



KONICA MINOLTA

NEOVISTA
I-PACS CX

医用画像管理システム

NEOVISTA
I-PACS CX

Version 1.00

DICOM3.0
Conformance
Statement
For Network Gateway

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Revision History

| Date | Version | Change |
|------------|---------|-----------------------------------|
| 2016-07-05 | V1.00 | First edition |
| 2017-04-21 | V1.00 | Changed the design of cover page. |

NOTE

If you cannot find answers to your questions in any of the documentation, contact I-PACS CX Technical Support. Please include any relevant logs, usage descriptions, or other data that may be helpful in diagnosing the problem in your submission.

1 Introduction

This conformance statement (CS) specifies the compliance of I-PACS CX Network Gateway to DICOM. It details the DICOM Service Classes and the roles that are supported by this product.

2 DICOM Conformance Statement

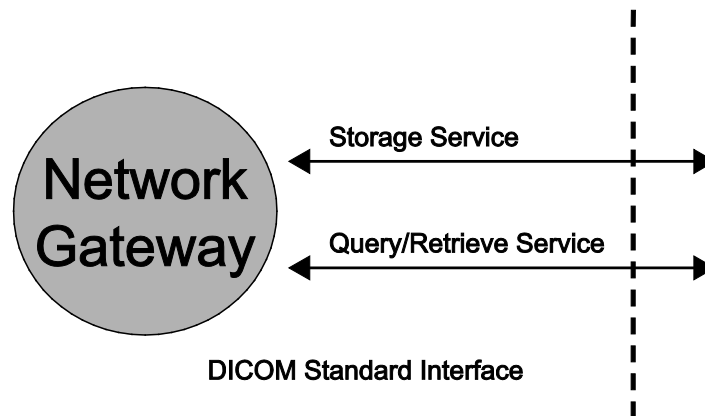
Network Gateway is DICOM Gateway running on Microsoft Windows Server 2012 R2. Network Gateway uses DICOM services to store and query/retrieve images to and/or from other DICOM applications.

Note that the format for this article strictly follows that of the DICOM Standard Part 4 (Service Class Specifications) Annex K and DICOM Standard Part 2 (Conformance) Annex A. Thus, it is advised for the reader to refer to those parts of the standard while reading this article.

2.1 Implementation Model

2.1.1 Application Data Flow Diagram

The basic and specific application models for the Network Gateway and Worklist Gateway are shown in the following figure.



Network Gateway uses DICOM protocol to send and query/retrieve images from/to other DICOM applications.

Network Gateway Administrator is used to configure all the configurations for Network Gateway. Also I-PACS CX Administrator is used to configure remote DICOM applications.

The Network Gateway is always waiting for request from users.

2.1.2 Fundamental Definition of AE's

Network Gateway supports the following functions:

- Response to DICOM associations to receive images from remote hosts
- Response to DICOM associations to query/retrieve images from remote hosts
- Storage of DICOM Part 10 format files into the storage device

2.1.3 Sequencing of Real-World Activities

Not Applicable

2.2 Network Gateway AE Specifications

2.2.1 SOP Classes Supported

Network Gateway provides conformance to the following SOP Classes as an SCU.

| SOP Class Name | SOP Class UID |
|--|---|
| Standard CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 |
| Standard Digital X-ray Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.1 1.2.840.10008.5.1.4.1.1.1.1.1 |
| Standard Mammography Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.2 1.2.840.10008.5.1.4.1.1.1.2.1 |
| Standard Intra-oral X-ray Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.3 1.2.840.10008.5.1.4.1.1.1.3.1 |
| Standard CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 |
| Standard US Multiframe Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Standard MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 |
| Standard US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Standard Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 |
| Standard Overlay Storage | 1.2.840.10008.5.1.4.1.1.8 |
| Standard Modality LUT Storage | 1.2.840.10008.5.1.4.1.1.10 |
| Standard VOI LUT Storage | 1.2.840.10008.5.1.4.1.1.11 |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |
| Standard X-ray Angio Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 |
| Standard X-ray Radio Fluoroscopy Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 |
| Standard NM Image Storage | 1.2.840.10008.5.1.4.1.1.20 |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 |
| Standard VL Image Storage (retired) | 1.2.840.10008.5.1.4.1.1.77.1 |
| Standard VL Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.77.2 |
| Standard VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 |
| Standard Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 |
| Standard VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 |
| Standard Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 |
| Standard VL Slide Microscopic Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 |
| Standard VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 |
| Standard Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 |
| Standard Ophthalmic Photographic 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 |
| Standard Ophthalmic Photographic 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 |
| Structured Reporting Storage (Basic Text, Enhanced SR, Comprehensive) | 1.2.840.10008.5.1.4.1.1.88.11 1.2.840.10008.5.1.4.1.1.88.22 1.2.840.10008.5.1.4.1.1.88.33 |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 |
| Standard PET Image Storage | 1.2.840.10008.5.1.4.1.1.128 |
| Standard PET Curve Storage | 1.2.840.10008.5.1.4.1.1.129 |
| Standard RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 |
| Standard RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 |
| Standard RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 |
| Standard RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 |

