DICOM Conformance Statement

ATLAS 500

Version 1.0

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1 Conformance Statement Overview

ATLAS 500 acquisition modalities enable examination of patient's eye, allows users to view, analyze and manage ATLAS 500 data on a personal computer and shall be consistent with the "Intended Use" claim in the product manual.

The ATLAS 500 Application Software allows the user to:

- query modality worklist
- perform exam
- create report
- delete data
- merge of patients & reassign of exams

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

Table 1-1 Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Encapsulated PDF Storage	Yes	No
Workflow Management		
Verification	Yes	Yes
Storage Commitment Push Model SOP Class	Yes	No
Modality Worklist Information Model - FIND	Yes	No
Patient Root Query/Retrieve Information Model – FIND	Yes[1]	No

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

The SOP Classes are categorized as follows:

Table 1-2 UID Values

UID Value	UID Name	Category
1.2.840.10008.1.1	Verification	Workflow Management
1.2.840.10008.5.1.4.1.1.104.1	Encapsulated PDF Storage	Transfer
1.2.840.10008.5.1.4.31	Modality Worklist Information Model - FIND	Workflow Management
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model - FIND	Query/Retrieve
1.2.840.10008.1.20.1	Storage Commitment	1.2.840.10008.1.20.1

The ALTAS 500 does not support Media Interchange.

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3 Introduction

3.1 Revision History

Table 3-1 Revision History

Document Version	Date	Changes
01	5/4/2022	Initial Version

3.2 Audience

This document is written for the people that need to understand how ATLAS 500 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 ATLAS 500 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. 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.

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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.

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)

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Service/Object Pair (SOP) Class

The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification.

Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance

An information object: a specific occurrence of information exchanged in a SOP Class.

Examples: a specific x-ray image.

Tag

A 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element.

Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax

The encoding used for exchange of DICOM information objects and messages.

Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID)

A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier.

Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR)

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

3.5 Abbreviations

Table 3-2 Abbreviations used in this Document

Abbreviation	Definition
ANAP	Attribute is not always present - applicable for type 3 attributes
AE	Application Entity
AET	Application Entity Title
APP	Application
AUTO	Automatically generated, cannot be modified by the operator
BRQ	Broad Query mode of Modality Worklist Query
CONFIG	Configurable parameter
CZM	Carl Zeiss Meditec
DEF	Default Value
DICOM	Digital Imaging and Communications in Medicine
ELE	Explicit Little Endian
ILE	Implicit Little Endian
IM	Information Model
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1 transfer syntax; JPEG Baseline; ISO 10918-1
JPG-LL	JPEG Lossless

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Abbreviation	Definition
J2K	JPEG 2000 Image Compression
J2K-LL	JPEG 2000 Image Compression (Lossless Only)
RLE-LL	Run Length Encoding Lossless
MWL	Modality Worklist
MPG2	Motion Picture Expert Group 2; Abbreviation and synonym for video encoding and compression transfer syntax.
MPG2 – ML	MPEG2 Main Profile @ Main Level
MPG2 – HL	MPEG2 Main Profile @ High Level
MPG4 – HP4.1	MPEG-4 AVC/H.264 High Profile / Level 4.1
MPG4 – BD-HP4.1	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1
MPG4 – HP4.2-2D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 2D Video
MPG4 – HP4.2-3D	MPEG-4 AVC/H.264 High Profile / Level 4.2 For 3D Video
MPG4 – SHP4.2	MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2
OD	Oculus Dexter, the right eye
OS	Oculus Sinister, the left eye
OU	Oculus Uterque, both eyes
PBQ	Patient Based Query mode of Modality Worklist Query
PL	Pick list
PLD	Pick list item details
PRQ	Patient Root Query
RNG	Range of values
SCP	Service Class Provider
SCU	Service Class User
SEL	Selection from a list of values
SOP	Service Object Pair, union of a specific DICOM service and related IOD
SRQ	Study Root Query
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
USER	User input
VNAP	Value not always present (attribute sent zero length if no value is present) - applicable for type 2 and 2C attributes

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/).

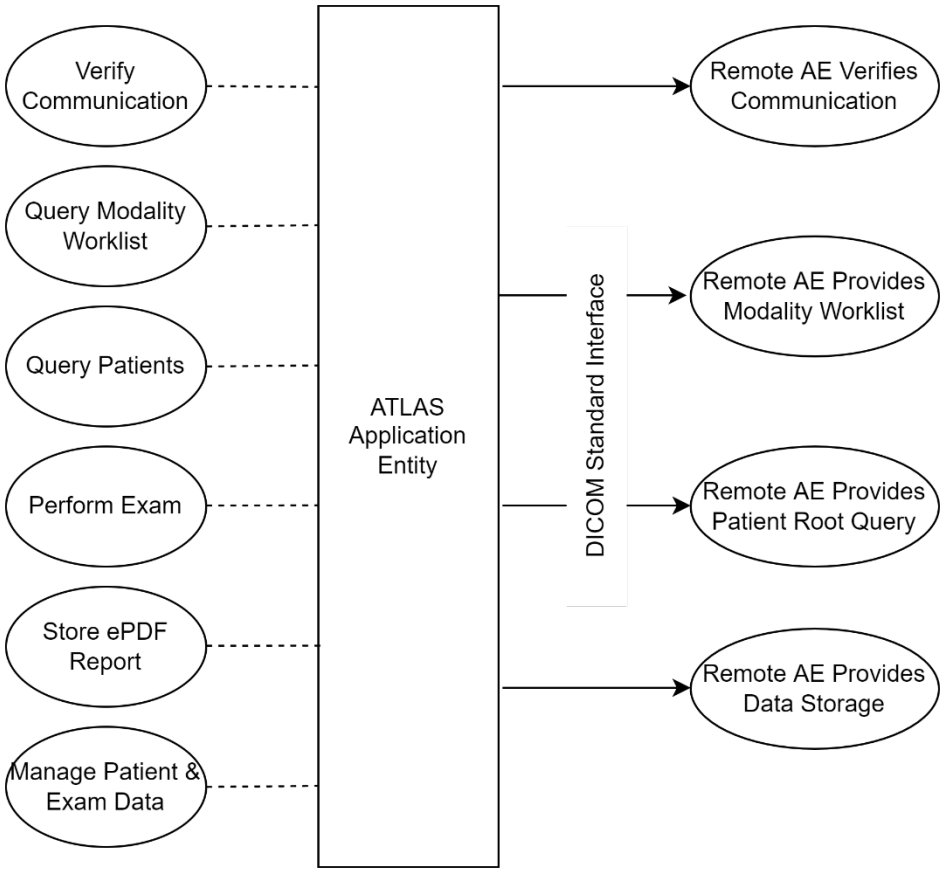
Integrating the Healthcare Enterprise (IHE) EYECARE Technical Framework, rev 4.0, 2016 (available free at http://www.ihe.net/Technical_Framework/index.cfm).

4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Figure 4-1 ATLAS 500 Application Data Workflow Diagram



4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of ALTAS 500

The following configurations are supported:

Figure 4-2 ATLAS 500 in Standalone Mode

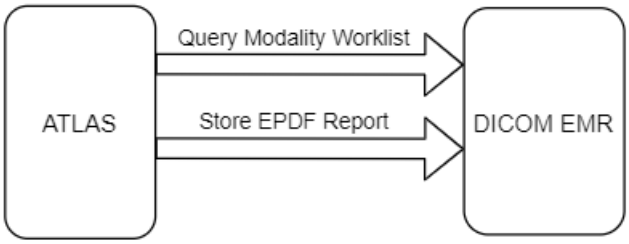


Figure 4-3 ATLAS 500 in EMR Mode

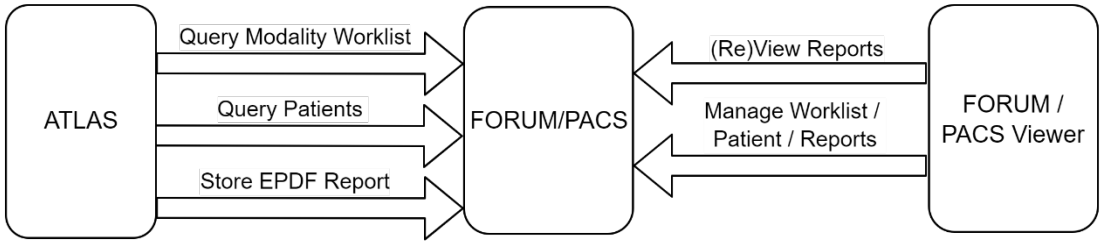


Figure 4-4 ATLAS 500 in FORUM/PACS Mode

ATLAS 500 acquisition modalities enable examination of patient's eye, allows users to view, analyze and manage ATLAS 500 data on a personal computer and shall be consistent with the "Intended Use" claim in the product manual.

The ATLAS 500 Application Software allows the operator to:

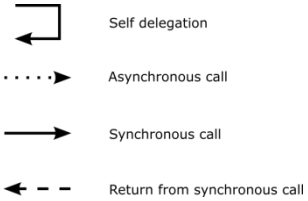
- query modality worklist
- perform exam
- create report
- delete data
- merge of patients & reassign of exams

The ATLAS 500 Software allows performing a verification of the configured AEs. The result of this verification contains information about the supported SOP Classes and Transfer Syntaxes.

The ATLAS 500 Software logs extensive information about the DICOM operations to its log file.

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.

4.1.3.1 ATLAS 500 Acquisition Modality Activities

Query Modality Worklist

When the patient arrives at the ATLAS 500, the operator queries the worklist. The user can invoke this by simply selecting the “Today” Tab in the main view which lists all patients scheduled for today for this instrument (identified by the instrument’s AE Title) and scheduled procedure step start date from today. The default parameters used for this “Today’s” Query are configurable. See Table 4-28 Configuration Parameters for more details. For more specific worklist queries the “Advanced” and then “Scheduled Patients” button can be used.

In either way the operator can select a patient from the result list and furthermore select a requested procedure to proceed with data acquisition. According to the transferred data ATLAS 500 creates an entry in the local database.

ATLAS 500 does not support multiple Scheduled Procedure Steps in one Requested Procedure.

Note: In case of multiple Scheduled Procedure Steps within one Requested Procedure only the first Scheduled Procedure Step will be shown:

Scheduled Procedure Step Start Time1 = 2pm

Scheduled Procedure Step Start Time2 = 4pm

Only Scheduled Procedure Step scheduled for 2 pm will be shown.

Query patients

When the patient arrives at the ATLAS 500, the operator can search patients at a remote AE. This can be done by using the “Quick Search” in the main screen or by using “Advanced” and then the “All Patients” for a more detailed search. ATLAS 500 does not perform Study Root based query.

This activity generates an unscheduled case.

The operator can then select the patient for data acquisition or analysis.

Perform Exam

When a patient or worklist item is selected the operator selects an acquisition type and then performs the exam on the patient’s eye. After acquiring exams, user can review it, though it will be saved in database when user navigate away from acquisition screen. If acquired image is not of good quality, it may be discarded by the operator.

