DICOM Conformance Statement

for MARIE Server

MARIE PACS Digital solution by OR-CZ

August 2016

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0 Introduction

0.1 Scope and Field of Application

This document is the DICOM Conformance Statement for the MARIE Server product of OR-CZ s.r.o. The purpose of this document is to descibe how the MARIE Server application collaborates in a DICOM network with other Medical Imaging applications that conform to the DICOM 3.0 standard.
DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3-1993 and PS 3.4-1994.

0.2 References

The Digital Imaging and Communications in Medicine (DICOM) standard: National Electrical Manufacturers Association (NEMA) PS 3.X (X refers to the part 1 - 16), supplements and correction proposals.

0.3 Definitions

The Digital Imaging and Communications in Medicine (DICOM) standard: National Electrical Manufacturers Association (NEMA) PS 3.X (X refers to the part 1 - 16), supplements and correction proposals.

0.4 Symbols and Abbreviations

The Digital Imaging and Communications in Medicine (DICOM) standard: National Electrical Manufacturers Association (NEMA) PS 3.X (X refers to the part 1 - 16), supplements and correction proposals.

1 Implementation model

MARIE Server provides the following features:

- The application serves as a short and long term archive for images. It accepts images from external sources and stores them for later retrieval.
- The application has no deletion mechanism. Images/studies are deleted by hand.

The image server uses DICOM as the interface to the external world. The server accepts DICOM association requests for the purpose of storing images and for image query and retrieve. The image server will initiate DICOM association requests for the purpose of sending images to an external server. The image server does not respond to any other type of network communication.

1.1 Application Data Flow

The image server provides for storage and query/retrieval of images. It runs on Unix systems as a background process that accepts association requests from external applications. For each association request, the image server forks a copy of itself so that the copy communicates exclusively with the requesting application. The image server will initiate a DICOM association in response to a move request from an external application.
The image server (image_server) is invoked from the command line. The single mandatory argument is the TCP/IP port number used to accept network connections.

Figure 1 shows the relationship of the image server application to external applications. As noted above, the image server does not initiate any action except in response to requests which are received via DICOM communication.

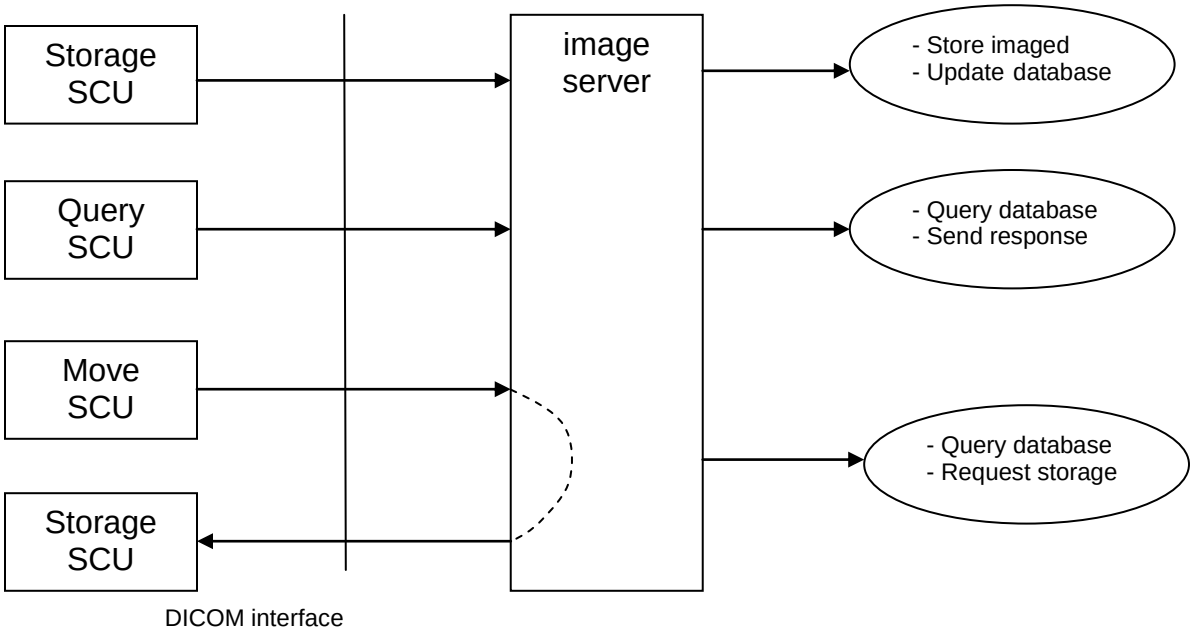

Figure 1. *image server* **Implementation Model**

1.2 Functional Definition of Application Entities

The image server waits for another application to connect at the TCP/IP port number specified when the application is initiated. When another application makes a DICOM association request, the image server uses a control database and logic to verify the request:

1. The image server uses a control table to verify that the Called Application Title used in the association request is defined on the node (Unix host-name) upon which the image server is running.

