



DICOM Conformance Statement

I-Reach 4.2

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DICOM Conformance Statement

Cedara I-Reach™

Version 4.2

Table of Contents

1. INTRODUCTION.....4

1.1 PURPOSE OF THIS DOCUMENT.....4

1.2 RELATED DOCUMENTS4

1.3 DEFINITIONS.....4

1.4 ACRONYMS AND ABBREVIATIONS4

1.5 IMPORTANT NOTE TO THE READER.....4

2. IMPLEMENTATION MODEL6

2.1 APPLICATION DATA FLOW DIAGRAM.....6

2.2 FUNCTIONAL DEFINITIONS OF APPLICATION ENTITIES8

2.3 SEQUENCING OF REAL-WORLD ACTIVITIES9

3. APPLICATION ENTITY SPECIFICATIONS10

3.1 I-REACH MANUAL MOVE APPLICATION ENTITY SPECIFICATION10

3.1.1 *Association Establishment Policies*10

3.1.1.1 General.....10

3.1.1.2 Number of Associations.....10

3.1.1.3 Asynchronous Nature10

3.1.1.4 Implementation Identifying Information.....10

3.1.1.4.1 Find Request.....10

3.1.1.4.2 Move Request.....11

3.1.2 *Association Initiation by Real-World Activity*11

3.1.2.1 Manual Study Move.....11

3.1.2.1.1 Associated Real-World Activity.....11

3.1.2.1.2 Proposed Presentation Contexts.....11

3.1.2.1.3 SOP Specific Conformance for Patient Root Query/Retrieve Model - FIND.....12

3.1.2.1.4 SOP Specific Conformance for Study Root Query/Retrieve Model - FIND12

3.1.2.1.5 SOP Specific Conformance for Patient Root Query/Retrieve Model - MOVE13

3.1.2.1.6 SOP Specific Conformance for Study Root Query/Retrieve Model - MOVE.....13

3.1.3 *Association Acceptance Policy*13

3.2 I-REACH AUTOMATED APPLICATION ENTITY SPECIFICATION13

3.2.1 *Association Establishment Policies*13

3.2.1.1 General.....13

3.2.1.2 Number of Associations.....13

3.2.1.3 Asynchronous Nature13

3.2.1.4 Implementation Identifying Information.....14

3.2.1.4.1 Find Request.....14

3.2.2 *Association Initiation by Real-World Activity*14

3.2.2.1 View Study Worklist and Load Images14

3.2.2.1.1 Associated Real-World Activity.....14

3.2.2.1.2 Proposed Presentation Contexts.....14

3.2.2.1.3 SOP Specific Conformance for Patient Root Query/Retrieve Model - FIND.....15

3.2.3 *Association Acceptance Policy*.....15

4. COMMUNICATION PROFILES17

4.1 SUPPORTED COMMUNICATION STACKS (PARTS 8,9)17

4.1.1 *TCP/IP Stack*17

4.1.1.1 API.....17

4.1.1.2 Physical Media Support.....17

5. EXTENSIONS/SPECIALIZATION'S/PRIVATIZATION'S18

5.1 STANDARD/EXTENDED/SPECIALIZED/PRIVATE SOPS18

5.2 PRIVATE TRANSFER SYNTAX'S18

6. CONFIGURATION.....19

6.1 I-REACH CLIENT APPLICATION ENTITY CONFIGURATION 19

7. SUPPORT OF EXTENDED CHARACTER SETS.....20

1. Introduction

1.1 Purpose of this Document

This document is the DICOM Conformance Statement for I-Reach 4.2. The I-Reach product includes both a Web Server and a Client. Both components include DICOM functionality that will be described here.

The product also includes a data storage and management subsystem called I-Store. For the DICOM conformance of I-Store, please refer to “DICOM Conformance Statement Cedara I-Store for Windows Version 4.2, 2005-01248, Rev 3.0, 2006”

1.2 Related Documents

- The Digital Imaging and Communications in Medicine (DICOM) standard. NEMA 1999 and Supplements.
- System Requirements Document for Cedara I-Reach, William Lingley, 2005-05004, Rev. 1.0, 2006/1/27.
- DICOM Conformance Statement Cedara I-Store for Windows Version 4.2, 2005-01248, Rev 3.0, 2006

1.3 Definitions

DICOM terms are used throughout this Conformance Statement. For a description of these, consult the DICOM standard publication.