Store ePDF Report

This is an automatic and on-demand activity. When user changes the selected patient from patient management screen, it exports the reports of previously selected patient. User can generate the report on-demand from analysis screen and can export it.

The reports are created on the fly. The user can print and/or save the created report. The application will send the report to the storage provider if it is configured.

Merge and Reassign

It is possible to merge a local patient into a patient imported via Modality Worklist or into a patient imported via Patient Root Query from a DICOM Query Provider.

The operator can also reassign a local exam to another patient.

Delete Data

The activity "Delete data" can be invoked manually by the operator.

The operator can invoke this activity from the "Patient" screen by pressing the "Delete" button shown for a certain measurement, a complete group of measurements or a patient. When connected to a DICOM network, a patient cannot be removed from the modality.

Optionally, the operator can select a patient, navigate to the Analyze screen to delete selected exams.

Manually triggered deletion of data is performed immediately.

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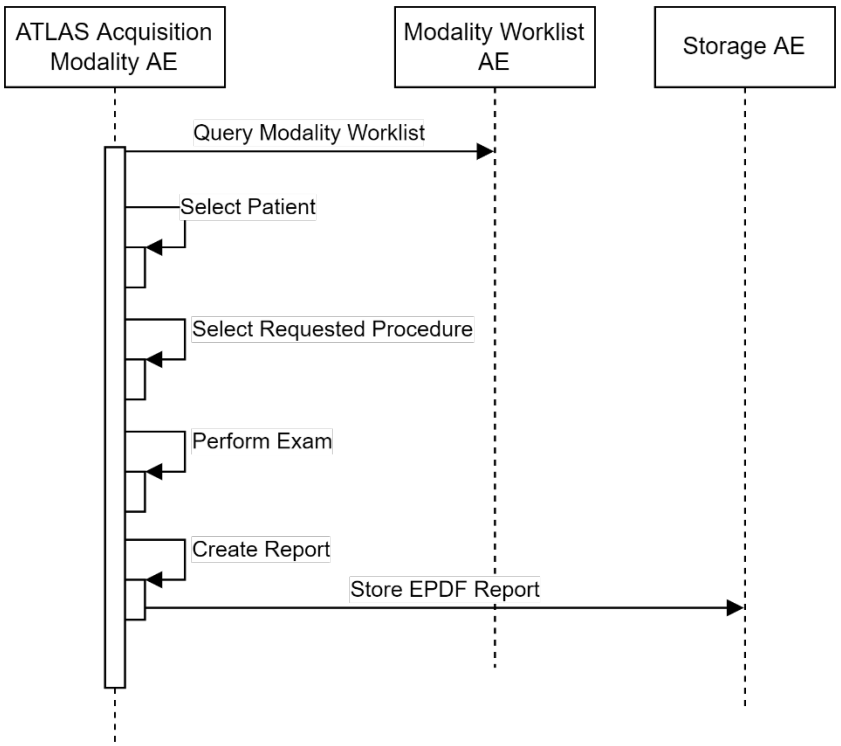
4.1.3.2 Scheduled Case

The normal case is that the patient arrives at the front desk. There could be two possibilities at this point. The examination can be scheduled in advance or when the patient arrives and will be obtained by ATLAS 500 via Modality Worklist query.

In either case all patient and study related information is available at the day the examination takes place. On ATLAS 500 these patients appear in the "Todays" list in the main screen. This information is used to take the examination.

Figure 4-5 Scheduled Case



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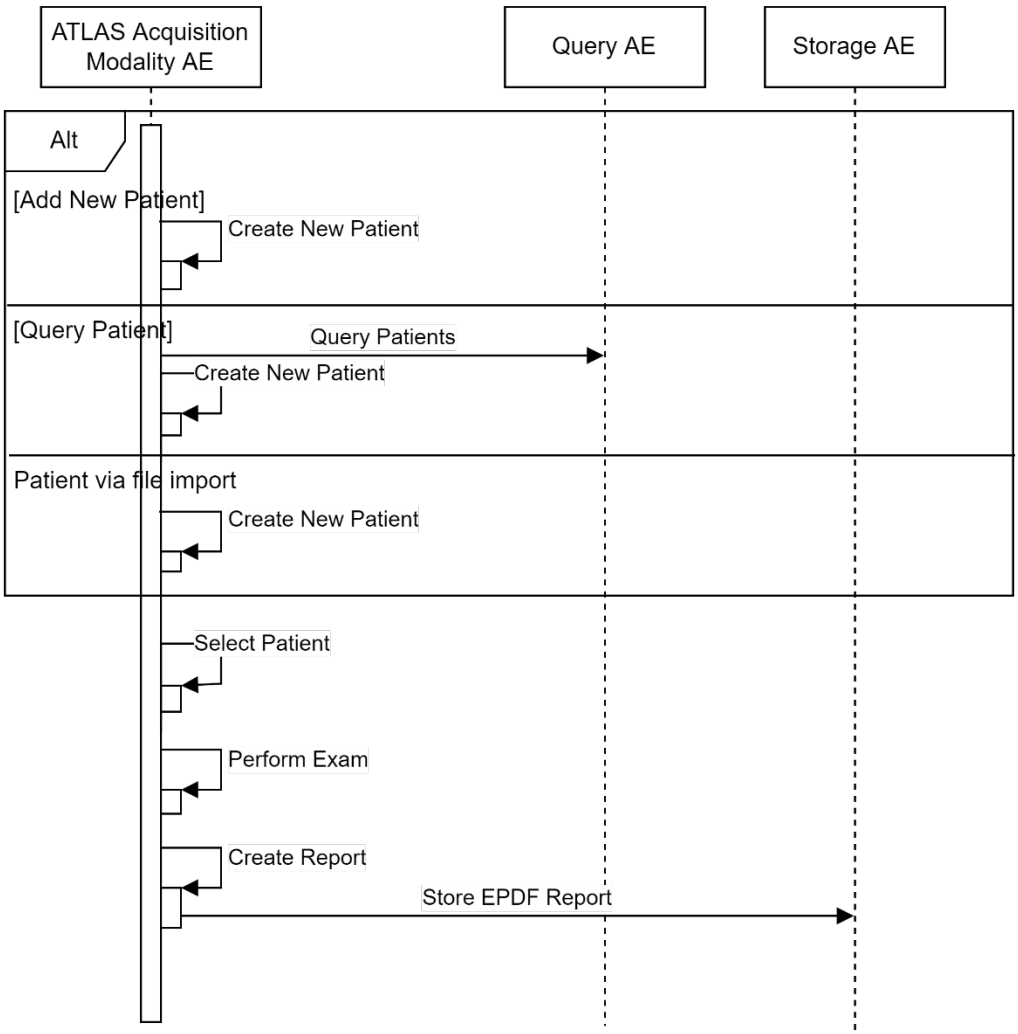
4.1.3.3 Unscheduled Case

In the unscheduled case the patient at the instrument was not registered at the front desk or the software does not support DICOM modality worklist. In this case, the examination is not scheduled in the Modality Worklist. Patient demographics and study specific information must be generated at the instrument itself. The situation is akin to the case in which the Modality Worklist AE could not be reached due to network issues.

Patient demographics can be queried from the Query Service Class Provider. However, this should be considered as an exceptional way to obtain patient demographics.

Figure 4-6 Unscheduled Case



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4.2 AE Specifications

4.2.1 ATLAS 500 AE Specification

4.2.1.1 SOP Classes

This application entity provides Standard Conformance to the following SOP Class(es):

Table 4-1 SOP Classes for ATLAS 500 AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes[1]	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

4.2.1.2 Associations Policies

4.2.1.2.1 General

The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

Table 4-2 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

The number of simultaneous associations depends on the usage profile. At a certain point of time there might be active simultaneously:

- 1 association for Verification
- 1 association for Storage
- 1 association for Storage Commitment
- n associations for Modality Worklist - FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)
- n associations for Query/Retrieve - FIND, depending on whether search criteria are changed while a previous query is still active (no response yet)

Table 4-3 Number of Associations as an Association Initiator for ATLAS 500 AE

Maximum number of simultaneous associations	50

Table 4-4 Number of Associations as an Association Acceptor for ATLAS 500 AE

Maximum number of simultaneous associations	2

4.2.1.2.3 Asynchronous Nature

ATLAS 500 Application Software does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

Table 4-5 DICOM Implementation Class and Version for ATLAS 500 AE

Implementation Class UID	1.2.276.0.75.2.5.20
Implementation Version Name	NIM-3.1.0

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Verify Communication

4.2.1.3.1.1 Description and Sequencing of Activities

This activity is available during the configuration phase. It facilitates the setup and management of the DICOM Application Entities.

The user can test the application-level communication between instrument's software Application Entity and its peer DICOM Application Entities. During one test call, all peer DICOM Application Entities are contacted.

In the association request ATLAS 500 Application Software proposes not only Verification SOP Class, but also all other SOP Classes as supported by the instrument's DICOM interface.

The association is established when the peer DICOM entity accepts the verification related presentation context. In a sub-sequent step, a C-ECHO message is exchanged.

The results of the "Verify Communication" activity are shown to the user as success or failure. For e. g. a Storage Provider not only the Verification information is evaluated, but also the acceptance of the proposed presentation context comprising the respective Storage SOP Classes.

4.2.1.3.1.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- **Verification with Transfer Syntax ILE as SCU**

Table 4-6 Proposed Presentation Contexts for Activity "Verify Communication"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	BOTH[1]	None
		ELE	1.2.1	BOTH[1]	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

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4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The ATLAS 500 Application Software provides standard conformance.

4.2.1.3.2 Activity – Query Modality Worklist

The worklist contains scheduling information for patients. Query Modality Worklist is used to search for the right scheduling information for this instrument. An operator has two options to perform this activity.

4.2.1.3.2.1 Description and Sequencing of Activities

Option "Todays Patients query"

In this case, the Application Software performs a query with predefined query keys. These keys can be included/excluded in/from the worklist query by settings on "EMR/PACS"→"MWL"→"Modality Worklist - Today's Query". The applied query keys are:

Table 4-7 Modality Worklist Query for Today's Patients

Tag	Attribute Name	Description	Modality Worklist Query Settings For Today's List
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.	N/A
> (0040,0001)	Scheduled Station Application Entity Title	"Local AE title" is set to ON: Uses the AE Title value as configured for the ATLAS 500 instrument. "Local AE title" is set to OFF: User can enter AE title or keep it blank	Include/exclude with setting "Use Local AE title". Default: Checkbox checked with default AE title in the textbox below it.
> (0040,0002)	Scheduled procedure Step Start Date	All, Today, Tomorrow, Week	Include/exclude with setting "Scheduled Procedure Step Start Date". Default: Today
> (0008,0060)	Modality	`All, OP, OPV, OPM, OPT, OAM, IOL`	Include/exclude with setting "Modality". Default: "All"

All matching worklist items are subject to be imported into the local database.

This default query can be manually triggered by simply pressing the button in the header of the "Today" list. This default query is also triggered automatically in a configurable interval to keep the "Today" List up to date if option "Automatic MWL Update" is switched on.

