DICOM 3.0
CONFORMANCE STATEMENT
JETConnect
9206-0000, REV. C 09-2004
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**INTRODUCTION**

**Scope**

This document states the conformance of the JETConnect DICOM software version Atlantis400R01.

The DICOM conformance of other medical devices manufactured by Philips Medical Systems is detailed in separate documents.

**Important Notes**

This DICOM software is in compliance with ACR-NEMA DICOM 3.0 standard; however, due to the inherent nature of DICOM, you must perform acceptance testing to verify that the DICOM software meets requirements for your configuration.

The acceptance testing must include all representative data sets (images) that you intend to transfer, all types of transfers desired for a type of data set, and clinical evaluation of each representative data set on the receiving end after the transfer of the desired type.

Please read the following sections carefully before you use any of the DICOM software products.

**Why a Conformance Statement**

The DICOM 3.0 standard enables vendors to configure systems in such a way that an imaging device can exchange patient and image data with another imaging device of the same or different modality, a Radiology Information System (RIS), a Hospital Information System (HIS), a Review/PACS station, or an archive device or a hardcopy device over a standard network. It also permits data exchange via removable media, such as a magneto-optical disk.

Because of the broadness and extensibility of the DICOM standard, each DICOM-conforming system normally supports only a subset of DICOM 3.0. Each pair of DICOM peer devices, or Application Entities (AE), can only communicate over the intersection of commonly supported parts of DICOM. Fortunately, DICOM 3.0 standard requires some minimum conformance.

This conformance statement can help you understand the level of connectivity between JETConnect DICOM and other DICOM-compatible devices.

This conformance statement is written in accordance with Part 2 of DICOM, NEMA Standards Publication No. PS 3.2.
**Source of Information**

Digital Imaging and Communication in Medicine (DICOM), NEMA Standards Publication No. PS 3.1–3.16.

NEMA, 1300 N. 17th Street Rosalyn, Virginia 22209 USA

**How DICOM Works in JETConnect DICOM**

JETStream acquisition computers 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).

The JETConnect DICOM software is transparent to the person using the SKYLight or Forte imaging system. The Philips Nuclear Medicine Field Service Engineer is not required to change or modify any configurations. By default the Save To field on the Protocol Information page is set to the target system (DICOM target). A Philips Nuclear Medicine Field Service Engineer configures the JETConnect DICOM software during the initial installation.

Table 1 on page 2 describes the DICOM Service Classes and DICOM Commands supported by JETConnect DICOM.

**Table 1: DICOM Service Classes and Commands**

<table>
<thead>
<tr>
<th>DICOM Service Class</th>
<th>DICOM commands (DIMSE-C/N group)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification</td>
<td>C-ECHO</td>
<td>Checks if the peer application entity is active</td>
</tr>
<tr>
<td>Storage</td>
<td>C-STORE</td>
<td>Image data transfer</td>
</tr>
<tr>
<td>Modality Worklist</td>
<td>C-FIND</td>
<td>Patient and Schedule data retrieval</td>
</tr>
<tr>
<td>Storage Commitment</td>
<td>N-Action</td>
<td>Checks if the data transfer was successful.</td>
</tr>
</tbody>
</table>
Implementation Model

Application Data Flow Diagram

Verification

DICOM interface

[C-ECHO-RQ “ping”]

JETConnect DICOM

Foreign host DICOM

[C-ECHO-RSP “echo”]

Simple Image Transfer “Put”

DICOM Interface

(1) Storage of images, overlays, etc

C-STORE-RQ “put”

JETConnect DICOM

Foreign host DICOM

C-STORE-RSP “acknowledge”

Storage Commit

(2) N-Action (Request Storage Commitment)

JETConnect DICOM

Foreign host DICOM

(3) N-Event-Report (Results Status)
Functional Definitions of AE (Application Entities)

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 with a C-ECHO-RSP.

- Exporting image data to a remote system

The JETStream acquisition automates the export to the remote system.