| | |
|------------------------------------|--------------------------------|
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 |

Table 2-1: SOP Classes Supported as an SCU (Network Gateway)

Network Gateway provides conformance to the following SOP Classes as an SCP.

| SOP Class Name | SOP Class UID |
|--|---|
| Standard Echo | 1.2.840.10008.1.1 |
| Standard Digital X-ray Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.1 1.2.840.10008.5.1.4.1.1.1.1.1 |
| Standard Mammography Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.2 1.2.840.10008.5.1.4.1.1.1.2.1 |
| Standard Intra-oral X-ray Image Storage (presentation, processing) | 1.2.840.10008.5.1.4.1.1.1.3 1.2.840.10008.5.1.4.1.1.1.3.1 |
| Standard CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 |
| Standard CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 |
| Standard US Multiframe Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Standard MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 |
| Standard US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Standard Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 |
| Standard Overlay Storage | 1.2.840.10008.5.1.4.1.1.8 |
| Standard Curve Storage | 1.2.840.10008.5.1.4.1.1.9 |
| Standard Modality LUT Storage | 1.2.840.10008.5.1.4.1.1.10 |
| Standard VOI LUT Storage | 1.2.840.10008.5.1.4.1.1.11 |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |
| Standard X-ray Angio Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 |
| Standard X-ray Radio Fluoroscopy Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 |
| Standard NM Image Storage | 1.2.840.10008.5.1.4.1.1.20 |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 |
| Standard VL Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.77.2 |
| Standard VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 |
| Standard Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 |
| Standard VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 |
| Standard Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 |
| Standard VL Slide Microscopic Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 |
| Standard VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 |
| Standard Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 |
| Standard Ophthalmic Photographic 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 |
| Standard Ophthalmic Photographic 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 |
| Structured Reporting Storage (Basic Text, Enhanced SR, Comprehensive) | 1.2.840.10008.5.1.4.1.1.88.11 1.2.840.10008.5.1.4.1.1.88.22 1.2.840.10008.5.1.4.1.1.88.33 |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 |
| Standard PET Image Storage | 1.2.840.10008.5.1.4.1.1.128 |
| Standard PET Curve Storage | 1.2.840.10008.5.1.4.1.1.129 |
| Standard RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 |
| Standard RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 |
| Standard RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 |
| Standard RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 |

| | |
|--|--------------------------------|
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 |
| Patient Root Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.1.1 |
| Patient Root Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 |
| Patient Root Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.1.3 |
| Study Root Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.2.1 |
| Study Root Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 |
| Study Root Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.2.3 |
| Patient Study Only Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.3.1 |
| Patient Study Only Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.3.2 |
| Patient Study Only Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.3.3 |

Table 2-2: SOP Classes Supported as an SCP (Network Gateway)

2.2.1.1 Association Establishment Policies

2.2.1.1.1 General

Before any SOP Classes are interchanged between Network Gateway and other DICOM applications, an association stage takes place to negotiate and exchange the capabilities of the SCU and SCP. Network Gateway and other DICOM application establish an association by using the Association Services of the DICOM Upper Layer. During association establishment stage, Network Gateway negotiates the supported SOP classes.

