that a secured environment includes at a minimum:

a. Firewall or router protections to ensure that only approved external hosts have network access to RETI-Port/Scan 21.
b. Firewall or router protections to ensure that RETI-Port/Scan 21 only has network access to approved external hosts and services.
c. Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

# 8 ANNEXES

## 8.1 IOD CONTENTS

### 8.1.1 Created SOP Instances

The sections in this chapter specify the attributes of SOP Instances handled by RETI-Port/Scan 21. This refers to both, SOP Instances created by RETI-Port/Scan 21 and sent to remote AEs by the Send AE and SOP Instances received by the Storage Service AE to be processed by RETI-Port/Scan 21.

The following tables use a number of abbreviations. The abbreviations used in the “Presence of …” column are:

| | |
|---|---|
| VNAP | Value Not Always Present (attribute sent zero length if no value is present) |
| ANAP | Attribute Not Always Present |
| ALWAYS | Always Present |
| EMPTY | Attribute is sent without a value |

The abbreviations used in the “Source” column:

| | |
|---|---|
| MWL | the attribute value source Modality Worklist, see chapter 8.1.4 |
| USER | the attribute value source is from User input |
| AUTO | the attribute value is generated automatically |
| CONFIG | the attribute value source is a configurable parameter |

NOTE: All dates and times are encoded in the local configured calendar and time. Date, Time and Time zone are configured using the Service/Installation Tool.

#### 8.1.1.1 Encapsulated PDF IOD

**Table 8.1-1 IOD OF CREATED ENCAPSULATED PDF SOP INSTANCES**

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Patient | Patient | Table 8.1-2 | ALWAYS |
| | Clinical Trial Subject | - | NEVER |
| Study | General Study | Table 8.1-3 | ALWAYS |
| | Patient Study | Table 8.1-4 | ALWAYS |
| | Clinical Trial Study | - | NEVER |
| Series | Encapsulated Document Series | Table 8.1-9 | ALWAYS |
| | Clinical Trial Series | - | NEVER |

| IE | Module | Reference | Presence of Module |
|---|---|---|---|
| Equipment | General Equipment | Table 8.1-6 | ALWAYS |
| | SC Equipment | Table 8.1-8 | ALWAYS |
| Document | Encapsulated Document | Table 8.1-10 | ALWAYS |
| | SOP Common | Table 8.1-7 | ALWAYS |

### 8.1.2 IOD Module Definitions

#### 8.1.2.1 Common Modules

**Table 8.1-2 PATIENT MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Patient's Name | (0010,0010) | PN | From Modality Worklist or user input. Values supplied via Modality Worklist will be entered as received. Maximum 64 characters. | VNAP | MWL/ USER |
| Patient ID | (0010,0020) | LO | From Modality Worklist or user input. Maximum 64 characters. | VNAP | MWL/ USER |
| Issuer of Patient ID | (0010,0021) | LO | From Modality Worklist or user input. Maximum 64 characters. | ANAP | MWL/ USER |
| Patient's Birth Date | (0010,0030) | DA | From Modality Worklist or user input | VNAP | MWL/ USER |
| Patient's Sex | (0010,0040) | CS | From Modality Worklist or user input | VNAP | MWL/ USER |
| Patient Comments | (0010,4000) | LT | From Modality Worklist or user input | ANAP | MWL/ USER |

**Table 8.1-3 GENERAL STUDY MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Study Instance UID | (0020,000D) | UI | From Modality Worklist or generated by device | ALWAYS | MWL/ AUTO |
| Study Date | (0008,0020) | DA | Generated by device | ALWAYS | AUTO |
| Study Time | (0008,0030) | TM | Generated by device | ALWAYS | AUTO |
| Referring Physician's Name | (0008,0090) | PN | From Modality Worklist or user input | VNAP | MWL/ USER |
| Study ID | (0020,0010) | SH | From Modality Worklist or user input | VNAP | USER |

| | | | | | |
|---|---|---|---|---|---|
| Accession Number | (0008,0050) | SH | From Modality Worklist or user input | VNAP | MWL/ USER |
| Study Description | (0008,1030) | LO | User Input | VNAP | USER |

