

MODALITY PERFORMED PROCEDURE STEP SERVER

Version 2.0

DICOM Conformance Statement

2012/12/14



1. Implementation model

The server runs on top of Windows system to receive performed procedure step. It runs as a process that accepts association requests from external applications. The server creates a separated thread for each association request. Therefore, each thread communicates only with the requesting application.

1.1 Data flow

Figure 1 illustrates the relation between the server and external applications. The aforementioned service does not perform any other operations except responding to the requests received via DICOM connection.

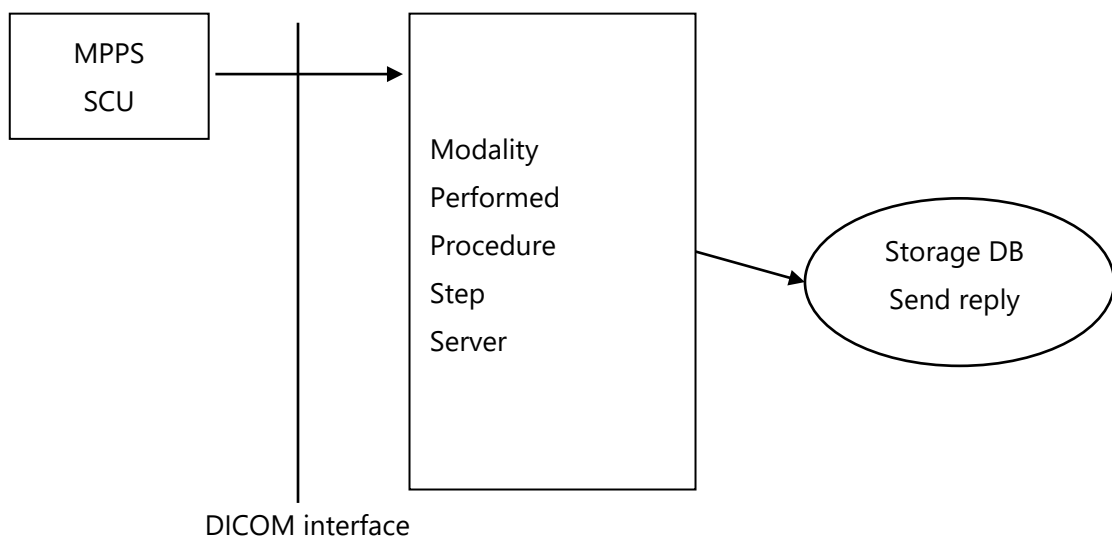


Fig 1. MPPS server implementation model

1.2 Application Entity function definition

Once the server is launched, it is awaiting for the connections from other applications via certain TCP/IP ports. When a DICOM association is requested from another application, the server confirms the request by using the database and the logic.

1. The server looks up the control table in order to confirm whether the name of the requested application contained in the association request has been defined.
2. The server looks up the control table in order to find the application defined in the association request as the name of the requesting application. It confirms whether the name of the requesting application matches the value stored in the control table.

2.AE Specification

The server can be called multiple times from a single equipment unit and operate by using one instance. Moreover, every time the association request is received, the server generates a copy of itself. Calling the server and creating its copy express the same application entity.

2.1 AE Modality Performed Procedure Step Specification

The server, as an SCP, provides the standard conformance with the following DICOM 3.0 SCP classes.

Table 2. The SOP classes that the server supports as an SCP

SOP Class Name	SOP Class UID
Confirmation SOP class	1.2.840.10008.5.1.4.1.1
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

2.1.1 Association Establishment Policy

2.1.1.1 Summary

On receiving a modality performed procedure step request from another application entity, the server attempts to initiate the association.

The default maximum PDU size for communication with the server is 32 KB.

2.1.1.2 Number of associations

The number of simultaneous associations the server can accept is restricted by the kernel parameters of the basic TCP/IP implementation. Also, although the server generates a thread pool according to the settings at startup, the number of simultaneous associations substantially depends on the mentioned parameters.

