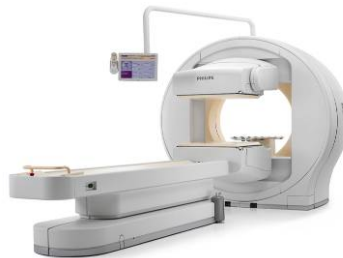

DICOM

Conformance Statement

JETStream Acquisition



This DICOM Conformance Statement is generated for the JETStream Acquisition Software. This implementation will be released on all new Philips Nuclear Medicine JETStream based Gamma Cameras.

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1. DICOM CONFORMANCE STATEMENT OVERVIEW

The Overview consists of an overview of the Network Services used by the JETStream Acquisition System. JETStream acquisition systems build a transparent network environment with other DICOM-compatible imaging and administrative medical devices (i.e.: PACS) through an implementation of some of the following DICOM service classes (see NEMA Standard Publication PS 3.4) and DICOM message exchange commands (see NEMA Standard Publication PS 3.7). JETStream acquisition system is able to fetch worklists and store acquired images onto a workstation.

The JETStream acquisition system provides the following DICOM features:

- Verification of application level communication.
- Basic Worklist Management (BWLM).
- Storage of images on a remote DICOM system.
- Study Management per Modality Performed Procedure Step (MPPS).

MPPS Service class is not supported for Forte JS and SkyLight Systems.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
Transfer			
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Workflow Management			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

Note: Verification SCU (C-ECHO) is not included in the table since it is provided as a debug utility. The Verification SCU details are covered in the details of the conformance statement.

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3. INTRODUCTION

3.1. Revision History

Table 2: Revision History

Document Version	Date of Issue	Author	Description
0.0	28 July 2005	PMS MIT-IO	Draft version of the DICOM Conformance Statement for JetStream Acquisition System Release 6 DRAFT.
0.1	26 Sep 2005	Sacheen Kamath	Filled in missing information.
0.2	11 Aug 2006	Charles Carman	Updated with MPPS-specific information
0.3	23 Oct 2006	Charles Carman	Updated with reviewers comments and product specific information
0.4	9 th April 2007	Richa Oberoi	Updated Section 8.1.1: Created SOP Instances - refer to Note 1 in the section
0.5	25 th April 2007	Richa Oberoi	Updated Section 8.1.1: Created SOP Instances - refer to Note 2 in the section
0.6	1 st June 2007	Richa Oberoi	Updated Section 8.1.1: Created SOP Instances - refer to Note 3 in the section
0.7	11 th June 2007	Richa Oberoi	Updated Section 8.1.1: Created SOP Instances - refer to Note 4 in the section, Section 8.3.1. Section 8.5.
1.0	29 th June 2007	Richa Oberoi	Incorporated review comments.
Rev A	10 th Aug 2007	Richa Oberoi	Updated part Number.

3.2. Audience

This Conformance Statement is intended for:

- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of [DICOM] PS 3.2.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**
Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by

this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.

It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see [DICOM] PS 3.3 and PS 3.4.

The word Philips in this document refers to Philips Medical Systems.

The word Atlantis AE refers to JETStream Acquisition AE.

The following acronyms and abbreviations are used in this document.

ACC	American College of Cardiology
ACR	American College of Radiology
AE	Application Entity
ANSI	American National Standard Institute
AP	Application Profile
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DIMSE-Composite
DIMSE-N	DIMSE-Normalized
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
GUI	Graphic User Interface
HIS	Hospital Information System
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition

ISIS	Information System – Imaging System
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real-World Activity
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
WLM	Worklist Management

3.5. References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18 (NEMA PS 3.1 – PS 3.18),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Virginia. 22209, United States of America

4. NETWORKING

This section contains the networking related services

4.1. Implementation model

The JETStream Acquisition System is the software controlling a Nuclear Medicine Gamma Camera, an image generation system. It used to fetch worklists, update procedure status, and store acquired images onto a workstation. The software consists of the following features.

Table 3: JETStream Acquisition System Features

Features
DICOM Verification
DICOM Image Export function to transfer images and image related data from the camera to a remote system.
DICOM Storage Commitment to verify that transferred images were accepted by the remote system.
DICOM Worklist Query to get scheduled procedure information
DICOM MPPS to update performed procedure status

4.1.1. Application Data Flow

The JETStream Acquisition System consists of one single application entity, the JETStream Acquisition System AE. The following diagram shows the JETStream Acquisition System AE and its networking interaction using real-world activities.

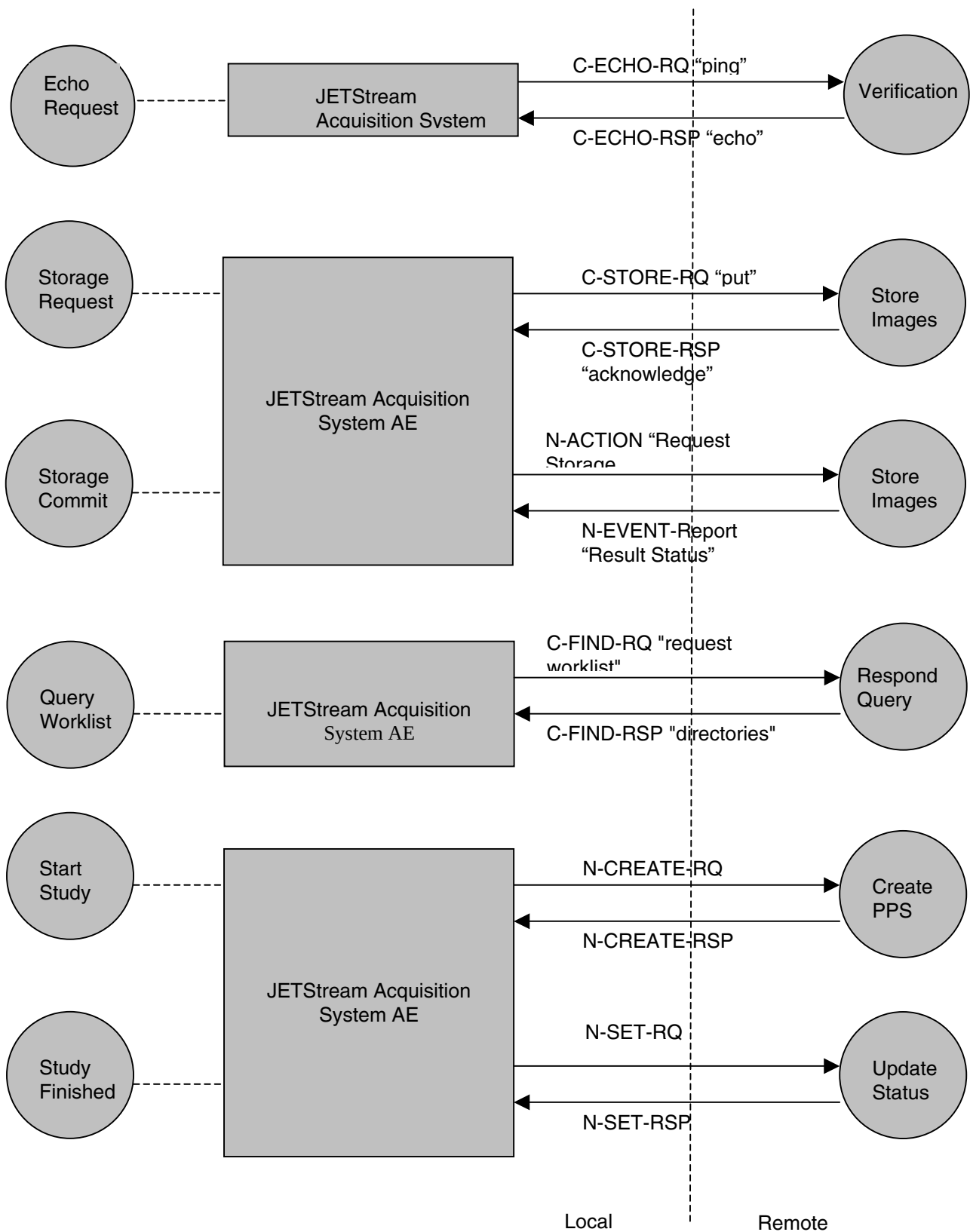


Figure 1: Application Data Flow Diagram

The JETStream Acquisition System AE offers the following functionality:

- Verifying network connection
- Sending worklist query
- Exporting acquired NM images, with or without commit
- Exporting secondary captured images, with or without commit
- Sending MPPS status

