

GE Healthcare

Technical Publications

Direction DOC0509300
Revision 0.1

ConnectR Plus Version 5.0
DICOM CONFORMANCE STATEMENT

GE Healthcare IT

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Section 1: Introduction

1.1 Overview

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 (Introduction) describes the overall structure, intent, and references for this Conformance Statement.

Section 2 (Network Conformance Statement) specifies compliance of ConnectR Plus DICOM Services to DICOM Standards requirements for network communication for all SOP classes it supports. This part generally follows the DICOM Standard Conformance Statement as specified in the DICOM Standard, Part 2. General network operations are described in this section. In the places that individual real-work activities should be described, references to the following sections are made, instead of including all SOP classes in this part.

This document specifies the DICOM implementation supported by GE Healthcare ConnectR Plus. It is entitled:

***ConnectR Plus Version 5.0
DICOM Conformance Statement
Direction DOC0509300***

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with GE Healthcare network interface. The GE Conformance Statement, contained in this document, also specifies the Lower Layer communications, which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

Introductory information, which is applicable to all GE Conformance Statements, is described in the following GE document:

*Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780*

This document familiarizes the reader with DICOM terminology and general concepts. It should be read prior to reading the individual products' Conformance Statements.

For more information regarding the DICOM Standard, copies of the Standard may be obtained on the Internet at <http://medical.nema.org>. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209 USA
Phone: +1.703.841.3200

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1.2 Intended Audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts that are used in that Standard.

If readers are unfamiliar with DICOM terminology they should first refer to the GE document listed below, then read the DICOM Standard itself, prior to reading this DICOM Conformance Statement document.

*Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0)
Conformance Statement
Direction: 2118780*

1.3 Scope And Field Of Application

It is the intent of this document, in conjunction with the GE document, *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780*, to provide an unambiguous specification for GE implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GE medical data exchanged using DICOM. The GE Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GE devices are capable of using different Information Object Definitions. For example, a GE CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions, which define all data elements, used by this GE implementation. If the user encounters unspecified private data elements while parsing a GE Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GE devices.

1.4 Important Remarks

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non-GE systems is the

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user's responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non-GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non-GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non-GE device and the stability of the image data for the intended applications. Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.
- **Future Evolution** - GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standards. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GE protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. **In addition, GE reserves the right to discontinue or make changes to the support of communications features, on its products, as described by these DICOM Conformance Statements.** The **user** should ensure that any non-GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standards. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standards change and GE products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the **non-GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.5 References

A list of references which are applicable to all GE Conformance Statements is included in the GE Document, *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

1.6 Definitions

A set of definitions which are applicable to all GE Conformance Statements is included in the GE Document, *Introduction to the Integrated DICOM/Network v3.0 (ID/Net v3.0) Conformance Statement, Direction: 2118780.*

1.7 Symbols, Terms And Abbreviations

A list of symbols, terms and abbreviations which are applicable included in the GE Document, *Introduction to the Integrated Conformance Statement, Direction: 2118780.*

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Additional abbreviations and terms used in this Conformance:

<u>TERM</u>	<u>DESCRIPTION</u>
AE	Application Entity
DMWL	DICOM Modality Work List
DICOM	Digital Imaging and Communication in Medicine
MPPSS	Modality Performed Procedure Step Server
NEMA	National Electrical Manufacturers Association
OS	Operating System
SCP	Service Class Provider
SOP	Service-Object Pair

Section 2: Network Conformance Statement

2.1 Introduction

This document is the DICOM 3.0 Conformance Statement for ConnectR Plus which provides various information systems with different types of DICOM services, including DICOM Modality Work List (DMWL) and Modality Performed Procedure Step (MPPS).

ConnectR Plus creates a number of DICOM Application Entities (AEs) to support these services. Each DICOM AE will be dedicated to a particular type of the DICOM services, as explained in the rest of the document.

All implemented ConnectR Plus DICOM services conform to the DICOM 3.0 standard in order to fulfill queries from external information systems.

2.2 Implementation Model

ConnectR Plus provides a number of DICOM services with separate DICOM Application Entities (AEs):

- Modality Work List Application Entity (DMWL AE)
- Modality Performed Procedure Step Application Entity (MPPS AE)

DMWL accepts queries from modalities and furnishes them with the information retrieved from the data repository using the DICOM Basic Worklist Management Service. The application is implemented as a ConnectR Plus interface running continuously in the background. DMWL may be configured to start automatically during computer start-up without any users logging into the Windows OS.