The DICOM Application Context Name (ACN), which is always proposed, is:

| | |
|---------------------------------|------------------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
|---------------------------------|------------------------------|

The Maximum Length PDU negotiation is included in all association establishment requests. However, the Maximum Length PDU for an association cannot be greater than:

| | |
|---------------------------|--------------------|
| Maximum Length PDU | 64234 bytes |
|---------------------------|--------------------|

The SOP Class Extended Negotiation is not supported. The user information items sent by this application are:

- Maximum PDU Length
- Implementation UID

2.2.1.1.2 Number of Associations

The number of supported associations depend on the SCU/SCP role of Network Gateway. The number of associations as an SCU varies from 0 (on idle) to as many as the number of the retrieve request. So Network Gateway can make multiple associations when transferring images to multiple DICOM applications.

The number of associations as an SCP is virtually unlimited, but it may be confined due to the system resource limit. This means Network Gateway can handle multiple associations at the same time.

2.2.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.2.1.1.4 Implementation Identifying Information

The Implementation Version Name and the Implementation Class UID are as follows:

| | |
|------------------------------------|--------------------------------|
| Implementation Version Name | KM_CX_4.5 |
| Implementation Class UID | 1.2.392.200036.9107.660 |

2.2.1.2 Association Initiation Policy

Network Gateway initiates a new association to transfer images only when the retrieve request is received. This association corresponds to only Real-World Activities.

2.2.1.2.1 Real-World Activity – Storage

2.2.1.2.1.1 Associated Real-World Activity

Network Gateway can transfer images to remote applications when responding to the retrieve request.

2.2.1.2.1.2 Proposed Presentation Contexts

| Transfer Syntax Table - Proposed | | |
|----------------------------------|---|------------------------|
| No. | Transfer Syntax | UID |
| 1 | Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| 2 | Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| 3 | Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |
| 4 | JPEG Baseline Transfer Syntax | 1.2.840.10008.1.2.4.50 |
| 5 | JPEG Extended Transfer Syntax | 1.2.840.10008.1.2.4.51 |
| 6 | JPEG Lossless, Non-Hierarchical, First-Order Prediction Transfer Syntax | 1.2.840.10008.1.2.4.70 |
| 7 | JPEG2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| 8 | JPEG2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| 9 | RLE Transfer Syntax | 1.2.840.10008.1.2.5 |

Table 2-3: Transfer Syntax List – Proposed (Network Gateway)

| Presentation Context Table – Proposed | | | | |
|---|--|--------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | Role | Extended Negotiation |
| SOP Class Name | SOP Class UID | | | |
| CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 | All from Table 2-3 | SCU | None |
| Digital X-ray Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.1 1.2.840.10008.5.1.4.1.1.1.1.1 | All from Table 2-3 | SCU | None |
| Mammography Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.2 1.2.840.10008.5.1.4.1.1.1.2.1 | All from Table 2-3 | SCU | None |
| Intra-oral X-ray Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.3 1.2.840.10008.5.1.4.1.1.1.3.1 | All from Table 2-3 | SCU | None |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | All from Table 2-3 | SCU | None |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | All from Table 2-3 | SCU | None |
| US Multiframe Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | All from Table 2-3 | SCU | None |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | All from Table 2-3 | SCU | None |

| | | | | |
|--|----------------------------------|--------------------|-----|------|
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | All from Table 2-3 | SCU | None |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | All from Table 2-3 | SCU | None |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | All from Table 2-3 | SCU | None |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 | All from Table 2-3 | SCU | None |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | All from Table 2-3 | SCU | None |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | All from Table 2-3 | SCU | None |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | All from Table 2-3 | SCU | None |
| Standalone Overlay Storage | 1.2.840.10008.5.1.4.1.1.8 | All from Table 2-3 | SCU | None |
| Standalone Curve Storage | 1.2.840.10008.5.1.4.1.1.9 | All from Table 2-3 | SCU | None |
| Standalone Modality LUT Storage | 1.2.840.10008.5.1.4.1.1.10 | All from Table 2-3 | SCU | None |
| Standalone VOI LUT Storage | 1.2.840.10008.5.1.4.1.1.11 | All from Table 2-3 | SCU | None |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | All from Table 2-3 | SCU | None |
| X-ray Angio Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | All from Table 2-3 | SCU | None |
| X-ray Radio Fluoroscopy Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | All from Table 2-3 | SCU | None |
| NM Image Storage | 1.2.840.10008.5.1.4.1.1.20 | All from Table 2-3 | SCU | None |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | All from Table 2-3 | SCU | None |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | All from Table 2-3 | SCU | None |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | All from Table 2-3 | SCU | None |
| Standard VL Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.77.2 | All from Table 2-3 | SCU | None |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | All from Table 2-3 | SCU | None |
| Standard Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | All from Table 2-3 | SCU | None |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | All from Table 2-3 | SCU | None |
| Standard Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | All from Table 2-3 | SCU | None |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | All from Table 2-3 | SCU | None |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | All from Table 2-3 | SCU | None |

