Canon

No. 2G985-061EN*A

DICOM CONFORMANCE STATEMENT

FOR

Automation Platform

SCAI-1PF

V1.1 SP0000* or later

CANON MEDICAL SYSTEMS CORPORATION

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1. OVERVIEW

This Conformance Statement applies to the DICOM interface for the SCAI-1PF. This interface is provided by the DicomStoreSCP and DicomStoreSCU components.

DicomStoreSCP and DicomStoreSCU components handle the DICOM communication and storage in between SCAI-1PF and any other Application Entity capable to treat DICOM objects (PACS, …).

It provides storage and retrieval of DICOM objects such as Images and Structured Reports, obtained over the network.

The supported network services are:

Table 1-1 Network Services

SOP Class	User of Service (SCU)	Provider of Service (SCP)
Transfer		
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	No	Yes
Basic Text SR	Yes	No
Grayscale Softcopy Presentation State Storage	Yes	No
Segmentation Storage	Yes	No
Secondary Capture Image Storage	Yes	Yes
Encapsulated PDF Storage	Yes	No
Verification		
Verification SOP Class	Yes	Yes

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3. INTRODUCTION

3.1. REVISION HISTORY

REV.	Date of Issue	Author	Description
/	April, 2020	Canon Medical Systems	First Edition.
A	September, 2020	Canon Medical Systems	Add TLS Support Add Supported Abstract Syntax （Encapsulated PDF Storage）and Transfer Syntax (JPEG Baseline (Process 1)) to STORAGE-SCU

3.2. AUDIENCE

This document is intended for hospital staff, health system integrators, software designers and/or system implementers. It is assumed that the reader of this document has a working understanding of the DICOM 3.0 Standard as well as with the terminology and concepts, which are used in that Standard.

3.3. REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of the intended information.

The scope of this Conformance Statement is to facilitate communication between the product and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself, this Conformance Statement does not guarantee the desired interoperability and successful interconnectivity.

The user should be aware of the following important issues:

- Comparison of the different conformance statements is the first step towards assessing the interconnectivity between the product and other equipment.

- Test procedures should be defined to validate the desired level of connectivity.

- The DICOM standard is evolving to meet the future requirements of users. Canon Medical Systems Corporation is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue them.

3.4. TERMS AND DEFINITIONS

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Abbreviations and terms are as follows:

AE DICOM Application Entity

AET Application Entity Title

CT Computed Tomography

DICOM Digital Imaging and Communications in Medicine

DIMSE DICOM Message Service Element

IOD Information Object Definition

ISO International Standard Organization

PDU DICOM Protocol Data Unit

SCP Service Class Provider

SCU Service Class User

SOP DICOM Service-Object Pair

TCP/IP Transmission Control Protocol/Internet Protocol

TLS Transport Layer Security

UID Unique Identifier

VR Value Representation

3.5. REFERENCES

• [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 22,

4. NETWORKING

4.1. IMPLEMENTATION MODEL

SCAI-1PF has four DICOM Application Entities: ECHO-SCP, ECHO-SCU, STORAGE-SCP, and STORAGE-SCU.

4.1.1. Application Data Flow

SCAI-1PF provides both a graphical user interface, internal database and network listener that spawns additional threads as necessary to handle incoming connections.

The network services may be modeled as the following separate AE's:

— ECHO-SCP, which responds to verification requests

— ECHO-SCU, which verification requests to the specified DICOM destination.

