SIEMENS

syngo WebSpace DICOM Server

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DICOM Conformance Statement

syngo WebSpace 2007A

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Introduction and Overview

Syngo WebSpace is a fully integrated hardware and software system for streaming 2D, 3D and 4D images over a network in real time. It is designed to communicate with other machines on the network using DICOM 3.0. The syngo WebSpace DICOM Server (SWSDS) is a component of the WebSpace system, but for the purposes of this document, it will be considered on its own. The purpose of this document is to describe the conformance of the SWSDS to the DICOM 3.0 Standard as described by the NEMA in the year 2001.
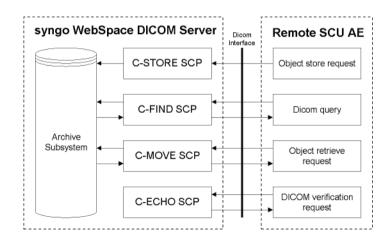
CHAPTER

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Implementation Model

Remote DICOM Application Entities (AE) can push images to SWSDS, query and retrieve against SWSDS's archive, and request verification. In addition, SWSDS can transmit images to remote AE's.

Application Data Flow Diagram

The diagram below depicts communications as they might occur between an SCU AE and an SWSDS AE.

Functional Definitions of Application Entities

Network related functions

1. Storage of received SOP instances sent to SWSDS by a remote SCU AE.
2. Responding to queries about stored instances from a remote SCU AE.
3. Transmission of stored instances to a remote SCU AE triggered by a retrieve request.
4. Transmission of stored instances to a remote SCU AE triggered by an auto-routing rule (in response to a storage request made to a specific AE).
5. Responding to verification requests for the purpose of troubleshooting connectivity problems.

Media Storage related functions

None are supported.

Sequencing of real-world activities

No assumptions are made about the sequencing of real-world activities.

File Meta Information For Implementation Class and Version

Not applicable.

AE Specifications

SWSDS AE Specifications

Verification Service Class

The SWSDS supports the Verification Service Class by sending C-ECHO responses to any remote AE's that send it C-ECHO requests.

SOP Class Name	SOP Class UID
Verification Service Class	1.2.840.10008.1.1

Storage SOP Classes

SWSDS supports standard conformance to the following storage SOP classes as SCU and SCP.

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US Multi-Frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
US Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Fluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic BiPlane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
PET Image Storage	1.2.840.10008.5.1.4.1.1.128

Query/Retrieve SOP Classes

SWSDS provides standard conformance to the following SOP Classes as a Query/Retrieve SCP.

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve IM - Find	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve IM - Move	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve IM - Find	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve IM -Move	1.2.840.10008.5.1.4.1.2.2.2

Transfer Syntaxes

SWSDS supports the transfer syntaxes listed below. For a given SOP, the supported syntax list name (which refers to one of the names listed in the table below) can be found in one of the presentation context tables found later in this document. When SWSDS is acting as SCP, the syntax selection policy is from top down as listed below.

Transfer Syntax Table

Syntax List Name	Transfer Syntax	
Full Syntax List	JPEG Lossless (Heir 14)	1.2.840.10008.1.2.4.70
	JPEG Baseline	1.2.840.10008.1.2.4.50
	JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51
	JPEG Lossless (NonHeir 14)	1.2.840.10008.1.2.4.57
	JPEG 2000 Lossless Only	1.2.840.10008.1.2.4.90
	JPEG 2000	1.2.840.10008.1.2.4.91
	RLE	1.2.840.10008.1.2.4.5
	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG 2000 Syntax List	JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
	JPEG 2000	1.2.840.10008.1.2.4.91
	Implicit VR Little Endian	1.2.840.10008.1.2
Uncompressed Syntax List	Implicit VR Little Endian	1.2.840.10008.1.2
	Explicit VR Little Endian	1.2.840.10008.1.2.1
	Explicit VR Big Endian	1.2.840.10008.1.2.2

Association Establishment Policies

General

SWSDS always proposes the DICOM Application Context Name listed in in the table below during the establishment of all associations.

Name	UID
DICOM 3.0 Application Context	1.2.840.10008.3.1.1.1

Number of Associations

SWSDS is designed for multi-threaded operation, and is able to handle requests from multiple remote AE's at the same time. The maximum number of simultaneous inbound associations is configurable at runtime, but defaults to 10. SWSDS will initiate associations only when acting in the SCU role while servicing C-MOVE requests, or when sending storage requests.

