



DICOM 3.0
Conformance Statement
DICOMlink for
DELTAmanager – Send

Mac OS Part number: 500-505

Windows Part number: 500-514

Document #:

Copyright © 1996-2008 MedImage, Inc. All Rights Reserved.

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

tel: 734-665-5400

fax: 734-665-4115

web: www.medimage.com

Printed: 4/3/08 1:30 PM

Filename: DELTAmgr-Send Conf. v1.3.doc

Last Modified: 4/3/08 12:11 PM

Table of Contents

0.0 Introduction	3
0.1 Purpose of this Document	3
0.2 Definitions	3
1.0 Implementation model	5
1.1 Application Data Flow Diagram	5
1.1.1 DICOMlink as storage SCU - Sending DELTAManager data to a remote node	5
1.1.2 DICOMlink as Query/Retrieve SCP - Servicing remote Q/R request	5
1.1.3 DICOMlink as Verification SCP - Servicing remote C_ECHO request	6
1.2 Functional Definitions of AE's	6
1.2.1 DICOMlink as storage SCU - Sending DELTAManager data to a remote node	6
1.2.2 DICOMlink as Query/Retrieve SCP - Servicing remote Q/R request	6
1.2.3 DICOMlink as Verification SCP - Servicing remote C_ECHO request	6
1.3 Sequencing of Real-World Activities	7
2.0 AE Specifications	7
2.1 DICOMlink Specification	7
2.1.1 Association Establishment Policies	8
2.1.1.1 General	8
2.1.1.2 Number of Associations	8
2.1.1.3 Asynchronous Nature	8
2.1.1.4 Implementation Identifying Information	8
2.1.2 Association Initiation Policy	8
2.1.2.1 Real World Activity 1. Sending a DELTAManager Dataset	8
2.1.3 Association Acceptance Policy	11
2.1.3.1 Real World Activity 1. Remote Query	11
2.1.3.2 Real World Activity 2. Remote Fetch	12
2.1.3.3 Real World Activity 3. Remote Verification	13
3.0 Communication Profiles	15
3.1 Supported Communications Stacks (Parts 8, 9)	15
3.2 TCP/IP Stack	15
3.2.1 Physical media supported	15
4.0 Extensions/Specializations/Privatizations	15
5.0 Configuration	16
5.1 AE Title/Presentation Address Mapping - Remote Node definition	16
5.2 Configurable Parameters	16
5.2.1 DICOM Parameters	16
5.2.2 Transmit and Receive Parameters	16
6.0 Support of Extended Character Sets	16

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	Note Remote Queries are not case sensitive.
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 - Send to the DICOM 3.0 standard. DICOMlink for DELTAManager - Send is one of the two DICOM products offered for the DELTAManager. The other product is DICOMlink for DELTAManager – Receive. Any combination of these products may be purchased.

DELTAManager is a nuclear medicine review system. DICOMlink for DELTAManager - Send is a software option to the DELTAManager family of products that provides DICOM 3.0 services. DICOMlink for DELTAManager - Send provides for export of DELTAManager data to a remote DICOM enabled node.

DICOMlink for DELTAManager - Send

C_STORE as SCU
C_FIND and C_MOVE as SCP -- **MAC OS only**
C_ECHO as SCP

Other DICOMlink for DELTAManager options:

DICOMlink for DELTAManager - Receive (Mac OS Part number: 500-510)
DICOMlink for DELTAManager - Receive (Windows Part number: 500-512)