2.1.1.3 Asynchronous nature

The server does not support asynchronous operation and does not perform asynchronous window negotiation.

2.1.1.4 Implementation Identifying Information

The server provides the implementation class UID.

2.2 Real-World Activity – Modality Performed Procedure Step

The server accepts associations from the nodes attempting to perform request of modality performed procedure step.

2.2.1 Presentation Context Table

Table 5 illustrates the Presentation Contexts that the server can accept in response to the query operations.

Table 5. Acceptable Presentation Contexts for request class

Presentation Contexts					
Abstract syntax		Transfer syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality performed procedure step	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little endian	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big endian	1.2.840.10008.1.2.2		

2.2.2 SOP Specific Conformance for SOP class modality

performed procedure step

The server supports the modules listed in Table 6 as follows.

On receiving N-CREATE service containing Study Instance UID issued by the MWM server, if the status is [In PROGRESS] and is not received, this server returns normal termination.

On receiving N-SET service containing Affected SOP Instance UID returned as a reply from N-CREATE, if the status is [DISCONTINUED] OR [COMPLETED], this server updates the status.

The server updates the status only based on the service request from SCU.

If for whatever reason the SCU update has not been performed, it is required to update the status by using the database management application.

On the server, Study Instance UID and SOP Instance UID are stored in the internal database. By default storage period is 24 hours.

Table 6. SOP Common

Attribute Name	Tag	N-CREATE	N-SET
Specific Character Set	0008 0005	1C	–

Table 6. Performed Procedure Step Relationship

Attribute Name	Tag	N-CREATE	N-SET
Scheduled Step Attributes Sequence	0040 0270	1	–
> Study Instance UID	0020 000D	1	–

>Referenced Study Sequence	0008 1110	2	–
>> Referenced SOP Class UID	0008 1150	1	–
>>Referenced SOP Instance UID	0008 1155	1	–
> Accession Number	0008 0050	2	–
> Placer Order Number / Imaging Service Request	0040 2016	3	–
> Filler Order Number/ Imaging Service Request	0040 2017	3	–
> Requested Procedure ID	0040 1001	2	–
> Requested Procedure Description	0032 1060	2	–
> Scheduled Procedure Step ID	0040 0009	2	–
> Scheduled Procedure Step Description	0040 0007	2	–
> Scheduled Protocol Code Sequence	0040 0008	2	–
>> Code Value	0008 0100	1	–
>> Coding Scheme Designator	0008 0102	1	–
>> Coding Scheme Version	0008 0103	3	–
>> Code Meaning	0008 0104	3	–
Patient's Name	0010 0010	2	–
Patient ID	0010 0020	2	–
Patient's Birth Date	0010 0030	2	–
Patient's Sex	0010 0040	2	–
Referenced Patient Sequence	0008,1120	2	–
> Referenced SOP Class UID	0008 1150	1	–
> Referenced SOP Instance UID	0008 1155	1	–

Table 6. Performed Procedure Step Data

Attribute Name	Tag	N-CREATE	N-SET
Performed Procedure Step ID	0040 0253	1	–
Performed Station AE Title	0040 0241	1	–
Performed Station Name	0040 0242	2	–
Performed Location	0040 0243	2	–
Performed Procedure Step Start Date	0040 0244	1	–
Performed Procedure Step Start Time	0040 0245	1	–
Performed Procedure Step Status	0040 0252	1	1
Performed Procedure Step Description	0040 0254	2	2
Performed Procedure Type Description	0040 0255	2	2
Procedure Code Sequence	0008 1032	2	2
> Code Value	0008 0100	1	1
> Coding Scheme Designator	0008 0102	1	1
>> Coding Scheme Version	0008 0103	3	3

> Code Meaning	0008 0104	3	3
Performed Procedure Step End Date	0040 0250	2	1
Performed Procedure Step End Time	0040 0251	2	1
Comments on the Performed Step	0040 0280	3	3