— STORAGE-SCP, which receives incoming images

— STORAGE-SCU, which sends outbound images and other composite instances

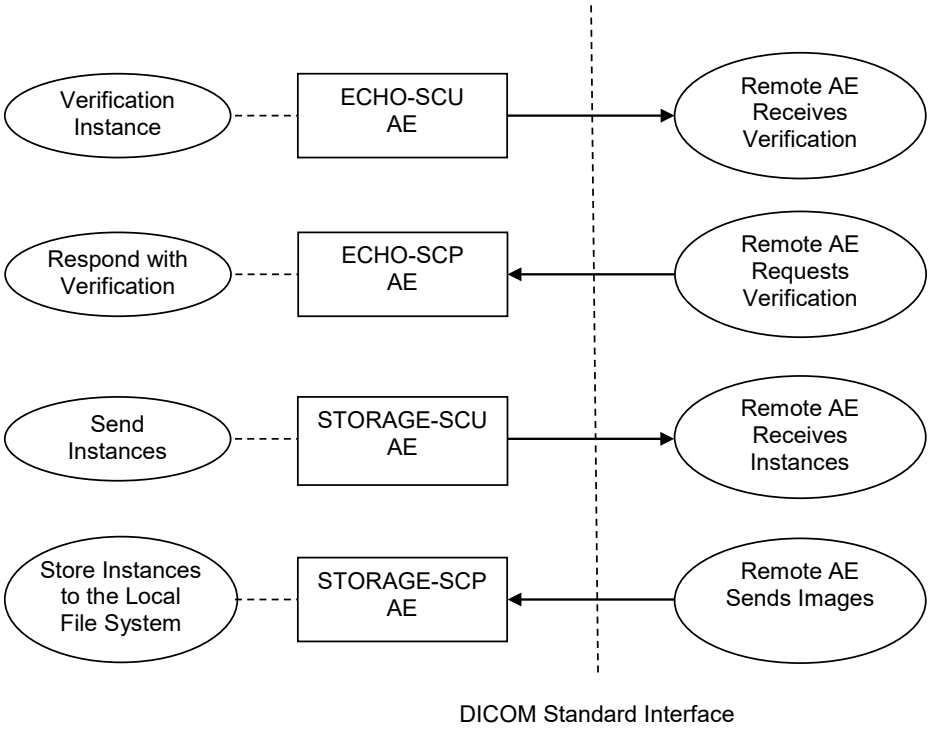

Figure 4.1-1 Application Fata Flow

4.1.2. Functional Definitions of AE's

4.1.2.1. ECHO-SCP

SCAI-1PF ECHO-SCP waits in the background for connections, will accept associations with Presentation Contexts for SOP Class of the Verification Service Class, and will respond to echo requests.

4.1.2.2. ECHO-SCU

SCAI-1PF ECHO-SCU is activated through the user interface when a user requests an echo to a remote AE. An echo is performed to that remote AE, verifying basic DICOM connectivity and displaying results.

4.1.2.3. STORAGE-SCP

The SCAI-1PF Storage Server Application Entity waits in the background for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the STORAGE-SCP AE expects it to be a DICOM application.

The STORAGE-SCP AE will accept associations with Presentation Contexts for SOP Class of the Storage Service Class.

DICOM Instances as well as a subset of attributes from instances received in a Storage Request are stored in records local database.

4.1.2.4. STORAGE-SCU

SCAI-1PF STORAGE-SCU is automatically activated when data is identified to be sent to a remote AE (selected from a pre-configured list).

4.1.3. Sequencing of Real-World Activities

All SCP activities are performed asynchronously in the background and are not dependent on any sequencing.

All SCU activities are sequentially initiated automatically or from within the user interface, and another activity **may** not be initiated until the prior activity has completed.

4.2. AE SPECIFICATIONS

4.2.1. ECHO-SCP

4.2.1.1. SOP Classes

SCAI-1PF ECHO-SCP provide Standard Conformance to the following SOP Class(es):

Table 4.2-1 SOP Classes supported by SCAI-1PF ECHO-SCP

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	Yes

4.2.1.2. Association Policies

4.2.1.2.1. General

SCAI-1PF ECHO-SCP accepts but never initiates associations.

The DICOM standard application context name for DICOM is always accepted and proposed:

Table 4.2-2 DICOM Application Context for SCAI-1PF ECHO-SCP

Application Context Name	1.2.840.10008.3.1.1.1

Table 4.2-3 Maximum PDU size received as a SCP for SCAI-1PF ECHO-SCP

Maximum PDU size received	16378 (Not configurable)

4.2.1.2.2. Number of Associations

SCAI-1PF ECHO-SCP can support up to three Associations at a time.

Table 4.2-4 Number of Associations as a SCP for SCAI-1PF ECHO-SCP

Maximum number of simultaneous associations	3

4.2.1.2.3. Asynchronous Nature

SCAI-1PF ECHO-SCP does not support asynchronous communication.

Table 4.2-5 Asynchronous Nature as SCP for SCAI-1PF ECHO-SCP

Maximum number of outstanding asynchronous transactions	1 (Not configurable)

4.2.1.2.4. Implementation Identifying Information

Table 4.2-6 DICOM Implementation Class and Version for SCAI-1PF ECHO-SCP

Implementation Class UID	1.3.6.1.4.1.32839
Implementation Version Name	AP-1.0

4.2.1.3. Association Initiation Policy

SCAI-1PF ECHO-SCP does not initiate associations.

4.2.1.4. Association Acceptance Policy

When SCAI-1PF ECHO-SCP accepts an association, it will respond to echo requests. If the Called AE Title does not match the pre-configured AE Titles, the association will be rejected.

4.2.1.4.1. Activity – Receive Echo Request

4.2.1.4.1.1. Description and Sequencing of Activities

When the ECHO-SCP AE accepts an association, it will respond to a verification request (C-ECHO).