| | | | | |
|---|----------------------------------|--------------------|-----|------|
| Standard Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | All from Table 2-3 | SCU | None |
| Standard Ophthalmic Photographic 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | All from Table 2-3 | SCU | None |
| Standard Ophthalmic Photographic 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | All from Table 2-3 | SCU | None |
| Basic Text Structured Report | 1.2.840.10008.5.1.4.1.1.88.11 | All from Table 2-3 | SCU | None |
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 | All from Table 2-3 | SCU | None |
| Comprehensive Structured Reporting | 1.2.840.10008.5.1.4.1.1.88.33 | All from Table 2-3 | SCU | None |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | All from Table 2-3 | SCU | None |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | All from Table 2-3 | SCU | None |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | All from Table 2-3 | SCU | None |
| PET Image Storage | 1.2.840.10008.5.1.4.1.1.128 | All from Table 2-3 | SCU | None |
| Standard PET Curve Storage | 1.2.840.10008.5.1.4.1.1.129 | All from Table 2-3 | SCU | None |
| Standard RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | All from Table 2-3 | SCU | None |

Table 2-4: Presentation Context List – Proposed (Network Gateway)

2.2.1.2.1.2.1 SOP Specific Conformance for Instance Storage SOP Classes

This implementation can perform multiple C-STORE operations over a single association. Upon receiving a C-STORE confirmation containing a Successful status, this implementation will perform the next C-STORE operation. The association will be maintained if possible. Upon receiving a C-STORE confirmation containing an Error or a Refused status, this implementation will terminate the association. The current C-STORE operation is considered as failed.

Upon receiving a C-STORE confirmation containing a Warning status, this implementation will treat it as a Success response.

The following timers are related to the Image Storage SCU. These timers can be configured by editing “MFDCM38.PRO” configuration file. If any of these timers expires, the connection is closed and the operation is considered as failed.

| Timer Name | Default (in sec.) | Meaning |
|---------------------|-------------------|--|
| ARTIM_TIMEOUT | 90 | The number of seconds to use as timeout waiting for association request or waiting for the peer to shut down an association. |
| ASSOC_REPLY_TIMEOUT | 60 | The number of seconds to wait for reply to associate request. |
| RELEASE_TIMEOUT | 60 | The number of seconds to wait for reply to associate response. |
| WRITE_TIMEOUT | 60 | The number of seconds to wait for a network write up to be accepted. |
| CONNECT_TIMEOUT | 60 | The number of seconds to wait for a network connection to be accepted. |

| | | |
|--------------------|----|--|
| INACTIVITY_TIMEOUT | 60 | The number of seconds to wait for data between TCP/IP packets. |
|--------------------|----|--|

Table 2-5: Timers for Network Gateway

When Network Gateway initiates an association to issue a C-STORE operation, the image will be transmitted with the same elements in which it was received.

2.2.1.3 Association Acceptance Policy

2.2.1.3.1 Real-World Activity – Verification

2.2.1.3.1.1 Associated Real-World Activity

Network Gateway can transfer DICOM instances to remote applications when responding to the retrieve request.

2.2.1.3.1.2 Presentation Context Table

| Transfer Syntax Table – Accepted | |
|---|---------------------|
| Transfer Syntax | UID |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |

Table 2-6: Transfer Syntax List – Accepted

| Presentation Context Table – Proposed | | | | |
|---------------------------------------|-------------------|--------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | Role | Extended Negotiation |
| SOP Class Name | SOP Class UID | | | |
| Verification | 1.2.840.10008.1.1 | All from Table 2-6 | SCP | None |

Table 2-7: Presentation Context List - Accepted

2.2.1.3.1.2.1 SOP Specific Conformance for Verification SOP Class

This implementation performs a C-ECHO operation over an association. Timers in Table 2-5 are also applicable to this Verification SCP.