Asynchronous Nature

SWSDS only supports a single outstanding transaction over an existing association. As such, it does not support asynchronous communication.

Implementation Identifying Information

SWSDS will respond with the following implementation identifying parameters:

Implementation Version Name	Implementation Class UID
MergeCOM3_330	2.16.840.1.113669.632.21.1.1.0

Association Initiation by real-world activity

SWSDS will initiate C-STORE associations as SCU in response to C-MOVE requests, or when sending storage requests due either to a triggered auto-routing rule, or at a user's request.

Real-world activity: Store

Associated Real-world activity: Store

SWSDS will initiate a C-Store association as SCU when attempting to send SOP Instances to remote AE's. The transfer syntaxes that can be proposed are normally determined using table → page 2–7, *Proposed Presentation Contexts: Store*. However, SWSDS may also propose the transfer syntax that was used to store an instance on disk; i.e. any of the transfer syntaxes for that storage class as listed in table → page 2–11, *Acceptable Presentation Contexts: Store*. If this transfer syntax is accepted by the SCP, SWSDS may send using it if: (1) the SOP instance has a value not equal to 1 for (0028, 0002) Samples Per Pixel, (2) the SOP instance has number of frames > 1, (3) there is a problem sending using the first choice of transfer syntax. Otherwise, it will choose one of the syntaxes negotiated based on the compression settings in the routing configuration.

Proposed Presentation Contexts: Store

	Presentation Context Table				
Abstract Syntax		**Transfer Syntax**			**Extended**
Name	**UID**	**List Name**	**Role**		**Negotiation**
Computed Radiography	1.2.840.10008.5.1.4.1.1.1	JPEG 2000 Syntax List	SCU		None
Digital X-Ray - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Syntax List	SCU		None
Digital X-Ray - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	JPEG 2000 Syntax List	SCU		None
CT	1.2.840.10008.5.1.4.1.1.2	JPEG 2000 Syntax List	SCU		None
MR	1.2.840.10008.5.1.4.1.1.4	JPEG 2000 Syntax List	SCU		None
Secondary Capture	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Syntax List	SCU		None
X-Ray Angiographic	1.2.840.10008.5.1.4.1.1.12.1	JPEG 2000 Syntax List	SCU		None
X-Ray Fluoroscopy	1.2.840.10008.5.1.4.1.1.12.2	JPEG 2000 Syntax List	SCU		None
X-Ray Angiographic BiPlane	1.2.840.10008.5.1.4.1.1.12.3	JPEG 2000 Syntax List	SCU		None
Ultrasound	1.2.840.10008.5.1.4.1.1.6.1	JPEG 2000 Syntax List	SCU		None
Ultrasound Multi-Frame	1.2.840.10008.5.1.4.1.1.3.1	JPEG 2000 Syntax List	SCU		None
Ultrasound (retired)	1.2.840.10008.5.1.4.1.1.6	JPEG 2000 Syntax List	SCU		None
Ultrasound Multi-Frame (retired)	1.2.840.10008.5.1.4.1.1.3	JPEG 2000 Syntax List	SCU		None
PET	1.2.840.10008.5.1.4.1.1.128	JPEG 2000 Syntax List	SCU		None
Nuclear Medicine	1.2.840.10008.5.1.4.1.1.20	JPEG 2000 Syntax List	SCU		None

SOP Specific Conformance for all Storage Service Classes

No extended negotiation is supported.

Association Acceptance by real-world activity

SWSDS will accept associations for Verification, Storage, and Query/Retrieve requests.

Real-world activity: Echo

SWSDS will accept associations for requests using the Verification Service. The association will be closed either by the initiator, or aborted by SWSDS if certain error conditions arise.

Associated Real-world activity: Echo

SWSDS will respond to an echo request with an echo response.

Acceptable Presentation Contexts: Echo

Presentation Context Table				
Abstract Syntax		Transfer Syntax		Extended
Name	**UID**	**List Name**	**Role**	**Negotiation**
Verification	1.2.840.10008.1.1	Uncompressed Syntax List	SCP	None

SOP Specific Conformance to Verification Service Class

SWSDS supports standard conformance to the Verification Service Class.

Presentation Context acceptance criterion for Verification

SWSDS will accept any of the presentation contexts listed in the table above.

Real-world activity: Store

SWSDS will accept associations for Storage Service requests. The association will be closed either by the initiator, or aborted by SWSDS if certain error conditions arise.