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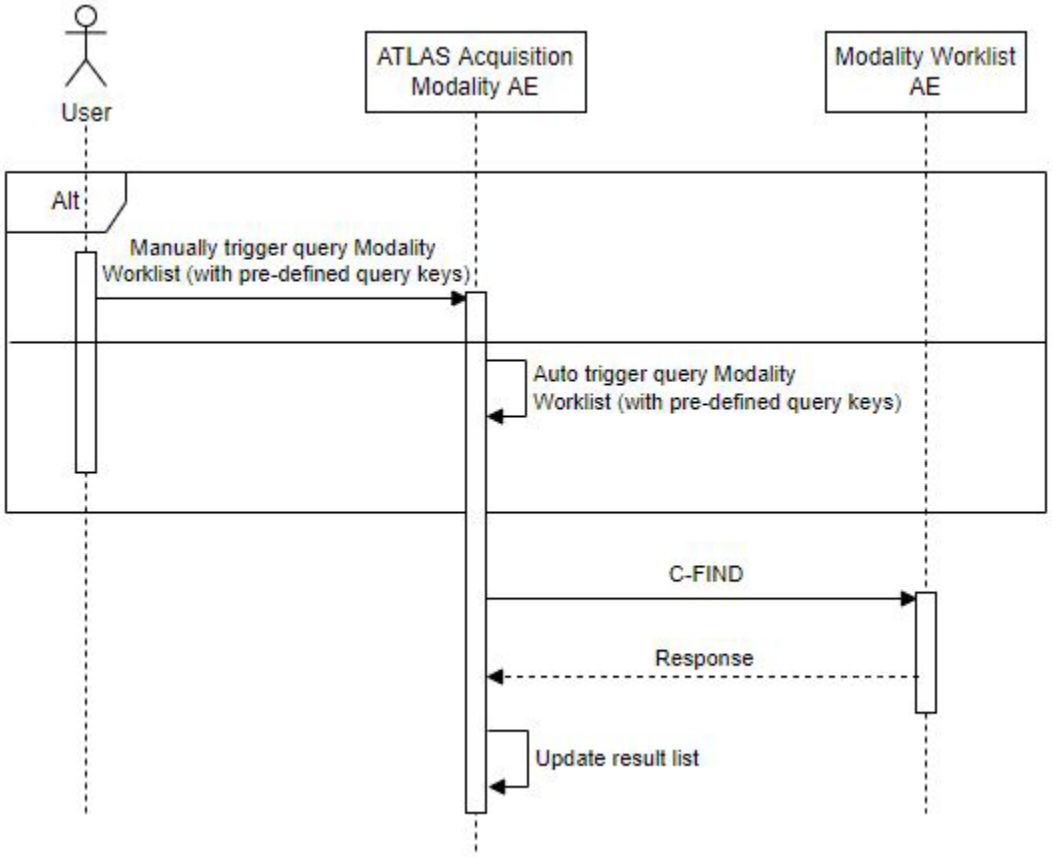
Figure 4-7 Today's Patients Query



Select Requested Procedure

The worklist item planned next according to its Scheduled Procedure Step Start Date and Time will be pre-selected. The operator can choose to either start the scan acquisition directly or choose another worklist item from the Today's list before continuing with the acquisition. If the operator proceeds to acquire without choosing any worklist item, the acquisition is associated with a worklist item with the earliest study date from the available worklist items.

Option "Interactive query"

The query keys of the "Interactive query" can be modified by the operator. To modify the query key the operator must open the "Advanced" screen and use the tab "Scheduled Patients". This screen will provide all available search fields for the Modality Worklist search.

The operator can select the patient after the Modality Worklist search. In this case the patient will be added to the Today's Patients list and the operator can perform an acquisition.

Depending on the option "Automatic MWL Update" the workflow results in a scheduled or an unscheduled case.

Alternatively, the operator can display the Modality Worklist Details for a selected patient. In the Details screen the operator can select a Requested Procedure and add the patient including the selected Requested Procedure / Scheduled Procedure Step information.

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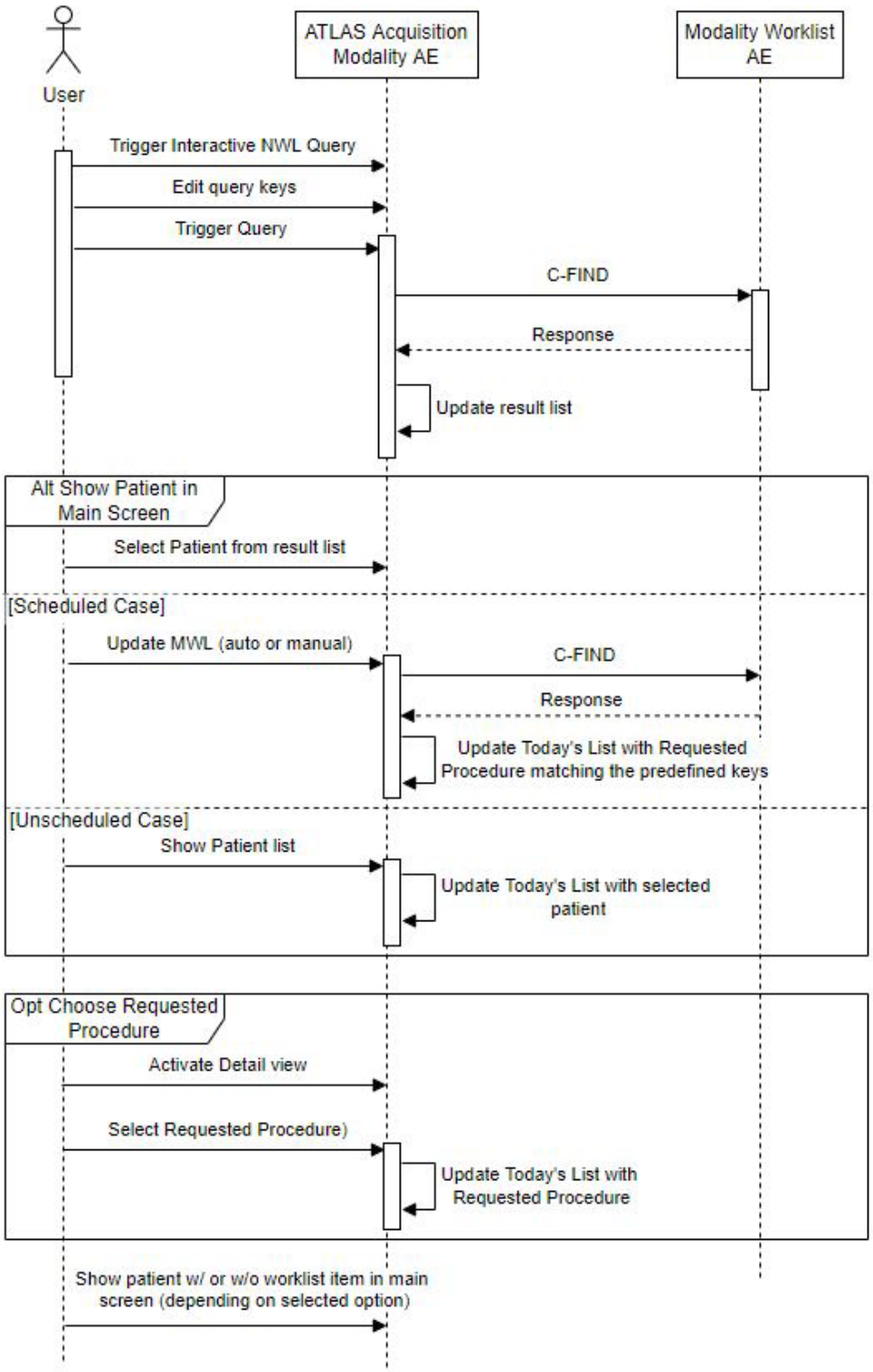
Figure 4-8 Interactive Query



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Trigger “Interactive MWL Query”

The activity “Trigger Interactive MWL Query” can be triggered by the operator at any time if no other activity is in progress. To invoke the query the operator must use the “Scheduled Patients” tab from the “Advanced” search screen. It is meaningful to perform the query when the patient arrives at the modality. Then the worklist contains latest information.

Edit query keys

The Modality Worklist query offers a GUI for interactive query. The “Scheduled Station AE Title” is prefilled with the AE title configured for the Today’s Modality Worklist Query (see Table 4-7 Modality Worklist Query for Today's Patients) and the “Schedule date” is predefined with today. All predefined values can be changed. The operator can change or fill in search criteria in the shown dialog. For instance, the incomplete patient name or the patient ID can be used.

Trigger query

The operator triggers the search after he filled in search criteria. The Application Software sends a DICOM C-FIND request, which contains the search criteria. The Application Software waits for the response from the partner Application Entity. The Application Software will accept up to a configurable number of matches. If the number of received worklist items overstepped the configurable limit, the Application Software sends a C-CANCEL-RQ followed by a A-RELEASE-RQ to the service provider and a message is displayed. Despite this warning, the operator gets results in the result-list.

After receiving the response, the picklist is updated. The result-list provides the most important information for a quick overview (see section 4.2.1.3.1.3 for the supported set of tags).

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct worklist item.

Select patient from result list

The operator can select a patient in the picklist and return to the acquisition screen. Depending on the configuration of the predefined query keys and the “Automatic or manual MWL Update” the workflow results in an unscheduled or a scheduled case. Please refer to step “Show Patient in main screen” for further information.

Activate detailed view

The detailed view allows a closer look to all work items for the selected patient. Thus, the operator can see more information about the patient, the Requested Procedures and the Scheduled Procedure Steps planned for the selected patient.

Select Requested Procedure

In the detailed view the operator has the option to select a dedicated Requested Procedure with the earliest associated Scheduled Procedure Step by clicking on the Select button of the highlighted Requested Procedure.

Show Patient in main screen

The operator can take over the selected item at any time. The data is stored in the list of “Today”. After all that, the operator can start the examination of the patient and acquire scan data.

The transfer of the selected patient from the “Advanced” – “Scheduled Patients” screen will result in an unscheduled case.

The only exception is:

Predefined query keys for Today’s List do match the selected Modality Worklist Item. The Patient is transferred to the main screen. Another MWL default query is triggered by manual or automatic Modality Worklist refresh, and the query results are displayed on Today’s list.

Query conditions for Today’s list is configurable in EMR/PACS→MWL→Modality Worklist – Today’s Query.