2.2.1.3.1.2.2 Presentation Context Acceptance Criterion

Network Gateway can accept multiple presentation contexts for each Service Class.

2.2.1.3.1.2.3 Transfer Syntax Selection Policies

Transfer syntaxes are accepted in the following order:

| Transfer Syntax | UID |
|---|---------------------|
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |

Table 2-8: Transfer Syntax Acceptance Priority

Note that these acceptance criteria can be overridden by the use of a “Transfer Syntax List” in the “MFDCM38.APP” configuration file.

2.2.1.3.2 Real-World Activity – Storage

2.2.1.3.2.1 Associated Real-World Activity

Network Gateway can transfer DICOM instances to remote applications when responding to the retrieve request.

2.2.1.3.2.2 Presentation Context Table

| Transfer Syntax Table – Accepted | |
|---|------------------------|
| Transfer Syntax | UID |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |
| JPEG Baseline Transfer Syntax | 1.2.840.10008.1.2.4.50 |
| JPEG Extended Transfer Syntax | 1.2.840.10008.1.2.4.51 |
| JPEG Lossless Non-Hierarchical | 1.2.840.10008.1.2.4.57 |
| JPEG Lossless, Non-Hierarchical, First-Order Prediction Transfer Syntax | 1.2.840.10008.1.2.4.70 |
| JPEG2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| RLE Transfer Syntax | 1.2.840.10008.1.2.5 |

Table 2-9: Transfer Syntax List – Accepted

| Presentation Context Table – Accepted | | | | |
|---|--|------------------------|-------------|-----------------------------|
| Abstract Syntax | | Transfer Syntax | Role | Extended Negotiation |
| SOP Class Name | SOP Class UID | | | |
| CR Image Storage | 1.2.840.10008.5.1.4.1.1.1 | All from Table 2-9 | SCP | None |
| Digital X-ray Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.1 1.2.840.10008.5.1.4.1.1.1.1.1 | All from Table 2-9 | SCP | None |
| Mammography Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.2 1.2.840.10008.5.1.4.1.1.1.2.1 | All from Table 2-9 | SCP | None |
| Intra-oral X-ray Image Storage (Presentation, Processing) | 1.2.840.10008.5.1.4.1.1.1.3 1.2.840.10008.5.1.4.1.1.1.3.1 | All from Table 2-9 | SCP | None |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | All from Table 2-9 | SCP | None |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | All from Table 2-9 | SCU | None |
| US Multiframe Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | All from Table 2-9 | SCP | None |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | All from Table 2-9 | SCP | None |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | All from Table 2-9 | SCU | None |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | All from Table 2-9 | SCP | None |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | All from Table 2-9 | SCP | None |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 | All from Table 2-9 | SCP | None |

| | | | | |
|--|----------------------------------|--------------------|-----|------|
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | All from Table 2-9 | SCP | None |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | All from Table 2-9 | SCP | None |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | All from Table 2-9 | SCP | None |
| Standalone Overlay Storage | 1.2.840.10008.5.1.4.1.1.8 | All from Table 2-9 | SCP | None |
| Standalone Curve Storage | 1.2.840.10008.5.1.4.1.1.9 | All from Table 2-9 | SCP | None |
| Standalone Modality LUT Storage | 1.2.840.10008.5.1.4.1.1.10 | All from Table 2-9 | SCP | None |
| Standalone VOI LUT Storage | 1.2.840.10008.5.1.4.1.1.11 | All from Table 2-9 | SCP | None |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | All from Table 2-9 | SCP | None |
| X-ray Angio Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | All from Table 2-9 | SCP | None |
| X-ray Radio Fluoroscopy Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | All from Table 2-9 | SCP | None |
| NM Image Storage | 1.2.840.10008.5.1.4.1.1.20 | All from Table 2-9 | SCP | None |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | All from Table 2-9 | SCP | None |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | All from Table 2-9 | SCP | None |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | All from Table 2-9 | SCP | None |
| Standard VL Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.77.2 | All from Table 2-9 | SCP | None |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | All from Table 2-9 | SCP | None |
| Standard Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | All from Table 2-9 | SCP | None |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | All from Table 2-9 | SCP | None |
| Standard Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | All from Table 2-9 | SCP | None |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | All from Table 2-9 | SCP | None |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | All from Table 2-9 | SCP | None |
| Standard Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | All from Table 2-9 | SCP | None |
| Standard Ophthalmic Photographic 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | All from Table 2-9 | SCP | None |
| Standard Ophthalmic Photographic 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | All from Table 2-9 | SCP | None |
| Basic Text Structured Report | 1.2.840.10008.5.1.4.1.1.88.11 | All from Table 2-9 | SCP | None |