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

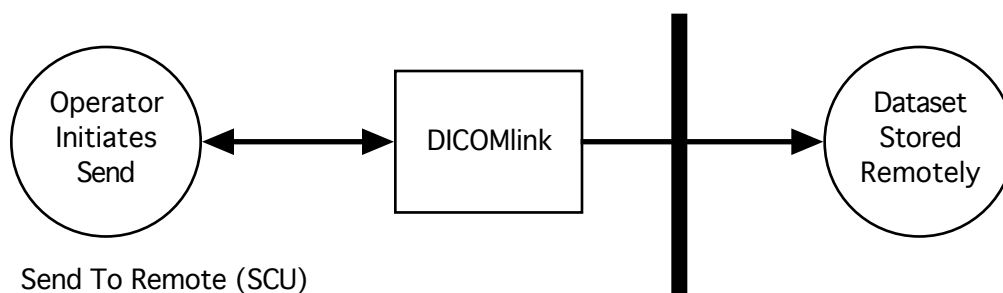
This implementation provides for simple transfer of datasets using the DICOM Storage Service Class as an SCU, and simple management of images using the DICOM Query/Retrieve Service Class as a SCP. Verification service class is implemented as SCP only.

The operator initiates data transfers from the DELTAManager to a remote AE by selecting datasets from the DELTAManager Patient list. Alternatively a remote node can query and retrieve datasets from the DELTAManager.

1.1 Application Data Flow Diagram

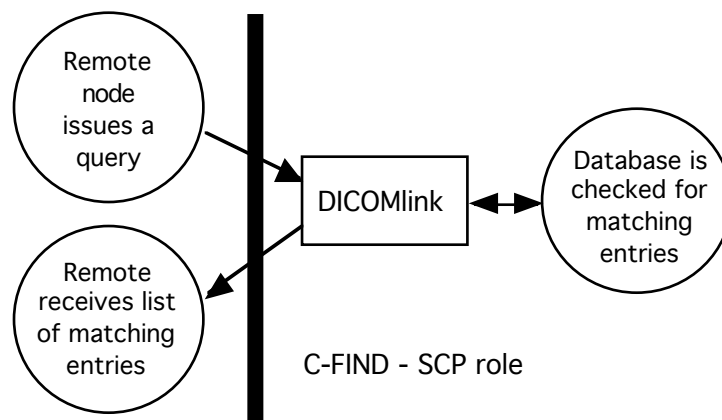
1.1.1 DICOMlink as storage SCU - Sending DELTAManager data to a remote node

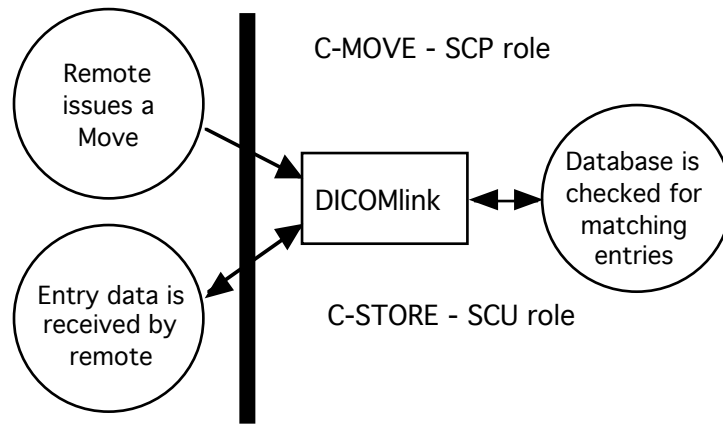
Dataset transfers from the DELTAManager to a remote AE are started when the operator selects a set of patients or datasets to transfer with the DELTAManager database function, and then selects the DICOM transfer function.



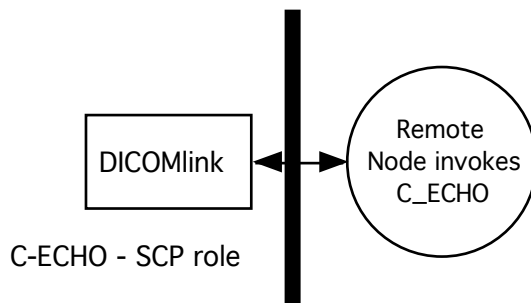
1.1.2 DICOMlink as Query/Retrieve SCP - Servicing remote Q/R request -- **Mac OS only**

As remote C_FIND and C_MOVE requests are received they are processed.