4.1.2. Functional Definition of AE's

4.1.2.1. Functional Definition of JETStream Acquisition System AE

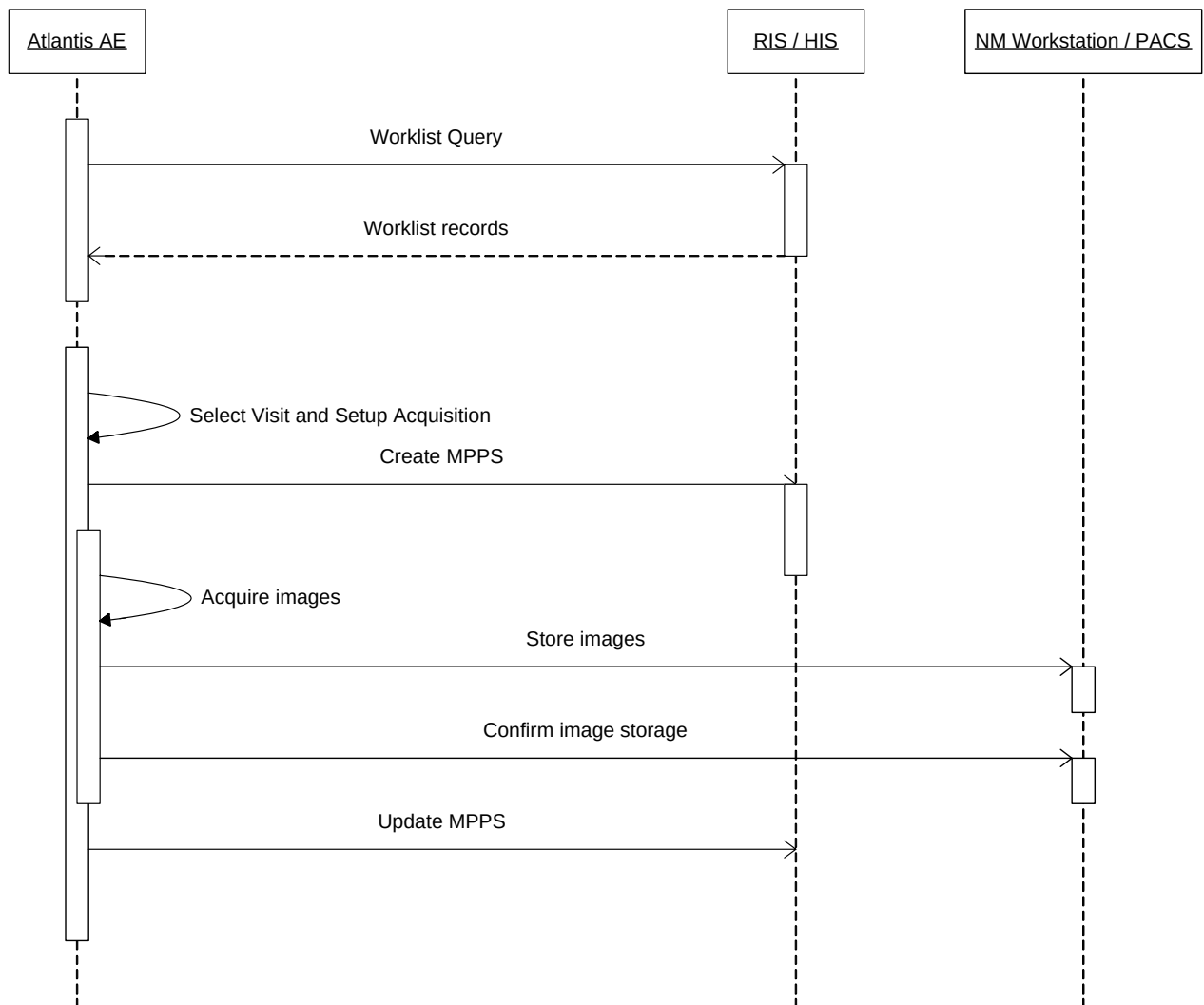
The JETStream Acquisition System AE can initiate an association with an SCP to verify application level communication. After receiving the verification response the JETStream Acquisition System AE will release the association. A utility program called mc3echo performs C-ECHO to check if a remote DICOM peer is responding. The DICOM server responds to a remote C-ECHO-RQ with a C-ECHO-RSP.

The JETStream Acquisition System AE can initiate an association with a WLM SCP – such as a RIS – and use the association to query for the applicable worklist. After receiving the worklist update the JETStream Acquisition System AE will release the association.

The JETStream Acquisition System AE can initiate an association with a Storage SCP to export the acquired NM and SC images. After all acquired images have been exported the JETStream Acquisition System AE will release the association. Then for each image the JETStream Acquisition System AE will initiate a new association with the Storage Commitment SCP to request storage commitment. After receiving the event report the JETStream Acquisition System AE will release the association.

The JETStream Acquisition System AE can initiate an association with a MPPS SCP – such as a RIS – and use the association to send an N-CREATE or an N-SET message. After receiving the N-CREATE-RSP or N-SET-RSP the JETStream Acquisition System AE will release the association.

4.1.3. Sequencing of Real World Activities

**Figure 2: Sequencing of image acquisition**

When a RIS interface is configured, the WorkList data can be requested from the RIS and MPPS status can be sent to the RIS.

After acquisition, the images can be sent to a configured DICOM station using the Storage and Storage Commit (supporting DICOM stations only) commands.

Verification (C-ECHO) requests can be sent to the RIS or a configured DICOM station in order to verify the connection.

4.2. AE Specifications

4.2.1. JETStream Acquisition System AE

4.2.1.1. SOP Classes

The JETStream Acquisition System AE provides standard conformance to the following SOP Classes.

Table 4: SOP Classes for JETStream Acquisition System AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

4.2.1.2. Association Policies

4.2.1.2.1. General

This implementation generally establishes one association (connection) per SOP interaction, such as Ping("Echo"), Store ("put"), Find (query for Worklist information), Create (for MPPS in-progress), and Set (for MPPS completion). The association closes at the completion of each interaction. The association aborts if the SOP class is not supported.

Some interactions, such as C-STORE, require a series of packet exchanges. The following are the general rules for transfer:

- The association (connection) remains open until all data is transferred.
- The maximum PDU (Protocol Data Unit) size is site configurable. The default maximum is 28672 8-bit bytes.

Table 5: DICOM Application Context

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

4.2.1.2.2. Number of Associations

For each of the functional descriptions in section 4.1.2 the JETStream Acquisition System AE can initiate 1 simultaneous association.

Table 6: Number of Associations as an Association Initiator for JETStream Acquisition System AE

Maximum number of simultaneous associations	1
---	---

It is possible for multiple SCU role client applications or multiple instances of the same application to be running at the same time, with each having an association.

The JETStream Acquisition System AE does not accept any associations.

4.2.1.2.3. Asynchronous Nature

The JETStream Acquisition System AE does not support asynchronous transactions. It does not perform asynchronous operations window negotiation.

4.2.1.2.4. Implementation Identifying Information

The JETStream Acquisition System AE supplies the following Implementation Class UID and Version Name.

Table 7: DICOM Implementation Class and Version for the JETStream Acquisition System AE

Implementation Class UID	1.3.46.670589.28.1.1
Implementation Version Name	Atlantis600R01

The implementation version contains the release tag of the JETStream acquisition software. The implementation version value changes for each release of the JETStream acquisition software. 2.

Philips uses UID's with an ANSI-registered <org root> numeric root.

4.2.1.2.5. Communication Failure Handling

When a communication failure occurs, a warning message is shown in a pop-up window and the failure details are logged in log files. The log files can be found in the /tmp and /export/home/atlas/data/Logfiles directories.

4.2.1.3. Association Initiation Policy

This describes the conditions under which the JETStream Acquisition System AE will initiate an association.

- All of the SCU role applications attempt to initiate an association for each interaction. These include "verification", "put", and "find", "create", and "set". The default port number, DICOM registered TCP port 104, is used unless otherwise configured.

The behavior of the AE during association rejection is summarized in Table 8.

Table 8: DICOM Association Rejection Handling

Result	Source	Reason/Diagnosis	Behavior
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	No information is logged or provided to the user. Abort will be issued.
		2 – application-context-name-not-supported	No information is logged or provided to the user. Abort will be issued.
		3 – calling-AE-title-not-recognized	No information is logged or provided to the user. Abort will be issued.
		7 – called-AE-title-not-recognized	No information is logged or provided to the user. Abort will be issued.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	No information is logged or provided to the user. Abort will be issued.
		2 – protocol-version-not-supported	No information is logged or provided to the user. Abort will be issued.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	No information is logged or provided to the user. Abort will be issued.
		2 – local-limit-exceeded	No information is logged or provided to the user. Abort will be issued.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	No information is logged or provided to the user. Abort will be issued.
		2 – application-context-name-not-supported	No information is logged or provided to the user. Abort will be issued.
		3 – calling-AE-title-not-recognized	No information is logged or provided to the user. Abort will be issued.
		7 – called-AE-title-not-recognized	No information is logged or provided to the user. Abort will be issued.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	No information is logged or provided to the user. Abort will be issued.
		2 – protocol-version-not-supported	No information is logged or provided to the user. Abort will be issued.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	No information is logged or provided to the user. Abort will be issued.
		2 – local-limit-exceeded	No information is logged or provided to the user. Abort will be issued.

The behavior of the JETStream Acquisition System AE on receiving an association abort is summarized in Table 9.

Table 9: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	No information is logged or provided to the user
2 – DICOM UL service-provider	0 – reason-not-specified	No information is logged or provided to the user
	1 – unrecognized-PDU	No information is logged or provided to the user
	2 – unexpected-PDU	No information is logged or provided to the user
	4 – unrecognized-PDU parameter	No information is logged or provided to the user
	5 – unexpected-PDU parameter	No information is logged or provided to the user
	6 – invalid-PDU-parameter value	No information is logged or provided to the user

In Table 10 the situations are listed in which the JETStream Acquisition System AE initiates an abort request.