JETConnect initiates a C-STORE request and the remote DICOM server uses the SCP role of storage to receive the data.

Sequencing of Real-World Activities

Not Applicable.

Network Interchange AE Specifications

Supported SOP Classes

JETConnect DICOM provides standard conformance to the following DICOM 3.0 SOP Classes.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>SOP Class UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification</td>
<td>1.2.840.10008.1.1</td>
<td>SCU</td>
</tr>
</tbody>
</table>
Table 3: Storage SOP Class

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>SOP Class UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.20</td>
<td>SCU</td>
</tr>
</tbody>
</table>

Table 4: Storage Commitment Model (Push)

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>SOP Class UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Action</td>
<td>1.2.840.10008.1.20.2</td>
<td>SCU</td>
</tr>
</tbody>
</table>

Table 5: Modality Worklist

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>SOP Class UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Worklist Information Model-FIND</td>
<td>1.2.840.10008.5.1.4.31</td>
<td>SCU</td>
</tr>
</tbody>
</table>

**General Association Policies**

This implementation generally establishes one association (connection) per SOP interaction, such as Ping-Echo and Store (“put”), Find (query for Worklist information). 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.

**Number of Associations**

- Each SCU role client application maintains one association at a time.
- You can run multiple SCU role client applications, or multiple instances of the same application, at the same time, with each having an association.

**Asynchronous Nature**

JETConnect DICOM does not perform asynchronous operations window negotiation.
Implementation Identifying Information

- The Philips IMPLEMENTATION_CLASS_UID is “1.3.46.670589.28.1.1”.
- The implementation version contains the release tag of the ADACJetC software. The initial release contains the implementation version name Atlantis200R03. The implementation version value changes for each release of the ADACJetC software. An example of a potential future implementation version number is Atlantis400R01.

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

Association Initiation Policy

- All of the SCU role applications attempts to initiate an association for each interaction. These include “verification”, “put” and “find”.
- You use the default port number, DICOM registered TCP port 104, unless otherwise configured.

Associated Real World Activity

The associated Real-World Activity is the attempt to send a request for:

- Echo (C-ECHO request)
- Sending image data (C-STORE request)
- Getting patient schedule information
Proposed Presentation Context

Table 6: Proposed Presentation Contexts for Sending Data/Request

<table>
<thead>
<tr>
<th>Presentation context (SCU)</th>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOP Name</td>
<td>UID</td>
<td>Name list</td>
<td>UID list</td>
</tr>
<tr>
<td>see Tables 1-5</td>
<td>see Tables 1-5</td>
<td>DICOM Implicit VR Little Endian</td>
<td>1.2.840.10008.1.2</td>
<td>SCU</td>
</tr>
<tr>
<td>see Tables 1-5</td>
<td>see Tables 1-5</td>
<td>DICOM Explicit VR Little Endian</td>
<td>1.2.840.10008.1.2.1</td>
<td>SCU</td>
</tr>
</tbody>
</table>

SOP Specific Conformance of SCU

The SCU role of all the SOP classes listed in Tables 1-5 in this document are provided with Standard Conformance.
### Table 7: Supported Query Keys/Elements for Worklist Matching