Associated Real-world activity: Store

SWSDS will accept C-Store association requests as SCP. Received instances are stored to disk. Some attributes of the stored instances will be kept in a database.

Acceptable Presentation Contexts: Store

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Extended**
Name	**UID**	**List Name**	**Role**	**Negotiation**
Computed Radiography	1.2.840.10008.5.1.4.1.1.1	Full Syntax List	SCP	None
Digital X-Ray - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Full Syntax List	SCP	None
Digital X-Ray - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Full Syntax List	SCP	None
CT	1.2.840.10008.5.1.4.1.1.2	Full Syntax List	SCP	None
MR	1.2.840.10008.5.1.4.1.1.4	Full Syntax List	SCP	None
Secondary Capture	1.2.840.10008.5.1.4.1.1.7	Full Syntax List	SCP	None
X-Ray Angiography	1.2.840.10008.5.1.4.1.1.12.1	Full Syntax List	SCP	None
X-Ray Fluoroscopy	1.2.840.10008.5.1.4.1.1.12.2	Full Syntax List	SCP	None
X-Ray Angiography BiPlane	1.2.840.10008.5.1.4.1.1.12.3	Full Syntax List	SCP	None
Ultrasound	1.2.840.10008.5.1.4.1.1.6.1	Full Syntax List	SCP	None
Ultrasound Multi-Frame	1.2.840.10008.5.1.4.1.1.3.1	Full Syntax List	SCP	None
Ultrasound (retired)	1.2.840.10008.5.1.4.1.1.6	Full Syntax List	SCP	None
Ultrasound Multi-Frame (retired)	1.2.840.10008.5.1.4.1.1.3	Full Syntax List	SCP	None
PET	1.2.840.10008.5.1.4.1.1.128	Uncompressed Syntax List	SCP	None
Nuclear Medicine	1.2.840.10008.5.1.4.1.1.20	Uncompressed Syntax List	SCP	None

SOP Specific Conformance for all Storage SOP Classes

SWSDS supports level 2 (full) conformance to the Storage SOP Classes listed above. SWSDS stores all attributes, including those that are private or unkown. A runtime configurable option determines if duplicate instances will be rejected, or stored with coercion of (0008,0018) SOP Instance UID.

SWSDS sends a response message with one of the following status codes:

Service Status	Status Description	Status Code (0000, 0900)	Related Fields
Refused	**Out of Resources** - There were insufficient resources to process the request. The request was not processed.	A700	None
Error	**Data Set does not match SOP Class** - A required attribute is not present in the message. The request was not processed.	A900	None
	Cannot understand - The message was not properly encoded. The request was not processed.	C000	None
	Duplicate SOP Instance - An instance with this SOP Instance UID has been stored previously. The request was not processed.	0111	
	Processing failure - A condition arose which prevented the request from being processed.	0110	
Success		0000	None

Presentation Context acceptance criterion for Storage

SWSDS will accept any of the presentation contexts listed above.

Transfer Syntax selection policies for Storage

SWSDS selects from available transfer syntaxes from the top down as listed in → page 2–4, *Transfer Syntaxes*.

Real-world activity: Find and Move

Associated Real-world activity: Find and Move

SWSDS will accept C-Find and C-Move association requests as SCP. SWSDS will service move requests at the IMAGE, SERIES and STUDY levels as specified in attribute (0008,0052). PATIENT level move is not supported.

Acceptable Presentation Contexts: Find and Move

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Extended**
Name	**UID**	**List Name**	**Role**	**Negotiation**
Patient Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.1.1	Uncompressed Syntax List	SCP	None
Study Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.2.1	Uncompressed Syntax List	SCP	None
Patient Root Query/Retrieve - Move	1.2.840.10008.5.1.4.1.2.1.2	Uncompressed Syntax List	SCP	None
Study Root Query/Retrieve - Move	1.2.840.10008.5.1.4.1.2.2.1	Uncompressed Syntax List	SCP	None

SOP Specific Conformance for all Query/Retrieve Service Classes

No extended negotiation is supported.

Communication Profiles

Supported Communication Stacks

TCP/IP Stack

SWSDS uses the MergeCOM-3 Advanced DICOM Toolkit to communicate over the TCP/IP protocol stack on any physical interconnection media supporting the TCP/IP stack. The Toolkit inherits the TCP/IP stack from the host operating system upon which it executes.

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