2. The image server uses a control table to lookup the application defined by the Calling Application Title in the association request. The image server verifies that the node from which the call originated matches the value stored in the control table.

3. The image server verifies that the calling application has access rights for the SOP classes proposed (write access for storage, read access for query retrieve).

1.3 Sequencing of Real-World Activities

The image server has no way of knowing when it has a complete study or what constitutes a complete study. If it receives an image query while also receiving storage requests, the query response may not include all of the images that are in the study.

2 Application Entity Specifications

2.1 AE MARIE Server Specification

The MARIE Server Application Entity provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCU:

TABLE 1. SOP Classes Supported by Image Server as an SCU

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1
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 X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray 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
Enhanced CT	1.2.840.10008.5.1.4.1.1.2.1
Ultrasound Multi-frame Image Storage 1993	1.2.840.10008.5.1.4.1.1.3
Nuclear Medicine Image Storage 1993	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage 1993	1.2.840.10008.5.1.4.1.1.6
Waveform Storage – Trial 1993	1.2.840.10008.5.1.4.1.1.9.1
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
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
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
Ultrasound Multi-frame Image Storage 1993	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Nuclear Medicine 1993 Image Storage	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage 1993	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
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
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
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 Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
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
Enhanced MR	1.2.840.10008.5.1.4.1.1.4.1
CT Image Storage	1.2.840.10008.5.1.4.1.2
Ultrasound Multi-Frame Image	1.2.840.10008.5.1.4.1.3
MR Image Storage	1.2.840.10008.5.1.4.1.4
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.6
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.7
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20
X-Ray Angiographic Image	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
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31
GE private 3D object	1.2.840.113619.4.26

The MARIE Server Application Entity provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

TABLE 2. SOP Classes Supported by Image Server as an SCP

SOP Class Name	SOP Class UID
Verification SOP Class	1.2.840.10008.1.1
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1
Stored Print Storage SOP Class	1.2.840.10008.5.1.1.27
Hardcopy Grayscale Image Storage SOP Class	1.2.840.10008.5.1.1.29
Hardcopy Grayscale Image Storage SOP Class	1.2.840.10008.5.1.1.30
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1
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 X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray 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
Enhanced CT	1.2.840.10008.5.1.4.1.1.2.1
Ultrasound Multi-frame Image Storage 1993	1.2.840.10008.5.1.4.1.1.3
Nuclear Medicine Image Storage 1993	1.2.840.10008.5.1.4.1.1.5
Ultrasound Image Storage 1993	1.2.840.10008.5.1.4.1.1.6
Waveform Storage – Trial 1993	1.2.840.10008.5.1.4.1.1.9.1
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
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
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
Ultrasound Multi-frame Image Storage 1993	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Nuclear Medicine 1993 Image Storage	1.2.840.10008.5.1.4.1.1.5

Ultrasound Image Storage 1993	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
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
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
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 Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
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
Enhanced MR	1.2.840.10008.5.1.4.1.1.4.1
CT Image Storage	1.2.840.10008.5.1.4.1.2
Ultrasound Multi-Frame Image	1.2.840.10008.5.1.4.1.3
MR Image Storage	1.2.840.10008.5.1.4.1.4
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.6
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.7
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20
X-Ray Angiographic Image	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
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31
GE private 3D object	1.2.840.113619.4.26
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2
Patient Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.1.3
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2
Study Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.2.3
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2
Patient/Study Only Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.3.3

2.1.1 Association Establishment Policies

2.1.1.1 General

The MARIE Server will attempt to initiate associations in response to C-MOVE requests from other Application Entities. The MARIE Server will only initiate associations in reponse to valid C-MOVE requests for images that are known to the server (stored in its database).

The maximum PDU size which can be transmitted by the MARIE Server is fixed at 16KB. The default maximum PDU size which can be received by the MARIE Server is configurable with a default value of 16KB and a maximum value of 32KB.

2.1.1.2 Number of Associations

The number of simultaneous associations which will be accepted by the MARIE Server are limited only by the kernel parameters of the underlying TCP/IP implementation. The image server will spawn a new process for each association request that it receives. Therefore, the MARIE Server can have multiple simultaneous connections, and there is no inherent limitation on the total number of simultaneous associations which the MARIE Server can maintain.
The MARIE Server does limit each external Application Entity to no more than two simultaneous associations.