Table 10: DICOM Association Abort Policies

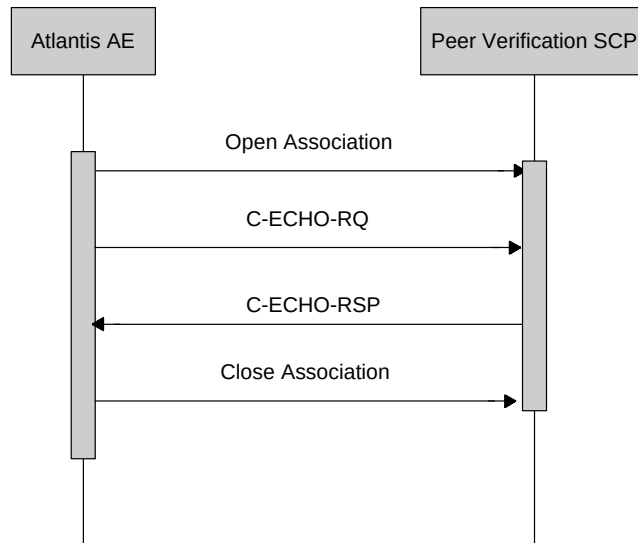
Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	In case of any command failure.
2 – DICOM UL service-provider	0 – reason-not-specified	Never issued.
	1 – unrecognized-PDU	Never issued.
	2 – unexpected-PDU	Never issued.
	4 – unrecognized-PDU parameter	Never issued.
	5 – unexpected-PDU parameter	Never issued.
	6 – invalid-PDU-parameter value	Never issued.

When a DICOM communication failure occurs, a warning message is shown in a pop-up window and the failure details are logged in log files. The log files can be found in the /tmp and /export/home/atlas/data/Logfiles directories.

4.2.1.3.1. Association Real-World Activity – Modality

4.2.1.3.1.1. Description and Sequencing of Activities

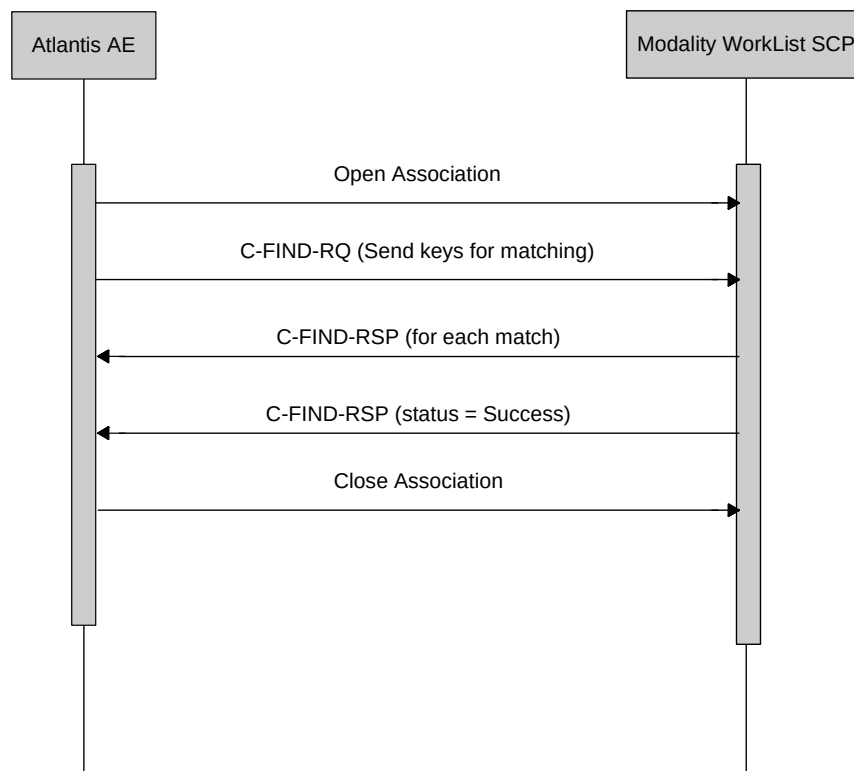
Only a service user can initiate the Verification activity, running the mc3echo program in a command window with parameters specifying the SCU and SCP networking values. The standard sequence of messages is attempted, as shown in Figure 3: Sequencing of Verification. Errors are displayed in the command window, and logged in files in the /tmp and /export/home/atlas/data/Logfiles directories.

**Figure 3: Sequencing of Verification**

Modality Worklist queries can be initiated in one of two ways:

- 1) automatically, at regularly scheduled intervals, and
- 2) manually, from the Acquisition Client user interface.

In either case, the query parameters are composed into a DICOM message, and the standard sequence of messages is attempted, as shown in Figure 4: Sequencing of Modality Worklist. At the end of the interaction, an informational message may be displayed to the user informing them that new worklist information has been retrieved.

**Figure 4: Sequencing of Modality Worklist**

A Modality Performed Procedure Step is Created as part of starting the acquisition of a new visit / study, new on that camera. The Atlantis AE does NOT check whether a PPS was already created for a particular visit / study by another camera. The specific sequencing of messages is shown in Figure 5: Sequencing of MPPS Create.

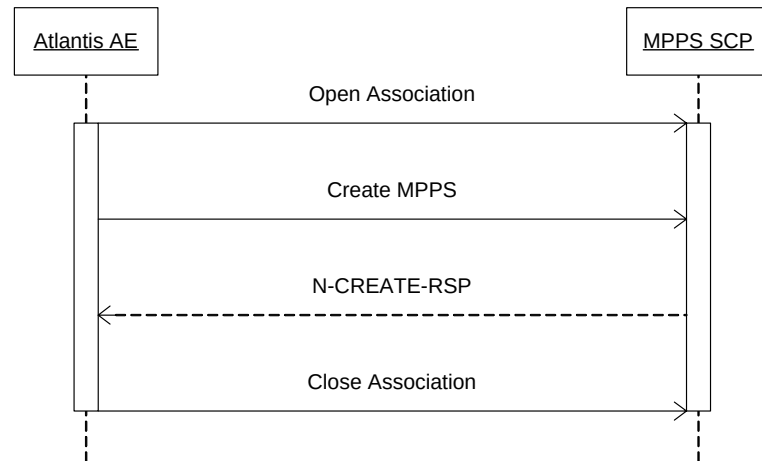


Figure 5: Sequencing of MPPS Create

A Modality Performed Procedure Step is Updated at the conclusion of acquisition for a visit / study. If all steps / series were acquired successfully, and no more steps are left in the schedule, then a Completed update is sent to the RIS. If not all steps / series were completed successfully, or the visit / study is Dismissed from the acquisition client before all steps / series have been acquired, then the acquisition client asks the user whether the MPPS status should be updated, and if so whether as Discontinued, or Completed, and then the appropriate messages are sent, as shown in Figure 6: Sequencing of MPPS Set.

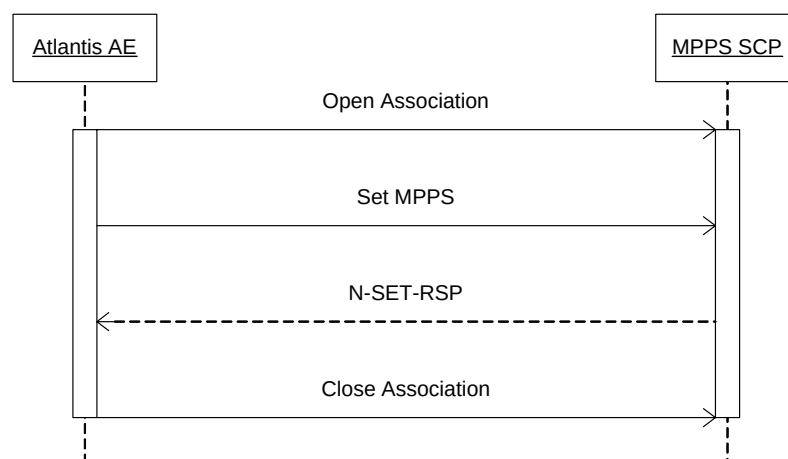


Figure 6: Sequencing of MPPS Set

At the completion of a successful acquisition, the system automatically stores ALL acquired images to the single configured storage target. Following successful image storage, and if configured, the system will use Storage Commitment to verify that the images were imported into the target system. The specific sequence of associations and messages is shown in Figure 7: Sequencing of Image Storage and Storage Commitment.