Table 6. Image Collection Results

Attribute Name	Tag	N-CREATE	N-SET
Modality	0008 0060	1	–
Study ID	0020 0010	2	–
Performed Protocol Code Sequence	0040 0260	2	2
> Code Value	0008 0100	1	1
> Coding Scheme Designator	0008 0102	1	1
>> Coding Scheme Version	0008 0103	3	3
> Code Meaning	0008 0104	3	3
Performed Series Sequence	0040 0340	2	1
> Performing Physician's Name	0008 1050	2	2
> Protocol Name	0018 1030	1	1
> Operators' Name	0008 1070	2	2
> Series Instance UID	0020 000E	1	1
> Series Description	0008 103E	2	2
> Retrieve AE Title	0008 0054	2	2
> Referenced Image Sequence	0008 1140	2	2
>> Referenced SOP Class UID	0008 1150	1	1
>> Referenced SOP Instance UID	0008 1155	1	1
> Referenced Unique SOP Instance Sequence	0040 0220	2	2
>> Referenced SOP Class UID	0008 1150	1	1
>> Referenced SOP Instance UID	0008 1155	1	1
> All other attributes from Performed Series Sequence		3	3
All other attributes from radiation dose module, bill creation, material code module		3	3

2.2.3 Presentation Context Acceptance Criterion

Whether the server receives association requests from unknown applications depends on the system settings. Only if such requests are allowed, any number of the request SOP classes specified in Table 5 can be accepted. The server does not define a limit for the number of the accepted presentation contexts. Also, among several duplicated presentation contexts, the first accepted one is to be selected.

2.2.4 Transfer Syntax Selection Policy

By default, the server selects transfer syntax according to the priority determined in Table 5; however this priority can be changed in the system settings.

2.3 Real-World Activity – Confirming

This server accepts the associations from the nodes attempting to perform confirmation on the image server.

2.3.1 Related Real-World Activity – Confirming

The real-world activity related to C-ECHO requests attempts to confirm the network and server operations without initiating actual operation of external nodes.

2.3.2 Presentation Context Table

Table 8 illustrates the Presentation Contexts the server can accept in response to the confirming operation.

Table 8. Proposed Presentation Contexts of the Server for Confirming Operation

Presentation Contexts					
Abstract Syntax		Transfer Syntax		Role	Extension Negotiation
Name	UID	Name	UID		
Confirm	1.2.840.10008.1.1	DICOM Implicit VR Little endian	1.2.840.10008.1.2	SCP	None

2.3.3 Presentation Context Acceptance Criterion

Whether the server receives association requests from unknown applications depends on the system settings. Only if such requests are allowed, any number of the request SOP classes specified in Table 5 can be accepted. The server does not define a limit for the number of the accepted presentation contexts. Also, among several duplicated presentation contexts, the first accepted one is to be selected.

2.3.4 Transfer Syntax Selection Criterion

By default, the server selects transfer syntax according to the priority determined in Table 5; however this priority can be changed in the system settings.

3. Communication Profile

3.1 TCP/IP Stack

The server provides support for the DICOM V3.0 TCP/IP network communication defined in the part 8 of the DICOM standard.

3.1.1 TCP/IP API

The server is using the TCP/IP stack from Windows system that is running the image server. The subroutine library based on Berkeley sockets interface has been used.

3.1.2 Physical media support

The server exists as a software that can be compiled on various Windows platforms. Therefore, there is no limitation of the physical network. The image server is implemented by using TCP/IP over Ethernet (Thick Wire, Thin Wire, 10 Base T), FDDI (twisted pair into a concentrator, fiber backbone), Tin-Can-Telephone-Net.

4. Extension / Specialization / Privatization

Not applicable

5. Configuration

The server obtains the configuration information from the “control” database stored in the related database. In this implementation, the related database is an ini file.

5.1 AE Title / Presentation Address Mapping

“Application Entity” in the control table is used for mapping between AE titles and presentation address.

5.2 Configurable parameters

The following parameters can be configured on the image server.

- Application entity title
- Maximum PDU size
- Number of TCP/IP ports

5.3 Support of extended character sets

The server supports [ISO 2022 IR 13] and [ISO 2022 IR 87].