**Table 8.1-4 PATIENT STUDY MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Admission ID | (0038,0010) | LO | From Modality Worklist or user input | VNAP | MWL/ USER |

**Table 8.1-5 GENERAL SERIES MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | DOC | ALWAYS | AUTO |
| Series Instance UID | (0020,000E) | UI | Generated by device | ALWAYS | AUTO |
| Series Number | (0020,0011) | IS | Generated by device | VNAP | AUTO |
| Performing Physician's Name | (0008,1050) | PN | Physician field in Study list. Maximum 64 characters. | ANAP | USER |
| Series Date | (0008,0021) | DA | Generated by device | VNAP | AUTO |
| Series Time | (0008,0031) | TM | Generated by device | VNAP | AUTO |
| Series Description | (0008,103E) | LO | User input | ANAP | USER |

**Table 8.1-6 GENERAL EQUIPMENT MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Manufacturer | (0008,0070) | LO | softgate | ALWAYS | AUTO |
| Institution Name | (0008,0080) | LO | From Configuration or Worklist | ANAP | CONFIG / MWL |
| Institution Address | (0008,0080) | ST | From Configuration or Worklist | ANAP | CONFIG / MWL |
| Station Name | (0008,1010) | SH | From Configuration | ANAP | CONFIG |
| Institutional Department Name | (0008,1040) | LO | From Configuration or Worklist | ANAP | CONFIG |
| Manufacturer's Model Name | (0008,1090) | LO | "RETI" | ANAP | AUTO |
| Software Version | (0018,1020) | LO | From Configuration, currently V10 | ANAP | CONFIG |

**Table 8.1-7 SOP COMMON MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Specific Character Set | (0008,0005) | CS | Configuration dependent, depending on the locale settings of the device. See Chapter 6. | ALWAYS | CONFIG |
| SOP Class UID | (0008,0016) | UI | Dependent on / according to the type of created object | ALWAYS | AUTO |
| SOP Instance UID | (0008,0018) | UI | Generated by device | ALWAYS | AUTO |

#### 8.1.2.1 Secondary Capture Image specific Modules

**Table 8.1-8 SC EQUIPMENT MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Conversion Type | (0008,0064) | CS | WSD | ALWAYS | AUTO |
| Modality | (0008,0060) | CS | OT | ALWAYS | AUTO |

#### 8.1.2.2 Encapsulated PDF Specific Attributes

**Table 8.1-9 ENCAPSULATED DOCUMENT SERIES MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Modality | (0008,0060) | CS | DOC | ALWAYS | AUTO |
| Series Instance UID | (0020,000E) | UI | Generated by device | ALWAYS | AUTO |
| Series Number | (0020,0011) | IS | Generated by device | VNAP | AUTO |
| Series Description | (0008,103E) | LO | User input | ANAP | USER |
| Protocol Name | (0018,1030) | LO | Generated by device | ANAP | USER |

**Table 8.1-10 ENAPSULATED DOCUMENT MODULE ATTRIBUTES OF CREATED SOP INSTANCES**

| Attribute Name | Tag | VR | Value | Presence of Value | Source |
|---|---|---|---|---|---|
| Instance Number | (0020,0013) | IS | Generated by device | ALWAY | AUTO |
| Content Date | (0008,0023) | DA | Generated by device | ALWAY | AUTO |
| Content Time | (0008,0033) | TM | Generated by device | ALWAY | AUTO |
| Acquisition DateTime | (0008,002A) | DT | Generated by device | ALWAY | AUTO |
| Image Laterality | (0020,0062) | CS | User input | ANAP | USER |
| Burned in Annotation | (0028,0301) | CS | Yes (Header in printout PDF) | ALWAYS | USER |
| Document Title | (0042,0010) | ST | User input | VNAP | USER |
| Concept Name Code Sequence | (0040,E008) | SQ | User input | VNAP | USER |

## 8.1.3 Used Fields in received IOD by application

Images received by the Storage Service AE are limited to the SOP Classes that can be handled by RETI-Port/Scan 21. Images received are referenced in the local database, which makes use of the conventional identification attributes to distinguish patients, studies, series and instances. The usage of attributes received via Modality Worklist is described in section 4.2.2.3.1.3.

