



DICOM 3.0
Conformance Statement
DICOMlink for
DELTAmanager – Receive

Mac OS Part number: 500-510

Windows Part number: 500-512

Document #:

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MedImage, Inc.
6276 Jackson Road
Ann Arbor, Michigan 48103-9579

tel: 734-665-5400

fax: 734-665-4115

web: www.medimage.com

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Revision History

1.0	11/25/96	R. Helton	Original
1.1	12/31/96	R. Helton	UID information added
1.2	11/7/98	R. Helton	Q/R features added
1.2 r2	11/25/98	R. Helton	US UID was revised.
1.3	04/02/08	R. Helton	Added Secondary Capture Multi-Frame SOP Support.

0.0 Introduction

0.1 Purpose of this Document

This document states the conformance of the DICOMlink for DELTAManager - Receive to the DICOM 3.0 standard. DICOMlink for DELTAManager - Receive Send is one of the two DICOM products offered for the DELTAManager. The other product is DICOMlink for DELTAManager – Send. Any combination of these products may be purchased.

DELTAManager is a nuclear medicine review and reporting system. DICOMlink for DELTAManager - Receive is a software option to the DELTAManager family of products that provides DICOM 3.0 services. DICOMlink for DELTAManager - Receive provides for reception of DICOM transmissions into the DELTAManager system.

DICOMlink for DELTAManager - Receive

C_STORE as SCP

C_FIND and C_MOVE as SCU

C_ECHO as SCP

Other DICOMlink for DELTAManager options:

DICOMlink for DELTAManager - Send (Mac OS Part number: 500-505)

DICOMlink for DELTAManager – Send (Windows Part number: 500-514)

0.2 Definitions

The following are symbols and abbreviations used within this document.

AE	Application Entity
ACR	American College of Radiology
DICOM	Digital Imaging and Communications in Medicine
DICOMlink	DICOM software application name
DIMSE	DICOM Message Service Element

DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normative
IOD	Information Object Definition
Media Format	DICOM media format, see part 10 of DICOM standard
NEMA	National Electrical Manufacturers Association
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
Tag	A 32 bit integer consisting of a group/element pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
VR	Value Representation refers to a Tag, see part 5 of NEMA standard
VM	Value Multiplicity of tag, see part 5 of NEMA standard

1.0 Implementation model

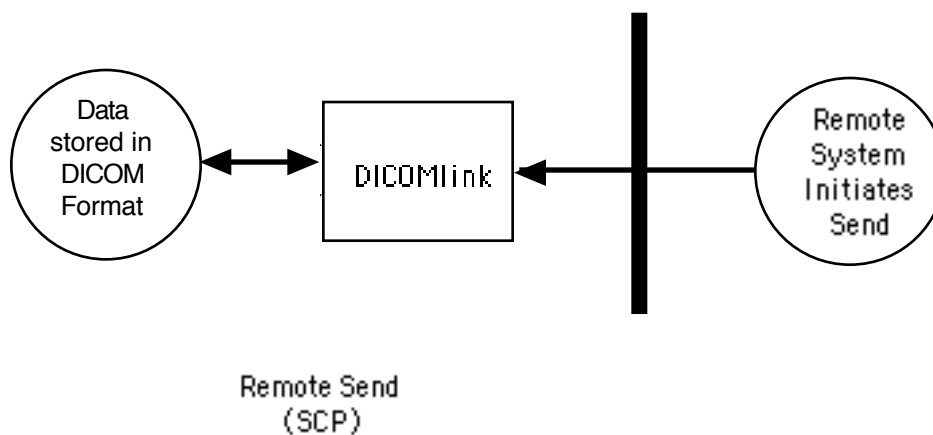
This implementation provides for simple reception of DICOM transmissions using the DICOM Storage Service Class as an SCP, and simple retrieval of images using the DICOM Query/Retrieve Service Class as an SCU. Verification service class is implemented as SCP only.