Word	Definition

1.4 Acronyms and Abbreviations

DICOM abbreviations are used throughout this Conformance Statement. For a description of these, consult the DICOM standard publication.

Acronym	Meaning
I-Reach 4.2	Product name

1.5 Important note to the reader

The use of this conformance statement by itself does not guarantee successful interoperability of Cedara™ products with equipment from other vendors. The user or integrator of Cedara™ products should keep the following issues in mind:

1. Successful interoperability of the I-Reach 4.2 with other devices may require functions which are not specified within the scope of DICOM. It is the user’s or integrator’s

responsibility to ensure that the proper analysis and validation is performed to verify the connection.

2. Test procedures should be used to verify that data transferred into a CedaraTM software is correct. This is often done with the aid of phantom scans using a variety of clinical protocols.
3. Test procedures should be used to verify connectivity. Issues such as database full and broken connections should be verified.
4. CedaraTM Software Corp. maintains a list of DICOM Applications which have been verified for connectivity and inter-operability correctness. The current list is available from the appropriate Product Manager. The current version of this DICOM Conformance Statement is also available on the CedaraTM Software Corp. web page at <http://www.cedara.com>
5. The DICOM standard will continually evolve to meet new user requirements. CedaraTM will follow the changes in the standard by implementing new features as specified by the standard. CedaraTM reserves the right to make changes to its products or to discontinue its delivery. The user or integrator should ensure that any non- CedaraTM device providers, which connect with CedaraTM devices, should also follow the standard. Failure to do so will likely result in future connectivity problems.

2. Implementation Model

The I-Reach 4.2 from Cedara™ Software Corp. contains software components that allow the user to read medical information.

The system architecture is illustrated in Figure 1. The I-Reach Client is used by end-users to review medical imaging studies. The I-Reach Client makes requests to the I-Reach Web Server via HTTP(S) for various operations, including operations that result in DICOM communications. Images are delivered to the client via HTTP(S) protocol.

The I-Reach Server is not directly used by end-users, but rather is used via a web browser on a remote computer. The I-Reach Server reacts to requests to manually move imaging studies to itself, view a user’s list of imaging studies to be reviewed, and to load imaging studies to be viewed on the client (among other things). These three activities can cause DICOM communication to occur.

The I-Store Image Cache Server communicates via DICOM in a number of ways, but this is outside of the scope of this document. Please refer to the I-Store document for more details.

The I-Reach Web Server and I-Store Image Cache Server can be on the same or different machine.

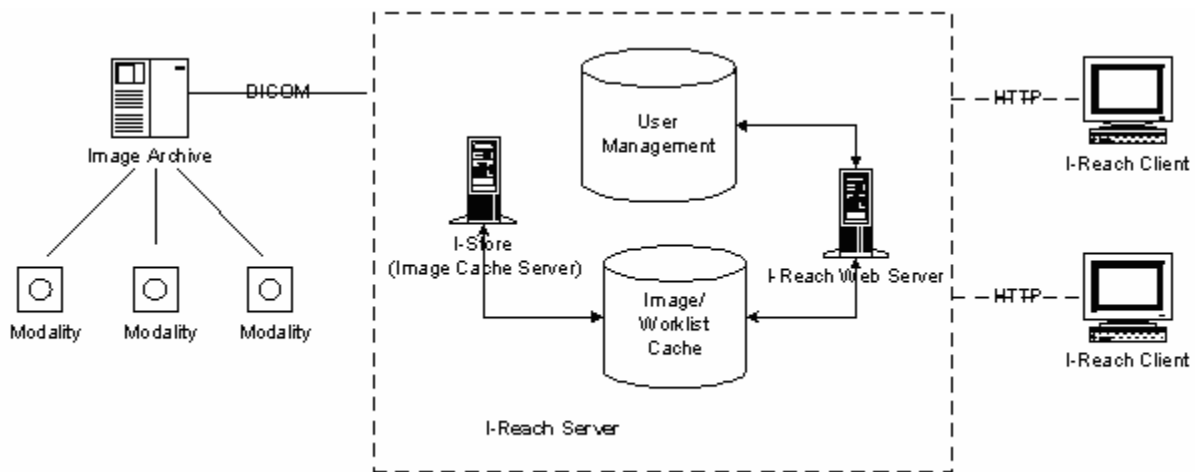


Figure 1 Transferring Image via HTTP Protocol

2.1 Application Data Flow Diagram

The diagram for the Implementation Model is shown in Figure 2.