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4.2.1.3.2.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Modality Worklist IM - FIND" with Transfer Syntax ILE as SCU

Table 4-8 Proposed Presentation Contexts for Activity "Query Modality worklist"

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	BOTH[1]	None
		ELE	1.2.1	BOTH[1]	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

4.2.1.3.2.3 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-9 Modality Worklist C-FIND-Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert message.
Failure	Identifier Does Not Match SOP Class	A900	Log message and display user alert message.
Failure	Unable to process	C000-CFFF	Log message and display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and display user alert message.
Cancel	Matching terminated due to Cancel request	FE00	Log message.
Success	Matching is complete	0000	The Application Software processes the gathered search results and updates the pick list.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If yes applies, gathering is canceled (C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about additional results being on the server. If no applies, gathering is continued.
Pending	Matches are continuing – Warning that one or more Optional Keys were not	FF01	Log message. The Application Software checks whether the number of received worklist items overstepped the configurable limit. If yes applies, gathering is canceled (C-CANCEL-RQ is sent) and the partial search

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Service Status	Further Meaning	Error Code	Behavior
	supported for existence and / or matching for this Identifier		result gets displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message

Table 4-10 Attributes involved in Modality Worklist C-FIND Request and Response

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied to SOP Instance
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence		X			
> (0040,0001)	Scheduled Station Application Entity Title	BRQ, DEF*		X	PLD	X
> (0040,0003)	Scheduled Procedure Step Start Time		X	X	PLD	
> (0040,0002)	Scheduled Procedure Step Start Date	BRQ, DEF*, SEL, RNG	X	X	PLD	
> (0008,0060)	Modality	BRQ, SEL, DEF*		X	PLD	X
> (0040,0006)	Scheduled Performing Physicians Name					
> (0040,0007)	Scheduled Procedure Step Description		X[1]	X	PLD	X
> (0040,0010)	Scheduled Station Name					
> (0040,0011)	Scheduled Procedure Step Location					
> (0040,0008)	Scheduled Protocol Code Sequence		X[1]	X		X
>> (0008,0100)	Code Value		X*	X		X
>> (0008,0102)	Coding Scheme Designator		X*	X		X
>> (0008,0103)	Coding Scheme Version					
>> (0008,0104)	Code Meaning			X	PLD	X
> (0040,0012)	Pre-Medication					
> (0040,0009)	Scheduled Procedure Step ID		X	X		X
> (0032,1070)	Requested Contrast Agent					
Requested Procedure						
(0040,1001)	Requested Procedure ID	PBQ	X	X	PLD	X
(0032,1060)	Requested Procedure Description		X[2]	X	PLD	X
(0032,1064)	Requested Procedure Code Sequence		X[2]	X		X
> (0008,0100)	Code Value		X*	X		X
> (0008,0102)	Coding Scheme Designator		X*	X		X
> (0008,0103)	Coding Scheme Version					

Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied to SOP Instance
> (0008,0104)	Code Meaning			X	PLD	X
(0020,000D)	Study Instance UID		X	X		X
(0008,0020)	Study Date					
(0008,0030)	Study Time					
(0008,1110)	Referenced Study Sequence					
> (0008,1150)	Referenced SOP Class UID					
> (0008,1155)	Referenced SOP Instance UID					
(0040,1003)	Requested Procedure Priority					
(0040,1004)	Patient Transport Arrangements					
(0040,1400)	Requested Procedure Comments			X	PLD	
Image Service Request						
(0008,0050)	Accession Number	PBQ		X	PLD	X
(0032,1032)	Requesting Physician					
(0008,0090)	Referring Physicians Name			X	PLD	X
Visit Identification						
(0038,0010)	Admission ID					
Visit Status						
(0038,0300)	Current Patient Location					
Visit Relationship						
(0008,1120)	Referenced Patient Sequence					
> (0008,1150)	Referenced SOP Class UID					
> (0008,1155)	Referenced SOP Instance UID					
Patient Identification						
(0010,0010)	Patients Name[1, 2]	PBQ	X	X	PL, PLD, APP	X
(0010,0020)	Patients ID	PBQ	X	X	PL, PLD, APP	X
(0010,0021)	Issuer of Patient ID			X	PLD	X
(0010,1000)	Other Patient IDs			X		X
Patient Demographics						
(0010,0030)	Patients Birth Date			X	PL, PLD, APP	X

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Tag	Tag Name	Query Keys Matching	Mandatory Query Keys Return	Imported	Displayed	Copied to SOP Instance
(0010,0040)	Patients Sex			X	PL, PLD, APP	X
(0010,1030)	Patients Weight					
(0040,3001)	Confidentiality Constraint on Patient Data Description					
(0010,2160)	Ethnic Group			X		X
(0010,4000)	Patients Comments			X		X
Patient Medical						
(0038,0500)	Patient State					
(0010,2110)	Allergies					
(0010,21C0)	Pregnancy Status					
(0010,2000)	Medical Alerts					
(0038,0050)	Special Needs					

Note[1]: If the multicomponent group name representation is enabled the name component group configured with Priority 1 is shown in the pick list and in the patient's details. The search string entered in patient's last name or first name is sent in the alphabetic component group of the attribute (0010,0010) Patient's Name in the C-Find-RQ (see section 4.4.2.1 for the setting of multicomponent group names).

Note[2]: Only patient's first name and last name are displayed in the GUI, but the entire name including all five components of all three component groups are imported and copied into the storage SOP Instance.

Note[3]: All attributes with grey background are by default excluded from the list of Modality Worklist C-FIND-RQ return keys. If needed they can get activated by service personnel.

Note[4]: All attributes with white background are by default included in the Modality Worklist C-FIND-RQ as return keys with the exception that sequences are sent zero-length (no sequence items included).

Values of column "Query Keys Matching":

PBQ

A tag that is marked with PBQ is used as query key in the Patient Based Query mode of the interactive Modality Worklist Query Dialog.

BRQ

A tag that is marked with BRQ is used as query key in the Broad Query mode of the interactive Modality Worklist Query Dialog.

DEF

A tag that is marked with DEF has a value assigned when the interactive Modality Worklist Query Dialog is shown the first time or when the Reset button is pushed.

Default values can get modified. The modifications will be stored for next use of Modality Worklist Query Dialog.

DEF*

The default value of the associated attribute can be configured in the Specific settings screen.

RNG

The operator can apply a range as value for the query key.

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SEL

The operator can select a value from a given list of values.

Values of column "Query Keys Return":

X

The tag shall be present in the Modality Worklist C-FIND response. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

X*

The tag shall be present in the Modality Worklist C-FIND response if its enclosing sequence is present. If any required tag is missing the relevant Modality Worklist C-FIND response item (Scheduled Procedure Step) will be ignored and not imported by the application software.

X[1]

Either the Scheduled Procedure Step Description (0040,0007) or the Scheduled Protocol Code Sequence (0040,0008) or both shall be present in the Modality Worklist C-FIND response.

X[2]

Either the Requested Procedure Description (0032,1060) or the Requested Procedure Code Sequence (0032,1064) or both shall be present in the Modality Worklist C-FIND response.

Values of column “Imported”:

X

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

Values of column “Displayed”:

PL

Values of this tag are instantly visible in the pick list.

PLD

Values of this tag are visible in the details dialog of the current selected pick list item.

APP

Values of this tag are visible in the application.

Values of column SOP Instance:

X

Values of marked tags will be stored in created SOP Instances. See section 8.1 “mapping of attributes” in 0 Each Application that depends on certain fields to function correctly should specify which ones are required for it to perform its intended function.

The ATLAS 500 Application Software provides standard conformance.

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity – Query Modality Worklist.

The case of patient data collision is outlined in chapter of Study Root Query/Retrieve SOP Class.Attribute Mapping.

Following set of tags can be used as query key in the so called “Patient Based Query”. The Patient Based Query is a working mode of the Modality Worklist Query Dialog.

Table 4-11 Modality Worklist query key details - Patient Based Query

Tag	Tag Name	Description
(0010,0010)	Patients Name[1]	The ATLAS 500 Application Software supports family name and given name only. A “*” wildcard will automatically be added at the end.

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(0010,0020)	Patient ID	The operator can enter a string which conforms to the Value Representation LO.
(0008,0050)	Accession Number	The operator can enter a string which conforms to the Value Representation SH.
(0040,1001)	Requested Procedure ID	The operator can enter a string which conforms to the Value Representation SH.

Note[1]: Even if the multicomponent group name representation is enabled the search string entered in patient's last name or first name as query key will always be sent in the Alphabetic group of the C-Find-RQ (see section 4.4.2.1 for the setting of multicomponent group names).

Table 4-12 Modality Worklist Query Key – Patient's Name - Wildcard Details

Multicomponent Group Name Representation		Search on Patient's Name: Search string entered in GUI: "Quincy"	Query key - Value in attribute (0010,0010) Patient's Name
Disabled		Last Name	Quincy*
		First Name	*^Quincy*
Enabled (See section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	Last Name	*=Quincy*
		First Name	*=*^Quincy*
	Priority 1 - Phonetic	Last Name	*=*=Quincy*
		First Name	*=*=*^Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	*^Quincy*

Following set of tags can be used as query key in the so called "Broad Query". The Broad Query is a working mode of the Modality Worklist Query Dialog.

Table 4-13 Modality Worklist query key details - Broad Query

Tag	Tag Name	Description
(0040,0100)	Scheduled Procedure Step Sequence	This attribute is the container for the tags as listed below. The sequence contains one item.
> (0040,0002)	Scheduled Procedure Step Start Date	The default value is today's date. The operator can change the value to tomorrow, week and can even enter date ranges in the Advanced query. .
> (0008,0060)	Modality	The operator can change the value and select one value of a predefined set of values including an empty string. Possible values are "OAM", "OP", "OPM", "OPT", "OPV", "IOL". For "Today's patient" query, this key is included when "Include Modality" is ON.
> (0040,0001)	Scheduled Station AE Title	The default value is given by the local AE Title as configured for the ATLAS 500. The operator can enter the AE Title of another device or leave the field empty. For "Today's patient" query this key is included when "Include AE Title" is ON.

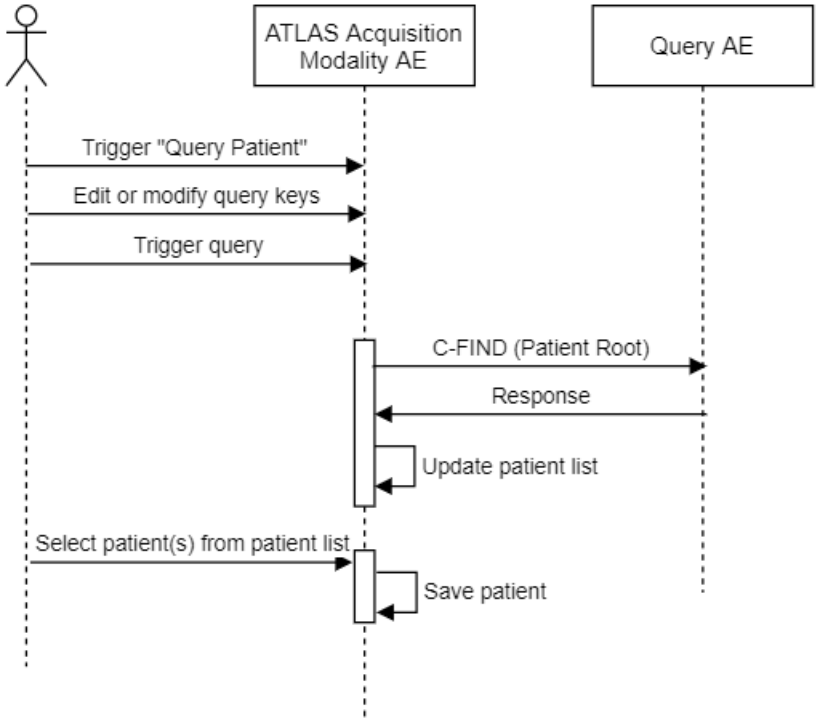
4.2.1.3.3 Activity - Query Patients

Query is used to get patient information stored on a DICOM server.