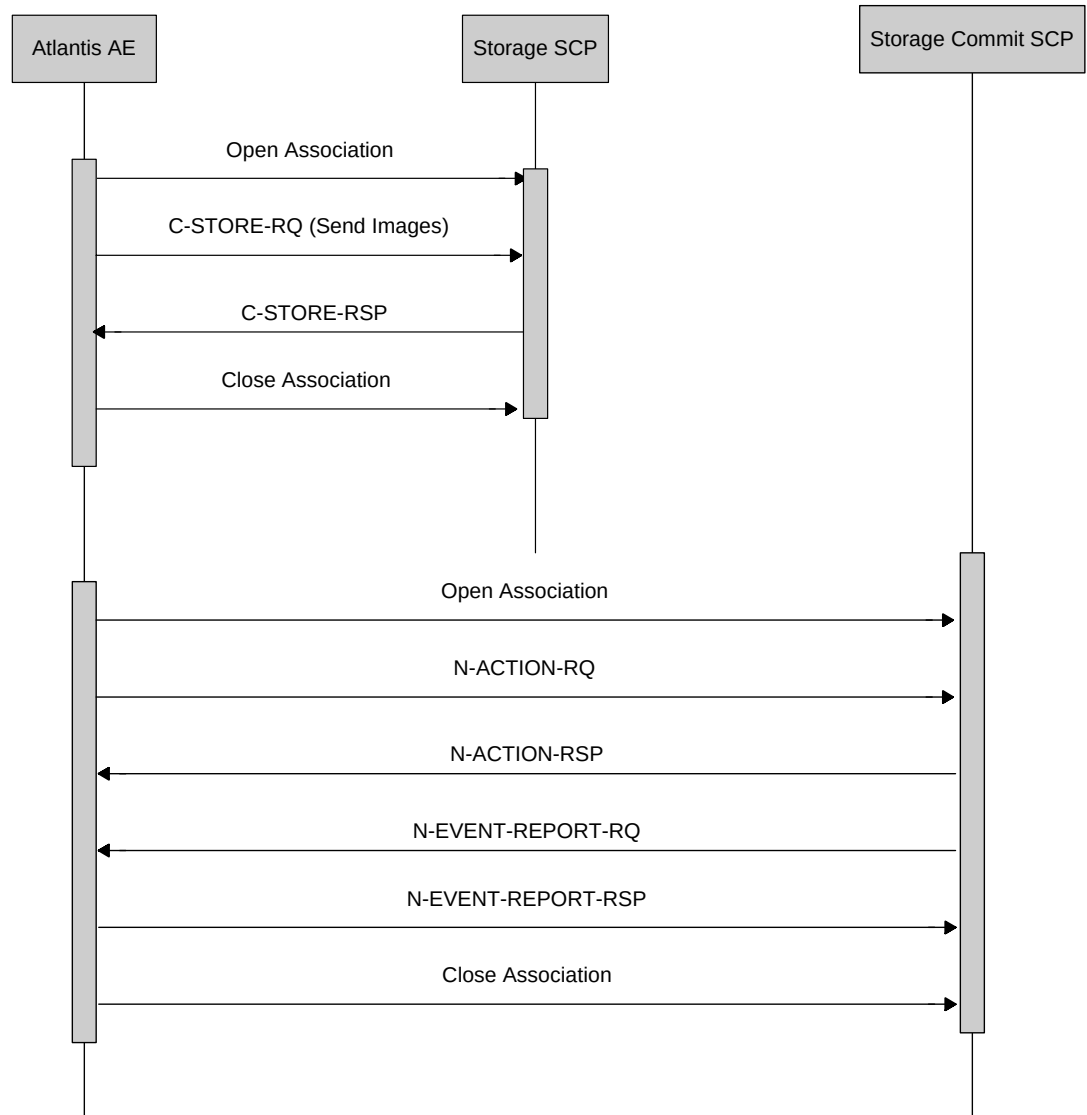


Figure 7: Sequencing of Image Storage and Storage Commitment

4.2.1.3.1.2. Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of presentation contexts to be used on that association. In this subsection, the presentation contexts proposed by JETStream Acquisition System AE for Association Real-World Activity - are defined in Table 11.

Table 11: Proposed Presentation Contexts for

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	EBE ELE ILE	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

Any response to any other presentation context will be ignored.

4.2.1.3.1.3. SOP Specific Conformance for SOP Classes

4.2.1.3.1.3.1. Verification

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 12.

Table 12: DICOM C-ECHO Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Verification is successful	The SCP has successfully returned a verification response.
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	An error message is shown.

4.2.1.3.1.3.2. Modality Worklist

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 13.

Table 13: DICOM C-FIND Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Matching is complete	The returned worklist information is displayed.

Service Status	Code	Further Meaning	Behavior
Failure	A700	Refused – Out of resources	Error message shown in a pop-up window and the failure details are logged in log files.
	A900	Failed – Identifier does not match SOP class	Error message shown in a pop-up window and the failure details are logged in log files.
	Cxxx	Failed – Unable to process	Error message shown in a pop-up window and the failure details are logged in log files.
Cancel	FE00	Matching terminated due to Cancel	
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys are supported in the same manner as required keys	
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence for this identifier	
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

Table 14 lists in detail the applied attributes in the C-FIND Service Elements of this supported SOP class.

Table 14 should be read as follows:

Attribute name : Attributes supported to build a Modality Worklist Request Identifier.
 Tag : DICOM tag for this attribute.
 VR : DICOM VR for this attribute.
 M : Matching Keys for (automatic) Worklist Update.

An “S” will indicate an attribute value for Single Value Matching,

an “R” will indicate an attribute value for Range Matching,

an “W” will denote Wildcard Matching (* and ?) and

an “U” will indicate an attribute for Universal Matching

R : Return Keys. An “x” will indicate that this attribute as Return Key with zero length for Universal Matching.

Q : Interactive Query Key. An “x” will indicate that this attribute as matching key can be used.

- D : Displayed Keys. An “x” indicates that this Worklist attribute is displayed to the user during a patient registration dialog.
- IOD : An “x” indicates that this Worklist attribute is included into all object Instances.

Table 14: DICOM Worklist C-FIND Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD
Scheduled Procedure Step Sequence	0040,0100	SQ		X			X
>Scheduled Station AE Title	0040,0001	AE	S		X		
>Scheduled Station Name	0040,0010	SH		X			
>Scheduled Procedure Step Start Date	0040,0002	DA	S, R, W, U	X	X	X	
>Scheduled Procedure Step Start Time	0040,0003	TM	U	X			
>Scheduled Performing Physician's Name	0040,0006	PN	S, W, U	X	X		
>Scheduled Procedure Step Description	0040,0007	LO		X			X
>Scheduled Protocol Code Sequence	0040,0008	SQ		X			X
>>Code Value	0008,0100	SH					X
>>Coding Scheme Designator	0008,0102	SH					X
>>Code Meaning	0008,0104	LO		X			X
>Scheduled Procedure Step ID	0040,0009	SH		X			X
>Modality	0008,0060	CS	S		X		
Requested Procedure ID	0040,1001	SH		X			X
Requested Procedure Description	0032,1060	LO		X			X
Requested Procedure Code Sequence	0032,1064	SQ		X			X
>Code Value	0008,0100	SH					X
>Coding Scheme Designator	0008,0102	SH					X
>Code Meaning	0008,0104	LO		X			X
Study Instance UID	0020,000D	UI		X			X
Accession Number	0008,0050	SH	S, W, U	X	X	X	X
Requesting Physician	0032,1032	PN	S, W, U	X	X	X	X
Referring Physician's Name	0008,0090	PN	S, W, U	X	X	X	X
Patient's Name	0010,0010	PN	S, W, U	X	X	X	X
Patient ID	0010,0020	LO	S, W, U	X	X	X	X
Patient's Birth Date	0010,0030	DA		X			X
Patient's Size	0010,1020	DS		X			X

Attribute Name	Tag	VR	M	R	Q	D	IOD
Patient's Weight	0010,1030	DS		X			X
Patient's Sex	0010,0040	CS		X			X
Patient State	0038,0500	LO		X			X
Pregnancy Status	0010,21C0	US		X			X
Medical Alerts	0010,2000	LO		X			X
Contrast Allergies	0010,2110	LO		X			X
Special Needs	0038,0050	LO		X			X
Other Patient Ids	0010,1000	LO		X			X
Names of Intended Recipients of Results	0040,1010	PN		X			X
Imaging Service Request Comments	0040,2400	LT		X			X
Requested Procedure Comments	0040,1400	LT		X			X
Reason for the Imaging Service Request	0040,2001	LO		X			X
Reason for the Requested Procedure	0040,1002	LO		X			X

When the user selects a worklist entry and presses the PROCEED button the following restrictions apply:

- Leading and trailing spaces are stripped from most(?) string values.
- For code sequences, the Coding Scheme Version is not preserved by the system

4.2.1.3.1.3.3. Storage and Storage Commitment

For the Storage Commitment functionality, Asynchronous Storage Commitment is not supported. The JETStream Acquisition System AE can only receive the N-EVENT-REPORT within the outstanding association.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 15 to Table 17.

Table 15: DICOM C-STORE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Storage was successful	No UI feedback, or logging.
Failure	A7xx	Refused – Out of resources	No UI feedback, or logging.
	A9xx	Error – Dataset does not match SOP class	No UI feedback, or logging.
	Cxxx	Error – Cannot understand	No UI feedback, or logging.
Warning	B000	Coercion of data elements	No UI feedback, or logging.
	B006	Elements discarded	No UI feedback, or logging.
	B007	Dataset does not match SOP class	No UI feedback, or logging.