MPPSS accepts information from modalities that contain information about procedures steps being performed by them, processes and stores necessary data in the data repository. MPPSS supports Modality Performed Procedure Step SOP Class. The application is implemented as a ConnectR Plus interface running continuously in the background. MPPSS may be configured to start automatically during computer start-up without any users logging into the Windows OS.

All ConnectR Plus DICOM services utilize data repository implemented as Microsoft SQL database.

2.2.1 Application Data Flow Diagrams

2.2.1.1 Application Data Flow Diagram of DMWL AE

DMWL is implemented as ConnectR Plus interface for accepting queries and returning information retrieved from data repository. DMWL is installed along with installation of ConnectR Plus. After DMWL is installed, it may be configured to start automatically or manually using ConnectR Plus user interface.

DMWL may be stopped using ConnectR Plus user interface.

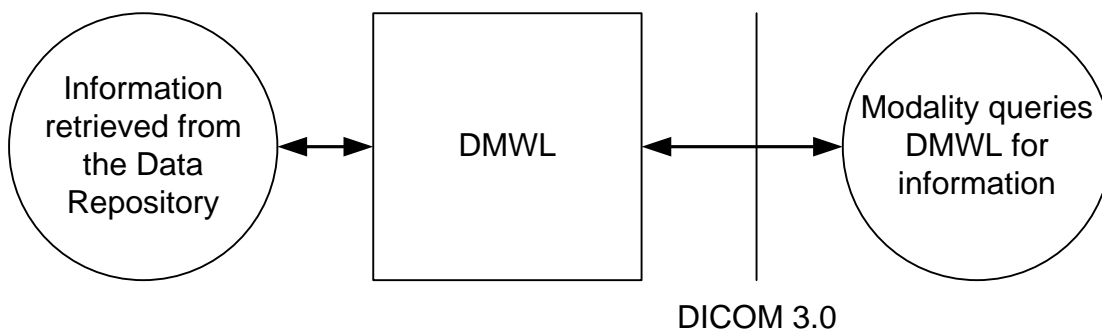


Figure 1 - DMWL DICOM Data Flow Diagram

2.2.1.2 Application Data Flow Diagram of MPPSS AE

MPPSS is implemented as ConnectR Plus interface for accepting, processing, storing and retrieving information about procedure steps performed by modalities. MPPSS is installed along with installation of ConnectR Plus. After DMWL is installed, it may be configured to start automatically or manually using ConnectR Plus user interface.

MPPSS may be stopped using ConnectR Plus user interface.

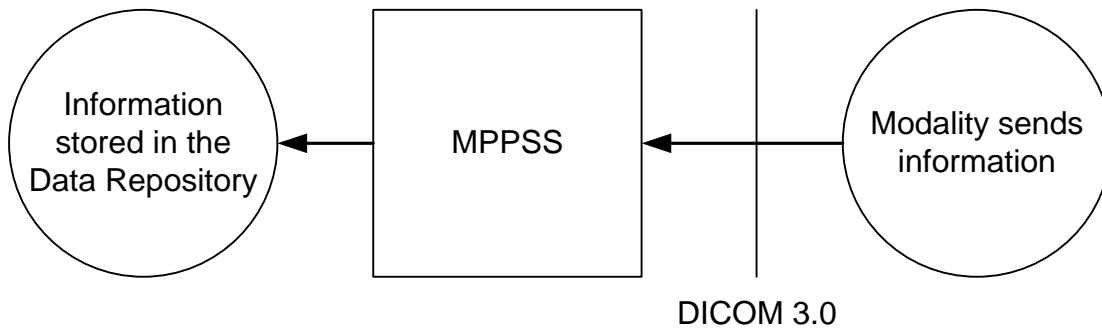


Figure 2 - MPPSS DICOM Data Flow Diagram

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2.2.2 Functional Definitions of Application Entities

2.2.2.1 DMWL AE

DMWL waits for a modality to connect at the presentation address configured for its Application Entity Title. When the modality connects, DMWL expects it to be DICOM-compliant. DMWL will accept associations with Presentation Contexts for Modality Worklist SOP Class. It will receive queries and return information on these Presentation Contexts.