| | | | | |
|------------------------------------|-------------------------------|--------------------|-----|------|
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 | All from Table 2-9 | SCP | None |
| Comprehensive Structured Reporting | 1.2.840.10008.5.1.4.1.1.88.33 | All from Table 2-9 | SCP | None |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | All from Table 2-9 | SCP | None |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | All from Table 2-9 | SCP | None |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | All from Table 2-9 | SCP | None |
| PET Image Storage | 1.2.840.10008.5.1.4.1.1.128 | All from Table 2-9 | SCP | None |
| Standard PET Curve Storage | 1.2.840.10008.5.1.4.1.1.129 | All from Table 2-9 | SCP | None |
| Standard RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | All from Table 2-9 | SCP | None |

Table 2-10: Presentation Context List - Accepted

2.2.1.3.2.2.1 SOP Specific Conformance for Storage SOP Classes

This implementation can perform multiple C-STORE operations over a single association. Upon receiving a C-STORE confirmation containing a Successful status, will perform the next C-STORE operation. The association will be maintained if possible.

Upon receiving a C-STORE confirmation containing an Error or a Refused status, this implementation will terminate the association. The current C-STORE operation is considered as failed.

Upon receiving a C-STORE confirmation containing a Warning status, this implementation will treat it as a Success response.

Timers in Table 2-5 are also applicable to the Storage SCP.

2.2.1.3.2.2.2 Presentation Context Acceptance Criterion

Network Gateway can accept multiple presentation contexts for each Service Class.

2.2.1.3.2.2.3 Transfer Syntax Selection Policies

Transfer syntaxes are accepted in the following order:

| Transfer Syntax | UID |
|---|------------------------|
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |
| JPEG Lossless, Non-Hierarchical, First-Order Prediction Transfer Syntax | 1.2.840.10008.1.2.4.70 |
| JPEG Lossless Non-Hierarchical | 1.2.840.10008.1.2.4.57 |
| JPEG Extended Transfer Syntax | 1.2.840.10008.1.2.4.51 |
| JPEG Baseline Transfer Syntax | 1.2.840.10008.1.2.4.50 |
| RLE Transfer Syntax | 1.2.840.10008.1.2.5 |
| JPEG2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG2000 Image Compression | 1.2.840.10008.1.2.4.91 |

Table 2-11: Transfer Syntax Acceptance Priority

Note that these acceptance criteria can be overridden by the use of a “Transfer Syntax List” in the “MFDCM38.APP” configuration file.

2.2.1.3.3 Real-World Activity – Query/Retrieve

2.2.1.3.3.1 Associated Real-World Activity

Network Gateway can transfer DICOM instances to remote applications when responding to the retrieve request.

2.2.1.3.3.2 Presentation Context Table

| Transfer Syntax Table – Accepted | |
|---|---------------------|
| Transfer Syntax | UID |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |

Table 2-12: Transfer Syntax List – Accepted

| Presentation Context Table – Accepted | | | | |
|--|-----------------------------|------------------------|-------------|-----------------------------|
| Abstract Syntax | | Transfer Syntax | Role | Extended Negotiation |
| SOP Class Name | SOP Class UID | | | |
| Patient Root Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.1.1 | All from Table 2-12 | SCP | None |
| Patient Root Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | All from Table 2-12 | SCP | None |
| Patient Root Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.1.3 | All from Table 2-12 | SCP | None |
| Study Root Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | All from Table 2-12 | SCP | None |
| Study Root Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | All from Table 2-12 | SCP | None |
| Study Root Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.2.3 | All from Table 2-12 | SCP | None |
| Patient Study Only Query/Retrieve – FIND | 1.2.840.10008.5.1.4.1.2.3.1 | All from Table 2-12 | SCP | None |
| Patient Study Only Query/Retrieve – MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | All from Table 2-12 | SCP | None |
| Patient Study Only Query/Retrieve – GET | 1.2.840.10008.5.1.4.1.2.3.3 | All from Table 2-12 | SCP | None |