### 8.1.4 Attribute mapping

The relationships between attributes received via Modality Worklist and stored in acquired images are summarized in Table 8.1-11. The format and conventions used in Table 8.1-11 are the same as the corresponding table in DICOM Part 4, Annex M.6 [DICOM].

**Table 8.1-11 ATTRIBUTE MAPPING BETWEEN MODALITY WORKLIST AND CREATED INSTANCES**

| Modality Worklist | Instance IOD |
|---|---|
| Patient Name | Patient Name |
| Patient ID | Patient ID |
| Issuer of Patient ID | Issuer of Patient ID |
| Patient's Birth Date | Patient's Birth Date |
| Patient's Sex | Patient's Sex |
| Patient's Size | Patient's Size |

| | |
|---|---|
| Patient's Weight | Patient's Weight |
| Ethnic Group | Ethnic Group |
| Patient Comments | Patient Comments |
| ---- | ---- |
| ---- | Series Instance UID |
| ---- | Series Description |
| ---- | Protocol Name |
| ---- | Operator's Name |
| ---- | ---- |
| ---- | SOP Class UID |
| ---- | SOP Instance UID |
| Scheduled Performing Physician's Name | Performing Physician's Name |
| Referring Physician's Name | Referring Physician's Name |
| Admission ID | Admission ID |
| ---- | ---- |
| Study Instance UID | Study Instance UID |
| Accession Number | Accession Number |
| Scheduled Protocol Code Sequence | ---- |
| Requested Procedure Description | Study Description |
| Requested Procedure ID | Study ID |
| Scheduled Procedure Step ID | ---- |
| Modality | Modality[2] |
| Scheduled Station AE Title | ---- |
| Scheduled Station Name | ---- |
| Scheduled Procedure Step Location | ---- |
| Scheduled Procedure Step Description | ---- |
| Scheduled Protocol Code Sequence | ---- |
| Requested Procedure Code Sequence | ---- |
| Institution Name | Institution Name |
| Institution Address | Institution Address |
| Institutional Department Name | Institutional Department Name |

### 8.1.5 Coerced/Modified Fields

No coercion / modification of fields received by other DICOM AEs is performed by the AEs which are part of RETI-Port/Scan 21.

### 8.2 PRIVATE TRANSFER SYNTAXES

No Private Transfer Syntaxes are supported.

### 8.3 Association Rejection Reasons

The Verification AE may reject association requests as shown in Table 8.3-1. The Result, Source and Reason / Diag columns represent the values returned in the appropriate fields of an ASSOCIATE-RJ PDU (see Section 9.3.4 “A-ASSOCIATE-RJ PDU Structure” in PS3.8). The contents of the Source column are abbreviated to save space and the meanings of the abbreviations are:

a. 1 - DICOM UL service-user

b. 2 - DICOM UL service-provider (ASCE related function)

c. 3 - DICOM UL service-provider (Presentation related function)

**Table 8.3-1 ASSOCIATION REJECTION REASONS**

| Result | Source | Reason / Diag | Explanation |
|---|---|---|---|
| 2 – rejected transient | C | 2 – local limit exceeded | The (configurable) maximum number of simultaneous association has been reached. An association request with the same parameters may succeed at a later time |
| 2 – rejected permanent | A | 2 – application context name not supported | The association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time |

## 9 Revision History

| Rev | gültig ab | gültig bis | Änderung |
|---|---|---|---|
| 01 | 15.03.2021 | - | Release |