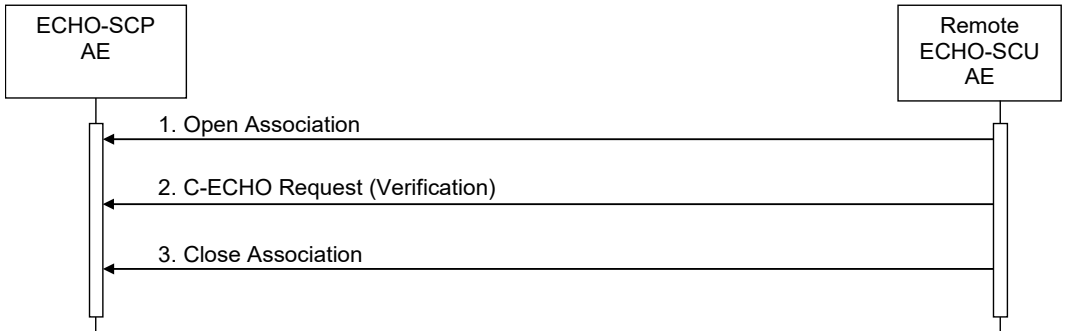

Figure 4.2-1
SEQUENCING OF ACTIVITY – RESPOND TO VERIFICATION REQUEST

A remote peer DICOM Application Entity, acting as an ECHO-SCU, tries to establish an association with SCAI-1PF ECHO-SCP that accepts or doesn't accept these Associations for the purpose of testing the DICOM communication between peer DICOM AEs.

In the default configuration any Calling and Called AET will be accepted. If the Called AET does not correspond to the actual SCAI-1PF ECHO-SCP AET, the SCU can only verify the DICOM Association.

If the Calling AE Titles property is configured, only these Application Entities will be accepted.

4.2.1.4.1.2. Accepted Presentation Contexts

Table 4.2-7 Acceptable Presentation Contexts for SCAI-1PF ECHO-SCP

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Role**
Name	**UID**	**Name**	**UID**	
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP

No extended negotiation is performed.

4.2.1.4.1.3. SOP Specific Conformance

4.2.1.4.1.3.1. SOP Specific Conformance to Verification SOP Class

SCAI-1PF ECHO-SCP provides standard conformance to the DICOM Verification Service Class as a SCP. The status code for the C-ECHO is described in the following table:

Table 4.2-8 SOP Specific Conformance to Verification SOP Class

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0	The C-ECHO request is accepted

4.2.1.4.1.3.2. Presentation Context Acceptance Criterion

SCAI-1PF ECHO-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.1.4.1.3.3. Transfer Syntax Selection Policies

SCAI-1PF ECHO-SCP prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

first encountered explicit Transfer Syntax,

default Transfer Syntax.

SCAI-1PF ECHO-SCP will accept duplicate Presentation Contexts, that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same priority for selecting a Transfer Syntax for each.

4.2.2. ECHO-SCU

4.2.2.1. SOP Classes

SCAI-1PF ECHO-SCU provide Standard Conformance to the following SOP Class(es):

Table 4.2-9 SOP Classes supported by SCAI-1PF ECHO-SCU

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No

4.2.2.2. Association Policies

4.2.2.2.1. General

SCAI-1PF ECHO-SCU can only request the starting of an association.

The DICOM standard application context name for DICOM is always proposed and accepted:

Table 4.2-10 DICOM Application Context for SCAI-1PF ECHO-SCU

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2. Number of Associations

The maximum number of simultaneous Associations is not configurable.

Table 4.2-11 Number of Associations as a SCU for SCAI-1PF ECHO-SCU

Maximum number of simultaneous associations	1(Not Configurable)

4.2.2.2.3. Asynchronous Nature

SCAI-1 PF ECHO-SCU does not support asynchronous communication (multiple incomplete transactions on a single association). All association requests must be completed and confirmed before new actions can be performed.

Table 4.2-12 Asynchronous Nature as SCU for SCAI-1PF ECHO-SCU

Maximum number of outstanding asynchronous transactions	1 (Not configurable)

4.2.2.2.4. Implementation Identifying Information

Table 4.2-13 DICOM Implementation Class and Version for SCAI-1PF ECHO-SCU

Implementation Class UID	1.3.6.1.4.1.32839
Implementation Version Name	AP-1.0

4.2.2.3. Association Initiation Policy

4.2.2.3.1. Activity – Receive Echo Request

4.2.2.3.1.1. Description and Sequencing of Activities

SCAI-1 PF ECHO-SCU attempts to initiate a new association when the user requests an Echo from the user interface to a single remote AE. A single attempt will be made to verify the remote AE. If the verification fails, for whatever reason, no retry will be performed. The results will be displayed.