Table 2-13: Presentation Context List - Accepted

2.2.1.3.3.2.1 SOP Specific Conformance for Patient Root Query (FIND) SOP Class

This implementation performs a C-FIND operation over an association. Timers in Table 2-5 are also applicable to the Patient Root Query/Retrieve SCU.

The following required and optional keys are supported for Patient Root FIND. The fields Patient ID, Patient's Name, Study ID, Study Date, Accession Number and Study Description may be queried based on user specification. All other values for fields are requested as part of the query.

| Description | Element Tag | Type | Note |
|----------------|-------------|------|------|
| Patient's Name | (0010,0010) | R | |
| Patient ID | (0010,0020) | R | |
| Patient Sex | (0010,0040) | O | |

Table 2-14: Patient Level Keys for Patient Root Query/Retrieve Information Model

| Description | Element Tag | Type | Note |
|--------------------|-------------|------|------|
| Study ID | (0020,0010) | R | |
| Study Date | (0008,0020) | R | |
| Study Time | (0008,0030) | R | |
| Accession Number | (0008,0050) | R | |
| Study Description | (0008,1050) | O | |
| Study Instance UID | (0020,000D) | U | |

Table 2-15: Study Level Keys for Patient Root Query/Retrieve Information Model

| Description | Element Tag | Type | Note |
|---------------------|-------------|------|------|
| Series Number | (0020,0011) | R | |
| Series Date | (0008,0021) | O | |
| Series Time | (0008,0031) | O | |
| Modality | (0008,0060) | R | |
| Series Description | (0008,103E) | O | |
| Series Instance UID | (0020,000E) | U | |

Table 2-16: Series Level Keys for Patient Root Query/Retrieve Information Model

| Description | Element Tag | Type | Note |
|------------------|-------------|------|------|
| Instance Number | (0020,0013) | R | |
| Acquisition Date | (0008,0022) | O | |
| Acquisition Time | (0008,0032) | O | |
| Instance Date | (0008,0023) | O | |
| Instance Time | (0008,0033) | O | |
| SOP Instance UID | (0008,0018) | U | |

Table 2-17: Instance Level Keys for Patient Root Query/Retrieve Information Model

2.2.1.3.3.2.2 SOP Specific Conformance for Patient Root Retrieve (MOVE) SOP Class

This implementation performs a C-MOVE operation over an association. Timers in Table 2-5 are also applicable to the Patient Root Query/Retrieve SCU.

2.2.1.3.3.2.3 SOP Specific Conformance for Patient Root Retrieve (GET) SOP Class

This implementation performs a C-GET operation over an association. Timers in Table 2-5 are also applicable to the Patient Root Query/Retrieve SCU.

2.2.1.3.3.2.4 SOP Specific Conformance for Study Root Query (FIND) SOP Class

This implementation performs a C-FIND operation over an association. Timers in Table 2-5 are also applicable to the Patient Root Query/Retrieve SCU.

The following required and optional keys are supported for Study Root FIND. The fields Patient ID, Patient's Name, Study ID, Study Date, Accession Number and Study Description may be queried based on user specification. All other values for fields are requested as part of the query.

| Description | Element Tag | Type | Note |
|--------------------|-------------|------|------|
| Patient ID | (0010,0020) | R | |
| Patient's Name | (0010,0010) | R | |
| Study ID | (0020,0010) | R | |
| Study Date | (0008,0020) | R | |
| Study Time | (0008,0030) | R | |
| Accession Number | (0008,0050) | R | |
| Study Description | (0008,1050) | O | |
| Study Instance UID | (0020,000D) | U | |