This software option basically allows data into the DELTAManager either by an operator on another DICOM capable system sending image data to the DELTAManager or by an operator at the DELTAManager querying a remote node for data.

1.1 Application Data Flow Diagram

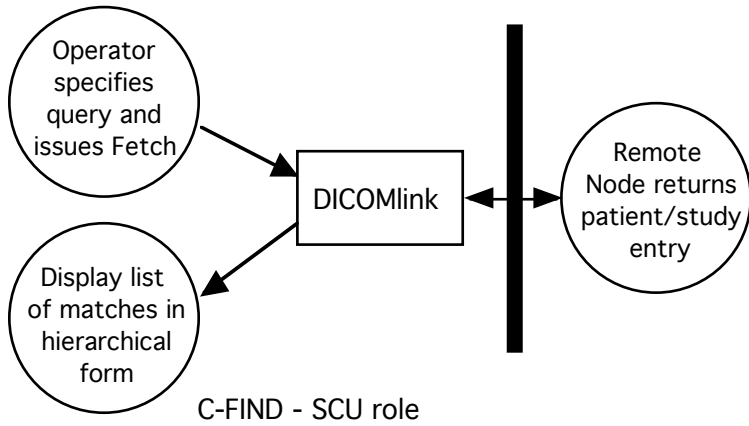
1.1.1 DICOMlink as storage SCP - Receiving Remote Data on the DELTAManager

Dataset transfers from a remote AE to the DELTAManager are initiated by the remote AE. No operator interaction is required on the DELTAManager. The SCP can be configured to store the data in DELTAManager or alternatively DICOM Media Format.

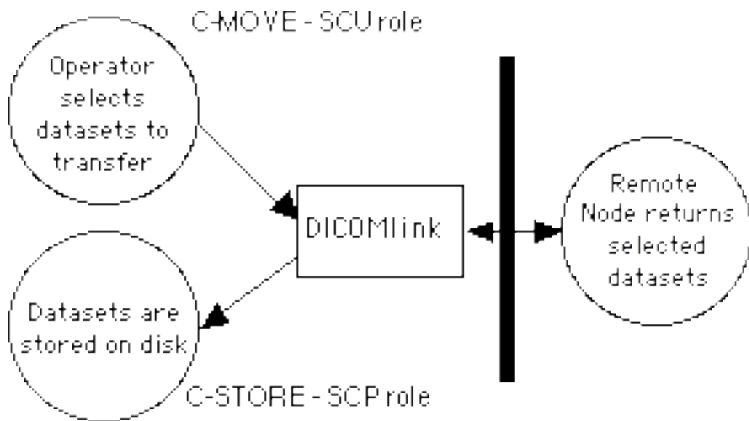


1.1.2 DICOMlink as Query/Retrieve SCU - Selecting and retrieving studies

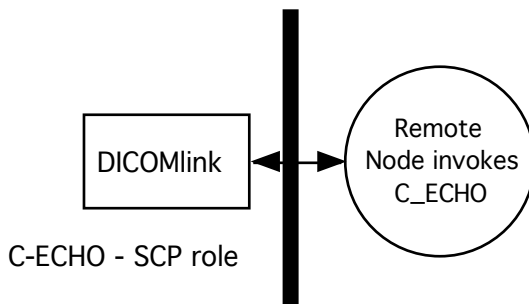
From the DICOMlink application operator may select a remote application entity along with search parameters. To query a remote node for matching studies. A list is displayed showing the matching sets.



From the list of matching studies, the operator may either select studies to retrieve, further refine the search or request a list of the series for a given study. If refining the search or requesting a list of series for a given study, another C_FIND service is requested as shown above. If studies or series are selected for retrieval, a C_MOVE as a SCU is issued for each object selected. The C_MOVE should cause the remote application entity to issue a C_STORE as a SCU for the objects specified. As below:



1.1.3 DICOMlink as Verification SCP - Servicing remote C_ECHO request



1.2 Functional Definitions of AE's

1.2.1 DICOMlink as storage SCP - Receiving Remote Data on the DELTAManager

DICOMlink provides for importing of data from remote systems. No operator intervention is required on the DELTAManager. The remote node initiates the transfer of data to the DELTAManager. The remote node acts as SCU.