4.2.1.3.3.1 Description and Sequencing of Activities

There are two ways for the user to trigger a query request. The “Quick Search” in the main screen will search in “Patient Given Name”, “Patient Last Name”, “Patient ID” and "Patient Birth Date" in parallel. The second way is the “Advanced” search. The user can select this search by clicking the “Advanced” button in the main screen.

Figure 4-9 Query for patients



Trigger “Query Patients”

The activity “Query remote AE for patients” can be triggered by the operator by using the “Quick Search” or change to the “Advanced” screen.

Edit or modify query keys

The “Advanced Search – All Patients” screen offers a GUI for interactive query. The operator can change or fill in search criteria in the shown search fields.

The top-most search field in the main screen is the “Quick Search” field. Any value entered herein is applied to

- (0010,0010) Patient’s Name – Family Name
- (0010,0010) Patient’s Name – Given Name
- (0010,0020) Patient ID
- (0010,0030) Patient's Birth Date (only if the value entered is a date, format depends on the locale settings configuration)

The entered value has automatically a trailing wildcard to fulfill the ‘starts with’ condition. For more details on supported query keys see Table 4-20 Query key details.

Trigger query

The operator triggers the search after he or she filled in search criteria by either depressing the “Enter” key or click on the “Search button”. The Application Software sends a Patient Root Query based DICOM C-FIND request which contains the entered search criteria. The Application Software waits for the response from the Query AE and accepts up to a configurable number of matches. If the number of matches exceeds this limit, the Application Software shows an information about truncated

search results and a request to apply more specific query keys. Despite this warning, the operator gets results in the picklist.

After receiving the response, the patient picklist is updated. The patient picklist provides the most important information for a quick overview.

The operator can start over, redefine query keys and trigger the query again. This can be performed as often as required, until he or she finds the correct patient entry.

Important note: For this activity it is required that the SCP supports the Relational query model since Application Software does not use the Hierarchical model.

Select patient(s) from patient list

If in Advanced Search the operator can select 1-n patients from the pick-list at the same time and save them into the database.

4.2.1.3.3.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- "Patient Root Query/Retrieve Information Model - FIND" with Transfer Syntax ILE as SCU

Important note: For this activity it is required that the SCP supports the Relational query model since Application Software does not use the Hierarchical model.

Table 4-14 Proposed Presentation Contexts for Activity Query Patient

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	SCU	No
		ELE	1.2.1	SCU	No
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	Yes[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	No

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

4.2.1.3.3.3 SOP Specific Conformance for Patient Root Query SOP Class as SCU

Table 4-15 Query C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Failure	Refused: Out of Resources	A700	Log message and display user alert message.
Failure	Identifier does not match SOP Class	A900-A9FF	Log message and display user alert message.
Failure	Unable to process	C000-CFFF	Log message and display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and display user alert message.

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Service Status	Further Meaning	Error Code	Behavior
Cancel	Matching terminated due to Cancel request	FE00	Log message.
Success	Matching is complete – No final Identifier is supplied	0000	The Application Software processes the gathered search results and updates the pick list.
Pending	Matches are continuing – Current Match is supplied, and any Optional Keys were supported in the same manner as Required Keys	FF00	Log message. The Application Software checks whether the number of received query result items overstepped the configurable limit. If yes applies, gathering is canceled (C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and / or matching for this Identifier.	FF01	Log message. The Application Software checks whether the number of received query result items overstepped the configurable limit. If yes applies, gathering is canceled (C-CANCEL-RQ is sent) and the partial search result gets displayed along with a message informing the user about more results being on the server. If no applies, gathering is continued.
Unknown	All other responses with unknown code meaning	xxxx	Log message and display user alert message.

Table 4-16 PATIENT level keys for the Patient Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0010,0010)	Patient's Name[1]	X		X	X	X
(0010,0020)	Patient ID	X	X	X	X	X
(0010,0021)	Issuer of Patient ID			X		X
(0010,0030)	Patient's Birth Date	RNG		X	X	X
(0010,0040)	Patient's Sex			X	X	X
(0010,1000)	Other Patient IDs			X		X
(0010,2160)	Ethnic Group			X		X
(0010,4000)	Patient Comments			X		X

Note[1]: Even if the multicomponent group name representation is enabled the search string entered in patient's last name or first name as query key will always be sent in the Alphabetic group of the C-Find-RQ (see section 4.4.2.1 for the setting of multicomponent group names).

Table 4-17 STUDY level keys for the Patient Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0020)	Study Date					
(0008,0030)	Study Time					
(0008,0050)	Accession Number	X				
(0008,0061)	Modalities in Study					
(0008,0090)	Referring Physician's Name	X				
(0008,0090)	Study Description					
(0008,1080)	Admitting Diagnoses Description					
(0020,0010)	Study ID					
(0020,000D)	Study Instance UID					

Table 4-18 SERIES level keys for the Patient Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0021)	Series Date					
(0008,0031)	Series Time					
(0008,0060)	Modality	SEL				
(0008,103E)	Series Description					
(0008,1050)	Performing Physician's Name					
(0008,1090)	Manufacturer's Model Name					
(0020,000E)	Series Instance UID					
(0020,0011)	Series Number					
(0020,0060)	Laterality					
(0040,0244)	Performed Procedure Step Start Date					
(0040,0245)	Performed Procedure Step Start Time					
(0040,0275)	Request Attributes Sequence					

Table 4-19 IMAGE level keys for the Patient Root Query/Retrieve Information Model (request and response)

Tag	Tag Name	Query Keys Matching	Query Keys Return	Imported	Displayed	Copied into SOP Instance
(0008,0008)	Image Type					
(0008,0012)	Instance Creation Date					
(0008,0013)	Instance Creation Time					
(0008,0016)	SOP Class UID					
(0008,0018)	SOP Instance UID					
(0008,002A)	Acquisition DateTime	RNG				
(0008,114A)	Referenced Instance Sequence					
>(0008,1150)	Referenced SOP Class UID					
>(0008,1155)	Referenced SOP Instance UID					
(0020,0013)	Instance Number					
(0020,0062)	Image Laterality					

Values of column "Query Keys Matching":

RNG

The operator can apply a range as value for the query key.

SEL

The operator can select a value from a given list of values.

X

The value is included in the query request if not empty.

AUTO

The value cannot be modified by the operator.

Values of column "Query Keys Return":

X

The tag shall be present in the Patient Root Query/Retrieve C-FIND response. If any required tag is missing the relevant Patient Root Query/Retrieve C-FIND response item will be ignored and not imported by the application software.

Values of column "Imported":

X

The value gets imported in the application. Thus this value may have influence in Information Objects which will be created as a result of the performed examination.

Values of column "Displayed":

X

Values of this tag are instantly visible in the pick list.

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Values of column SOP Instance:

X

Values of marked tags will be stored in created SOP Instances. See section “mapping of attributes” in 0 Each Application that depends on certain fields to function correctly should specify which ones are required for it to perform its intended function.

The ATLAS 500 Application Software provides standard conformance.

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity – Query Modality Worklist.

The case of patient data collision is outlined in chapter of Study Root Query/Retrieve SOP Class.Attribute Mapping.

Table 4-20 Query key details

Tag	Tag Name	Description
(0010,0010)	Patient’s Name[1]	The default value is empty string. Only family name and given name can be used as query keys. A trailing wildcard “*” is automatically added at the end of the specified search string. This is a DICOM Standard query key on Patient level.
(0010,0020)	Patient ID	The default value is empty string. The operator can enter each value that conforms to the Value Representation LO. This is a DICOM Standard query key on Patient level.
(0010,0030)	Patient’s Birth Date	The default value is empty date. The operator can enter a specific value that conforms to the Value Representation DA. The operator can also select from a range of dates. This is a DICOM Optional query key on Patient level, thus the effect of this query key on the query depends on Service Provider implementation.
(0008,0050)	Accession Number	The default value is empty string. The operator can enter each value that conforms to the Value Representation SH. This is a DICOM Standard query key on Study level.
(0008,0090)	Referring Physician’s Name[2]	The default value is empty string. Only family name can be used as query key. This is a DICOM Optional query key on Study level, thus the effect of this query key on the query depends on Service Provider implementation.
(0008,0060)	Modality	The default value is empty string. The operator can select from a list of pre-defined values and the application software will convert the selection to a value that conforms to the Value Representation CS. This is a DICOM Standard query key on Series level.

Note[1]: Even if the multicomponent group name representation is enabled the search string entered in patient’s last name or first name as query key will always be sent in the Alphabetic group of the C-Find-RQ (see section 4.4.2.1 for the setting of multicomponent group names).

Note[2]: The search string is always sent in the Alphabetic part of the multicomponent group name of the query key.

Table 4-21 Query Key – Patient's Name - Wildcard Details

Multicomponent Group Name Representation		Search on Patient's Name – Search string entered in GUI: "Quincy"	Query key – Value in attribute (0010,0010) Patient's Name
Disabled		Last Name	Quincy*
		First Name	*^Quincy*
Enabled (See section 4.4.2.1 for the setting of multicomponent group names).	Priority 1 - Ideographic	Last Name	*=Quincy*
		First Name	*=*^Quincy*
	Priority 1 - Phonetic	Last Name	*=*=Quincy*
		First Name	*=*=*^Quincy*
	Priority 1 - Alphabetic	Last Name	Quincy*
		First Name	*^Quincy*

4.2.1.3.4 Activity – Perform Exam

The operator can trigger "Acquire" at any time if no other activity is in progress.

This activity has no direct relation to DICOM messaging.

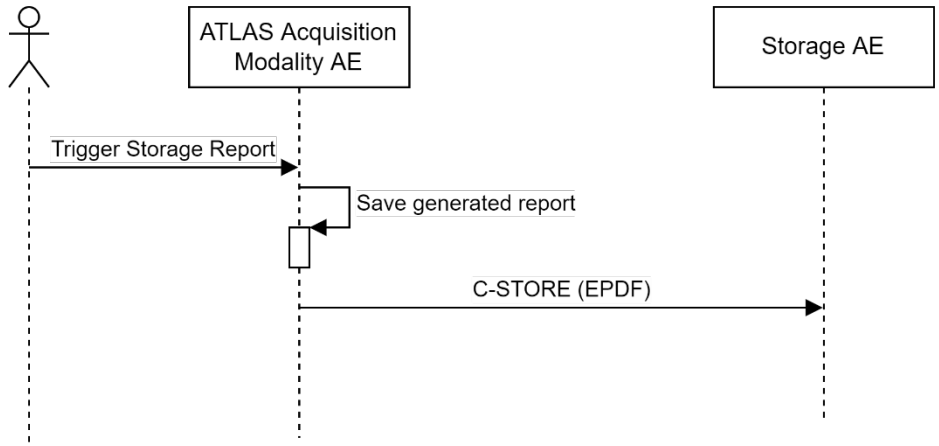
During this activity, the Application Software creates scan data. The created data is stored in local database. Reports will be generated based on the data and sent to the configured storage service provider.