Table 2-18: Study Level Keys for Study Root Query/Retrieve Information Model

| Description | Element Tag | Type | Note |
|---------------------|-------------|------|------|
| Series Number | (0020,0011) | R | |
| Series Date | (0008,0021) | O | |
| Series Time | (0008,0031) | O | |
| Modality | (0008,0060) | R | |
| Series Description | (0008,103E) | O | |
| Series Instance UID | (0020,000E) | U | |

Table 2-19: Series Level Keys for Study Root Query/Retrieve Information Model

| Description | Element Tag | Type | Note |
|------------------|-------------|------|------|
| Instance Number | (0020,0013) | R | |
| Acquisition Date | (0008,0022) | O | |
| Acquisition Time | (0008,0032) | O | |
| Instance Date | (0008,0023) | O | |
| Instance Time | (0008,0033) | O | |
| SOP Instance UID | (0008,0018) | U | |

Table 2-20: Instance Level Keys for Study Root Query/Retrieve Information Model

2.2.1.3.3.2.5 SOP Specific Conformance for Study Root Retrieve (MOVE) SOP Class

This implementation performs a C-MOVE operation over an association. Timers in Table 2-5 are also applicable to the Retrieve SCU.

2.2.1.3.3.2.6 SOP Specific Conformance for Study Root Retrieve (GET) SOP Class

This implementation performs a C-MOVE operation over an association. Timers in Table 2-5 are also applicable to the Retrieve SCU.

2.2.1.3.3.2.7 Presentation Context Acceptance Criterion

Network Gateway can accept multiple presentation contexts for each Service Class.

2.2.1.3.3.2.8 Transfer Syntax Selection Policies

Transfer syntaxes are accepted in the following order:

| Transfer Syntax | UID |
|---|---------------------|
| Explicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2.1 |
| Implicit VR Little Endian Transfer Syntax | 1.2.840.10008.1.2 |
| Explicit VR Big Endian Transfer Syntax | 1.2.840.10008.1.2.2 |

Table 2-21: Transfer Syntax Acceptance Priority

Note that these acceptance criteria can be overridden by the use of a “Transfer Syntax List” in the “MFDCM38.APP” configuration file.

2.3 Communication Profiles

2.3.1 Supported Communication Stacks

DICOM Upper Layer (Part 8) is supported using TCP/IP.

DICOM Secure Transport Connection Profiles (Part 15) is supported using The Basic TLS Secure Transport Connection Profile.

2.3.2 TCP/IP Stack

The TCP/IP stack is inherited from the Microsoft Windows Socket implementation.

2.3.2.1 API

Not Applicable

2.3.2.2 Physical Media Support

DICOM is indifferent to the physical medium over which TCP/IP executes (e.g. Ethernet, Fast-Ethernet, FDDI, ATM, etc)

2.3.3 Point-to-Point Stack

Not Applicable

2.3.4 Basic TLS Secure Transport Profile

A Basic TLS Secure Transport Profile supports all mechanisms in the table 2 -63. IP ports on which the profile accepts TLS connections is configurable by the application user. And the mechanism for key management based on X.509 certificate validation.

| Supported TLS Feature | Minimum Mechanism |
|----------------------------|---------------------------|
| Entity Authentication RSA | RSA based certificates |
| Exchange of Master Secrets | RSA |
| Data Integrity | SHA |
| Privacy | Triple DES EDE, CBC, NULL |

Table 2-41: Mechanisms for Basic TLS Secure Transport Profile

2.4 Extension/Specialization/Privatization

2.4.1 Standard Extended/Specialized/Private SOP

None Supported

2.4.2 Private Transfer Syntaxes

None Supported

2.5 Configuration

2.5.1 AE Title / Presentation Address Mapping

The Local AE Title is configurable in the Setting menu.

2.5.2 Configuration Parameters

The following fields are configurable for this AE (local):

- *Local AE Title*
- *Local IP Address*
- *Local TCP Port Number*
- *Accept/Reject Policy for unknown called/calling AE Title*

2.6 Supported Extended Character Sets

This implementation supports the following extended character set:

- ISO-IR 6 = Default repertoire
- ISO-IR 13 = Japanese, Katakana
- ISO-IR 87 = Japanese, Kanji
- ISO-IR 192 = Unicode, UTF-8



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