As non-nuclear single image data is received an attempt is made to concatenate uniformly spaced slice data in the same DELTAManager dataset. This concatenation will only take place if the image slice data is transmitted in one association, the slices are uniformly spaced, and are identified as belonging to the same study.

The operator has the option of storing the data in DICOM Media Format or in a DICOM Stream format instead of DELTAManager format. Media format is described in Part 10 of the DICOM standard. Media Format is basically the transmitted group/elements prefaced by a 132 byte header (last 4 bytes are "DICM"). A directory file is not supported. DICOM Stream format is a file containing just the group/elements (ie. no Media Format header).

1.2.2 DICOMlink as Query/Retrieve SCU - Selecting and retrieving studies

Send query requests (C_FIND) to a remote application entity. Displays returned information on matching studies. Allows retrieval of studies via C_MOVE.

1.2.3 DICOMlink as Verification SCP - Servicing remote C_ECHO request

Response to all C_ECHO requests.

1.3 Sequencing of Real-World Activities

Not applicable.

2.0 AE Specifications

DICOMlink acts as a single AE. The operational parameters (including AE title and port number) of DICOMlink are derived from the DICOM Configuration Dialog that is accessible within the DICOMlink Application.

2.1 DICOMlink Specification

DICOMlink provides Standard Conformance to the following DICOM V3.0 SOP Storage Classes.

Table 1: Storage SOP Class

SOP Class Name	SOP Class UID	Role
CR Storage	1.2.840.10008.5.1.4.1.1.1	SCP
CT Storage	1.2.840.10008.5.1.4.1.1.2	SCP
MR Storage	1.2.840.10008.5.1.4.1.1.4	SCP
Ultrasound Storage	1.2.840.10008.5.1.4.1.1.6.1	SCP
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7	SCP

Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.2	SCP
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.3	SCP
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.4	SCP
Nuclear Medicine Storage	1.2.840.10008.5.1.4.1.1.20	SCP
PET Storage	1.2.840.10008.5.1.4.1.1.128	SCP

Table 2: Query/Retrieve Information Model (Study Root)

SOP Class Name	SOP Class UID	Role
C_FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCU

Table 3: Verification SOP Class

SOP Class Name	SOP Class UID	Role
Verification - C_ECHO	1.2.840.10008.1.1	SCP

2.1.1 Association Establishment Policies

2.1.1.1 General

This implementation will generally establish one association per SOP interaction. The operator initiates a query of a remote node by providing search criteria and selection of the remote node. Upon successful retrieval of a matching list of studies, the operator at the DELTAmanger may mark studies to be retrieved. The default maximum PDU size is 16384 bytes. This can be adjusted by the operator.

2.1.1.2 Number of Associations

The DICOMlink software will attempt or accept only one association at a time. An exception to this is during a C_MOVE operation of a query/retrieve; the subordinate C_STORE operation is processed while the C_MOVE is active.

2.1.1.3 Asynchronous Nature

There is no asynchronous activity in this implementation.

2.1.1.4 Implementation Identifying Information

DICOMlink will provide a single Implementation Class UID (tag [0002,0012]) which is "1.2.124.285.1."
 DICOMlink will provide an implementation version name of "DICOMlink <current SW version number>."

2.1.2 Association Initiation Policy

DICOMlink attempts to initiate a new association for each of the following.

Querying a remote node for matching studies

Retrieving studies from a remote node.