The I-Reach Client allows the user to access a 3rd party DICOM system to query for imaging studies of interest and cause them to be moved to the I-Reach Server. This is a manual operation, and results in DICOM C-FIND and C-MOVE requests respectively.

If the I-Reach Web Server is configured to communication with a 3rd party DICOM system, C-FIND requests will be issued to that system to search for imaging studies. If the user chooses to load a study found on that system, a C-MOVE request will be issued to move that study to the local I-Reach system, however this C-MOVE is performed via I-Store functionality and is not covered here.

This I-Reach Web Server configuration can result from two different installation types; an OEM integration where the 3rd party DICOM system is the one and only primary source of data, or a multi-site configuration where one or more 3rd party DICOM systems and I-Reach systems can be used transparently as direct data sources.

2.2 Functional Definitions of Application Entities

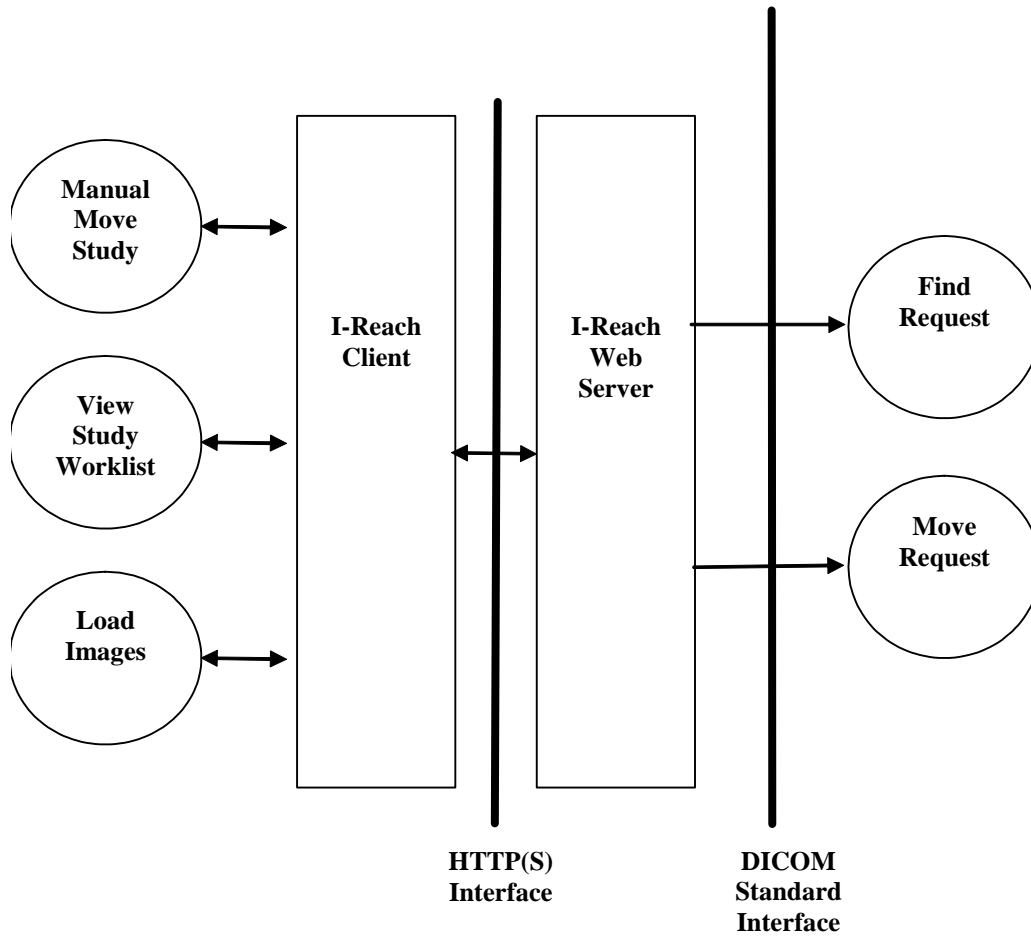


Figure 2. Application Entity Implementation Model

2.3 Sequencing of Real-World Activities

Not applicable.