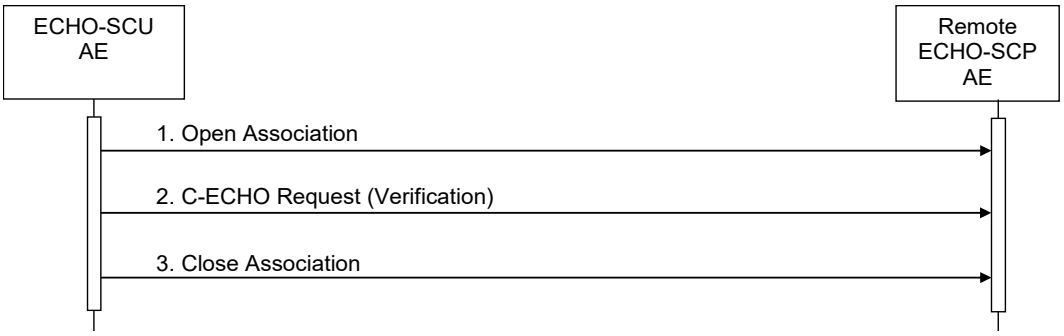

Figure 4.2-2
SEQUENCING OF ACTIVITY

1. SCAI-1 PF ECHO-SCU opens a new association with the specified destination AE.
2. SCAI-1 PF ECHO-SCU sends C-ECHO requests.
3. SCAI-1 PF ECHO-SCU closes the Association.

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4.2.2.3.1.2. Proposed Presentation Contexts

Table 4.2-14 Proposed Presentation Contexts for SCAI-1PF ECHO-SCU

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Role**
Name	**UID**	**Name**	**UID**	
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU

4.2.2.3.1.3. SOP Specific Conformance

4.2.2.3.1.3.1. SOP Specific Conformance to Verification SOP Class

Table 4.2-15 Response Status for SCAI-1PF ECHO-SCU

Service Status	Further Meaning	Status Codes	Related Fields	Behavior
Error	Data Set does not match SOP Class	A9xx	(0000,0901) (0000,0902)	Never sent – data set is not checked prior to storage
	Cannot understand	Cxxx	(0000,0901) (0000,0902)	Never sent
Success	Success	0000	None	-

4.2.3. STORAGE-SCP

4.2.3.1. SOP Classes Supported

SCAI-1PF Storage Application Entity provides Standard Conformance to the following SOP Class(es):

Table 4.2-16 SOP Classes supported by SCAI-1PF Storage Application Entity (SCP)

SOP Class Name	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes

These are the default SOP Classes supported. By altering the configuration, it is possible to support additional or fewer SOP Classes.

4.2.3.2. Association Policies

4.2.3.2.1. General

The SCAI-1PF Storage Application Entity accepts but never initiates association requests. It will accept Association Requests for the Verification and Storage Services.

The DICOM standard application context name for DICOM is always accepted and proposed:

Table 4.2-17 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

Table 4.2-18 Maximum PDU size the SCAI-1PF STORAGE-SCP AE can receive

Maximum PDU size received	16378 (Not configurable)

Table 4.2-19 Maximum PDU size the SCAI-1PF STORAGE-SCP AE can send

Maximum PDU size to send	16378 (Not configurable)

4.2.3.2.2. Number of Associations

The SCAI-1PF Storage Application Entity can support multiple simultaneous Associations requested by peer AEs. The maximum total number of simultaneous Associations accepted from peer AEs is 3.

Table 4.2-20 Number of Associations

Maximum number of simultaneous associations	3 (Not configurable)

4.2.3.2.3. Asynchronous Nature

The SCAI-1PF STORAGE-SCP does not support asynchronous communication.

Table 4.2-21 Asynchronous Nature for SCAI-1PF STORAGE-SCP Server AE

Maximum number of outstanding asynchronous transactions	1 (Not configurable)

4.2.3.2.4. Implementation Identifying Information

Table 4.2-22 DICOM Implementation Class and Version for SCAI-1PF STORAGE–SCP

Implementation Class UID	1.3.6.1.4.1.32839
Implementation Version Name	AP-1.0

4.2.3.3. Association Initiation Policy

SCAI-1PF STORAGE-SCP does not initiate associations.

4.2.3.4. Association Acceptance Policy

The SCAI-1PF Storage Application Entity can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or Application Entity Titles.