2.1.2.1 Real World Activity 1. Query a remote node for Image Data

2.1.2.1.1 Associated Real World Activity

The Associated Real World Activity is the operator specification of search criteria and a remote application entity to query. The DICOMlink software issues a request for a list of matching studies (C_FIND request).

2.1.2.1.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Find	1.2.840.10008.5.1.4.1.2.2.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		

2.1.2.1.3 SOP Specific Conformance

This implementation does not make use of any optional keys. Relational queries are not generated. The user selectable fields for query are 1) patient name, 2) patient id, 3) studyname and 4) a study date range.

2.1.2.2 Real World Activity 2. Retrieving Image Data from a remote node

2.1.2.2.1 Associated Real World Activity

The Associated Real World Activity is the operator selecting studies from a list of studies on a remote node and pressing the fetch button.

2.1.2.2.2 Proposed Presentation Contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Study Root Move	1.2.840.10008.5.1.4. 1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		

2.1.2.2.3 SOP Specific Conformance

This implementation provides standard conformance as SCU of C_MOVE.

2.1.3 Association Acceptance Policy

DICOMlink accepts association for each of the following real-world activities.

Remote application entity sends a data set. (C_STORE)

Remote application entity requests an echo. (C_ECHO)

2.1.3.1 Real World Activity 1. Receiving a Dataset

2.1.3.1.1 Associated Real-World Activity - C_STORE

The Real-World Activity associated with the C-STORE operation is the storage of the image data on the disk of the system upon which DICOMlink is running. DICOMlink reports an error message to the status window if it is unable to store the image data on disk.

2.1.3.1.2 Presentation Context Table

Any of the Presentation Contexts shown below are acceptable for DICOMlink to receive datasets.

Storage SCP Presentation Contexts for DICOMlink

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
CR Image	1.2.840.10008.5.1.4.1.1.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
CT Image	1.2.840.10008.5.1.4.1.1.2	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
MR Image	1.2.840.10008.5.1.4.1.1.4	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
US Image	1.2.840.10008.5.1.4.1.1.6.1	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
SC Image	1.2.840.10008.5.1.4.1.1.7 1.2.840.10008.5.1.4.1.1.7.2 1.2.840.10008.5.1.4.1.1.7.3 1.2.840.10008.5.1.4.1.1.7.4	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
NM Image	1.2.840.10008.5.1.4.1.1.20	Imp. VR Little Exp. VR Big Exp. VR Little	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

PET Image	1.2.840.10008.5.1.4.1.1.128	Imp. VR Little	1.2.840.10008.1.2	SCP	None
		Exp. VR Big	1.2.840.10008.1.2.2		
		Exp. VR Little	1.2.840.10008.1.2.1		

2.1.3.1.3 SOP Specific Conformance

2.1.3.1.3.1 SOP Specific Conformance to Storage SOP Classes

A DELTAManager file is created using the tags or elements in the received file. In the event of a successful C-STORE operation, the image(s) have been successfully written to disk in DELTAManager format. DELTAManager format retains all of the original DICOM Tags, most typically the DICOM Media Part 10 format (extension .dcm). When receiving a volume or single frame data DELTAManager will write the all of the single image dataset to a container file we is referred to as the Multiframe Format (extension .mff). The DELTAManager software, MedImport or MedFiler or MedView, will automatically incorporate this dataset into the DELTAManager's database without operator intervention.

DICOMlink will never delete a file that has been received; the duration of the storage of the dataset is determined by other users of the DELTAManager system.

If the C-STORE operation is unsuccessful, an informative error message is written to the status window.

<time> Rec'd to MedView format: <node> (NM): <dataset> -- Error <err #> in - <error text>

Lower level connection and communication information can be optionally routed to a file or the console window.

2.1.3.1.4 Presentation Context Acceptance Criterion

DICOMlink will always accept up to three Presentation contexts on an association provided that all of these Presentation Contexts specify the same Abstract Syntax. The acceptable Presentation Contexts, which DICOMlink may accept, are specified in section 2.1.3.1.2.