Service Status	Code	Further Meaning	Behavior
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

Table 16: DICOM N-ACTION Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful notification	No UI feedback, or logging.
Failure	0119	Class instance conflict	No UI feedback, or logging.
	0210	Duplicate invocation	No UI feedback, or logging.
	0115	Invalid argument value	No UI feedback, or logging.
	0111	Invalid SOP Instance	No UI feedback, or logging.
	0212	Mistyped argument	No UI feedback, or logging.
	0113	No such action	No UI feedback, or logging.
	0114	No such argument	No UI feedback, or logging.
	0118	No such SOP class	No UI feedback, or logging.
	0112	No such SOP Instance	No UI feedback, or logging.
	0110	Processing failure	No UI feedback, or logging.
Communication failures	0213	Resource limitation	No UI feedback, or logging.
	0211	Unrecognized operation	No UI feedback, or logging.
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

Table 17: DICOM N-EVENT-REPORT Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful notification	No UI feedback, or logging.
Failure	0119	Class instance conflict	No UI feedback, or logging.
	0210	Duplicate invocation	No UI feedback, or logging.
	0115	Invalid argument value	No UI feedback, or logging.
	0111	Invalid SOP Instance	No UI feedback, or logging.
	0212	Mistyped argument	No UI feedback, or logging.
	0114	No such argument	No UI feedback, or logging.
	0113	No such event type	No UI feedback, or logging.
	0118	No such SOP class	No UI feedback, or logging.
	0112	No such SOP Instance	No UI feedback, or logging.
	0110	Processing failure	No UI feedback, or logging.

Service Status	Code	Further Meaning	Behavior
Communication failures	0213	Resource limitation	No UI feedback, or logging.
	0211	Unrecognized operation	No UI feedback, or logging.
		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

4.2.1.3.1.3.4. Modality Performed Procedure Step Create and Set

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 18 and Table 19.

Table 18: DICOM N-CREATE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful notification	No UI feedback, or logging.
Failure	0119	Class instance conflict	No UI feedback, or logging.
	0210	Duplicate invocation	No UI feedback, or logging.
	0115	Invalid argument value	No UI feedback, or logging.
	0111	Invalid SOP Instance	No UI feedback, or logging.
	0212	Mistyped argument	No UI feedback, or logging.
	0114	No such argument	No UI feedback, or logging.
	0113	No such event type	No UI feedback, or logging.
	0118	No such SOP class	No UI feedback, or logging.
	0112	No such SOP Instance	No UI feedback, or logging.
	0110	Processing failure	No UI feedback, or logging.
	0213	Resource limitation	No UI feedback, or logging.
	0211	Unrecognized operation	No UI feedback, or logging.
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

Table 19: DICOM N-SET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful notification	No UI feedback, or logging.
Failure	0119	Class instance conflict	No UI feedback, or logging.
	0210	Duplicate invocation	No UI feedback, or logging.
	0115	Invalid argument value	No UI feedback, or logging.
	0111	Invalid SOP Instance	No UI feedback, or logging.
	0212	Mistyped argument	No UI feedback, or logging.

Service Status	Code	Further Meaning	Behavior
	0114	No such argument	No UI feedback, or logging.
	0113	No such event type	No UI feedback, or logging.
	0118	No such SOP class	No UI feedback, or logging.
	0112	No such SOP Instance	No UI feedback, or logging.
	0110	Processing failure	No UI feedback, or logging.
	0213	Resource limitation	No UI feedback, or logging.
	0211	Unrecognized operation	No UI feedback, or logging.
Communication failures		The JETStream Acquisition System AE could not communicate with the peer DICOM station	Error message shown in a pop-up window and the failure details are logged in log files.

4.2.1.4. Association Acceptance Policy

The JETStream Acquisition System AE does not accept any association.

4.3. Network Interfaces

4.3.1. Physical Network Interface

The JETStream Acquisition System provides DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM 3.0 Standard. No OSI stack communications are provided with this implementation.

The DICOM implementation is indifferent to the physical network media. The only requirement, which is completely transparent to you, is that it operates on top of the TCP/IP stack.

The default connection port is the Ethernet.

You can use other common network media like the following: Token Ring, FDDI, ATM, ISDN, and dedicated T1, T3, and other types of digital or digital/audio lines. These are transparently supported by DICOM but can require additional hardware/software and expertise.

4.3.2. Additional Protocols

None.

4.4. Configuration

Configuration can be done by launching the updateSystem script that is present in the /export/home/atlas/etc directory.

Configuration files can be found in the following locations:

```
/export/home/atlas/DicomJetConnect/mc3java/config
/export/home/atlas/DicomJetConnect/mc3c/mc3apps
/export/home/atlas/data/Facility.ADAC01/systems/systems.xml
/export/home/atlas/data/Facility.ADAC01/worklist
```

4.4.1. AE Title/Presentation Address Mapping

4.4.1.1. Local AE Titles

The local AE title mapping and configuration shall be specified. The following table shall be used:

Table 20: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
JETStream Acquisition System AE	No default	104

4.4.1.2. Remote AE Title/Presentation Address Mapping

Configuration of remote host names and port numbers shall be specified here.

4.4.1.2.1. RIS

The JETStream Acquisition System AE system has been tested with the following RISs:

- VA VISTA RIS
- MITRA RIS

The DICOM configuration requires the following information from the local system (camera):

Local System The local AE Title. (JETStream Acquisition System AE)
Calling AE Title

The DICOM configuration requires the following information from the remote RIS:

HostName The hostname of the RIS system.
HostIP The IP address of the RIS system.
AE Title The AE Title of the RIS system.
Port The remote DICOM store service Port.
Name The name of Remote DICOM service.

4.4.1.2.2. Odyssey

Only DICOM store to an Odyssey system is allowed.

The DICOM configuration requires the following information from the local system (camera).

Local System The local AE Title. (JETStream Acquisition System AE)
Calling AE Title

The DICOM configuration requires the following information from the remote Odyssey for DICOM store:

HostName The hostname of the JETStream Workspace.
HostIP The IP address of the JETStream Workspace.
AE Title The AE Title of the JETStream Workspace.

Port	The remote DICOM store service Port.
Name	The name of Remote DICOM service.
Local System Calling AE Title	The local AE Title. (JETStream Acquisition System AE)

Refer to the document “BrightView SPECT System Installation and Configuration Guide 9202-5029A” for information on configuring the JETStream Acquisition System.

4.4.1.2.3. JETStream Workspace

Only DICOM store and Storage commit to the JETStream Workspace are allowed.

The DICOM configuration requires the following information from the local system (camera).

Local System Calling AE Title	The local AE Title. (JETStream Acquisition System AE)
----------------------------------	---

The DICOM configuration requires the following information from the remote JETStream Workspace for DICOM store:

HostName	The hostname of the JETStream Workspace.
HostIP	The IP address of the JETStream Workspace.
AE Title	The AE Title of the JETStream Workspace.
Port	The remote DICOM store service Port.
Name	The name of Remote DICOM service.

For Storage Commit to the JETStream Workspace, the following DICOM configuration is required in addition to the ones mentioned above

Storage Commit timeout	A value between 1 and 60 minutes should be entered. The default is set to 10 minutes.
---------------------------	--

Refer to the Installation and Configuration Guide for information on configuring the JETStream Acquisition System.

4.4.2. Parameters

The specification of important operational parameters, their default value and range (if configurable) are specified here. The following table shall be used.

Table 21: Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters		
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes	30s
General DIMSE level time-out values	No	
Time-out waiting for reply to associate request	Yes	15s

Parameter	Configurable	Default Value
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	Yes	15s
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	Yes	15s
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	Yes	15s
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	
AE Specific Parameters		
Size constraint in maximum object size	No	
Maximum PDU size the AE can receive	Yes	28672
Maximum PDU size the AE can send	Yes	28672
AE specific DIMSE level time-out values	No	60 seconds
Number of simultaneous Associations by Service and/or SOP Class	No	5
<SOP Class support (e.g. Multi-frame vs. single frame vs. SC support), when configurable>	No	
<Transfer Syntax support, e.g. JPEG, Explicit VR, when configurable>	No	
Implementation Class UID	No	1.3.46.670589.28.1.1
Implementation Version	No	Atlantis600R01

5. MEDIA INTERCHANGE

JETStream Acquisition System does not support any media.

6. SUPPORT OF CHARACTER SETS

The following character sets are supported.

Table 22: Supported DICOM Character Sets of JETStream Acquisition System

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Single-byte Character Sets without Code Extensions					
Default repertoire	-	-	ISO-IR 6	G0	ISO 646
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

There is no provision to configure character sets.

The behavior when an unsupported character set is received is untested and hence unknown.

For display purposes the characters are converted to Unicode.

7. SECURITY

JETStream Acquisition System does not support any security.

8. ANNEXES

8.1. IOD Contents

8.1.1. Created SOP Instances

This section specifies each IOD created (including private IOD's).

The following abbreviations are used for the IOD tables:

ALWAYS the module is always present
 CONDITIONAL the module is used under specified condition

The following abbreviations are used for the module tables:

ALWAYS the attribute is always present with a value
 EMPTY the attribute is always present without any value (attribute sent zero length)
 VNAP the attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present)
 ANAP the attribute is present under specified condition – if present then it will always have a value
 ANAPCV the attribute is present under specified condition – if present then its Value is Not Always Present (attribute sent zero length if condition applies and no value is present)
 ANAPEV the attribute is present under specified condition – if present then it will not have any value

The following abbreviations are used for the source of the data values in the tables:

AUTO the attribute value is generated automatically
 CONFIG the attribute value source is a configurable parameter
 COPY the attribute value source is another SOP instance
 FIXED the attribute value is hard-coded in the application
 IMPLICIT the attribute value source is a user-implicit setting
 MPPS the attribute value source is a Modality Performed Procedure Step
 MWL the attribute value source is a Modality Worklist
 USER the attribute value source is explicit user input

Specification of a company web address can refer to sample SOP instances that are available.

