

# STORZ

**KARL STORZ — ENDOSKOPE**

en

**DICOM Conformance Statement**  
**SCENARA .media Version 3**



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# 1 Conformance Statement Overview

This document is a DICOM conformance statement in accordance with the standard as specified in DICOM PS 3.2-2007.

The SCENARA DICOM service is a self-contained networked computer system used for receiving and sending diagnostic medical images. It allows external systems to send images to it for image integration, report generation. Images are temporarily stored in the SCENARA server, they can be forwarded to storage systems (PACS). The system conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

The modules are using parts of the OFFIS DCMTK Toolkit to provide DICOM services.

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<b>Transfer</b>	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
VL Endoscopic Image Storage	Yes	Yes
Video Endoscopic Image Storage	Yes	Yes
Storage Commitment Push Model SOP Class	Yes	Yes

## 2 Introduction

### 2.1 Audience

This document is intended for hospital staff, health system integrators, software designers and implementers. It is assumed that the reader has a working understanding of DICOM.

### 2.2 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates 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 information intended.

The scope of this Conformance Statement is to facilitate communication with the SCENARA system and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between KARL STORZ SE & Co. KG and non-KARL STORZ SE & Co. KG equipment.
- Test procedures should be defined to validate the desired level of connectivity.

The DICOM standard will evolve to meet the users' future requirements.

KARL STORZ SE & Co. KG is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

### 2.3 Definitions, Terms and Abbreviations

MDS	GUI-based proprietary medical documentation system
Database	The database that indexes procedures, orders and patients
AE	Application Entit
CR	Computerized radiography
CT	Computerized Tomography
DICOM	Digital Imaging and Communications in Medicine
DWS	DICOM Workflow Server
HIS	Hospital Information System
IE	Hospital Information System
IOD	Information Object Definition
ISO	International Standards Organization
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
MWL	Modality Worklist
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
SC	Secondary Capture

SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Report
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
VL	Visible Light
VM	Value Multiplicity
VR	Value Representation
GUI	Graphical User Interface
HL7	Health Level Seven - Communication Standard in Medicine
IHE	Integrating the Healthcare Enterprise
KST	KARL STORZ SE & Co. KG = KARL STORZ Tuttlingen
SCB	Storz Communication Bus
TLS	Transport Layer Security

## 2.4 References

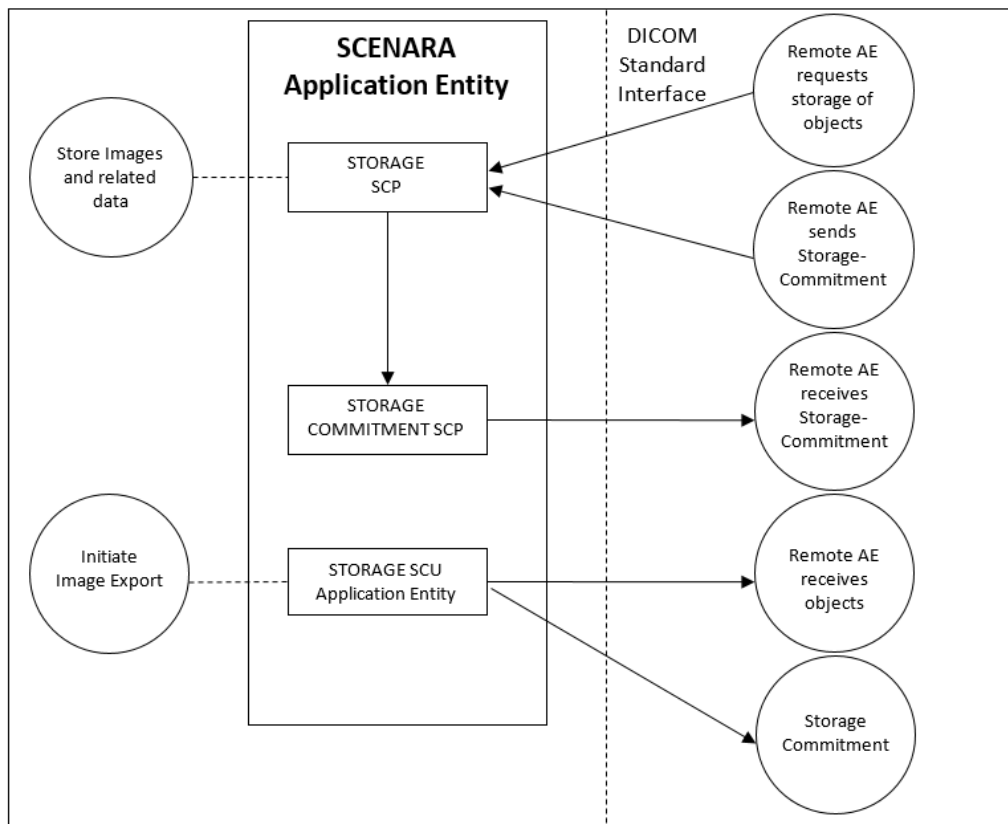
IHE Technical Framework, Revision 8.0, ACC/HIMSS/RSNA, 2007