4.2.1.3.5 Activity – Store EPDF Report

This activity is triggered automatically or manually to send the generated report to the pre-configured storage provider.

4.2.1.3.5.1 Description and Sequencing of Activities

Figure 4-10 Store EPDF Report



Trigger "Store Report"

This activity is triggered automatically in the background when analyze is finished.

4.2.1.3.5.2 Proposed Presentation Contexts

Following presentation contexts are offered for each initiated association. During this activity the Application Software uses only

- Encapsulated PDF Storage Transfer Syntax ILE or ELE as SCU

Table 4-22 Proposed Presentation Contexts for Activity Store EPDF Report

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg**
Name	**UID 1.2.840.10008. ...**	**Name List**	**UID List 1.2.840.10008. ...**		
Verification	1.1	ILE	1.2	BOTH	None
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	None
Encapsulated PDF Storage	5.1.4.1.1.104.1	ILE	1.2	BOTH[1]	None
		ELE	1.2.1	BOTH[1]	None
Patient Root Query/Retrieve IM – FIND	5.1.4.1.2.1.1	ILE	1.2	SCU	See Note[1]
Modality Worklist IM – FIND	5.1.4.31	ILE	1.2	SCU	None

Note[1]: C-FIND extended negotiation is offered. Relational-query support is required by the SCP.

4.2.1.3.5.3 SOP Specific Conformance for Storage SOP Classes

Table 4-23 Storage C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Behavior
Failure	Refused: Out of Resources	A700-A7FF	Log message and retry c-store. If error persists then display user alert message. After initial failure the storage request will be repeated two more times. Afterwards it will be taken up by the Background Storage Activity until successful completion.
Failure	Error: Data Set does not match SOP Class	A900-AFF	Log message and do not retry c-store. Display user alert message.
Failure	Error: Cannot understand	C000-CFFF	Log message and do not retry c-store. Display user alert message.
Failure	Refused: SOP class not supported	0122	Log message and do not retry c-store. Display user alert message.
Warning	Coercion of data Elements	B000	Log message.
Warning	Data Set does not match SOP Class	B007	Log message.
Warning	Elements Discarded	B006	Log message.
Success	Successful Storage	0000	The Application Software flags the data as successfully stored.
Unknown	All other responses with unknown code	xxxx	Log message and do not retry c-store. Display user alert message.

4.2.1.3.5.4 SOP Specific Conformance for Storage Commitment SOP Class

4.2.1.3.5.4.1 Storage Commitment Operations (N-ACTION)

The Application Software will request storage commitment for instances of the acquired Sensor Raw Data if the Remote AE is configured as Storage Commitment Provider and a presentation context for the Storage Commitment Push Model has been accepted.

The Storage Commitment Request addresses at least one SOP Instance and at maximum 500 SOP instances.

The behavior of the Application Software when encountering status codes in an N-ACTION response is summarized in the table below:

Table 4-24 Storage Commitment N-ACTION Response Status Handling Behavior

Service Status	Further Meaning	Status Code	Behavior
Failure	Class-instance conflict	0119	Log message and display user alert message.
Failure	Duplicate invocation	0210	Log message.
Failure	Invalid argument value	0115	Log message and display user alert message.
Failure	Invalid SOP Instance	0117	Log message and display user alert message.
Failure	Mistyped argument	0212	Log message and display user alert message.
Failure	No such action	0123	Log message and display user alert message.
Failure	No such argument	0114	Log message and display user alert message.
Failure	No such SOP class	0118	Log message and display user alert message.
Failure	No such SOP Instance	0112	Log message.
Failure	Processing failure	0110	Log message and display user alert message.
Failure	Resource limitation	0213	Log message.
Failure	Unrecognized operation	0211	Log message and display user alert message.
Success	Success	0000	The Application Software will wait for an incoming N-EVENT-REPORT.
Unknown	All other responses with unknown code meaning.	xxxx	Log message and display user alert message.

4.2.1.3.5.4.2 Storage Commitment Communication Failure Behaviour

If the Application Software runs in a timeout or if the association is aborted by the provider or network layer, or if waiting duration for Storage Commitment N-EVENT-REPORT oversteps a configurable time limit then the related SOP Instance is considered as not being committed. Then the SOP Instance is subject of a future Storage Commitment service call. It will be included again within next call of this activity.

In addition to that, the Application Software writes the SOP Instance UID to the log file, together with the failure reason.

4.2.1.3.6 Activity – Manage Patient & Exam Data

This activity has no direct relation to DICOM messaging.

Merge and Reassign

It is possible to merge a local patient into a patient imported via Modality Worklist or into a patient imported via Patient Root Query from a DICOM Query Provider.

The operator can also reassign a local exam to another patient.

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Delete Data

The activity "Delete data" can either be invoked manually by the operator.

The operator can invoke this activity from the "Patient" screen by pressing the "Delete" button shown for a certain measurement, a complete group of measurements or a patient. When connected to a DICOM network, a patient cannot be removed from the modality.

Optionally, the operator can select a patient, navigate to the Analyze screen to delete selected exams. Manually triggered deletion of data is performed immediately.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity – Verify Communication

This activity can be performed any time when the application is up and running.

4.2.1.4.1.1 Description and Sequencing of Activities

The Software AE responds to verification requests made by remote AEs.

4.2.1.4.1.2 Accepted Presentation Contexts

Table 4-25 Acceptable Presentation Context for Activity Verify Communication

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	… 1.1	ILE	… 1.2	BOTH	No

4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.2 Activity – Store EPDF Report

4.2.1.4.2.1 Description and Sequencing of Activities

The description and sequencing of activities is covered by 4.2.1.3.5 Activity – Store EPDF Report.

4.2.1.4.2.2 Accepted Presentation Contexts

Table 4-26 Acceptable Presentation Contexts for Activity Store EPDF Report

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID 1.2.840.10008. ...	Name List	UID List 1.2.840.10008. ...		
Verification	1.1	ILE	1.2	BOTH	No
Storage Commitment Push Model	1.20.1	ILE	1.2	SCU	No

4.2.1.4.2.3 SOP Specific Conformance for Storage SOP Class as SCP

The Application Software AE provides standard conformance.

4.2.1.4.2.4 SOP Specific Conformance for Storage Commitment SOP Class

4.2.1.4.2.4.1 Storage Commitment Operations (N-EVENT-REPORT)

The Application Software can receive an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push

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

Table 4-27 Storage Commitment N-EVENT-REPORT Request Failure Reasons

Service Status	Further Meaning	Status Code	Behavior
Failure	Processing Failure	0110	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.
Failure	No such object instance	0112	Log message. The SOP Instance(s) is also considered as not being committed. The application will re-archive or delete the local instance based on a setting (see section 4.4.2.1 General Parameters). The default setting is to re-archive the exam.
Failure	Resource limitation	0213	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.
Failure	Referenced SOP Class not supported	0122	Log message.
Failure	Class / Instance conflict	0119	Log message. A failed Storage Commitment request will be repeated two more times.
Failure	Duplicate transaction UID	0131	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times
Unknown	All other responses with unknown code meaning	xxxx	Log message and retry Storage Commitment for the failed SOP Instance(s). A failed Storage Commitment request will be repeated two more times.

If the N-EVENT-REPORT contains failed instances the behavior of the application depends on the failure reason associated with the failed instances (see table above). In general retry means a retry for 2 times, no retry will set the error counter to maximum. A reset of the error counter is possible in the application settings screen (Networking).

4.3 Network Interfaces

4.3.1 Physica/ Network Interface

The physical network interface is not visible for the instrument application. The instrument application uses the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

Both IP addresses and host names are supported and get resolved.
Else no additional protocols are supported.

4.3.3 IPv4 and IPv6 Support

The ATLAS 500 supports IPv4 as well as IPv6 Addresses.

4.4 Configuration

Local application entity and remote application entity information can be configured in the Settings → EMR/PACS→DICOM screen.

For AutoConnect™-enabled systems from ZEISS the configuration can be performed automatically using the AutoConnect button.

It is also possible to configure timeout and worklist item limit parameters via Application Software Settings → EMR/PACS→Advanced screen.

4.4.1 AE Title/Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by the Installation Personnel.

4.4.1.1 Local AE Titles

The IP address is configurable via the Settings -> Network -> Network Adapter screen. Any changes in this screen will update the Operating System settings. The Application Entity Title as well as the port number are configurable in Local Application Entity section of the same configuration screen. The default port number is 11112.

4.4.1.2 Remote AE Titles/Presentation Address Mapping

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The ATLAS 500 Application Software allows setting up a remote Application Entity for each service. For all Application Entities, the host name or IP, the Port and the Application Entity Title must be known.

4.4.2 Parameters

4.4.2.1 General Parameters

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

Table 4-28 Configuration Parameters Table

Parameter	Configurable (Yes/No)	Default Value
General Parameters		
DIMSE RSP Timeout	Yes (10 – 60 sec.)	20 sec
Network Timeout	Yes (5-20 sec.)	20 sec.
Max. Association Idle Time	Yes (10 – 60 sec.)	30 sec
Network log level	Yes	Error
Storage Commitment for failed instances	Yes	Re-archive
(0008,0080) Institution Name	Yes	EMPTY
(0008,1040) Institutional Department Name	Yes	EMPTY
(0008,0081) Institution Address	Yes	EMPTY
(0008,1010) Station Name	Yes	EMPTY

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Parameter	Configurable (Yes/No)	Default Value
(0010,0021) Issuer of Patient ID	Yes	ProductName + DeviceSerialNumber. If device serial number is blank, then it will auto generate guid
Use multicomponent name representation	Yes	Disabled
Transport Layer security (TLS) communication	Yes	Disabled
AE Specific Parameters		
AE Title	Yes	ALTAS500
Modality Worklist SCU Parameters		
Maximum Query Responses (Modality Worklist IM and Patient Root Q/R IM)	Yes (10-999)	200
Automatic MWL update	Yes	Enabled
Today's Patient List Refresh Rate (Modality Worklist Polling Interval)	Yes (Min. – Max.)	5 min.
Scheduled Station AE Title (Today's Patient Query)	Yes Possible values: Use local AE Title Empty value User configurable value	Same as Local AE Title
Modality (Today's Patient Query)	Yes Possible Values: "All" (Empty) Value from pre-defined list	OPM
Scheduled Procedure Step Start Date (Today's Patient Query)	Yes Possible Values: Today Tomorrow Week (Today – Today + 7 days) All dates	Today
Specific Character Set[1]	Yes (by service personnel only)	None (ATLAS 500 Application Software uses UTF-8)
Patient Root Query SCU Parameters		
Maximum Query Responses (Modality Worklist IM and Patient Root Q/R)	Yes (10-999)	200
Unconstraint query		
Extended Negotiation – relational query support negotiation (Patient Root Q/R IM)	Yes	Yes
DICOM Specific Character Set[1]	Yes (by service personnel only)	None (ATLAS 500 Application Software uses UTF-8)

Parameter	Configurable (Yes/No)	Default Value
Storage SCU Parameters		
Specific Character Set[1]	No	UTF-8
Verification SCP Parameters		
No specific configuration required The configuration of port number and Application Entity Title are part of the Local Application Entity setup (see 4.4.1.1 Local AE Titles).		