2.1.1.3 Asynchronous Nature

The MARIE Server does not support asynchronous operations and will not perform asynchronous window negotiation.

2.1.1.4 Implementation Identifying Information

The MARIE Server will provide an implementation class UID which is 1.2.840.113654.2.3.1995.2.8.5.
The MARIE Server will provide an implementation version name of MIRCTN21NOV96.

2.1.2 Association Initiation Policy

The MARIE Server attempts to initiate one association in response to each C-MOVE command it receives from an external node. The MARIE Server erver attempts a single type of association request.

2.1.2.1 Real-World Activity – Move Request from an External Node

2.1.2.1.1 Associated Real-World Activity – Move Request from an External Node

The associated Real-World activity is a C-MOVE request from an external application. If an application successfully establishes an association with the MARIE Server and makes a valid C-MOVE request that identifies one or more images known by the MARIE Server, the MARIE Server will intiate an association with the destination specified in the C-MOVE request.

2.1.2.1.2 Proposed Presentation Contexts

In response to a C-MOVE request, the MARIE Server builds a complete list of images to be moved. The list includes the SOP class of each image to be moved. The MARIE Server extracts the unique SOP classes from the image lists and proposes a set of presentation contexts that includes one presentation context for each unique SOP class identified in the image list. Thus, the association request may have a single presentation context or multiple presentation contexts. Each presentation context contains the abstract syntax that identifies one image class as found in the image list.

TABLE 3. Proposed Presentation Contexts for MARIE Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
See note1	See note2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

Note1: The Abstract Syntax corresponds to the value found in the database maintained by the each server. More than one presentation context can be offered, each with a different abstract syntax.
Note2: The MARIE Server only supports Implicit VR Little Endian Transfer Syntax. Some images may have been stored by the image server with private elements whose encoding scheme is unknown by the MARIE Server. These elements will be transmitted by the MARIE Server exactly as they were received (in Implicit VR Little Endian Transfer Syntax), so they should be unaltered upon transmission.

2.1.2.2 SOP Specific Conformance Statement

All C-STORE operations are in the context of a C-MOVE request from an external node.

The MARIE Server sends one C-MOVE response message for each attempted C-STORE operation. For each response to a C-STORE request (success, warning, failure), the MARIE Server prints that response with an interpretation of the status value. The MARIE Server takes no action in response to a failure of warning status.

The MARIE Server does not attempt any extended negotiation.

The MARIE Server does not delete any elements from the files it transfers. Therefore the set of optional elements depends entirely on the contents of the files which were originally stored on the MARIE Server.

2.1.3 Association Acceptance Policy

The MARIE Server accepts associations for the purpose of storing images in its database or for the purpose of performing query/retrieve operations on the images that have been previously stored.

The MARIE Server will only accept association requests from applications that are defined during configuration. In addition, the MARIE Server will only store images sent by nodes that have been enabled by a configuration step.

2.1.3.1 Real-World Activity – Storage

The MARIE Server accepts associations from nodes that wish to store images using the C-STORE command.

2.1.3.1.1 Associated Real-World Activity

The associated Real-World activity associated with the C-STORE operation is the storage of the image on the disk of the system upon which the MARIE Server is running. Images are stored by writing the data set of the C-STORE command directly to disk with no further header or interpretation. After the image is stored to disk, the image server updates an image database with patient, study, series and image information; this image database can be used by the MARIE Server for query/retrieve operations.

The MARIE Server will issue a failure status if it is unable to store the image on disk, if the image does not conform to the IOD of the SOP class under which it was transmitted, or if the image server is not able to successfully update its image database.

2.1.3.1.2 Presentation Contexts Table

Any of the Presentation Contexts shown in Table 4 are acceptable to the image server for receiving images.

TABLE 4. Acceptable Presentation Contexts for the MARIE Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Computed Radiography Image	1.2.840.10008.5.1.4.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
CT Image	1.2.840.10008.5.1.4.1.2	"	1.2.840.10008.1.2	SCP	None
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.3	"	1.2.840.10008.1.2	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.4	"	1.2.840.10008.1.2	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.20	"	1.2.840.10008.1.2	SCP	None
Ultrasound Image	1.2.840.10008.5.1.4.1.6	"	1.2.840.10008.1.2	SCP	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.7	"	1.2.840.10008.1.2	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.1.12.1	"	1.2.840.10008.1.2	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.1.12.2	"	1.2.840.10008.1.2	SCP	None

2.1.3.1.2.1 SOP Specific Conformance for SOP Class Storage

The MARIE Server implements Level 2 (Full) conformance for the Storage SOP Class.

