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

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

Implementation Model

Application Data Flow Diagram

Verification

DICOM interface

C-ECHO-RQ "ping"

JETConnect
DICOM

Foreign host
DICOM

C-ECHO-RSP "echo"
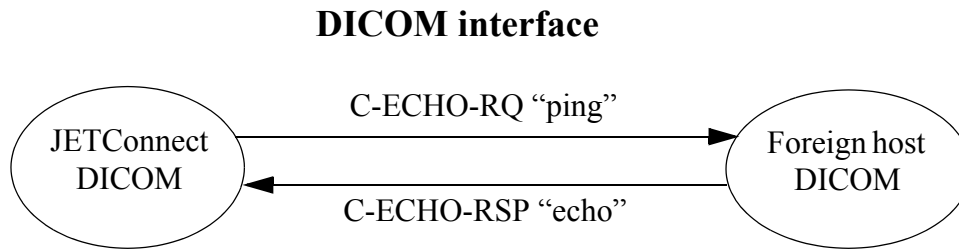
Simple Image Transfer "Put"

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)
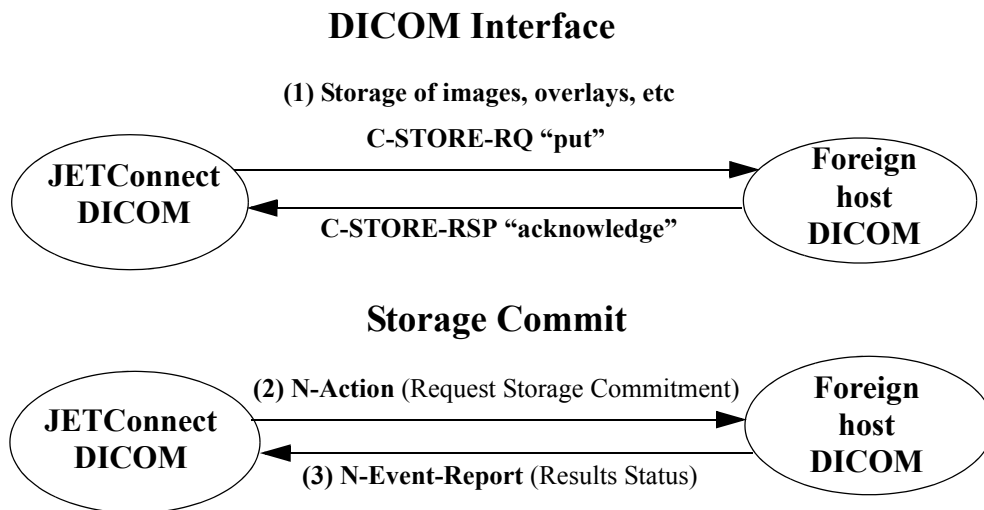
Worklist Query

DICOM interface
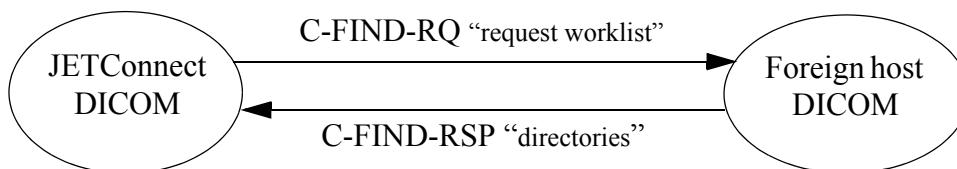
Functional Definitions of AE (Application Entities)

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 2: Verification of SOP Class

SOP Class Name	SOP Class UID	Role
Verification	1.2.840.10008.1.1	SCU

Table 3: Storage SOP Class

SOP Class Name	SOP Class UID	Role
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	SCU

Table 4: Storage Commitment Model (Push)

SOP Class Name	SOP Class UID	Role
N-Action	1.2.840.10008.1.20.2	SCU

Table 5: Modality Worklist

SOP Class Name	SOP Class UID	Role
Modality Worklist Information Model-FIND	1.2.840.10008.5.1.4.31	SCU

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 inter-action. 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

Presentation context (SCU)					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
SOP Name	**UID**	**Name list**	**UID list**		
see Tables 1-5	see Tables 1-5	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
see Tables 1-5	see Tables 1-5	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

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

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

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.

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/Facilty.ADAC01/Worklist
```

Comments

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

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 bandwith, 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 bandwith, 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