2.2.2.2 MPPSS AE

MPPSS waits for a modality to connect at the presentation address configured for its Application Entity Title. When the modality connects, MPPSS expects it to be DICOM-compliant. MPPSS will accept associations with Presentation Contexts for Modality Performed Procedure Step SOP Class and Modality Performed Procedure Step Retrieve SOP Class.

2.2.3 Sequencing of Real-World Activities

Not applicable.

2.3 AE Specifications

2.3.1 DMWL AE

The DMWL AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

2.3.1.1 Association Establishment Policies

2.3.1.1.1 General

The maximum PDU size is not configurable and is set to 28,672 bytes.

2.3.1.1.2 Number of Associations

DMWL may accept multiple simultaneous associations. Maximum number of simultaneous associations is not configurable and depends on available system resources.

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2.3.1.1.3 Asynchronous Nature

DMWL does not support multiple outstanding transactions over a single association.

2.3.1.1.4 Implementation Identifying Information

An Implementation Class UID is "2.16.840.1.113669.2.1.1" and version name is "MergeCOM3_330". These values are not configurable but may change occasionally from version to version.

2.3.1.2 Association Initiation Policy

DMWL AE does not initiate Associations.

2.3.1.3 Association Acceptance Policy

When DMWL accepts an association, it will receive query for information, perform corresponding query from data repository and return retrieved information in one or more responses to the initial DICOM query. DMWL may be configured to selectively accept or reject association requests coming from certain devices.

2.3.1.3.1 Associated Real-World Activity

The Real-World Activity associated with C-FIND operation is attempt by modality to retrieve information about Scheduled Procedure Steps. DMWL will issue failure status if it is unable process such a query.

2.3.1.3.2 Presentation Context Table

Any of the Presentation Contexts shown in Table 1 are acceptable for DMWL to receive queries.

Table 1 - Acceptable Presentation Contexts for DMWL

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
Modality Worklist	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Modality Worklist	1.2.840.10008.5.1.4.31	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Modality Worklist	1.2.840.10008.5.1.4.31	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

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2.3.1.3.2.1 SOP Specific Conformance to Verification SOP Class

DMWL provides standard conformance to the DICOM Verification Service Class.

2.3.1.3.2.2 SOP Specific Conformance to Modality Worklist SOP Class

DMWL conforms to the Modality Worklist SOP Class. Supported Matching and Return keys are listed in the Table 2. DMWL only supports required matching keys and return keys of Types 1, 1C, 2 and 2C. Some of Type 3 return keys are also supported (see Table 2 below for the list of supported keys). It means that DMWL will only accept queries based on supported matching keys, any values provided in the return keys will be ignored which may potentially lead to larger sets of returned information. DMWL does not support Extended Negotiation for Modality Worklist SOP Class.

Table 2 – Modality Worklist Matching and Return Keys

Description / Module	Tag	Matching Key Type	Return Key Type	Remark / Matching Type
SOP Common				
Specific Character Set	(0008,0005)	O	1C	Will always return "ISO_IR 100".
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	R	1	The Attributes of the Scheduled Procedure Step shall only be retrieved with Sequence Matching. The Scheduled Procedure Step Sequence shall contain only a single Item.
>Scheduled Station AE Title	(0040,0001)	R	1	The Scheduled station AE title shall be retrieved with Single Value Matching only.
>Scheduled Procedure Step Start Date	(0040,0002)	R	1	Scheduled Step Start Date shall be retrieved with Single Value Matching or Range Matching. See remark under Scheduled Procedure Step Start Time(0040,0003).
>Scheduled Procedure Step Start Time	(0040,0003)	R	1	Scheduled Step Start Time shall be retrieved with Single Value Matching or Range Matching. Scheduled Step Start Date and Scheduled Step Start Time are subject to Range Matching. If both keys are specified for Range Matching, e.g. the date range "July5\July 7" and the time range "10am\6pm" specifies the time period starting on July 5, 10am until July 7, 6pm.
>Modality	(0008,0060)	R	1	The Modality shall be retrieved with Single Value Matching.
>Scheduled	(0040,0006)	R	2	Scheduled Performing Physician's

