



NumaLink-3.0 DICOM 3.0 Conformance Statement

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Author	Bill Kilgore		
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Introduction

*"Come, let us go down, and there confound their language,
that they may not understand one another's speech."*

Genesis 11:7

This document states the conformance of NumaLink-3.0 to the DICOM 3.0 standard (DICOM by Merge). It is written according to part PS 3.2-1999 of Digital Imaging and Communications in Medicine (DICOM) 3.0¹.

NumaLink-3.0 is a nuclear medicine image translation system tailored to the needs of nuclear medicine. It provides the ability to translate nuclear medicine image data among a number of proprietary formats and Interfile.

Version 2 of this product provides the additional capability to translate nuclear medicine image data to the DICOM standard; either by creating DICOM Part 10 conformant output files, or by initiating store requests as a Service Class User for the DICOM Storage Service Class.

Symbols and Abbreviations

ACR	American College of Radiology
AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine
GUI	Graphic User Interface
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
VR	Value Representation

¹ National Electrical Manufacturers Association, 1300 N. 17th Street, Rosslyn, Virginia 22209, USA
<http://medical.nema.org/dicom.html>

1 Implementation Model

NumaLink-3.0 provides translation capabilities for nuclear medicine data among a number of proprietary vendor formats and Interfile. Version 2 supports translation to the DICOM standard; either by creating DICOM Part 10 conformant output files, or by initializing store requests as an SCU for the DICOM Storage Service Class.

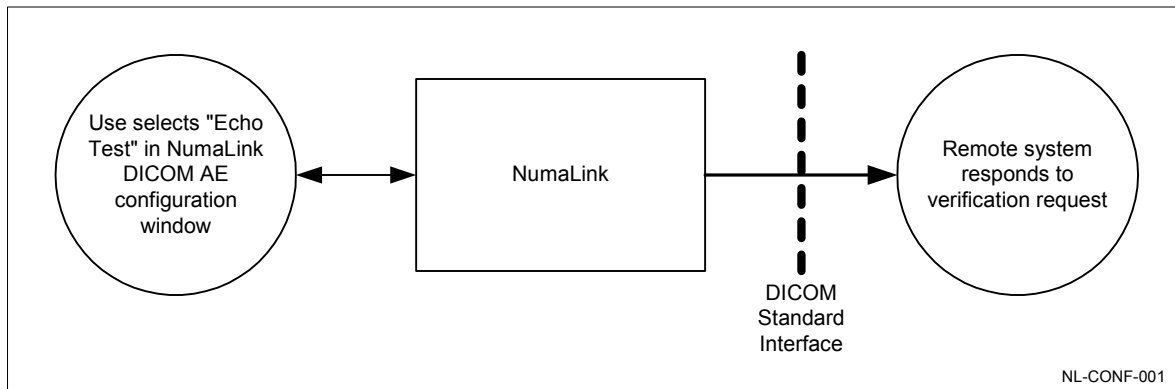
This implementation also supports communications testing using the DICOM Verification Service Class as an SCU.

1.1 Application Data Flow Diagram

1.1.1 Verification

NumaLink-3.0 allows a local user to verify connectivity with a configured remote AE, as shown in Figure 1-1.