## 3 Networking

### 3.1 Implementation Model

#### 3.1.1 Application Data Flow

The division of DWS into the separate DICOM Application Entities represents a somewhat arbitrary partitioning of functionality. For the purpose of this document they are organized in this manner so as to detail their independent logical functionality.



The Application Entities detailed in the Application Data Flow Diagram are all Windows applications / services.

- The STORAGE-SCU AE can send SOP Instances, sends acquired images, sends requests that the remote node confirms ownership for the specified DICOM objects, and handles the corresponding notification events.
- The STORAGE-SCP AE can receive incoming DICOM images and add them to the DWS database. It can respond to external Storage and Verification Requests as a Service Class Provider (SCP) for C-STORE and C-ECHO requests. It also acts as a move target for C-MOVE operations and can receive Storage Commitment N-ACTION messages.
- The STORAGE-COMMITMENT-SCP AE can send Storage Commitment N-EVENT-REPORT messages in reply to previously received Storage Commitment requests by the STORAGE-SCP.

### 3.1.2 Functional Definition of AEs

#### 3.1.2.1 Functional Definition of STORAGE-SCU Application Entity

The STORAGE-SCU AE is invoked by the real-world action ‘Store Images’ or ‘Finish procedure’. It sends acquired or generated images to the storage destination. The STORAGE-SCU AE optionally requests that the Storage Commitment Acceptor confirms ownership for the specified DICOM objects (e.g. images) that the requestor stored in the storage destination, thus allowing the sender to delete those objects now owned by the storage destination.

#### 3.1.2.2 Functional Definition of STORAGE-SCP Application Entity

The STORAGE-SCP AE waits 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 Classes of the Verification, the Storage Service and Storage Commitment Classes. Any images or storage commitment requests received on such Presentation Contexts will be added to the DWS database.

#### 3.1.2.3 Functional Definition of STORAGE-COMMITMENT-SCP Application Entity

The Storage Commitment SCP AE sends N-EVENT-REPORT messages in reply to previously received Storage Commitment requests. It uses a database driven queue and a configured set of remote recipients to answer N-ACTION messages received by the DWS STORAGE SCPs.

## 3.2 AE Specifications

### 3.2.1 STORAGE-SCP Application Entity Specification

#### 3.2.1.1 SOP Classes

The STORAGE-SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	Yes (Yes on separate association)
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes

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

#### 3.2.1.2 Association Policies

##### General

See General Association Policies [p. 19]



The STORAGE-SCP AE can accept Association Requests. The STORAGE-SCP AE will accept Association Requests for the Verification, Storage and Storage Commitment Services.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted and proposed:

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

**See also**

- ▢ STORAGE-SCP Application Entity Specification [▶ 8]

**Number of Associations**

The STORAGE-SCP AE supports only one simultaneous Association requested by peer AE. To support multiple peer AEs the DWS can create unlimited individual storage scp 's, each using its own port.

Maximum number of simultaneous Associations	1
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**Asynchronous Nature**

Asynchronous communication is not supported.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)
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**Implementation Identifying Information**

Implementation Class UID	1.2.276.0.76.3.1.87.0.2.0.2
Implementation Version Name	MNDWS2.0.2

**3.2.1.3 Association Initiation Policy**

STORAGE-SCP AE does not initiate associations.