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Description / Module	Tag	Matching Key Type	Return Key Type	Remark / Matching Type
Performing Physician's Name				Name shall be retrieved with Universal Matching or Wild Card Matching with a value of "*". Any other matching will return no information.
>Scheduled Procedure Step Description	(0040,0007)	0	1C	Note: This return attribute is supported as Type 1.
>Scheduled Station Name	(0040,0010)	0	2	
>Scheduled Procedure Step Location	(0040,0011)	0	2	Note: Supported, but will always be returned with zero length
>Scheduled Protocol Code Sequence	(0040,0008)	0	1C	The Scheduled Protocol Code Sequence is supported as Type 1 and contains a single Item.
>>Code Value	(0008,0100)	0	1C	Required if a Sequence Item is present.
>>Coding Scheme Designator	(0008,0102)	0	1C	Required if a Sequence Item is present.
>>Code Meaning	(0008,0104)	0	3	Note: This Value will always be identical to the one of the Scheduled Procedure Step description (0040,0007)
>Pre-Medication	(0040,0012)	0	2C	Required if Pre-Medication is to be applied to that Scheduled Procedure Step.
>Scheduled Procedure Step ID	(0040,0009)	0	1	
>Requested Contrast Agent	(0032,1070)	0	2C	Required if Contrast Media is to be applied to that Scheduled Procedure Step.
>Scheduled Procedure Step Status	(0040,0020)	0	3	
>All other Attributes from the Scheduled Procedure Step Module		0	3	Note: Not Supported
Requested Procedure				
Requested Procedure ID	(0040,1001)	0	1	
Requested Procedure Description	(0032,1060)	0	1C	Note: This return attribute is supported as Type 1.

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Description / Module	Tag	Matching Key Type	Return Key Type	Remark / Matching Type
Requested Procedure Code Sequence	(0032,1064)	0	1C	Note: This return attribute is supported as Type 1 and contains a single Item
>Code Value	(0008,0100)	0	1C	Required if a Sequence Item is present.
>Coding Scheme Designator	(0008,0102)	0	1C	Required if a Sequence Item is present.
>Code Meaning	(0008,0104)	0	3	
Study Instance UID	(0020,000D)	0	1	
Referenced Study Sequence	(0008,1110)	0	2	The Referenced Study Sequence will contain a single item if requested.
>Referenced SOP Class UID	(0008,1150)	0	1C	Required if a Sequence Item is present.
>Referenced SOP Instance UID	(0008,1155)	0	1C	Required if a Sequence Item is present.
Requested Procedure Priority	(0040,1003)	0	2	Note: Supported, but will always be returned with zero length
Patient Transport Arrangements	(0040,1004)	0	2	Note: Supported, but will always be returned with zero length
All other Attributes from the Requested Procedure Module		0	3	Note: Not Supported
Imaging Service Request				
Accession Number	(0008,0050)	0	2	Note: Supported and will always be returned with non-zero length
Requesting Physician	(0032,1032)	0	2	Note: Supported, but will always be returned with the same value as Referring Physician's Name (0008,0090)
Referring Physician's Name	(0008,0090)	0	2	
All other Attributes from the Imaging Service Request Module		0	3	Note: Not Supported
Visit Identification				
Admission ID	(0038,0010)	0	2	Note: Supported, but will always be returned with zero length
All other Attributes from the Visit Identification Module		0	3	Note: Not Supported
Visit Status				
Current Patient Location	(0038,0300)	0	2	

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Description / Module	Tag	Matching Key Type	Return Key Type	Remark / Matching Type
All other Attributes from the Visit Status Module		O	3	Note: Not Supported
Visit Relationship				
Referenced Patient Sequence	(0008,1120)	O	2	The Referenced Patient Sequence will contain a single item if requested.
>Referenced SOP Class UID	(0008,1150)	O	2	
>Referenced SOP Instance UID	(0008,1155)	O	2	
All other Attributes from the Visit Relationship Module		O	3	Note: Not Supported
Visit Admission				
All Attributes from the Visit Admission Module		O	3	Note: Not Supported
Patient Relationship				
All Attributes from the Patient Relationship Module		O	3	Note: Not Supported
Patient Identification				
Patient's Name	(0010,0010)	R	1	Patient Name shall be retrieved with Single Value Matching or Wild Card Matching.
Patient ID	(0010,0020)	R	1	Patient ID shall be retrieved with Single Value Matching.
All other Attributes from the Patient Identification Module		O	3	Note: Not Supported
Patient Demographic				
Patients Birth Date	(0010,0030)	O	2	
Patient's Sex	(0010,0040)	O	2	
Patient's Weight	(0010,1030)	O	2	
Confidentiality constraint on patient data	(0040,3001)	O	2	Note: Supported, but will always be returned with zero length
All other Attributes from the Patient Demographic Module		O	3	Note: Not Supported
Patient Medical				
Patient State	(0038,0500)	O	2	Note: Supported, but will always be returned with zero length
Pregnancy Status	(0010,21C0)	O	2	Note: Supported, but will always be returned with zero length
Medical Alerts	(0010,2000)	O	2	Note: Supported, but will always be