The following attributes are modified by converting all characters to upper case before data is stored in the image database. The image files themselves are not modified.

1. Patient Name
2. Patient ID
3. Accession Number
4. Study ID

In the event that an image is successfully stored by the MARIE Server, it may be accessed by requesting associations with the MARIE Server and performing query/retrieve operations. The MARIE Server is not designed to allow other access to stored images.

The MARIE Server stores images for an indefinite period. The system has no method for deleting images once they are stored.

The MARIE Server returns the following status values in response to a C-STORE request:

0000H Image successfully stored
A700H Refused - out of resources (unable to create local file)
A900H Error- data set does not match SOP Class
C000H Error - cannot understand

In the case of an error of an error storing an image, there is no documented method for recovery. Most users send reports of errors to dicom_bugs@wuerl.wustl.edu.

2.1.3.1.3 Presentation Context Acceptance Criterion

The MARIE Server will accept any number of storage SOP classes that are listed in Table 4 above, provided that the requesting application is known to the MARIE Server and has been enabled to store images on the MARIE Server (via a configuration step). The MARIE Server defines no limit on the number of presentation contexts accepted. In the event that the MARIE Server runs out of resources when trying to accept multiple presentation contexts, the MARIE Server will reject the association request.

The MARIE Server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

2.1.3.1.4 Transfer Syntax Selection Policies

The MARIE Server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

2.1.3.2 Real-World Activity – Query

The MARIE Server accepts associations from nodes that wish to perform query (find) and retrieve (move) operations on images that have been previously stored by the MARIE Server.

2.1.3.2.1 Associated Real-World Activity – Query

The real-world activity associated with C-FIND and C-MOVE requests are the query and retrieval operations initiated by another application. An application other than the MARIE Server queries the MARIE Server for patient/study/series/image information that has been previously stored by the MARIE Server and can request that the MARIE Server send images to a third application.

2.1.3.2.2 Presentation Context Table

Table 5 shows the presentation contexts that may be accepted by the MARIE Server for query operations.

TABLE 5. Acceptable Presentation Contexts for Query Classes

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	“	1.2.840.10008.1.2	SCP	None
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	“	1.2.840.10008.1.2	SCP	None
Study Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	“	1.2.840.10008.1.2	SCP	None
Patient StudyOnly Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	“	1.2.840.10008.1.2	SCP	None
Patient StudyOnly Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.3	“	1.2.840.10008.1.2	SCP	None

2.1.3.2.2.1 SOP Specific Conformance for SOP Class Query/Retrieve

The MARIE Server does not support relational searches. Table 6 below indicates which keys are supported by the MARIE Server for the patient root information model. The MARIE Server also supports the patient/study only information model. The keys supported for that model are the same keys found in Table 6 with a level of “Patient” or “Study”. Table 8 indicates which keys are supported by the MARIE Server for the study root information model. These tables include the optional and required keys that are supported. Optional keys are supported like required keys. The MARIE Server does not support relational queries.

TABLE 6. Keys Supported for Patient Root Information Model

Level	Description	Tag	Type
Patient	Patient Name	0010 0010	R
Patient	Patient ID	0010 0020	U
Patient	Patient Birth Date	0010 0030	O
Patient	Patient Birth Time	0010 0032	O
Patient	Patient Sex	0010 0040	O
Study	Study Date	0008 0020	R
Study	Study Time	0008 0030	R
Study	Accession Number	0008 0050	R
Study	Study ID	0020 0010	R
Study	Study Instance UID	0020 000D	U
Study	Refering Physician Name	0008 0090	O
Study	Study Description	0008 1030	O
Study	Patients Age	0010 1010	O
Study	Patients Size	0010 1020	O
Study	Patients Weight	0010 1030	O
Series	Modality	0008 0060	R
Series	Series Number	0020 0011	R
Series	Series Instance UID	0020 000E	U
Series	Body Part Examined	0018 0015	O
Image	Image Number	0020 0013	R
Image	SOP Instance UID	0008 0018	U
Image	SOP Class UID	0008 0016	O
Image	Samples Per Pixel	0028 0002	O
Image	Rows	0028 0010	O
Image	Columns	0028 0011	O
Image	Bits Allocated	0028 0100	O
Image	Bits Stored	0028 0101	O
Image	Pixel Representation	0028 0103	O

The MARIE Server supports the three MOVE SOP classes listed in Table 5. In response to a move request, the MARIE Server supports the Storage SOP classes that are listed in Table 1.