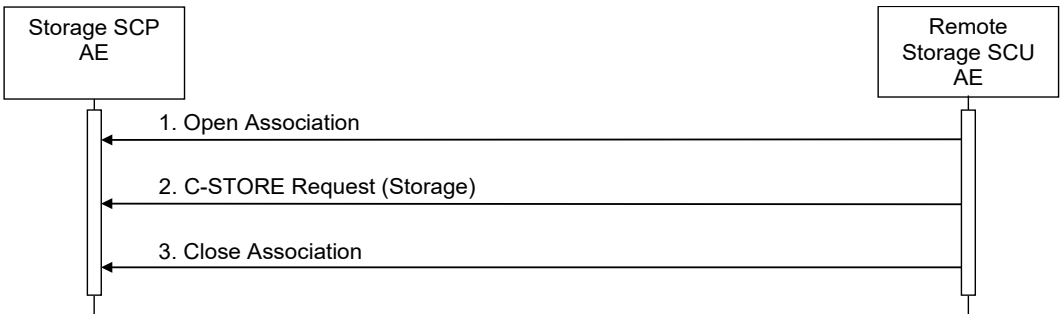

Figure 4.2-3
SEQUENCING OF ACTIVITY – STORE IMAGES TO THE LOCAL FILE SYSTEM

A possible sequence of interactions between the Storage SCP AE and the Server is illustrated in the Figure above:

1. Storage SCU AE opens an association with the Storage SCP AE.
2. Storage SCU AE sends images to the Storage SCP AE using a storage request (C-STORE) and the Storage SCP AE replies with a C-STORE response (status success).
3. Storage SCU AE closes the association with the Storage SCP AE.

4.2.3.4.1.1. Description and Sequencing of Activities

A remote peer DICOM Application Entity, acting as a Storage SCU, establishes an association with SCAI-1PF STORAGE-SCP that accepts these Associations for the purpose of receiving supported SOP Class Instances.

In the default configuration, any Calling and Called AET will be accepted. If the Called AET does not correspond to the actual SCAI-1PF Storage AET, the SCU can only verify the DICOM Association, but cannot invoke any other related DICOM service.

When an association has been established the Sequencing of Real-World Activities is as described in Section “Sequencing of Real-World Activities”.

The SCAI-1PF STORAGE-SCP AE may reject Association attempts as shown in the table below. The Result, Source and Reason columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4).

Table 4.2-23 Association Rejection Reasons

Result	Source	Reason	Description
2- rejected transient	provider	2 – local limit exceeded	The maximum number of simultaneous associations has been reached. An association request with the same parameters may succeed later.
1 – rejected permanent	User	2 – application context name not supported	The Association request contained an unsupported Application Context Name. An association request with the same parameters will NOT succeed later.
1 – rejected permanent	User	3 – calling AE Title not recognized	The Association request contained an unrecognized Calling AE Title. An association request with the same parameters will NOT succeed later unless configuration changes are made.

As instances are received, they are copied to the local database and a record is inserted into the local database. If the received instance is a duplicate of a previously received instance, the old file and database record will be overwritten with the new one.

4.2.3.4.1.2. Accepted Presentation Contexts

Table 4.2-24 Acceptable Presentation Contexts for SCAI-1PF STORAGE-SCP

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Role**
Name	**UID**	**Name**	**UID**	
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process14 [Selection Value 1])	1.2.840.10008.1.2.4.70	SCP
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP
		JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process14 [Selection Value 1])	1.2.840.10008.1.2.4.70	SCP
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP

4.2.3.4.1.2.1. Extended Negotiation

No extended negotiation is performed, though SCAI-1PF STORAGE-SCP:

- is a Level 2 Storage SCP (Full – does not discard any data elements, including private elements)
- does not support digital signatures
- does not coerce any received data elements

4.2.3.4.1.3. SOP Specific Conformance

4.2.3.4.1.3.1. SOP Specific Conformance for Storage SOP Classes

The associated Activity with the Storage service is the storage of medical DICOM data received over the network on a designated storage repository. The SCAI-1PF STORAGE-SCP AE will return a failure status if it is unable to store the received instance(s).

The SCAI-1PF STORAGE-SCP AE does not have any dependencies on the number of Associations used to send images to it. Images belonging to one or several studies can be sent over different Associations. SCAI-1PF STORAGE-SCP AE can be configured to correctly receive series split into several associations. There is no limit

on either the number of SOP Instances or the maximum amount of total SOP Instance data that can be transferred over a single Association.

The SCAI-1PF STORAGE-SCP AE is configured to retain the original DICOM data in DICOM Part 10 compliant file format. The AE server of the SCAI-1PF complies with Level 2 (complete) as a Storage SCP.

In addition, all Private and SOP Class Extended Elements are maintained in the DICOM format files.

In addition to saving all Elements in files, a subset of the Elements is stored in the SCAI-1PF Server database to support query and retrieval requests and also to allow the updating of Patient, Study, and Series information by user input, or demographic and Study related messages, solely via the SCAI-1PF interface .

If the received Series instance is a duplicate of a previously received instance, the old files

and database information will be overwritten with the new one.

Performance will depend greatly on the performance of the remote STORAGE-SCU, the number of simultaneous active Associations, and the underlying network performance.