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Description / Module	Tag	Matching Key Type	Return Key Type	Remark / Matching Type
				returned with zero length
Contrast Allergies	(0010,2110)	0	2	Note: Supported, but will always be returned with zero length
Special Needs	(0038,0050)	0	2	Note: Supported, but will always be returned with zero length
All other Attributes from the Patient Medical Module		0	3	Note: Not Supported

If the database query was unsuccessful, DMWL responds to the modality with C-FIND-RSP message conveying failure status of the operation (Status Attribute (0000,0900) with value 0xC001). It will also return Success and Pending status codes while returning information to the modality (see Table 3).

Table 3 – C-FIND Response status values for DMWL

Service Status	Further Meaning	Status Codes	Related Fields
Failed	Unable to process	C001	None
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied.	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	Identifier
Pending	Matches are continuing - Warning that one or more Optional Keys were not supported for existence for this Identifier.	FF01	Identifier

2.3.1.3.3 Presentation Context Acceptance Criterion

DMWL will always accept a Presentation Context for the Verification SOP Class with the DICOM Default Transfer Syntax. It will also accept up to the Presentation Contexts on an association, provided that all of them specify the same Abstract Syntax. The Presentation Contexts that may be accepted by DMWL are specified in Table 1. Proposed Presentation Contexts will be considered in the order proposed by SCU. The first acceptable Presentation Context with Abstract Syntax other than Verification determines the Abstract Syntax that will be used for the association. Later proposed Presentation Contexts may be accepted if they have the same Abstract Syntax and allow a different Transfer Syntax.

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2.3.1.3.4 Transfer Syntax Selection Policies

DMWL prefers to receive images encoded using Explicit Little Endian syntax. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

1. Explicit VR Little Endian Syntax
2. Explicit VR Big Endian Syntax
3. Implicit VR Little Endian Syntax

2.3.2 MPPSS AE

The MPPSS AE provides Standard Conformance to the following DICOM 3.0 SOP Classes as an SCP:

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

2.3.2.1 Association Establishment Policies

2.3.2.1.1 General

The maximum PDU size is not configurable and is set to 28,672 bytes.

2.3.2.1.2 Number of Associations

MPPSS may accept multiple simultaneous associations. Maximum number of simultaneous associations is not configurable and depends on available system resources.

2.3.2.1.3 Asynchronous Nature

MPPSS does not support multiple outstanding transactions over a single association.

2.3.2.1.4 Implementation Identifying Information

An Implementation Class UID is "2.16.840.1.113669.2.1.1" and version name is "MergeCOM3_330". These values are not configurable but may change occasionally from version to version.

2.3.2.2 Association Initiation by Real-World Activity

MPPSS AE does not initiate Associations.

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2.3.2.3 Association Acceptance Policy

When MPPSS accepts an association, it will receive query for information, perform corresponding query from data repository and return retrieved information in one or more responses to the initial DICOM query. MPPSS places no limitation on who may connect to it.

2.3.2.3.1 Associated Real-World Activity

The Real-World Activity associated with N-CREATE or N-SET operations is an attempt by modality to create or update previously created MPPS object respectively. MPPSS will issue failure status if it is unable process such a query.

2.3.2.3.2 Presentation Context Table

MPPSS accept Presentation Contexts shown in Table 4 for the corresponding SOP Classes.

Table 4 - Acceptable Presentation Contexts for MPPSS

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
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

2.3.2.3.2.1 SOP Specific Conformance to Verification SOP Class

MPPSS provides standard conformance to the DICOM Verification Service Class.

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2.3.2.3.2.2 SOP Specific Conformance to Modality Performed Procedure Step SOP Class

MPPSS provides standard conformance to the Modality Performed Procedure Step SOP Class as SCP. It uses the DIMSE service elements N-CREATE and N-SET to receive the MPPS messages.