TABLE 7. Keys Supported for Study Root Information Model

Level	Description	Tag	Type
Study	Study Date	0008 0020	R
Study	Study Time	0008 0030	R
Study	Accession Number	0008 0050	R
Study	Study ID	0020 0010	R
Study	Study Instance UID	0020 000D	U
Study	Refering Physician Name	0008 0090	O
Study	Study Description	0008 1030	O
Study	Patient Birth Date	0010 0030	O
Study	Patient Birdth Time	0010 0032	O
Study	Patient Sex	0010 0040	O
Study	Patients Age	0010 1010	O
Study	Patients Size	0010 1020	O
Study	Patients Weight	0010 1030	O
Series	Modality	0008 0060	R
Series	Series Number	0020 0011	R
Series	Series Instance UID	0020 000E	U
Series	Body Part Examined	0018 0015	O
Image	Image Number	0020 0013	R
Image	SOP Instance UID	0008 0018	U
Image	SOP Class UID	0008 0016	O
Image	Samples Per Pixel	0028 0002	O
Image	Rows	0028 0010	O
Image	Columns	0028 0011	O
Image	Bits Allocated	0028 0100	O
Image	Bits Stored	0028 0101	O
Image	Pixel Representation	0028 0103	O

2.1.3.2.3 Presentation Context Acceptance Criterion

The MARIE Server will accept any number of query SOP classes that are listed in Table 5 above, provided that the requesting application is known to the MARIE Server and has been enabled to make requests from the MARIE Server (via a configuration step). The MARIE Server defines no limit on the number of presentation contexts accepted. In the event that the MARIE Server runs out of resources when trying to accept multiple presentation contexts, the MARIE Server will reject the association request.

The MARIE Server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

2.1.3.2.4 Transfer Syntax Selection Policies

The MARIE Server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

2.1.3.3 Real-Worls Activity - Verification

The MARIE Server accepts associations from nodes that wish to perform a verification operation on the MARIE Server.

2.1.3.3.1 Associated Real-World Activity

The real-world activity associated with the C-ECHO request is that an external node wishes to verify network or server operation without initiating any actual work.

2.1.3.3.2 Presentation Context Table

Table 8 shows the presentation contexts that may be accepted by the MARIE Server for verification operations.

TABLE 8. Acceptable Presentation Contexts for the MARIE Server for Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.1.3.3.2.1 SOP Specific Conformance for SOP Class Verification

2.1.3.3.3 Presentation Context Acceptance Criterion

The MARIE Server will accept any number of verification SOP classes that are listed in Table 8 above, provided that the requesting application is known to the MARIE Server (via a configuration step). The MARIE Server defines no limit on the number of presentation contexts accepted. In the event that the MARIE Server runs out of resources when trying to accept multiple presentation contexts, the MARIE Server will reject the association request.

The MARIE Server does not check for duplicate presentation contexts and will accept duplicate presentation contexts.

2.1.3.3.4 Transfer Syntax Selection Policies

The MARIE Server only supports the Implicit VR Little Endian transfer syntax. Any proposed presentation context which includes the Implicit VR Little Endian transfer syntax will be accepted with the Implicit VR Little Endian transfer syntax. Any proposed presentation context that does not include the Implicit VR Little Endian transfer syntax will be rejected.

3. Communication Profiles

3.1 TCP/IP Stack

The MARIE Server provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

3.1.1 TCP/IP API

The MARIE Server uses the TCP/IP stack from the Unix system upon which is executes. It uses a subroutine library that is based on a Berkeley socket interface.

3.1.2 Physical Media Support

The MARIE Server exists as a software application that can be compiled on various Unix platforms. As such, it places no restrictions on the physical network. The MARIE Server has been demonstrated using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone) and Tin-Can-Telephone-Net.

4. Extensions/Specializations/Privatizations

Not applicable

5. Configuration

The MARIE Server obtains configuration information from a “Control” database which is stored in a relational database. In this implementation, the relational database is the MySQL database.

5.1 Security features

The MARIE Server uses three additional control tables to control access. These tables allow the MARIE Server to determine which nodes are allowed read and or write access and where images should be stored.

5.2 Configurable Parameters

Not applicable.

6 Support of Extended Character Sets

The MARIE Server provides no support for extended character sets.

7 Codes and Controlled Terminology

Not applicable.

8 Security Profiles

Not supported.