4.2.3.4.1.3.2. Presentation Context Acceptance Criterion

SCAI-1PF STORAGE-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

4.2.3.4.1.3.3. Transfer Syntax Selection Policies

The SCAI-1PF STORAGE-SCP will examine the Transfer Syntaxes for a given Presentation Context in the order that they are presented in the Association Request. The first Transfer Syntax that matches a supported Transfer Syntax will be accepted for each proposed Presentation Context.

4.2.3.4.1.3.4. Response Status

Table 4.2-25 Response Status for SCAI-1PF STORAGE-SCP

Service Status	Further Meaning	Status Codes	Related Fields	Behavior
Refused	Out of Resources	A7xx	(0000,0902)	Never sent
Error	Data Set does not match SOP Class	A9xx	(0000,0901) (0000,0902)	Never sent – data set is not checked prior to storage
	Cannot understand	Cxxx	(0000,0901) (0000,0902)	Never sent
Warning	Coercion of Data Elements	B000	(0000,0901) (0000,0902)	Never sent - no coercion is never performed
	Data Set does not match SOP Class	B007	(0000,0901) (0000,0902)	Never sent - data set is not checked prior to storage
	Elements Discarded	B006	(0000,0901) (0000,0902)	Never sent – all elements are always stored
Success	Success	0000	None	-

4.2.4. STORAGE-SCU

4.2.4.1. SOP Classes Supported

Table 4.2-26 SOP Classes supported by SCAI-1PF STORAGE-SCU

SOP Class Name	SOP Class UID	SCU	SCP
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

4.2.4.2. Association Policies

4.2.4.2.1. General

The DICOM standard application context name for DICOM is always accepted and proposed:

Table 4.2-27 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

The SCAI-1PF STORAGE-SCU AE initiates but never accepts association requests.

Table 4.2-28 Maximum PDU size the SCAI-1PF STORAGE-SCU AE can receive

Maximum PDU size received	16352 (Not configurable)

Table 4.2-29 Maximum PDU size the SCAI-1PF STORAGE-SCU AE can send

Maximum PDU size to send	65535 (Not configurable)

4.2.4.2.2. Number of Associations

The SCAI-1PF STORAGE-SCU can support multiple simultaneous Associations. The maximum total number of simultaneous Associations is 5.

Table 4.2-30 Number of Associations

Maximum number of simultaneous associations	5 (Not configurable)

4.2.4.2.3. Asynchronous Nature

SCAI-1PF STORAGE-SCU does not support asynchronous communication. Multiple outstanding transactions are not supported. It allows up to one invoked and one performed operation on an Association (it is synchronous). Asynchronous mode of operation is not supported.

Table 4.2-31 Asynchronous Nature as an association initiator for SCAI-1PF STORAGE-SCU

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

4.2.4.2.4. Implementation Identifying Information

SCAI-1PF will respond with the identifying parameters as listed in the following table:

Table 4.2-32 DICOM Implementation Class and Version for SCAI-1PF STORAGE-SCU

Implementation Class UID	1.3.6.1.4.1.32839
Implementation Version Name	AP-1.0

4.2.4.3. Association Initiation Policy Policies

SCAI-1PF STORAGE-SCU attempts to initiate a new association for each instance it attempts to transfer.

4.2.4.3.1. Activity – Send Storage Request

4.2.4.3.1.1. Description and Sequencing of Activities

An association is established when the user initiates a transmit request. For each instance selected from the user interface to be transferred, a single attempt will be made to transmit it to the selected remote AE. If the send fails, for whatever reason, no retry will be performed, and an attempt will be made to send the next instance.

Storage SCU AE attempts to initiate a new Association in order to issue a Storage Request (C-STORE).

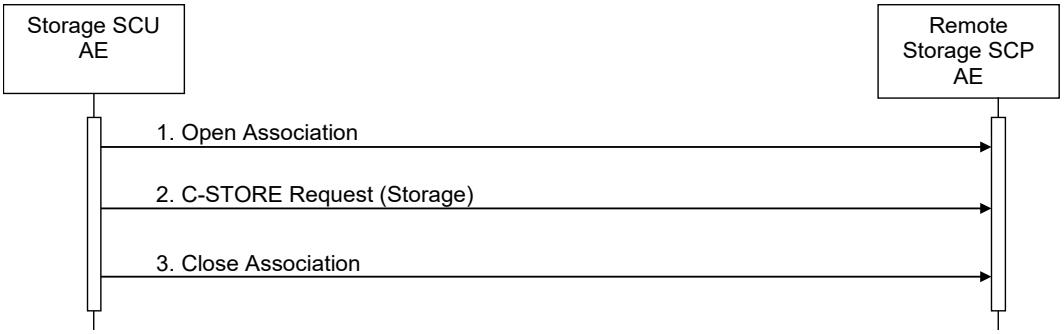

Figure 4.2-4
SEQUENCING OF ACTIVITY – SEND INSTANCES

A possible sequence of interactions between the Storage SCU AE and a Server (e.g. a storage or archive device supporting the Storage SOP Classes as an SCP) is illustrated in the Figure above:

1. Storage SCU AE opens an Association with Storage SCP AE.
2. Acquired instances are transmitted to the server using a Storage Request (C-STORE) and Storage SCP AE replies with a C-STORE response (status success).
3. Storage SCU AE closes the Association with Storage SCP AE.