2.1.3.1.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

2.1.3.2 Real World Activity 2. Remote Verification

2.1.3.2.1 Associated Real-World Activity - C_ECHO

Remote node requests an ECHO from the DICOMlink node.

2.1.3.2.2 Presentation Context Table

Verification SCP Presentation Contexts for DICOMlink

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Verification	1.2.840.10008.1.1	Imp. VR Little	1.2.840.10008.1.2	SCP	None
		Exp. VR Big	1.2.840.10008.1.2.2		
		Exp. VR Little	1.2.840.10008.1.2.1		

2.1.3.2.3 SOP Specific Conformance

The software provided standard conformance to the DICOM Verification Service Class.

2.1.3.2.4 Presentation Context Acceptance Criterion

DICOMlink will always accept up to three Presentation contexts on an association provided that all of these Presentation Contexts specify the same Abstract Syntax.

2.1.3.2.5 Transfer Syntax Selection Policies

DICOMlink accepts all the possible transfer syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will accept the first matching context.

3.0 Communication Profiles

3.1 Supported Communications Stacks (Parts 8, 9)

The DICOMlink software provides DICOM V3.0 TCP/IP Network Communications Support as defined in PS 3.8 of the DICOM standard.

3.2 TCP/IP Stack

DICOMlink inherits the TCP/IP stack from the host operating system upon which it runs.

3.2.1 Physical media supported

DICOMlink is indifferent to the physical medium over which TCP/IP executes.

4.0 Extensions/Specializations/Privatizations

There are no Extensions or Specializations in this release.

The following private elements may be present in DICOM transmissions from a DELTAManager system. We specifically look for private group 0x0011. The private creator identification is "MEDIMAGE_DM" (0011,0010). The defined elements are below.

Attribute Name for Private Group 0x0011	Tag	Type	VR	VM
Study name	(0011,10b1)	3	LO	1
Filename used	(0011,10b2)	3	LO	1
Protocol matching fields from original dataset, part 1	(0011,10b3)	3	LO	1
Protocol matching fields from original dataset, part 2	(0011,10b4)	3	LO	1
SUV body weight slope	(0011,10b4)	3	LO	1
SUV lean body mass slope	(0011,10ba)	3	LO	1
SUV body surface area slope	(0011,10bb)	3	LO	1
Private Storage Type	(0011,10bc)	3	IS	1
Private Storage	(0011,10bd)	3	UN	1

DELTAManager utilizes DICOM data from many different sources. We sometimes have to rely on the vendors Private Groups for information that is not contained in the standard DICOM tags for one reason or another. We encourage senders to retain private groups regardless of the source.

5.0 Configuration

5.1 AE Title/Presentation Address Mapping - Remote Node definition

DICOMlink provides for definition and editing of the remote Application Entities or nodes. For each remote node the operator specifies the host name, service the application entity title, and the port number. The host name must be assigned a TCP/IP address either by the Host file contained within the System Folder or by a name server.

5.2 Configurable Parameters

5.2.1 DICOM Parameters

DICOMlink provides for configuration of the DICOM node within the DICOM application. The following parameters are configurable.

- Application Entity Title
- Port Number
- Maximum Connections
- Maximum PDU size
- DICOM Timeouts for: Connection, Reply, Release and Write
- Low level logging file name and size of logged info
- Selection of logging information

5.2.2 Transmit and Receive Parameters

DICOMlink provides for configuration of the DICOM node within the DICOM application. The following parameters are configurable.

- Format to Store Received Data: DELTAMANAGER, DICOM Stream or DICOM Media format
- Destination folder to store the received data file
- Selection of optional listing file, a file is generated for each dataset received.
- Message validation checking. One of three levels of validation can be performed: Errors, Errors and warnings, and Errors warning and info.

6.0 Support of Extended Character Sets

Extended character sets are not supported by this release.