**3.2.1.4 Association Acceptance Policy**

SCENARA attempts to initiate a new association for the following service operations:

- Store Image(s) to a remote AE (Storage Service)
- Request Storage Commitment from a remote AE (if enabled)

The STORAGE-SCP AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ. The following abbreviations are used in the Source column:

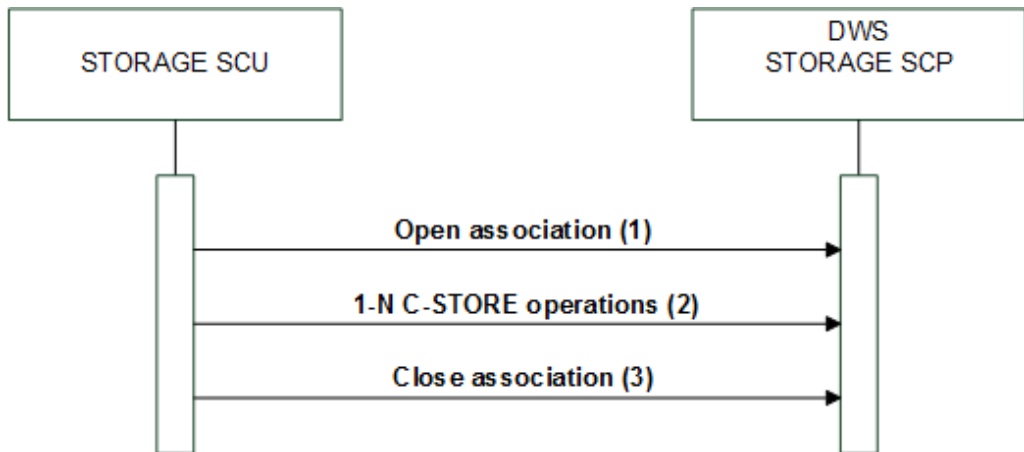
- a - DICOM STORE service-user
- b - DICOM STORE service-provider (ASCE related function)
- c - DICOM STORE service-provider (Presentation related function)

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	No Associations can be accepted at this time due to the real-time requirements of higher priority activities (e.g. during image acquisition no Associations will be accepted) or because insufficient resources are available (e.g. memory, processes, threads). An Association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	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 at a later time.
1 – rejected-permanent	a	7 – called-AE-title-not-recognized	The Association request contained an unrecognized Called AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association initiator is incorrectly configured and attempts to address the Association acceptor using the wrong AE Title.
1 – rejected-permanent	a	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 at a later time unless configuration changes are made. This rejection reason normally occurs when the Association acceptor has not been configured to recognize the AE Title of the Association initiator.
1 – rejected-permanent	b	1 – no-reason-given	The Association request could not be parsed. An Association request with the same format will not succeed at a later time.

## Activity – Receive Images

### Description and Sequencing of Activity

The STORAGE-SCP AE accepts Associations only if they have valid Presentation Contexts and if they use preconfigured Application Entity Titles. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. The following sequencing constraints apply to the STORAGE-SCP AE for handling Storage Requests over the original Association:



1. Peer AE opens an Association with the STORAGE-SCP AE.
2. Peer AE sends zero or more Composite SOP Instances.
3. Peer AE closes the Association.

### Accepted Presentation Contexts

If multiple Transfer Syntaxes are proposed per Presentation Context then only the most preferable Transfer Syntax is accepted. The order of Transfer Syntax preference for the STORAGE-SCP AE is configurable.

Any of the Presentation Contexts shown in the following table are acceptable to the STORAGE-SCP AE for receiving images.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit JPEG lossy compression	1.2.840.10008.1.2.4.5.0	SCP	None

Presentation Context Table					
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	DICOM Explicit JPEG baseline lossy compression	1.2.840.10008.1.2.4.50	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	DICOM Explicit JPEG lossy compression	1.2.840.10008.1.2.4.50	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.1.2.4.100	MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.1.2.4.101	MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.1.2.4.102	MPEG4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.1.2.4.103	MPEG4 AVC/H.264 BD compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	SCP	None

## SOP Specific Conformance for Storage SOP Classes

The associated Activity with the Storage service is the storage of medical image data received over the network on a designated hard disk. The STORAGE-SCP AE will return a failure status if it is unable to store the images on to the hard disk.

The STORAGE-SCP AE does not have any dependencies on the number of Associations used to send images to it. Images belonging to more than one Study or Series can be sent over a single or multiple Associations. Images belonging to a single Study or Series can also be sent over different 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 STORAGE-SCP AE is configured to retain the original DICOM data in DICOM Part 10 compliant file format. The STORAGE-SCP AE is Level 2 (Full) conformant 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 are stored in the DWS database. Refer to the Annex for the list of Elements that are checked and/or processed upon receiving a Composite SOP Instance.