The following table lists the attributes supported by the Atlantis AE in the NM Image IOD.

Table 23: List of attributes in the NM Image IOD

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient Module				ALWAYS	
Patient's Name	0010,0010	PN		VNAP	MWL, USER

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient ID	0010,0020	LO		VNAP	MWL, USER, AUTO
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER
Patient's Birth Time	0010,0032	TM		ANAP	MWL
Patient's Sex	0010,0040	CS		VNAP	MWL, USER
Other Patient Ids	0010,1000	LO		ANAP	MWL
Ethnic Group	0010,2160	SH		ANAP	MWL
Patient Comments	0010,4000	LT		ANAP (see note 4)	MWL
Patient Medical Module				CONDITIONAL	
Medical Alerts	0010,2000	LO		ANAP	MWL
Contrast Allergies	0010,2110	LO		ANAP	MWL
Pregnancy Status	0010,21C0	US		ANAP	MWL
Special Needs	0038,0050	LO		ANAP	MWL
Patient State	0038,0500	LO		ANAP	MWL
General Study Module				ALWAYS	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO, MWL
Study Date	0008,0020	DA		ALWAYS	MWL, AUTO
Study Time	0008,0030	TM		ALWAYS	MWL, AUTO
Referring Physician's Name	0008,0090	PN		VNAP	MWL, USER
Study ID	0020,0010	SH		VNAP	MWL, USER
Accession Number	0008,0050	SH		VNAP	MWL, USER
Study Description	0008,1030	LO		ANAP	MWL
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL
>Referenced SOP Class UID	0008,1150	UI		ANAP	MWL
>Referenced SOP Instance UID	0008,1155	UI		ANAP	MWL
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL
>Code Value	0008,0100	SH		ANAP	MWL
>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>Code Meaning	0008,0104	LO		ANAP	MWL
Patient Study Module				ALWAYS	
Patient's Age	0010,1010	AS		VNAP	IMPLICIT
Patient's Size	0010,1020	DS		ANAP	MWL, USER
Patient's Weight	0010,1030	DS		ANAP	MWL, USER
Additional Patient History	0010,21B0	LT		ANAP (see note 4)	MWL
General Series Module				ALWAYS	
Modality	0008,0060	CS	NM	ALWAYS	FIXED
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		VNAP	AUTO
Series Date	0008,0021	DA		ALWAYS	AUTO
Series Time	0008,0031	TM		ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Performing Physician's Name	0008,1050	PN		ANAP	MWL
Protocol Name	0018,1030	LO		ANAP	MWL, IMPLICIT
Series Description	0008,103E	LO		ANAP	USER
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAP	AUTO
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1.1.20	ANAP	FIXED
>Referenced SOP Instance UID	0008,1155	UI		ANAP	AUTO
Body Part Examined	0018,0015	CS		ANAP	IMPLICIT
Smallest Pixel Value in Series	0028,0108	US		ANAP	AUTO
Largest Pixel Value in Series	0028,0109	US		ANAP	AUTO
Request Attributes Sequence	0040,0275	SQ		ANAP (see note 3)	MWL
>Requested Procedure ID	0040,1001	SH		ANAP	MWL
>Scheduled Procedure Step ID	0040,0009	SH		ANAP	MWL
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	MWL
>>Code Value	0008,0100	SH		ANAP	MWL
>>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>>Code Meaning	0008,0104	LO		ANAP	MWL
Performed Procedure Step ID	0040,0253	SH		ANAP	MWL
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO
Performed Procedure Step Description	0040,0254	LO		ANAP	MWL
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL
>Code Value	0008,0100	SH		ANAP	MWL
>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>Code Meaning	0008,0104	LO		ANAP	MWL
NM/PET Patient Orientation Module				ALWAYS	
Patient Orientation Code Sequence	0054,0410	SQ		ANAP (see Note 1)	IMPLICIT
>Code Value	0008,0100	SH		VNAP	IMPLICIT
>Coding Scheme Designator	0008,0102	SH		VNAP	IMPLICIT
>Code Meaning	0008,0104	LO		VNAP	IMPLICIT
>Patient Orientation Modifier Code Sequence	0054,0412	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH		ANAP	IMPLICIT
>>Coding Scheme Designator	0008,0102	SH		ANAP	IMPLICIT
>>Code Meaning	0008,0104	LO		ANAP	IMPLICIT
Patient Gantry Relationship code sequence	0054,0414	SQ		ANAP (see Note 1)	IMPLICIT
>Code Value	0008,0100	SH		VNAP	IMPLICIT
>Coding Scheme Designator	0008,0102	SH		VNAP	IMPLICIT
>Code Meaning	0008,0104	LO		VNAP	IMPLICIT
General Equipment Module				ALWAYS	
Manufacturer	0008,0070	LO	Philips Medical Systems, NM Division	VNAP	FIXED
Institution Name	0008,0080	LO		ANAP	CONFIG

Attribute Name	Tag	VR	Value	Presence of Value	Source
Station Name	0008,1010	SH		ANAP	CONFIG
Manufacturer's Model Name	0008,1090	LO		ANAP	CONFIG
Device Serial Number	0018,1000	LO		ANAP	CONFIG
Software Version(s)	0018,1020	LO		ANAP	CONFIG
Spatial Resolution	0018,1050	DS		ANAP	CONFIG
General Image Module				ALWAYS	
Instance Number	0020,0013	IS		VNAP	AUTO
Image Date	0008,0023	DA		ALWAYS	AUTO
Image Time	0008,0033	TM		ALWAYS	AUTO
Image Type	0008,0008	CS		ALWAYS	IMPLICIT
Acquisition Number	0020,0012	IS		ANAP	AUTO
Acquisition Date	0008,0022	DA		ALWAYS	AUTO
Acquisition Time	0008,0032	TM		ALWAYS	AUTO
Images in Acquisition	0020,1002	IS	0	ALWAYS	FIXED
Quality Control Image	0028,0300	CS		VNAP	IMPLICIT
NM Image Module				ALWAYS	
Image ID	0054,0400	SH		ANAP	USER
Counts Accumulated	0018,0070	IS		VNAP	AUTO
Acquisition Termination Condition	0018,0071	CS		VNAP	IMPLICIT
Table Height	0018,1130	DS		ANAP	AUTO (see note 2)
Table Traverse	0018,1131	DS		ANAP	AUTO, USER
Actual Frame Duration	0018,1242	IS		ANAP	AUTO, USER
Count Rate	0018,1243	IS		ANAP	AUTO
Corrected Image	0028,0051	CS		ANAP	IMPLICIT
Whole Body Technique	0018,1301	CS		ANAP	IMPLICIT
Scan Velocity	0018,1300	DS		ANAP	USER
Scan Length	0018,1302	IS		ANAP	USER
Trigger Source or Type	0018,1061	LO		ANAPCV	IMPLICIT
Image Pixel Module				ALWAYS	
Samples per Pixel	0028,0002	US	1	ALWAYS	FIXED
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	FIXED
Rows	0028,0010	US		ALWAYS	USER
Columns	0028,0011	US		ALWAYS	USER
Bits Allocated	0028,0100	US	16	ALWAYS	FIXED
Bits Stored	0028,0101	US	16	ALWAYS	FIXED
High Bit	0028,0102	US	15	ALWAYS	FIXED
Pixel Representation	0028,0103	US	0	ALWAYS	FIXED
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO
Smallest Image Pixel Value	0028,0106	US		ALWAYS	AUTO
Largest Image Pixel Value	0028,0107	US		ALWAYS	AUTO
NM Image Pixel Module				ALWAYS	
Pixel Spacing	0028,0030	DS		ALWAYS	IMPLICIT
Acquisition Context Module				CONDITIONAL	