3. Application Entity Specifications

I-Reach Web Server capability consists of two logical components. One SCU originates associations for the C-FIND operation only. This is referred to as the Manual Move Application Entity. The second SCU originates associations for both C-FIND and C-MOVE operations. This is referred to as the Automated Application Entity. These, together, are treated as one Application Entity with respect to naming and identity.

Even if the I-Reach Web Server and I-Store Image Cache Server co-exist on the same machine, they are treated as separate Application Entity.

3.1 I-Reach Manual Move Application Entity Specification

I-Reach Client capability consists of one logical component. The SCU originates associations for the C-Find and C-Move operations. This is treated as one Application Entity.

The I-Reach Web Server Application Entity provides Standard Conformance to the following DICOM V3.1 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1
Patient Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2

Table 1 Supported SOP Classes as SCU

3.1.1 Association Establishment Policies

3.1.1.1 General

I-Reach Client can be configured for only one remote Application Entities needed for DICOM Find and Move operations. The configuration includes parameters such as AE Title, host name and port number.

The maximum PDU size is 65536 bytes.

3.1.1.2 Number of Associations

I-Reach Client can initiate only one association concurrently.

3.1.1.3 Asynchronous Nature

I-Reach Client does not support asynchronous operations and will not perform asynchronous window negotiation.

3.1.1.4 Implementation Identifying Information

3.1.1.4.1 Find Request

The I-Reach Client implementation class UID is 2.16.124.113531.1.8.

The I-Reach Client implementation version name is CedaraDdProv1.0.

3.1.1.4.2 Move Request

The I-Reach Client implementation class UID is 2.16.124.113531.1.1.1.

The I-Reach Client implementation version name is Dcim 1.0.

3.1.2 Association Initiation by Real-World Activity

3.1.2.1 Manual Study Move

3.1.2.1.1 Associated Real-World Activity

Via the “Archive” user interface within the I-Reach Client, the user can manually query for studies on a 3rd party DICOM system and move selected studies to the I-Reach system.

The user uses this “Archive” interface to set query criteria and issue a C-FIND request to find studies matching these criteria. The results of the query are displayed to the user. From this list of studies, the user can select one or more and initiate a C-MOVE of those selected studies to the I-Store Image Cache Server.

3.1.2.1.2 Proposed Presentation Contexts

The following table describes the Presentation Contexts that may be presented for the Find request.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query / Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query / Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

Table 2 Presentation Context for the Find Request

The following table describes the Presentation Contexts that may be presented for the Move request.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

Table 3 Presentation Context for the Move Request

3.1.2.1.3 SOP Specific Conformance for Patient Root Query/Retrieve Model - FIND

The I-Reach Web Server does not use Relational Query.

The I-Reach Web Server does not use Extended Negotiation.

The Keys used in the query are listed below:

Patient Level Keys

Description	Tag	Type
Patient Name	(0010,0010)	R
Patient ID	(0010,0020)	U

Study Level Keys

Description	Tag	Type
Modalities in Study	(0008,0061)	O
Study Date	(0008,0020)	R

3.1.2.1.4 SOP Specific Conformance for Study Root Query/Retrieve Model - FIND

The I-Reach Web Server does not use Relational Query.

The I-Reach Web Server does not use Extended Negotiation.

The Keys used in the query are listed below:

Patient Level Keys

Description	Tag	Type
Patient Name	(0010,0010)	R
Patient ID	(0010,0020)	U

Study Level Keys

Description	Tag	Type
Modalities in Study	(0008,0061)	O
Study Date	(0008,0020)	R

3.1.2.1.5 SOP Specific Conformance for Patient Root Query/Retrieve Model - MOVE

This implementation supports transfers against the Patient Query/Retrieve Information Model described in Section C.6.1.1 of NEMA PS3.4 (1996) Annex C using the C-MOVE SCU behavior described in Section C.4.2.2 of NEMA PS3.4 (1996) Annex C.