<table>
<thead>
<tr>
<th>Description</th>
<th>Tag</th>
<th>Type</th>
<th>Return Value Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Date</td>
<td>0008, 0020</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Study Time</td>
<td>0008, 0030</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Accession Number</td>
<td>0008, 0050</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Modality</td>
<td>0008, 0060</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Referring Physician</td>
<td>0008, 0090</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Name</td>
<td>0010, 0010</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Patient ID</td>
<td>0010, 0020</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Patient Birth Date</td>
<td>0010, 0030</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Sex</td>
<td>0010, 0040</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Secondary Patient ID</td>
<td>0010, 1000</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Age</td>
<td>0010, 1010</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Weight</td>
<td>0010, 1030</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Medical Alerts</td>
<td>0010, 2000</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Contrast Allergies</td>
<td>0010, 2110</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Patient Pregnancy Status</td>
<td>0010, 21C0</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Img Svc Requesting Physician</td>
<td>0032, 1032</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Req Procedure Description</td>
<td>0032, 1060</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Contrast Agent</td>
<td>0032, 1070</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Station AE Title</td>
<td>0040, 0001</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Procedure Step Start Date</td>
<td>0040, 0002</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Procedure Step Start Time</td>
<td>0040, 0003</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Performing Physician</td>
<td>0040, 0006</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Scheduled Proc Step Description</td>
<td>0040, 0007</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Procedure Step ID</td>
<td>0040, 0009</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Station Name</td>
<td>0040, 0010</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Proc Step Location</td>
<td>0040, 0011</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Pre-Medication</td>
<td>0040, 0012</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduled Pro Step Status</td>
<td>0040, 0020</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Procedure Step Sequence</td>
<td>0040, 0100</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Scheduling Comments</td>
<td>0040, 0400</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Requested Procedure ID</td>
<td>0040, 1001</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Reason for Requested Procedure</td>
<td>0040, 1002</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Intended Recipients</td>
<td>0040, 1010</td>
<td>Optional</td>
<td></td>
</tr>
</tbody>
</table>
**SOP-Specific Conformance for SOP Class Storage:**

The Storage service class converts a JETConnect image into an appropriate DICOM image format and exports it to a remote DICOM server. While all the important diagnostic information is preserved, it is not lossless or reversible.

The Nuclear Medicine image is converted into corresponding DICOM NM images. A multi-detector, energy window and/or rotation image is converted and stored into separate DICOM images.

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**Communication Profiles**

**Supported Protocol Stacks**

The data transfer uses DICOM Upper Layer Protocol as defined in Part 8 of DICOM standard, i.e., NEMA Standards Publication No. PS 3.8. Under or parallel to this layer:

- TCP/IP stack is supported
Network Media Support

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.

Deviation Report

Extensions, Specialization, Privatizations

There are no extensions, specialization or privatizations in this release.

Support of Extended Character Sets

Extended character sets are not supported in this release.

Configuration

Configuration files can be found in the following locations:
/export/home/atlas/etc/Facility.ADAC01/systems/systems.xml
/export/home/atlas/DicomJetConnect/mc3java/config
/export/home/atlas/DicomJetConnect/mc3c/mc3apps
/export/home/atlas/data/Facility.ADAC01/Worklist

Comments

Philips Medical Systems’ JETConnect implementation of DICOM - is synchronized with the latest DICOM standard development at ACR-NEMA.
Appendix

A GLOSSARY

Acronyms and Abbreviations

- ACR  American College of Radiology
- AE   Application Entity
- ANSI American National Standards Institute
- ATM  Async Transfer Mode
- DICOM Digital Imaging and Communication in Medicine
- DIMSE-C DICOM Message Service Element-Composite
- DIMSE-N DICOM Message Service Element-Normalized
- FDDI Fiber Distributed Data Interface
- IOD  Information Object Definition
- ISDN Integrated Services Digital Network
- ISO  International Standards Organization
- NEMA National Electrical Manufacturers Association
- NM   Nuclear Medicine
- PACS Archive Communication System
- PDU  Protocol Data Unit
- RIS  Radiology Information System
- SCP  Service Class Provider (server)
- SCU  Service Class User (client)
- T1   A dedicated digital communication link provided by a telephone company that offers 1.544 megabytes/sec of bandwidth, commonly used for carrying traffic to and from private business networks and internet service providers.
- T3   A dedicated digital communication link provided by a telephone company that offers 44.75 megabytes/sec of bandwidth, commonly used for carrying traffic to and from private business networks and internet service providers.
- TCP/IP Transmission Control Protocol/Internet Protocol
- SOP  Service Object Pair
- UID  Unique Identification