Table 5 – Data Elements Supported In MPPS N-CREATE Request

Attribute Name	Tag
Specific Character Set	(0008,0005)
Performed Procedure Step Relationship	
Scheduled Step Attribute Sequence	(0040,0270)
>Study Instance UID	(0020,000D)
>Referenced Study Sequence	(0008,1110)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Instance UID	(0008,1155)
>Accession Number	(0008,0050)
>Placer Order Number/Imaging Service Request	(0040,2016)
>Filler Order Number/Imaging Service Request	(0040,2017)
>Requested Procedure ID	(0040,1001)
>Requested Procedure Code Sequence	(0032,1064)
>>Code Value	(0008,0100)
>>Coding Scheme Designator	(0008,0102)
>>Code Meaning	(0008,0104)
>Requested Procedure Description	(0032,1060)
>Scheduled Procedure Step ID	(0040,0009)
>Scheduled Procedure Step Description	(0040,0007)
>Scheduled Protocol Code Sequence	(0040,0008)
>>Code Value	(0008,0100)
>>Coding Scheme designator	(0008,0102)
>>Coding Scheme Version	(0008,0103)
>>Code Meaning	(0008,0104)
>>All other Attributes from Scheduled Protocol Code Sequence	

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Attribute Name	Tag
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Referenced Patient Sequence	(0008,1120)
>Referenced SOP Class UID	(0008,1150)
>Referenced Instance UID	(0008,1155)
Admission ID	(0038,0010)
Issuer of Admission ID	(0038,0011)
Performed Procedure Step Information	
Performed Procedure Step ID	(0040,0253)
Performed Station AE Title	(0040,0241)
Performed Station Name	(0040,0242)
Performed Location	(0040,0243)
Performed Procedure Step Start Date	(0040,0244)
Performed Procedure Step Start Time	(0040,0245)
Performed Procedure Step Status	(0040,0252)
Performed Procedure Step Description	(0040,0254)
Performed Procedure Type Description	(0040,0255)
Procedure Code Sequence	(0008,1032)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Coding Scheme Version	(0008,0103)
>Code Meaning	(0008,0104)
Performed Procedure Step End Date	(0040,0250)
Performed Procedure Step End Time	(0040,0251)
Comments on the Performed Procedure Step	(0040,0280)
Performed Procedure Step Discontinuation Reason Code	(0040,0281)

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Attribute Name	Tag
Sequence	
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Coding Scheme Version	(0008,0103)
>Code Meaning	(0008,0104)
Image Acquisition Results	
Modality	(0008,0060)
Study ID	(0020,0010)
Performed Protocol Code Sequence	(0040,0260)
>Code Value	(0008,0100)
>Coding Scheme Designator	(0008,0102)
>Coding Scheme Version	(0008,0103)
>Code Meaning	(0008,0104)
>All other Attributes from Performed Protocol Code Sequence	
Performed Series Sequence	(0040,0340)
>Performing Physician's Name	(0008,1050)
>Protocol Name	(0018,1030)
>Operators' Name	(0008,1070)
>Series Instance UID	(0020,000E)
>Series Description	(0008,103E)
>Retrieve AE Title	(0008,0054)
>Referenced Image Sequence	(0008,1140)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Instance UID	(0008,1155)
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)
>>Referenced SOP Class UID	(0008,1150)
>>Referenced SOP Instance UID	(0008,1155)
>All other attributes from Performed Series Sequence	
All other attributes from Radiation Dose Module and Billing and	

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Attribute Name	Tag
Material Code Module	

After successfully receiving and processing a MPPS N-CREATE request, the MPPSS AE will create and maintain an MPPS object.

If the Affected SOP Instance UID attribute is supplied in the received N-CREATE request, the MPPSS AE will assign this SOP Instance UID to the newly created MPPS object. Otherwise MPPSS AE will not be able to create an MPPS object.