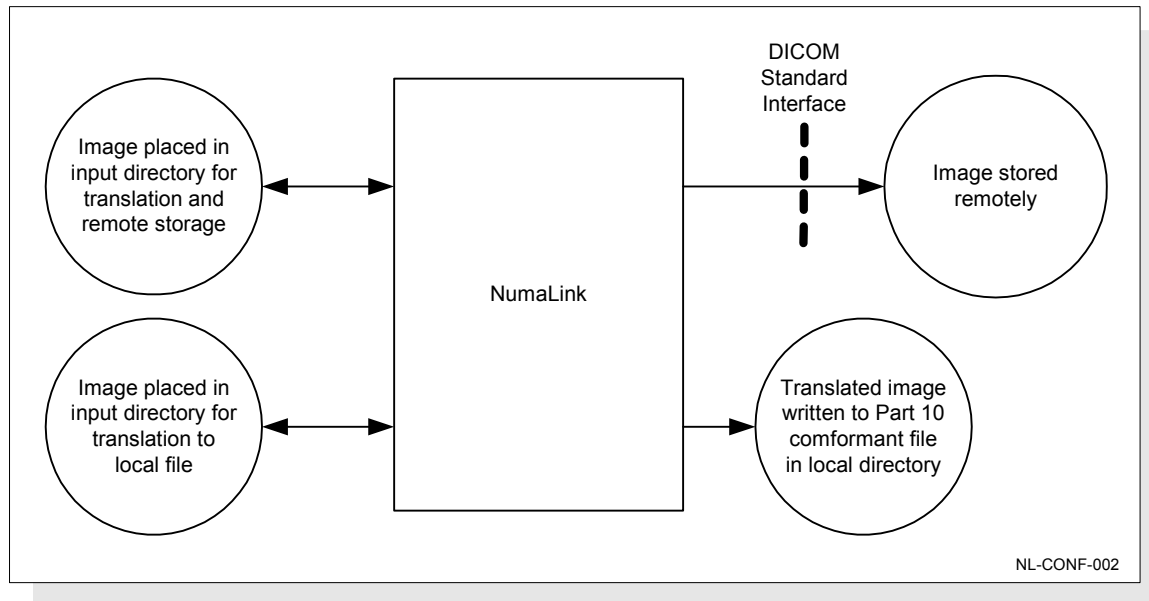
Figure 1-1 – Verification Data Flow



1.1.2 Translation

NumaLink-3.0 accepts images in configured input directories. For translation to DICOM, NumaLink-3.0 either writes DICOM Part 10 conformant output files to a configured output directory, or by making store requests as a Service Class User for the DICOM Storage Service Class to a configured remote AE, as shown in Figure 1-2.

Figure 1-2 -- Translation Data Flow



1.2 Functional Definitions of Application Entities

NumaLink-3.0 runs as an application on Windows 98, Windows NT 4.0 or Windows 2000. It is controlled via a configuration graphic user interface (GUI), or via a command line interface and configuration file that provide the same features. The user interface supports the following features:

- specify the location and verbosity of NumaLink-3.0 logs
- specify the location of the configuration file
- configure one or more translations to be performed; for each translation, specify:
 - the input directory and type (proprietary format)
 - the output directory and type (proprietary format)
 - for a DICOM output that stores to a remote AE, specify:
 - descriptive name
 - AE title
 - node
 - port
 - transfer syntax
- start and stop the translator
- view the active translation log

Once NumaLink-3.0 is configured and started, it senses files that are placed in its configured input directories, translates them according to the input and output types of the appropriate translation and places the results in the configured output directories. For a DICOM output that includes remote AE information, NumaLink-3.0 consumes the resulting output files and converts them to a C-STORE request to the configured remote AE.

1.2.1 Verification

NumaLink-3.0 uses the C-ECHO primitive of the Verification SOP Class as an SCU to verify application level communication with a remote AE. To verify communications, a user:

1. presses the DICOM button on the configuration tab;
2. supplies a remote AE Title, TCP/IP address and port number;
3. clicks on "Echo Test".

The results of the test are displayed in a message window.

1.2.2 Translation with Store

NumaLink-3.0 uses C-STORE service of the Storage Service Class as an SCU to store images to a remote AE. To do this, a translation must be configured such that the output format is DICOM and a remote AE is specified for that translation output. When appropriate data is placed in the configured input directory for that translation, NumaLink-3.0 will translate the input data to DICOM, and initiate a C-STORE service request with the configured remote AE.

1.3 Sequencing of Real World Activities

Not applicable.