4.2.4.3.1.2. Proposed Presentation Contexts

SCAI-1PF STORAGE-SCU may request any of the Presentation Contexts listed in the following table for Storage.

Table 4.2-33 Proposed Presentation Contexts for SCAI-1PF STORAGE-SCU

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Role**
Name	**UID**	**Name**	**UID**	
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
Grayscale Softcopy Presentation State SR	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU

Note: SCAI-1PF STORAGE-SCU does not convert Enhanced CT Image to multiple CT Images, thus Enhanced CT Image is only received by STORAGE-SCP AE for processing.

4.2.4.3.1.2.1. Extended Negotiation

No extended negotiation is performed.

4.2.4.3.1.3. SOP Specific Conformance

4.2.4.3.1.3.1. SOP Specific Conformance for Storage SOP Classes

SCAI-1PF STORAGE-SCU provides standard conformance to the Storage Service Class.

4.2.4.3.1.3.2. Presentation Context Acceptance Criterion

SCAI-1PF STORAGE-SCU does not accept associations.

4.2.4.3.1.3.3. Transfer Syntax Selection Policies

SCAI-1PF STORAGE-SCU prefers the original Transfer Syntax of the data to be sent.

4.2.4.3.1.3.4. Response status

SCAI-1PF STORAGE-SCU will behave as described in the Table below in response to the status returned in the C-STORE response command message.

Table 4.2-34 Response Status for SCAI-1PF STORAGE-SCU

Service Status	Further Meaning	Status Codes	Related Fields	Behavior
Refused	Out of Resources	A7xx	(0000,0902)	Never sent
Error	Data Set does not match SOP Class	A9xx	(0000,0901) (0000,0902)	Never sent – data set is not checked prior to storage
	Cannot understand	Cxxx	(0000,0901) (0000,0902)	Never sent
Warning	Coercion of Data Elements	B000	(0000,0901) (0000,0902)	Never sent - no coercion is ever performed
	Data Set does not match SOP Class	B007	(0000,0901) (0000,0902)	Never sent - data set is not checked prior to storage
	Elements Discarded	B006	(0000,0901) (0000,0902)	Never sent – all elements are always stored
Success	Success	0000	None	-

4.2.4.4. Association Acceptance Policy

SCAI-1PF STORAGE-SCU does not accept associations.

4.3. NETWORK INTERFACES

4.3.1. Physical Network Interfaces

SCAI-1PF is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying Operating System and hardware.

4.3.2. Supported Communications Stacks

SCAI-1PF provides DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the DICOM Standard. SCAI-1PF inherits their TCP/IP stack from the installed Java Runtime Environment on the underlying operating system upon which it executes.

4.3.3. Additional Protocols

SCAI-1PF conforms to the System Management Profiles listed in Table 4.3-1.

Table 4.3-1 Supported System Management Profiles

Profile Name	Actor	Protocol	Support
Network Address Management	DHCP Client	DHCP	No
	DNS Client	DNS	Depends on the operating system
Time Synchronization	NTP Client	NTP	Depends on the operating system
	DHCP Client	DHCP	No
DICOM Application Configuration Management	LDAP Client	LDAP	No

4.4. CONFIGURATION

Configuration is performed through the use of Java properties file(s) stored in pre-defined locations that are specific to the underlying operating system.

4.4.1. AE Title/Presentation Address Mapping

The Calling AE Title of the local application is configurable in the preferences file, and is shared by all of the AEs.

The mapping of the logical name by which remote AEs are described in the user interface to Called AE Titles as well as presentation address (hostname or IP address and port number) is configurable in the preferences files.

Table 4.4-1 AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
ECHO-SCP	AP	104
ECHO-SCU		None
STORAGE-SCP		104
STORAGE-SCU		None
Secured ECHO-SCP		2762
Secured STORAGE-SCP		2762

4.4.2. Parameters

A large number of parameters can be specified in the SCAI-1PF configuration files by Service or Installation Personnel. Users of SCAI-1PF must contact Canon Medical Systems Service or Installation personnel if they wish to change any of these settings.