Attribute Name	Tag	VR	Value	Presence of Value	Source
Acquisition Context Sequence	0040,0555	SQ		ANAP	USER
>Concept Name Code Sequence	0040,A043	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH	109055	ANAP	FIXED
>>Coding Scheme Designator	0008,0102	SH	DCM	ANAP	FIXED
>>Code Meaning	0008,0104	LO	Patient State	ANAP	FIXED
>Concept Code Sequence	0040,A168	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH		ANAP	IMPLICIT
>>Coding Scheme Designator	0008,0102	SH		ANAP	IMPLICIT
>>Code Meaning	0008,0104	LO		ANAP	IMPLICIT
Multi-frame Module				ALWAYS	
Number of Frames	0028,0008	IS		ALWAYS	IMPLICIT
Frame Increment Pointer	0028,0009	AT		ALWAYS	AUTO
NM Multi-frame Module				ALWAYS	
Energy Window Vector	0054,0010	US		ANAP	AUTO
Number of Energy Windows	0054,0011	US		ALWAYS	USER
Detector Vector	0054,0020	US		ANAP	AUTO
Number of Detectors	0054,0021	US		ALWAYS	USER
Phase Vector	0054,0030	US		ANAP	AUTO
Number of Phases	0054,0031	US		ANAP	USER
Rotation Vector	0054,0050	US		ANAP	AUTO
Number of Rotations	0054,0051	US		ANAP	USER
R-R Interval Vector	0054,0060	US		ANAP	AUTO
Number of R-R Intervals	0054,0061	US		ANAP	FIXED
Time Slot Vector	0054,0070	US		ANAP	AUTO
Number of Time Slots	0054,0071	US		ANAP	USER
Angular View Vector	0054,0090	US		ANAP	AUTO
Time Slice Vector	0054,0100	US		ANAP	AUTO
NM Isotope Module				ALWAYS	
Energy Window Information Sequence	0054,0012	SQ		ALWAYS	IMPLICIT
>Energy Window Name	0054,0018	SH		ALWAYS	AUTO
>Energy Window Range Sequence	0054,0013	SQ		ALWAYS	IMPLICIT
>>Energy Window Lower Limit	0054,0014	DS		ALWAYS	IMPLICIT
>>Energy Window Upper Limit	0054,0015	DS		ALWAYS	IMPLICIT
Radiopharmaceutical Information Sequence	0054,0016	SQ		ALWAYS	IMPLICIT
>Radionuclide Code Sequence	0054,0300	SQ		ALWAYS	IMPLICIT
>>Code Value	0008,0100	SH		ALWAYS	IMPLICIT
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	IMPLICIT
>>Code Meaning	0008,0104	LO		ALWAYS	IMPLICIT
>Radiopharmaceutical Volume	0018,1071	DS	0.0	ANAP	FIXED
>Radiopharmaceutical Start Time	0018,1072	TM		ANAP	USER
>Radiopharmaceutical Stop Time	0018,1073	TM		EMPTY	FIXED
>Radionuclide Total Dose	0018,1074	DS		ANAP	USER
>Radiopharmaceutical	0018,0031	LO		ANAP	USER
>Radiopharmaceutical Code Sequence	0054,0304	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH		ANAP	IMPLICIT

Attribute Name	Tag	VR	Value	Presence of Value	Source
>>Coding Scheme Designator	0008,0102	SH		ANAP	IMPLICIT
>>Code Meaning	0008,0104	LO		ANAP	IMPLICIT
Intervention Drug Information Sequence	0018,0026	SQ		ANAP	IMPLICIT
>Intervention Drug Start Time	0018,0035	TM		EMPTY	FIXED
>Intervention Drug Stop Time	0018,0027	TM		EMPTY	FIXED
>Intervention Drug Dose	0018,0028	DS	0.0	ANAP	FIXED
NM Detector Module				ALWAYS	
Detector Information Sequence	0054,0022	SQ		ALWAYS	IMPLICIT
>Collimator/grid Name	0018,1180	SH		ALWAYS	IMPLICIT
>Collimator Type	0018,1181	CS		ANAP	IMPLICIT
>Field of View Shape	0018,1147	CS	RECTANGLE	ANAP	FIXED
>Field of View Dimension(s)	0018,1149	IS		ANAP	IMPLICIT
>Focal Distance	0018,1182	IS	0	ANAP	FIXED
>X Focus Center	0018,1183	DS	0.0	ANAP	FIXED
>Y Focus Center	0018,1184	DS	0.0	ANAP	FIXED
>Zoom Center	0028,0032	DS	0.0	ANAP	FIXED
>Zoom Factor	0028,0031	DS		ANAP	IMPLICIT
>Center of Rotation Offset	0018,1145	DS	0.0	ANAP	FIXED
>Gantry/Detector Tilt	0018,1120	DS		ANAP	AUTO
>Start Angle	0054,0200	DS		ANAP	IMPLICIT
>Radial Position	0018,1142	DS		ANAP	AUTO
>Image Orientation (Patient)	0020,0037	DS		ANAP	IMPLICIT
>Image Position (Patient)	0020,0032	DS		ANAP	IMPLICIT
>View Code Sequence	0054,0220	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH		ANAP	IMPLICIT
>>Coding Scheme Designator	0008,0102	SH		ANAP	IMPLICIT
>>Code Meaning	0008,0104	LO		ANAP	IMPLICIT
>View Modifier Code Sequence	0054,0222	SQ		ANAP	IMPLICIT
>>Code Value	0008,0100	SH		ANAP	IMPLICIT
>>Coding Scheme Designator	0008,0102	SH		ANAP	IMPLICIT
>>Code Meaning	0008,0104	LO		ANAP	IMPLICIT
NM TOMO Acquisition Module				CONDITIONAL	
Rotation Information Sequence	0054,0052	SQ		ANAP	IMPLICIT
>Start Angle	0054,0200	DS		ANAP	USER
>Angular Step	0018,1144	DS		ANAP	IMPLICIT
>Rotation Direction	0018,1140	DS		ANAP	USER, IMPLICIT
>Scan Arc	0018,1143	DS		ANAP	USER
>Actual Frame Duration	0018,1242	IS		ANAP	USER, AUTO
>Radial Position	0018,1142	DS		ANAP	AUTO
>Number of Frames in Rotation	0054,0053	US		ANAP	USER
>Table Traverse	0018,1131	DS		ANAP	AUTO, USER
>Table Height	0018,1130	DS		ANAP	AUTO (see note 2)
Type of Detector Motion	0054,0202	CS		ANAP	USER

Attribute Name	Tag	VR	Value	Presence of Value	Source
NM Multi-gated Acquisition Module				CONDITIONAL	
Beat Rejection Flag	0018,1080	CS		ANAP	IMPLICIT
PVC Rejection	0018,1085	LO		ANAP	IMPLICIT
Skip Beats	0018,1086	IS		ANAP	AUTO
Heart Rate	0018,1088	IS		ANAP	AUTO
Gated Information Sequence	0054,0062	SQ		ANAP	IMPLICIT
>Trigger Time	0018,1060	DS	0.0	ANAP	FIXED
>Data Information Sequence	0054,0063	SQ		ANAPCV	IMPLICIT
>>Frame Time	0018,1063	DS		ANAP	USER, IMPLICIT
>>Nominal Interval	0018,1062	IS		ANAP	AUTO
>>Low R-R Value	0018,1081	IS		ANAP	AUTO
>>High R-R Value	0018,1082	IS		ANAP	AUTO
>>Intervals Acquired	0018,1083	IS		ANAP	AUTO
>>Intervals Rejected	0018,1084	IS		ANAP	AUTO
>>Time Slot Information Sequence	0054,0072	SQ		ANAP	IMPLICIT
>>>Time Slot Time	0054,0073	DS		ANAP	IMPLICIT
NM Phase Module				CONDITIONAL	
Phase Information Sequence	0054,0032	SQ		ANAP	IMPLICIT
>Phase Delay	0054,0036	IS	0	ANAP	FIXED
>Actual Frame Duration	0018,1242	IS		ANAP	USER, AUTO
>Pause Between Frames	0054,0038	IS	0	ANAP	FIXED
>Number of Frames in Phase	0054,0033	US		ANAP	USER
>Number of Triggers In Phase	0054,0211	US	0	ANAP	FIXED
SOP Common Module				ALWAYS	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.20	ALWAYS	FIXED
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	FIXED
Instance Creation Date	0008,0012	DA		ALWAYS	AUTO
Instance Creation Time	0008,0013	TM		ALWAYS	AUTO
Instance Creator UID	0008,0014	UI		ALWAYS	CONFIG
Instance Number	0020,0013	IS		ALWAYS	AUTO

The following table lists the private attributes in the NM Image IOD of the JETStream Acquisition System AE

Table 24: List of private attributes in the NM Image IOD

Attribute Name	Tag	VR	Value	Presence of Value	Source
Current Segment	7051,0010	US		ALWAYS	AUTO
Number of Segments	7051,1001	US		ALWAYS	USER
Segment Start Position	7051,1002	FL		ALWAYS	USER
Segment Stop Position	7051,1003	FL		ALWAYS	IMPLICIT
Rel. COR offset - X dir.	7051,1004	FL		ALWAYS	CONFIG
Rel. COR offset - Z dir.	7051,1005	FL		ALWAYS	CONFIG

Attribute Name	Tag	VR	Value	Presence of Value	Source
Current Rotation Number	7051,1006	US		ALWAYS	AUTO
Number of Rotations	7051,1007	US		ALWAYS	USER
Alignment Translations	7051,1010	DS		ANAP	CONFIG
Alignment Rotations	7051,1011	DS		ANAP	CONFIG
Alignment Timestamp	7051,1012	DS		ALWAYS	CONFIG

The following table lists the attributes supported by the Atlantis AE in the SC Image IOD.