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 SCU - Sending DELTAmanger data to a remote node

When a send is initiated, the operator is presented with the DELTAmanger patient list from the DICOMlink launch volume. The operator may select whole patient visits or individual data sets. Also a pop-up menu allows the operator to pick the remote AE or node to transfer the data sets to. Once the data sets are selected and the destination node is selected, the operator pushes the send button to initiate the transfer. For each data set selected the DICOMlink software: 1) translates the native DELTAmanger dataset into a DICOM message; 2) makes an association with the remote AE; 3) negotiates the Presentation Context; 4) initiates a C-STORE request and 5) closes the association.

1.2.2 DICOMlink as Query/Retrieve SCP - Servicing remote Q/R request

Supports the remote query and retrieval requests, C_MOVE and C_FIND. The scope of query may be restricted to the volume the application was launched from, all local volumes or all mounted volumes.

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
CT Storage	1.2.840.10008.5.1.4.1.1.2	SCU
MR Storage	1.2.840.10008.5.1.4.1.1.4	SCU
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7	SCU
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.2	SCU
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.3	SCU
Secondary Capture Storage	1.2.840.10008.5.1.4.1.1.7.4	SCU
Nuclear Medicine Storage	1.2.840.10008.5.1.4.1.1.20	SCU

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

SOP CLASS NAME	SOP CLASS UID	ROLE
C_FIND	1.2.840.10008.5.1.4.1.2.2.1	SCP
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP

Table 3: 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	SCP
C_MOVE	1.2.840.10008.5.1.4.1.2.2.2	SCP

Table 4: Query/Retrieve Information Model (Patient/Study Only)

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

Table 5: 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 transfer by selecting DELTAManager image data (including most manufacturer save screens) and a destination AE. An association is made for each dataset selected for transfer.

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

DICOMlink will only send a single dataset during an association. 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.

Sending a DELTAManager Dataset to a remote node.

2.1.2.1 Real World Activity 1. Sending a DELTAManager Dataset

2.1.2.1.1 Associated Real World Activity

The Associated Real World Activity is the operator selection of datasets to transfer. The DICOMlink software sends the image dataset (C-STORE request).

2.1.2.1.2 Proposed Presentation Contexts

Proposed Presentation contexts for DICOMlink

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
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	SCU	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	SCU	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	SCU	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	SCU	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	SCU	None
PET Image	1.2.840.10008.5.1.4.1.1.128	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	SCU	None

2.1.2.1.3 SOP Specific Conformance

If DICOMlink is unable to open an association for a particular file, two lines of the following form are written to the status window.

<time> Sending to <hostname> (NM): <studyname> -- Error: <err #> in - <error text>

And then it continues with the next file.

When a successful response to a C-STORE operation is received, a single line of the following form is written to the status window.

<time> Sending to <hostname> (NM): <studyname>, OK

When a failed or refused response to a C-STORE operation is received, two lines of the following form are written to the status window.

<time> Sending to <hostname> (NM): <studyname> -- Error: <err #> in - <error text>

DICOMlink will continue with the next file.

DICOMlink will not attempt any extended negotiation.

DELTAmanager generated image files are either Nuclear Medicine Image Objects using the NM Image IOD or Secondary Capture Image Objects. The following optional elements (Type 3) may be included:

Optional Elements

Tag	Name	Notes
[0008,0080]	Institution Name UID	If available
[0008,1010]	Station Name	If available
[0008,1030]	Study Description	If available
[0008,103E]	Series Description	If available
[0008,1040]	Institutional Department Name	If available
[0008,1060]	Name of Physician Reading Study	If available
[0008,1070]	Operator's Name	If available
[0010,1010]	Patient's Age	If available
[0010,1020]	Patient's Size	If available
[0010,1030]	Patient's Weight	If available
[0018,1030]	Protocol Name	If available
[0028,0106]	Smallest Image Pixel Value	Always
[0028,0107]	Largest Image Pixel Value	Always
[0028,0108]	Smallest Pixel Value in Series	Always