The Behavior for handling duplicate SOP Instances is to accept but not replace the original object with the conflicting instance.

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system database.
Refused	Out of Resources	A700	Indicates that there was not enough disk space to store the image.  Error message is output to the Service Log. The SOP Instance will not be saved.
Error	Data Set does not match SOP Class	A900	Indicates that the Data Set does not encode a valid instance of the SOP Class specified. This status is returned if the DICOM Object stream can be successfully parsed but does not contain values for one or more mandatory Elements of the SOP Class. The STORAGE-SCP AE does not perform a comprehensive check, as it only checks a subset of required Elements. In addition, if the SOP Class is for a type of image but the SOP Instance does not contain values necessary for its display then this status is returned.  Error message is output to the Service Log. The system can be configured to temporarily save such Data Sets in order to aid problem diagnosis.

Service Status	Further Meaning	Error Code	Reason
	Cannot understand	C000	Indicates that the STORAGE-SCP AE cannot parse the Data Set into Elements.  Error message is output to the Service Log. The system can be configured to temporarily save such Data Sets in order to aid problem diagnosis.

**NOTE:** If a failure condition does occur when handling an Association then all images previously received successfully over the Association are maintained in the DWS database. No previously successfully received images are discarded. Even if an image is successfully received but an error occurs transmitting the C-STORE Response then this final image is maintained rather than discarded. If the loss of an Association is detected then the Association is closed.

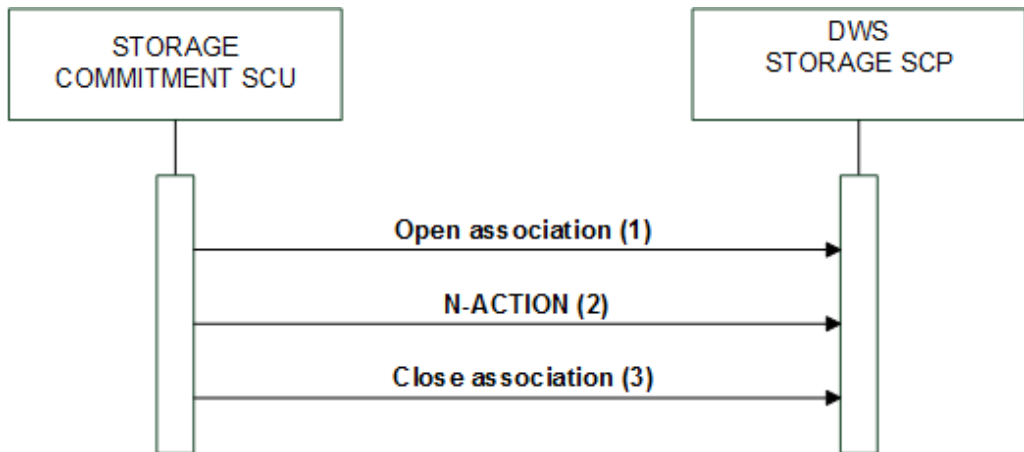
The behavior of STORAGE-SCP AE during communication failure is summarized in the following table:

Exception	Reason
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The STORAGE-SCP AE is waiting for the next C-STORE Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received then they are maintained in the database. They are not automatically discarded because of a later failure.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The STORAGE-SCP AE is waiting for the next C-STORE Data Set PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log. If a C-STORE Data Set has not been fully received then the data already received is discarded. If some Composite SOP Instances have already been successfully received over the Association then they are maintained in the database.
Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is output to the Service Log. If some Composite SOP Instances have already been successfully received then they are maintained in the database. They are not automatically discarded because of a later failure.

## Activity – Receive Storage Commitment Request

### Description and Sequencing of Activity

The following sequencing constraints apply to the STORAGE-SCP AE for handling Storage Commitment Requests:



1. Peer AE opens an Association with the STORAGE-SCP AE.
2. Peer AE sends on N-ACTION (Storage Commitment RQ) message.
3. Peer AE closes the Association.