Some of these properties can be changed by user via interface.

Table 4.4-2 Configuration Parameters table for ECHO-SCP and STORAGE-SCP

Parameter	Configurable (Yes/No)[Range]	Default Value
Time-out waiting for an acceptance or rejection response to an Association Request (Application Level Timeout)	No	60 sec
STORAGE-SCP time-out waiting for a response to an A-ASSOCIATE-RQ	No	5 sec
STORAGE-SCP time-out waiting for a response to an A-RELEASE-RP	No	5 sec
Time-out waiting for a response to a DIMSE Request (Low-Level Timeout)	No	60 sec

Table 4.4-3 Configuration Parameters table for ECHO-SCU and STORAGE-SCU

Parameter	Configurable (Yes/No)[Range]	Default Value
Time-out waiting for an acceptance or rejection response to an Association Request (Application Level Timeout)	No	60 sec
STORAGE-SCU time-out waiting for a response to an A-ASSOCIATE-RQ	No	5 sec
STORAGE-SCU time-out waiting for a response to an A-ASSOCIATE-AC	No	5 sec
STORAGE-SCU time-out waiting for a response to an A-RELEASE-RP	No	5 sec
Time-out waiting for a response to a DIMSE Request (Low-Level Timeout)	No	60 sec

5. MEDIA INTERCHANGE

SCAI-1PF does not support Media Storage.

6. SUPPORT OF EXTENDED CHARACTER SETS

This product supports the following character sets:

・ISO-IR 6 (default)	ISO646
・ISO-IR 100(Latin alphabet No.1)	Supplementary set of ISO8859
・ISO-IR 87	JIS X 0208(Kanji)

7. SECURITY

SCAI-1PF supports the TLS Secure Transport Connection Profile. SCAI-1PF does not provide any other specific security measures like firewalls, router protections, VPN (Virtual Private Network) … related to network access to external hosts and services.

7.1. DICOM® Security Profile Availability

SCAI-1PF provides two configurations of parameters for its local AE: one unsecured basic connection and one TLS connection. There is one associated port number for which SCAI-1PF accepts secured connections. This configuration of parameters is optional.

7.1.1. Secure Transport Connection Profiles

SCAI-1PF supports the following requirements for the secure DICOM communication. At the default configuration, the TLS option is deactivated.

Table 7.1-1 Secure Transport Connection Profiles and Cipher Suites

Profile	Creator/Sender	Consumer/Receiver	Reference
BCP195 TLS Secure Transport Connection	Y	Y	8.6.1
Non-Downgrading BCP195 TLS Secure Transport Connection	Y	Y	8.6.1
Extended BCP195 TLS Profile Secure Transport Connection	Y	Y	8.6.1

8. ANNEXES

8.1. IOD CONTENTS

SCAI-1PF does not create any SOP instances but sends one created by SCAI-1AP and/or third-party applications.

8.1.1. Created SOP Instances

Not applicable.

8.1.2. Usage of attributes from received IOD's

No SOP Class specific fields are required.

8.1.3. Attribute Mapping

Not applicable.

8.1.4. Coerced/modified fields

No coercion is performed.

8.2. DATA DICTIONARY OF PRIVATE ATTRIBUTES

Not applicable.

8.3. CONTROLLED TERMINOLOGY

None.

8.4. GRAYSCALE IMAGE CONSISTENCY

None.

8.5. PRIVATE TRANSFER SYNTAXES

None.

8.6. DICOM Security Profile Details

8.6.1. Secure Transport Connection Details

In order to handle secured connections on the specified port number, SCAI-1PF must be given a key store file, a trust store file and their associated passwords. When these parameters are fulfilled, after restarting, SCAI-1PF can accept TLS connections.

Key store, trust store files and their passwords are also used for each Remote AE for which it initiates connections. A boolean parameter indicates whether the Remote AE is designated as handling TLS connections or non-TLS connections.

The following table specifies the cipher suites that this product can support in each profile.

Table 8.6-1 Secure Transport Connection Profiles and Cipher Suites

Profile	Reference
BCP195 TLS Secure Transport Connection (TLS 1.3)	TLS_AES_128_GCM_SHA256
	TLS_AES_256_GCM_SHA384
BCP195 TLS Secure Transport Connection (TLS 1.2)	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
	TLS_DHE_DSS_WITH_AES_256_GCM_SHA384
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
	TLS_DHE_DSS_WITH_AES_128_GCM_SHA256
	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
Non-Downgrading BCP195 TLS Secure Transport Connection	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
	TLS_DHE_DSS_WITH_AES_256_GCM_SHA384
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
	TLS_DHE_DSS_WITH_AES_128_GCM_SHA256
	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
Extended BCP195 TLS Profile Secure Transport Connection	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384

	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256