[0028,0109]	Largest Pixel Value in Series	Always
[0028,1050]	Window Center	Always
[0028,1051]	Window Width	Always

2.1.3 Association Acceptance Policy

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

Remote application entity queries for matching datasets. (C_FIND) -- **MAC OS only**

Remote application entity requests a dataset. (C_MOVE) -- **MAC OS only**

Remote application entity requests an echo. (C_ECHO)

2.1.3.1 Real World Activity 1. Remote Query

2.1.3.1.1 Associated Real-World Activity - C_FIND

2.1.3.1.2 Presentation Context Table

Query SCP Presentation Contexts for DICOMlink

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Patient/Study Root Find	1.2.840.10008.5.1.4.1.2.3.1	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
Patient Root Find	1.2.840.10008.5.1.4.1.2.1.1	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
Study Root Find	1.2.840.10008.5.1.4.1.2.2.1	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

2.1.3.1.3 SOP Specific Conformance

This implementation does not make use of any optional keys. Relational queries are not supported. Required and unique fields and matching criteria are supported at the patient and study level. The accession number is not supported by DICOMlink for query. If an accession number is specified it is ignored. On the DELTAManager, the folder name for a patient visit consists of a possibly shortened version of the patient name, patient ID, protocol (study ID) and visit date. These concatenated entries are used for the remote queries. Using wildcards on the remote end is recommended. String comparisons are not case sensitive.

At the series and study search level, no matching is performed. That is at these levels all entries are returned.

As part of configuration of the DICOMlink software, the scope of the search can be limited to 1) the volume the application was launched from, 2) all local volumes or 3) all mounted volumes (includes networked volumes).

2.1.3.1.4 Presentation Context Acceptance Criterion

Remote Application Entity may not mix Storage and Query presentation syntaxes. If a mixture of C_STORE and C_FIND syntaxes is presented, the program assumes a C_STORE operation will follow. In this case if a C_FIND operation is attempted, the message is rejected.

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 Fetch

2.1.3.2.1 Associated Real-World Activity - C_MOVE

2.1.3.2.2 Presentation Context Table

Retrieve SCP Presentation Contexts for DICOMlink

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	DICOM	UID List		
Patient/Study Root Move	1.2.840.10008.5.1.4.1.2.3.3	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
Patient Root Move	1.2.840.10008.5.1.4.1.2.1.2	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

Study Root Move	1.2.840.10008.5.1.4.1.2.2.2	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
-----------------	-----------------------------	---	---	-----	------

2.1.3.2.3 SOP Specific Conformance

DICOMlink will accept any number of the SOP classes listed above.

2.1.3.2.4 Presentation Context Acceptance Criterion

Remote Application Entity may not mix Storage and Query presentation syntaxes. If a mixture of C_STORE and C_MOVE syntaxes is presented, the program assumes a C_STORE operation will follow. In this case if a C_MOVE operation is attempted, the message is rejected.

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.

2.1.3.3 Real World Activity 3. Remote Verification

2.1.3.3.1 Associated Real-World Activity - C_ECHO

Remote node requests an ECHO from the DICOMlink node.

2.1.3.3.2 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 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

2.1.3.3.3 SOP Specific Conformance

DICOMlink provides standard conformance to the DICOM Verification Service Class.

2.1.3.3.4 Presentation Context Acceptance Criterion

DICOMlink provides standard

2.1.3.3.5 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.

Images created in DICOM Media format on DELTAmanger systems will have a private group 0x0011 added. 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. When forwarding received DICOM data to another DICOM station we retain any Private Groups that were contained in the original DICOM data.

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.