Table 6 – Data Elements Supported In MPPS N-SET Request

Attribute Name	Tag	Description
Performed Procedure Step Information		
Performed Procedure Step Status	(0040,0252)	Attribute required for the Final State.
Performed Procedure Step Description	(0040,0254)	
Performed Procedure Type Description	(0040,0255)	
Procedure Code Sequence	(0008,1032)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Code Meaning	(0008,0104)	
Performed Procedure Step End Date	(0040,0250)	Attribute required for the Final State.
Performed Procedure Step End Time	(0040,0251)	Attribute required for the Final State.
Comments on the Performed Procedure Step	(0040,0280)	
Performed Procedure Step Discontinuation Reason Code Sequence	(0040,0281)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Code Meaning	(0008,0104)	

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Attribute Name	Tag	Description
Image Acquisition Results		
Performed Protocol Code Sequence	(0040,0260)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Code Meaning	(0008,0104)	
Performed Series Sequence	(0040,0340)	
>Performing Physician's Name	(0008,1050)	
>Protocol Name	(0018,1030)	
>Operators' Name	(0008,1070)	
>Series Instance UID	(0020,000E)	
>Series Description	(0008,103E)	
>Retrieve AE Title	(0008,0054)	
>Referenced Image Sequence	(0008,1140)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>All other attributes from Performed Series Sequence		
All other attributes from Radiation Dose Module and Billing and Material Code Module		

After MPPS object had been created per N-CREATE request, only a single N-SET request with Performed Procedure Step Status of "DISCONTINUED" or "COMPLETED" will be processed by MPPSS. N-SET requests with Performed Procedure Step Status of "IN PROGRESS" will not be processed by MPPSS and service status of "Success" (see Table 7) will be returned in corresponding N-SET response.

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MPPSS AE can be configured to forward N-CREATE and N-SET requests to another application entity. The result of that forwarding is not checked, i.e. if AE receiving forwarded messages is down, the messages will not be resent. Forwarding can only be enabled for a single destination application entity.

If additional attributes are present in N-CREATE or N-SET requests, MPPSS will ignore them without affecting the result of processing the request.

If MPPSS AE is unable to create or update MPPS information in the Data Repository, it responds to the modality with N-CREATE-RSP or N-SET-RSP message conveying failure status of the operation (Status Attribute (0000,0900) with value 0xC001). Otherwise, it will return Success status code (see Table 7).

Table 7 – N-CREATE and N-SET Response status values for MPPSS

Service Status	Further Meaning	Status Codes	Related Fields
Failed	Unable to process	C001	None
Success		0000	None

2.3.2.3.3 Presentation Context Acceptance Criterion

MPPSS will always accept a Presentation Context for the Verification SOP Class with the DICOM Default Transfer Syntax. It will also accept up to three Presentation Contexts on an association, provided that all of them specify the same Abstract Syntax. The Presentation Contexts that may be accepted by MPPSS are specified in Table 4. Proposed Presentation Contexts will be considered in the order proposed by SCU. The first acceptable Presentation Context with Abstract Syntax other than Verification determines the Abstract Syntax that will be used for the association. Later proposed Presentation Contexts may be accepted if they have the same Abstract Syntax and allow a different Transfer Syntax.

2.3.2.3.4 Transfer Syntax Selection Policies

MPPSS prefers to receive images encoded using Explicit Little Endian syntax. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

1. Explicit VR Little Endian Syntax
2. Explicit VR Big Endian Syntax
3. Implicit VR Little Endian Syntax

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2.4 Communication Profiles

2.4.1 Supported Communication Stacks

All ConnectR Plus DICOM services provide DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

2.4.2 TCP/IP Stack

All ConnectR Plus DICOM services inherit TCP/IP stack from the Windows operating system upon which they execute.

2.4.2.1 Physical Media Support

All ConnectR Plus DICOM services are indifferent to the physical medium over which TCP/IP executes. They inherit this support from the Windows OS upon which they execute.

2.5 Extensions/Specializations/Privatizations

Not Applicable.

2.6 Configuration

The exact method for configuring each configurable item is specified in other ConnectR Plus documentation. The following sections only describe some items that are configurable.

2.6.1 AE Title/Presentation Address Mapping

2.6.1.1 Local AE Titles

DMWL and MPPSS Presentation Addresses are specified by configuring "Local AE Title" and "Port Number" parameters in ConnectR Plus UI.

2.6.2 Configurable Parameters

For DMWL and MPPSS the following parameters can be configured by using ConnectR Plus user interface:

- Local AE Title
- IP Port Number

2.7 Support for Extended Character Sets

ConnectR Plus DICOM services support ISO_IR 100 Character Set.