Table 25: List of attributes in the SC Image IOD

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient Module				ALWAYS	
Patient's Name	0010,0010	PN		VNAP	MWL, USER
Patient ID	0010,0020	LO		VNAP	MWL, USER, AUTO
Patient's Birth Date	0010,0030	DA		VNAP	MWL, USER
Patient's Birth Time	0010,0032	TM		ANAP	MWL
Patient's Sex	0010,0040	CS		VNAP	MWL, USER
Other Patient Ids	0010,1000	LO		ANAP	MWL
Ethnic Group	0010,2160	SH		ANAP	MWL
Patient Comments	0010,4000	LT		ANAP	MWL
General Study Module				ALWAYS	
Study Instance UID	0020,000D	UI		ALWAYS	AUTO, MWL
Study Date	0008,0020	DA		ALWAYS	MWL, AUTO
Study Time	0008,0030	TM		ALWAYS	MWL, AUTO
Referring Physician's Name	0008,0090	PN		VNAP	MWL, USER
Study ID	0020,0010	SH		VNAP	MWL, USER
Accession Number	0008,0050	SH		VNAP	MWL, USER
Study Description	0008,1030	LO		ANAP	MWL
Name of Physician(s) Reading Study	0008,1060	PN		ANAP	USER
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL
>Referenced SOP Class UID	0008,1150	UI		ANAP	MWL
>Referenced SOP Instance UID	0008,1155	UI		ANAP	MWL
Procedure Code Sequence	0008,1032	SQ		ANAP	MWL
>Code Value	0008,0100	SH		ANAP	MWL
>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>Code Meaning	0008,0104	LO		ANAP	MWL
General Series Module				ALWAYS	
Modality	0008,0060	CS	SC	ALWAYS	FIXED
Series Instance UID	0020,000E	UI		ALWAYS	AUTO
Series Number	0020,0011	IS		VNAP	AUTO
Series Date	0008,0021	DA		ALWAYS	AUTO
Series Time	0008,0031	TM		ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence of Value	Source
Protocol Name	0018,1030	LO		ANAP	MWL, IMPLICIT
Series Description	0008,103E	LO		ANAP	USER
Body Part Examined	0018,0015	CS		ANAP	IMPLICIT
Patient Position	0018,5100	CS		ANAPCV	IMPLICIT
Smallest Pixel Value in Series	0028,0108	US		ANAP	AUTO
Largest Pixel Value in Series	0028,0109	US		ANAP	AUTO
Request Attributes Sequence	0040,0275	SQ		ALWAYS	MWL
>Requested Procedure ID	0040,1001	SH		ANAP	MWL
>Scheduled Procedure Step ID	0040,0009	SH		ANAP	MWL
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	MWL
>>Code Value	0008,0100	SH		ANAP	MWL
>>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>>Code Meaning	0008,0104	LO		ANAP	MWL
Performed Procedure Step ID	0040,0253	SH		ANAP	MWL
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO
Performed Procedure Step Description	0040,0254	LO		ANAP	MWL
Performed Protocol Code Sequence	0040,0260	SQ		ANAP	MWL
>Code Value	0008,0100	SH		ANAP	MWL
>Coding Scheme Designator	0008,0102	SH		ANAP	MWL
>Code Meaning	0008,0104	LO		ANAP	MWL
General Equipment Module				ALWAYS	
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	FIXED
Institution Name	0008,0080	LO		ANAP	CONFIG
Institution Address	0008,0081	ST		ANAP	CONFIG
Station Name	0008,1010	SH		ANAP	CONFIG
Institutional Department Name	0008,1040	LO		ANAP	CONFIG
Manufacturer's Model Name	0008,1090	LO		ANAP	CONFIG
Device Serial Number	0018,1000	LO		ANAP	CONFIG
Software Version(s)	0018,1020	LO		ANAP	CONFIG
Spatial Resolution	0018,1050	DS		ANAP	CONFIG
SC Equipment Module				ALWAYS	
Conversion Type	0008,0064	CS	WSD	ALWAYS	FIXED
Secondary Capture Device ID	0018,1010	LO		ANAP	CONFIG
Secondary Capture Device Manufacturer	0018,1016	LO	Philips Medical Systems	ALWAYS	FIXED
Secondary Capture Device Manufacturer's Model name	0018,1018	LO		ANAP	CONFIG
Secondary Capture Device Software Version(s)	0018,1019	LO		ANAP	CONFIG
General Image Module				ALWAYS	
Instance Number	0020,0013	IS		VNAP	AUTO
Image Type	0008,0008	CS	DERIVED PRIMARY	ALWAYS	FIXED

Attribute Name	Tag	VR	Value	Presence of Value	Source
Quality Control Image	0028,0300	CS		VNAP	IMPLICIT
SC Image Module				ALWAYS	
Date of Secondary Capture	0018,1012	DA		ALWAYS	AUTO
Time of Secondary Capture	0018,1014	TM		ALWAYS	AUTO
Image Pixel Module				ALWAYS	
Samples per Pixel	0028,0002	US	3	ALWAYS	FIXED
Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	FIXED
Rows	0028,0010	US		ALWAYS	USER
Columns	0028,0011	US		ALWAYS	USER
Bits Allocated	0028,0100	US	8	ALWAYS	FIXED
Bits Stored	0028,0101	US	8	ALWAYS	FIXED
High Bit	0028,0102	US	7	ALWAYS	FIXED
Pixel Representation	0028,0103	US	0	ALWAYS	FIXED
Pixel Data	7FE0,0010	OW		ALWAYS	AUTO
Planar Configuration	0028,0006	US	0	ALWAYS	FIXED
Pixel Aspect Ratio	0028,0034	IS		ALWAYS	AUTO
Smallest Image Pixel Value	0028,0106	US		ALWAYS	AUTO
Largest Image Pixel Value	0028,0107	US		ALWAYS	AUTO
SOP Common Module				ALWAYS	
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ALWAYS	FIXED
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO
Specific Character Set	0008,0005	CS	ISO_IR 100	ALWAYS	FIXED
Instance Creation Date	0008,0012	DA		ALWAYS	AUTO
Instance Creation Time	0008,0013	TM		ALWAYS	AUTO
Instance Number	0020,0013	IS		ALWAYS	AUTO

Note:

- When values of attribute Patient Position from the camera client UI is selected as "Other", then the following sequence attributes are not present to maintain interoperability with legacy Philips NM workstations –
 - Patient Orientation Code sequence (0054,0410)
 - Patient Gantry relationship code sequence (0054,0414)
- The value of attribute Table Height (0018, 1130) should be ignored because it is a preset unit less position value (the value is NOT a distance) of the table height device in the gantry.
- The attribute Request Attributes Sequence (0040,0275) would ALWAYS be present in the NM IOD for all acquisitions that are started using a worklist entry.
- Odd length strings for DICOM type LT and ST are padded with a '.' in the end to make the length even. This is done to cover for a known bug in the underlying third party DICOM implementation.

8.1.2. Usage of Attributes from Received IODs

Not Applicable.

8.1.3. Attribute Mapping

Many of the attributes received via Modality Worklist are copied to the same attribute in the storage IOD. A few Worklist attributes are also copied to different attributes in the storage IOD, and these are summarized in Table 26.

Table 26: Attribute mapping between modality work list and storage IOD

Modality Worklist	Storage IOD
Scheduled Procedure Step ID	Performed Procedure Step ID
Scheduled Procedure Step Description	Performed Procedure Step Description
Scheduled Protocol Code Sequence	Performed Protocol Code Sequence

8.1.4. Coerced/Modified fields

Not Applicable.

8.2. Data Dictionary of Private Attributes

All NM images contain a few private elements in the group 7051, "PHILIPS NM – Private". See the definition of attributes in the NM IOD in Section 8.1.1.

8.3. Coded Terminology and Templates

The Atlantis AE uses a number of standard context groups, as described below.

8.3.1. Context Groups

Each Context Group (i.e., use of coded terminology in a specific context) used in the Atlantis AE is shown in Table 27. The mapping context group used for acquisition protocol selection is user configurable in the user console.

Note 5: JETStream Acquisition System supports all Isotopes and Radiopharmaceuticals as per June 2007 Version of the DICOM Standard.

Table 27: Context Groups

Context Group	Default Value Set	Configurable	Use
Acquisition Protocol Selection	None	Replaceable	Value of Scheduled Procedure Step Description (0040,0007) from selected Modality Worklist Scheduled Procedure Step is matched to this group for equipment-specific protocol selection.
Isotope	CID 18	No	Mapped from user console selection of Energy Window Set. Used in the Radionuclide Code Sequence (0054,0300) – See note 5
Patient Orientation	CID 19	No	Mapped from user console selection of Patient Orientation. Used in Patient Orientation Code Sequence (0054,0410)
Patient Orientation Modifier	CID 20	No	Mapped from user console selection of Patient Position. Used in Patient Orientation Modifier Code Sequence (0054,0412)
Gantry-Patient Relationship	CID 21	No	Mapped from user console selection of Patient Orientation and Patient Position. Used in Patient Gantry Relationship Code Sequence (0054,0414)

Context Group	Default Value Set	Configurable	Use
Detector Angulation	CID 23	No	Mapped from equipment position at the start of an acquisition and the user console selection of Patient Orientation. Used in View Modifier Code Sequence (0054,0222)
Radiopharmaceuticals	CID 25	No	Mapped from user console selection of Radiopharmaceutical. Used in Radiopharmaceutical Code Sequence (0054,0304) – See note 5
NM Projection	CID 26	No	Mapped from equipment position at the start of an acquisition and the user console selection of Patient Orientation and Patient Position. Used in View Code Sequence (0054,0220)
Acquisition Context	CID 3101	No	Mapped from user console selection of Patient State. Used in Acquisition Context Sequence (0040,0555)

8.4. Grayscale Image consistency

Not Applicable.

8.5. Standard Extended/Specialized/Private SOPs

Standard NM SOP classes are extended with the following attributes –

1. Requested Procedure Comments (0040,1400)
2. Imaging Service Request Comments (0040,2400)

There are no private SOPs.

8.6. Private Transfer Syntaxes

Not applicable.