Note[1]: DICOM Specific Character Set (Configuration settings available for Service user only)

Table 4-29 Specific Character Set

Defined Term	Description	Default
None[2]	N/A	None
ISO_IR 100	Latin alphabet No. 1	N/A
ISO_IR 101	Latin alphabet No. 2	N/A
ISO_IR 109	Latin alphabet No. 3	N/A
ISO_IR 110	Latin alphabet No. 4	N/A
ISO_IR 148	Latin alphabet No. 5	N/A
ISO_IR 144	Cyrillic	N/A
ISO_IR 127	Arabic	N/A
ISO_IR 126	Greek	N/A
ISO_IR 138	Hebrew	N/A
ISO_IR 13	Japanese	N/A
ISO_IR 166	Thai	N/A
GB18030	Chinese	N/A
ISO_IR 192	Unicode in UTF-8	N/A

Note[2]: Per default the ATLAS 500 Application Software uses ISO_IR 192 (UTF-8), (Setting is “None”). Modification to the default settings is only recommended in case of integration issues which result in incorrect interpretation of transmitted characters. See chapter 6 Support of Character Sets for more information.

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5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported by ATLAS 500 Application Software.

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6 Support of Character Sets

All application entities described in the previous chapters support UTF-8 character set per default.

A specific character set can be provided optionally and individually per remote Service Provider except for the Storage Commitment service where specific character set is not needed. Possible defined terms for the character set element are listed in. ATLAS 500 Software does not support Code Extension techniques via configuration, so ISO 2022 standard cannot be used.

Table 6-1 Supported Character Set

Supported Specific Character Set	
Character Set Description	**Defined Term**
UTF-8 encoded Unicode	ISO_IR 192 (Default)
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Latin alphabet No. 5	ISO_IR 148
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Japanese	ISO_IR 13
Thai	ISO_IR 166
Chinese	GB18030

Please note, configured Character Set will only come into effect if the remote Service Provider does not send it in the DICOM response. The latter would be a violation of the DICOM standard which now can be corrected by service personnel via Character Set configuration.

Configuration of Specific Character Sets can only be performed by a Service User.

If Specific Character Set is missing in the request or response data set and no Character Set is configured (settings is “None”), the ATLAS 500 Application Software uses ISO_IR 192 (UTF-8) as default.

Examples of when to use the optional configuration of specific character sets:

- A 3rd party MWL Provider sends responses with string values encoded in Latin alphabet No. 1 but does not provide corresponding Specific Character Set attribute. The MWL Character Set should be set to ISO_IR 100 to ensure a proper decoding of the data set.
- A 3rd party Storage/Query/Retrieve Provider does only support DICOM instances with Specific Character Set ISO_IR 100. The Storage/Query/Retrieve Character Set should be set to ISO_IR 100 to ensure a proper encoding of the DICOM data set.
- Configuration of a Character Set is not needed if connected to FORUM Archive.

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7 Security

7.1 Security Profiles

7.1.1 Security Transport Connection Profiles

The DICOM capabilities of the ATLAS 500 Application Software supports Non-Downgrading BCP 195 TLS Secure Transport Connection Profile. Optionally, the ATLAS 500 Application Software also supports configurable TLS Secure Transport Connection Profile through selection of transport protocol(s) and cipher suite(s).

Table 7-1 Transport Protocols

Transport Protocol	Supported
TLS 1.0	N
TLS 1.1	N
TLS 1.2	Y – Default
TLS 1.3	Y

Table 7-2 Secure Transport Connection Profiles

Profile	Creator/Sender	Consumer/Receiver
Non-Downgrading BCP 195 TLS Secure Transport Connection	Y	Y
Any ATLAS 500 TLS Secure Transport Connection	Y/N	Y/N

Table 7-3 Supported Cipher Suites

Profile	Cipher Suites	Default Preference Order (from 1=preferred to n=less preferred)
Non-Downgrading BCP 195 TLS Secure Transport Connection	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	1
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	
Configurable TLS Secure Transport Connection on the ATLAS 500 Application Software	TLS_AES_128_GCM_SHA256	2
	TLS_AES_256_GCM_SHA384	
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	
	TLS_RSA_WITH_AES_256_GCM_SHA384	

Profile	Cipher Suites	Default Preference Order (from 1=preferred to n=less preferred)
	TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384	
	TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384	
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	
	TLS_DHE_DSS_WITH_AES_256_GCM_SHA384	
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_RSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256	
	TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256	
	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	
	TLS_DHE_DSS_WITH_AES_128_GCM_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	
	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	
	TLS_RSA_WITH_AES_256_CBC_SHA256	
	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384	
	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384	
	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256	
	TLS_DHE_DSS_WITH_AES_256_CBC_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA	
	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA	
	TLS_RSA_WITH_AES_256_CBC_SHA	
	TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA	
	TLS_ECDH_RSA_WITH_AES_256_CBC_SHA	
	TLS_DHE_RSA_WITH_AES_256_CBC_SHA	
	TLS_DHE_DSS_WITH_AES_256_CBC_SHA	
	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	
	TLS_RSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256	
	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256	
	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256	
	TLS_DHE_DSS_WITH_AES_128_CBC_SHA256	
	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA	
	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA	
	TLS_RSA_WITH_AES_128_CBC_SHA	

Profile	Cipher Suites	Default Preference Order (from 1=preferred to n=less preferred)
	TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA	
	TLS_ECDH_RSA_WITH_AES_128_CBC_SHA	
	TLS_DHE_RSA_WITH_AES_128_CBC_SHA	
	TLS_DHE_DSS_WITH_AES_128_CBC_SHA	

The Private Key and the Certificate used by the ATLAS 500 Application Software to identify itself in the TLS negotiation with remote application have to be provided in a local keystore file in PKCS12 or JKS (Java Key Store) format on the application host. Certificates of Certificate Authorities (CA) to validate Certificates received from remote applications during the TLS negotiation can also be provided in a local keystore file in JKS format or PKCS12 format.

7.1.2 Association Level Security

None supported.

7.1.3 Application Level Security

The DICOM capabilities of the ATLAS 500 Application Software allows the use of either a conventional (non-secure) DICOM communication or a secure DICOM communication based on the Transport Layer Security (TLS) protocol.

Additionally,

- It is assumed that ATLAS 500 Application Software is used within a secured environment. It is assumed that a secured environment includes at a minimum Firewall or router protections to ensure that only approved external hosts have network access to ATLAS 500 Application Software
- Firewall or router protections to ensure that ATLAS 500 Application Software only has network access to approve external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g., 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 Instance(s)

Abbreviations used for Presence of Values (PoV):

VNAP
Value Not Always Present (attribute sent zero length if no value is present)

ANAP
Attribute is not always present

ALWAYS
Attribute is always present with a value

EMPTY
Attribute is sent without a value

Abbreviations used for Sources of Data (Source):

USER
The attribute value source is from User input

AUTO
The attribute value is generated automatically

MWL
The attribute value is the same as the value received using a DICOM service such as Modality Worklist.

CONFIG
The attribute value source is a configurable parameter

ACQUISITION
The sources of data come from data acquisition process. Include Image and data relate to Image

ANALYSIS
The sources of data come from data generate by application or add/edit/update by user when images are analyzed.

SRQ
The attribute value is same as the value received using a DICOM service such as Study Root Query.

PRQ
The attribute value is same as the value received using a DICOM service such as Patient Root Query.

8.1.1.1 Encapsulated PDF Information Object Definition

Table 8-1 Encapsulated PDF IOD – Module Overview

IE	Module	References	Usage
Patient			
	Patient	Table 8-1 Module “Patient” of Created SOP Instances	ALWAYS
Study			
	General Study	Table 8-2 Module “General Study” of Created SOP Instances	ALWAYS
Series			
	Encapsulated Document Series	Table 8-4 Module “Encapsulated Document Series” of Created ePDF Instances	ALWAYS
Equipment			
	General Equipment	Table 8-3 Module “General Equipment” of Created SOP Instances	ALWAYS
	Sc Equipment	Table 8-5 Module “SC Equipment” of Created ePDF SOP Instances	ALWAYS
EncapsulatedDocument			
	Encapsulated Document	Table 8-6 Module “Encapsulated Document” of Created ePDF SOP Instances	ALWAYS
	Sop Common	Table 8-7 Module “Sop Common” of Created ePDF SOP Instances	ALWAYS

8.1.1.2 Common Modules

Table 8-1 Module “Patient” of Created SOP Instances

Module "Patient" Processing Hints	
value	**key**
information_object_definition	Common
module_name	Patient
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Patient's Name	(0010,0010)	PN	Patient's full name. Multicomponent group names are supported.	VNAP	USER, MWL, SRQ
Patient ID	(0010,0020)	LO	When a patient record is created locally, the patient ID can be assigned by user or generated automatically.	ALWAYS	USER, MWL, SRQ, AUTO
Issuer of Patient ID	(0010,0021)	LO	Configuration value applies when a patient record is created locally. The value is configurable in General Settings.	ANAP	MWL, SRQ, CONFIG
Patient's Birth Date	(0010,0030)	DA	Birth date of the patient.	ALWAYS	MWL, USER, SRQ
Patient's Sex	(0010,0040)	CS	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL, USER, SRQ
Other Patient IDs	(0010,1000)	LO	Present only when value is available	ANAP	MWL, SRQ

Attribute Name	Tag	VR	Value	PoV	Source
Ethnic Group	(0010,2160)	SH	Present only when the value is available	ANAP	MWL, SRQ
Patient Comments	(0010,4000)	LT	Present only when the value is available	ANAP	MWL, SRQ

Table 8-2 Module “General Study” of Created SOP Instances

Module "General Study" Processing Hints	
value	**key**
information_object_definition	Common
module_name	General Study
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Study Instance UID	(0020,000D)	UI	The software creates the UID in the unscheduled case. Then it uses “1.2.276.0.75.2.2.90.1.1 as DICOM root prefix for generated UIDs.	ALWAYS	AUTO, MWL
Study Date	(0008,0020)	DA	The date the study is created in ATLAS 500.	ALWAYS	AUTO
Study Time	(0008,0030)	TM	The time the study is created in ATLAS 500.	ALWAYS	AUTO
Referring Physician's Name	(0008,0090)	PN	Present only when the value is available from MWL	VNAP	MWL
Study ID	(0020,0010)	SH	In scheduled case: Copied from Requested Procedure ID. For unscheduled case, the value is generated from the study datetime.	ALWAYS	AUTO, MWL
Accession Number	(0008,0050)	SH	For the scheduled case via MWL. For the unscheduled case empty.	VNAP	MWL