3.1.2.1.6 SOP Specific Conformance for Study Root Query/Retrieve Model - MOVE

This implementation supports transfers against the Study Query/Retrieve Information Model described in Section C.6.2.1 of NEMA PS3.4 (1994) Annex C using the C-MOVE SCU behavior described in Section C.4.2.2 of NEMA PS3.4 (1994) Annex C.

3.1.3 Association Acceptance Policy

I-Reach Web Server does not accept any association.

3.2 I-Reach Automated Application Entity Specification

The I-Reach Web Server Application Entity provides Standard Conformance to the following DICOM V3.1 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Study Root Query/Retrieve Model - FIND	1.2.840.10008.5.1.4.1.2.2.1

Table 4 Supported SOP Classes as SCU

3.2.1 Association Establishment Policies

3.2.1.1 General

I-Reach Web Server can be configured to access one or more Application Entities needed for DICOM C-FIND operations. The configuration includes parameters such as AE Title, host name and port number.

The maximum PDU size is 65536 bytes.

3.2.1.2 Number of Associations

I-Reach Web Server can initiate multiple associations concurrently.

3.2.1.3 Asynchronous Nature

I-Reach Web Server does not support asynchronous operations and will not perform asynchronous window negotiation.

3.2.1.4 Implementation Identifying Information

3.2.1.4.1 Find Request

The I-Reach Web Server implementation class UID is 2.16.124.113531.9.

The I-Reach Web Server implementation version name is “OE ver 1.0”.

3.2.2 Association Initiation by Real-World Activity

3.2.2.1 View Study Worklist and Load Images

3.2.2.1.1 Associated Real-World Activity

Associations used for C-FIND requests are initiated in two scenarios:

- the user views their worklist of studies to be reviewed and one or more of the data sources is a 3rd party DICOM system, or
- a study is loaded in an OEM integration configuration and the study does not exist in the I-Store Image Cache Server.

In these situations, the I-Reach Web Server will initiate a Find to the 3rd party DICOM system(s) to find the studies of interest.

3.2.2.1.2 Proposed Presentation Contexts

The following table describes the Presentation Contexts that may be presented for the Find request.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2. 2.2	Implicit VR, Little Endian	1.2.840.10008. 1.2	SCU	None

Table 5 Presentation Context for the Find Request

The following table describes the Presentation Contexts that may be presented for the Move request.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Query / Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

Table 6 Presentation Context for the Move Request

3.2.2.1.3 SOP Specific Conformance for Patient Root Query/Retrieve Model - FIND

The I-Reach Web Server does not use Relational Query.

The I-Reach Web Server does not use Extended Negotiation.

The Keys used in the query are listed below:

Patient Level Keys

Description	Tag	Type
Patient's ID	(0010,0010)	U
Patient's Name	(0010,0020)	R
Patient's Date of Birth	(0010,0030)	O

Study Level Keys

Description	Tag	Type
Study Instance UID	(0020,000D)	U
Study ID	(0020,0010)	R
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Modalities In Study	(0008,0061)	O
Referring Physician	(0008,0090)	O
Study Description	(0008,1030)	O
Reading Physician	(0008,1060)	O

Series Level Keys

Description	Tag	Type
Series Instance UID	(0020,000E)	U

3.2.3 Association Acceptance Policy

I-Reach Web Server does not accept any assoication.

4. Communication Profiles

4.1 Supported Communication Stacks (Parts 8,9)

The DICOM services provide DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

4.1.1 TCP/IP Stack

The I-Reach 4.2 DICOM services inherit its TCP/IP stack from the Windows OS system upon which they execute.

4.1.1.1 API

The implementation uses Berkeley style sockets.

4.1.1.2 Physical Media Support

The implementation is not dependent on the physical medium used for the TCP/IP network.

5. Extensions/Specialization's/Privatization's

5.1 Standard/Extended/Specialized/Private SOPs

Not applicable

5.2 Private Transfer Syntax's

No Private Transfer Syntax's are used.

6. Configuration

6.1 I-Reach Client Application Entity Configuration

I-Reach 4.2 Installation and Configuration Guide, supplied with the product, define the available configuration parameters.

Application entity host names can be specified as either IP address or host name.

The port number to listen on for association requests is configurable.

7. Support of Extended Character Sets

This implementation supports the following extended character set:

ISO-IR 100 = Latin alphabet No. 1, supplementary set.