2 Application Entity Specifications

2.1 NumaLink-3.0 – Specification

2.1.1 Association Establishment Policies

2.1.1.1 General

NumaLink-3.0 initiates an association as an SCU of Storage Service Class.

The maximum PDU size is 28672 bytes.

2.1.1.2 Number of Associations

There is no inherent limit to the number of associations other than limits imposed by the computer operating system.

2.1.1.3 Asynchronous Nature

NumaLink-3.0 does not support asynchronous communication (multiple outstanding transactions over a single association).

2.1.1.4 Implementation Identifying Information

NumaLink-3.0 responds with the following implementation identifying parameters.

Table 2-1 -- NumaLink-3.0 Implementatin Identifying Information

Tag	Name	Value
(0002,0012)	Implementation Class UID	1.2.826.0.1.3680043.2.59.3
(0002,0013)	Implementation Version Name	NumaLink-3.0 2.0

2.1.1.5 Storage as SCU

Table 2-2 lists the SOP classes that NumaLink-3.0 supports as an SCU for storage services.

Table 2-2 -- NumaLink-3.0 Storage SOP Classes

SOP Class	UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Stand-alone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Stand-alone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Stand-alone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Stand-alone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
Stored Print Storage	1.2.840.10008.5.1.1.27
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Genie Private Storage	1.2.840.113619.4.27

2.1.1.6 Transfer Syntaxes

Table 2-3 lists the transfer syntaxes that NumaLink-3.0 supports as an SCU.

Table 2-3 – Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian	1.2.840.10008.1.2
DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2.

2.1.2 Association Initiation by Real-World Activity

NumaLink-3.0 initiates an association in response to the following real-world activities:

1. Verification (section 2.1.2.1)
2. Translation to DICOM with store to remote AE (section 2.1.2.2)

2.1.2.1 Real World Activity 1 – Verification

2.1.2.1.1 Associated Real-World Activity

A user selects "Echo Test" in the NumaLink-3.0 DICOM AE configuration window (see section 1.2.1).

2.1.2.1.2 Proposed Presentation Contexts

Presentation Contexts					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Name	UID	Name List	UID List		
Verification	1.2.840.10008.1.1	All Table 2-3		SCU	None

2.1.2.1.2.1 SOP Specific Conformance Statement -- Verification

NumaLink-3.0 provides standard conformance for the Verification Service Class.

2.1.2.2 Real World Activity 2 – Translation with Store

2.1.2.2.1 Associated Real-World Activity

A translation has been configured that includes a DICOM store to a remote AE. Input data for that translation is placed in the configured input directory for that translation (see section 1.1.2).

2.1.2.2.2 Proposed Presentation Contexts

Presentation Contexts					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Name	UID	Name List	UID List		
All Table 2-2		All Table 2-3		SCU	None

2.1.2.2.2.1 SOP Specific Conformance Statement -- Storage

NumaLink-3.0 provides standard conformance for the Storage Service Class.

3 Communication Profiles

3.1 Supported Communication Stacks

NumaLink-3.0 provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

3.1.1 TCP/IP Stack

NumaLink-3.0 uses the TCP/IP stack from the Windows NT system upon which it executes.

3.1.1.1 Physical Media Support

NumaLink-3.0 is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Windows NT system upon which it executes.

4 Extensions/Specializations/Privatizations

None supported.

5 Configuration

5.1 AE Title/Presentation Address Mapping

NumaLink-3.0 provides an interface that allows the user to configure:

- the TCP/IP address, port number and AE Title of remote AEs with which NumaLink-3.0 can communicate.

5.2 Configurable Parameters

NumaLink-3.0 does not present any configurable parameters other than those listed in section 5.1

6 Support for Extended Character Sets

NumaLink-3.0 does not support extended character sets.

7 Codes and Controlled Terminology

The SOP Classes supported by this NumaLink-3.0 implementation do not support the use of Codes and Controlled Terminology.