Attribute Name	Tag	VR	Value	PoV	Source
Study Description	(0008,1030)	LO	Copied from Requested Procedure Description.	ANAP	MWL
Referenced Study Sequence	(0008,1110)	SQ	Present only when the value is available from MWL	ANAP	MWL
> Referenced SOP Class UID	(0008,1150)	UI	Uniquely identifies the referenced SOP Class.	ALWAYS	MWL
> Referenced SOP Instance UID	(0008,1155)	UI	Uniquely identifies the referenced SOP Instance.	ALWAYS	MWL
Procedure Code Sequence	(0008,1032)	SQ	Present only when the value is available from MWL	ANAP	MWL
> Include 'Code Sequence Macro'.	From MWL	From MWL	Copied from MWL	ALWAYS	MWL

Table 8-3 Module “General Equipment” of Created SOP Instances

Module "General Equipment" Processing Hints	
value	**key**
information_object_definition	Common
module_name	General Equipment
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Manufacturer	(0008,0070)	LO	Always "Carl Zeiss Meditec”	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	Value is configurable in “General Settings”	ANAP	CONFIG
Institution Address	(0008,0081)	ST	Value is configurable in “General Settings”	ANAP	CONFIG
Station Name	(0008,1010)	SH	Value is configurable in “General Settings”	ANAP	CONFIG

Attribute Name	Tag	VR	Value	PoV	Source
Institutional Department Name	(0008,1040)	LO	Value is configurable in “General Settings”	ANAP	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	Set to “ATLAS 500”	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	The serial number of the ATLAS 500 instrument.	ALWAYS	AUTO
Software Version(s)	(0018,1020)	LO	Set to “1.0.x.y”	ALWAYS	AUTO
Date of Last Calibration	(0018,1200)	DA	Date when the ATLAS 500 device was calibrated.	ALWAYS	AUTO
Time of Last Calibration	(0018,1201)	TM	Time when the ATLAS 500 device was calibrated.	ALWAYS	AUTO

8.1.1.3 Module “Encapsulated Document Series” of Created ePDF SOP Instances

Table 8-4 Module “Encapsulated Document Series” of Created ePDF Instances

Encapsulated Pdf IOD, Module "Encapsulated Document Series" Processing Hints	
value	**key**
information_object_definition	Encapsulated Pdf
module_name	Encapsulated Document Series
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Modality	(0008,0060)	CS	Always “OPM”.	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	“1.2.276.0.75.2.2.90.1.2” constant prefix for generated UIDs	ALWAYS	AUTO

Attribute Name	Tag	VR	Value	PoV	Source
Series Number	(0020,0011)	IS	The value is generated from series datetime.	ALWAYS	AUTO
Request Attributes Sequence	(0040,0275)	SQ	Copied from MWL. See section 0 “Attribute Mapping”.	ANAP	MWL
> Requested Procedure ID	(0040,1001)	SH	Copied from MWL. See section 0 “Attribute Mapping”.	ANAP	MWL
> Requested Procedure Description	(0032,1060)	LO	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL
> Requested Procedure Code Sequence	(0032,1064)	SQ	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL
>> Include 'Code Sequence Macro'.	From MWL	From MWL	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ALWAYS	MWL
> Scheduled Procedure Step ID	(0040,0009)	SH	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL
> Scheduled Procedure Step Description	(0040,0007)	LO	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL
>> Include 'Code Sequence Macro'.	From MWL	From MWL	Copied from MWL	ALWAYS	MWL
Performed Procedure Step Start Date	(0040,0244)	DA	Date on which the Performed Procedure Step started.	ALWAYS	AUTO
Performed Procedure Step Start Time	(0040,0245)	TM	Time on which the Performed Procedure Step started.	ALWAYS	AUTO

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Attribute Name	Tag	VR	Value	PoV	Source
Performed Procedure Step Description	(0040,0254)	LO	Copied from MWL. See section 8.1.3 “Attribute Mapping”.	ANAP	MWL

8.1.1.4 Module “SC Equipment” of Created ePDF SOP Instance

Table 8-2 Module “SC Equipment” of Created ePDF SOP Instances

Encapsulated Pdf IOD, Module "Sc Equipment" Processing Hints	
value	**key**
information_object_definition	Encapsulated Pdf
module_name	Sc Equipment
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Conversion Type	(0008,0064)	CS	Set to “SYN”	ALWAYS	AUTO

8.1.1.5 Modules “Ecapsulated Document” of Created ePDF SOP Instances

Table 8-6 Module “Encapsulated Document” of Created ePDF SOP Instances

Encapsulated Pdf IOD, Module "Encapsulated Document" Processing Hints	
value	**key**
information_object_definition	Encapsulated Pdf
module_name	Encapsulated Document
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
Instance Number	(0020,0013)	IS	A number generated from SOP Instance UID	ALWAYS	AUTO
Content Date	(0008,0023)	DA	The date the document content creation was started.	ALWAYS	AUTO
Content Time	(0008,0033)	TM	The time the document content creation was started.	ALWAYS	AUTO
Acquisition Datetime	(0008,002A)	DT	The date and time that the original generation of the data in the document started.	ALWAYS	AUTO
Image Laterality	(0020,0062)	CS	Enumerated Values: R = right L = left U = unpaired B = both left and right	ALWAYS	AUTO
Burned In Annotation	(0028,0301)	CS	Always “YES”	ALWAYS	AUTO
MIME Type of Encapsulated Document	(0042,0012)	LO	Always “application/pdf”.	ALWAYS	AUTO
Encapsulated Document	(0042,0011)	OB	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO

Table 8-3 Module “Sop Common” of Created ePDF SOP Instances

Encapsulated Pdf IOD, Module "Sop Common" Processing Hints	
value	**key**
information_object_definition	Encapsulated Pdf
module_name	Sop Common
module_usage	MANDATORY

Attribute Name	Tag	VR	Value	PoV	Source
SOP Class UID	(0008,0016)	UI	Always “1.2.840.10008.5.1.4.1.1.104.1”	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	“1.2.276.0.75.2.2.90.1.3” constant prefix for generated UIDs	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	Always “ISO_IR 192” for UTF-8 encoded Unicode.	ALWAYS	AUTO
Instance Creation Date	(0008,0012)	DA	Date the SOP Instance was created. Date report was generated.	ALWAYS	AUTO
Instance Creation Time	(0008,0013)	TM	Time the SOP Instance was created. Time report was generated.	ALWAYS	AUTO

8.1.2 Usage of Attributes from Received IOD's

Each Application that depends on certain fields to function correctly should specify which ones are required for it to perform its intended function.

The ATLAS 500 Application Software provides standard conformance.

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.2 Activity – Query Modality Worklist.

8.1.3 The case of patient data collision is outlined in chapter of Study Root Query/Retrieve SOP Class.Attribute Mapping

In scheduled case, the following attributes are mapped from Modality Worklist to instances of Encapsulated Pdf IOD.

Table 8-8 Attribute Mapping

Modality Worklist		Instance IOD		Editable
(0010,0010)	Patient's Name	(0010,0010)	Patient's Name	No
(0010,0020)	Patient ID	(0010,0020)	Patient ID	No
(0010,0021)	Issuer of Patient ID	(0010,0021)	Issuer of Patient ID	No
(0010,1000)	Other Patient IDs	(0010,1000)	Other Patient IDs	No
(0010,0030)	Patient's Birth Date	(0010,0030)	Patient's Birth Date	No
(0010,0040)	Patient's Sex	(0010,0040)	Patient's Sex	No
(0010,2160)	Ethnic Group	(0010,2160)	Ethnic Group	No
(0010,4000)	Patient Comments	(0010,4000)	Patient Comments	No
(0008,0020)	Study Date[1]	(0008,0020)	Study Date	No
(0008,0030)	Study Time[1]	(0008,0030)	Study Time	No
(0008,0050)	Accession Number	(0008,0050)	Accession Number	No
(0008,0090)	Referring Physicians Name	(0008,0090)	Referring Physicians Name	No
(0040,1001)	Requested Procedure ID	(0020,0010)	Study ID	No
		(0040,0275)> (0040,1001)	Request Attributes Sequence > Requested Procedure ID	No
(0032,1032)	Requesting Physician	(0008,1048)	Physician(s) of Record	No
(0032,1060)	Requested Procedure Description	(0008,1030)	Study Description	No
		(0040,0275)> (0032,1060)	Request Attributes Sequence > Requested Procedure Description	No
		(0018,1030)	Protocol Name	No

Modality Worklist		Instance IOD		Editable
		(0040,0254)	Performed Procedure Step Description	No
(0032,1064)	Requested Procedure Code Sequence	(0008,1032)	Procedure Code Sequence	No
>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
(0020,000D)	Study Instance UID	(0020,000D)	Study Instance UID	No
(0008,1110)	Referenced Study Sequence	(0008,1110)	Referenced Study Sequence	No
>(0008,1150)	Referenced Sop Class UID	>(0008,1150)	Referenced Sop Class UID	No
>(0008,1155)	Referenced Sop Instance UID	>(0008,1155)	Referenced Sop Instance UID	No
(0040,0100)	Scheduled Procedure Step Sequence	N/A	N/A	No
>(0040,0007)	Scheduled Procedure Step Description	(0040,0275)> (0040,0007)	Request Attributes Sequence > Scheduled Procedure Step Description	No
>(0040,0008)	Scheduled Protocol Code Sequence	(0040,0275)> (0040,0008)	Request Attributes Sequence > Scheduled Protocol Code Sequence	No
>>(0008,0100)	Code Value	>(0008,0100)	Code Value	No
>>(0008,0102)	Coding Scheme Designator	>(0008,0102)	Coding Scheme Designator	No
>>(0008,0103)	Coding Scheme Version	>(0008,0103)	Coding Scheme Version	No
>>(0008,0104)	Code Meaning	>(0008,0104)	Code Meaning	No
>(0040,0009)	Scheduled Procedure Step ID	(0040,0275)> (0040,0009)	Request Attributes Sequence > Scheduled Procedure Step ID	No

8.1.4 Coerced/Modified Fields

Those tags are listed in chapter 4.2.1.3.2 Activity – Query Modality Worklist. Other attributes get lost and are not available in the ATLAS 500 Application Software.

8.2 Data Dictionary of Private Attributes

Table 8-9 Private Dictionary Group (2201,00xx) = "99CZM_NIM_INTERNAL_01"

Occurs in: Encapsulated PDF SOP Instance

Tag	Attribute Name	VR	VM
(2201,00xx)	Private Creator	LO	1
(2201,xx00)	Iod_name_meta_info	LT	1
(2201,xx01)	Czm_xml_version	LT	1
(2201,xx02)	private_module_names_and_versions	LT	1

8.3 Coded Terminology and Templates

In the scheduled case, ATLAS 500 uses codes that are available via the MWL provider. The Requested Procedure Code sequence (0032,1064) and Scheduled Protocol Code Sequence (0040,0008) will be transmitted from MWL C-FIND response to instances of ePDF.

8.3.1 Context Groups

N/A

8.3.2 Template Specifications

N/A

8.3.3 Private Code Definitions

N/A

8.4 Greyscale Image Consistency

Not applicable.

8.5 Standard Extended / Specialized/ Private SOP Classes

No extension is used.

8.6 Private Transfer Syntaxes

No Private Transfer Syntax is supported.

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