### Accepted Presentation Contexts

Any of the Presentation Contexts shown in the following table are acceptable to the STORAGE-SCP AE for receiving Storage Commit Requests:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

### SOP Specific Conformance for Storage Commitment SOP Classes

Incoming N-ACTION messages will be stored in a database driven queue and answered by the STORAGE-COMMITMENT-SCP AE described in its own section.

## 3.2.2 STORAGE-COMMITMENT-SCP Application Entity Specification

### 3.2.2.1 SOP Classes

The STORAGE-COMMITMENT-SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

### 3.2.2.2 Association Policies

#### General

The STORAGE-COMMITMENT-SCP AE will form Associations automatically when N-ACTION messages were previously received through the STORE-SCP AE and appropriate remote receiving AEs are configured.

The DICOM standard Application Context Name for DICOM is always proposed:

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

#### See also

- ▣ STORAGE-SCP Application Entity Specification [▶ 8]

#### Number of Associations

The maximum number of simultaneous Associations is one. Pending send requests from the database queue are processed sequentially.

If the first attempt to open an Association fails then the STORAGE-COMMITMENT-SCP AE will reschedule the task to attempt it again.

Maximum number of simultaneous Associations	1 (Not Configurable)
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#### Asynchronous Nature

Asynchronous communication is not supported.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)
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#### Implementation Identifying Information

Implementation Class UID	1.2.276.0.76.3.1.87.0.2.0.2
Implementation Version Name	MNDWS2.0.2

### 3.2.2.3 Association Acceptance Policy

The STORAGE-COMMITMENT-SCP AE does not accept Associations.

### 3.2.2.4 Association Initiation Policy

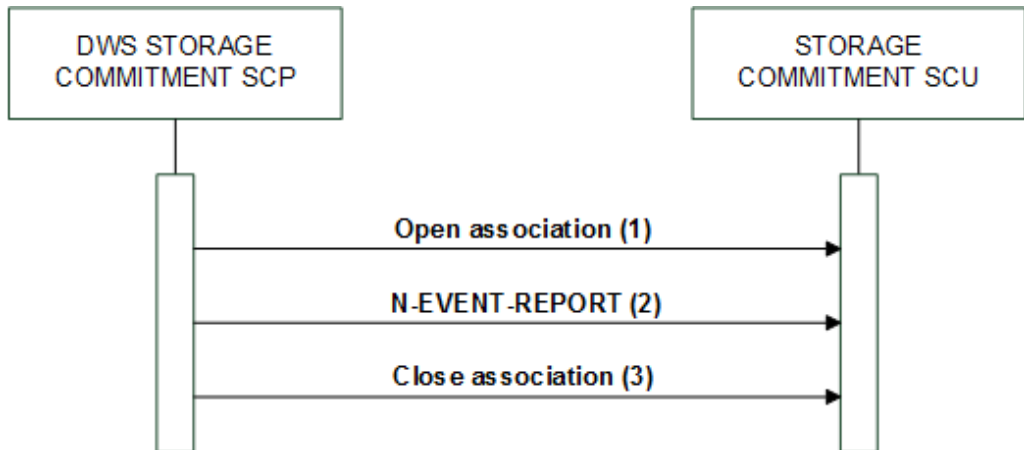
#### Activity – Send Storage Commitment Report

#### Description and Sequencing of Activity

The STORAGE-COMMITMENT-SCP AE will initiate a new Association automatically when unanswered N-ACTION messages are found in the DWS database. An Association Request is sent to the specified Destination AE and upon successful negotiation of the required Presentation Context the N-EVENT-REPORT transfer is started. In all cases an attempt will be made to transmit all the indicated messages in separate Associations. The Associations will be released after the messages have been sent. If an error occurs during transmission over an open Association then the STORAGE-COMMITMENT-SCP AE will attempt to independently retry the transfer.



The following sequencing applies to the STORAGE-COMMITMENT-SCP AE:



1. STORAGE-COMMITMENT SCP AE opens a new Association with the configured destination AE.
2. STORAGE-COMMITMENT-SCP AE sends the indicated N-EVENT-REPORT message.
3. STORAGE-COMMITMENT-SCP AE closes the Association.

### Proposed Presentation Contexts

STORAGE-COMMITMENT-SCP AE will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian			
		Explicit VR Big Endian			

### SOP Specific Conformance for Storage Commitment

The STORAGE-COMMIT-SCP AE will exhibit the following Behavior according to the Status Code value returned in a N-EVENT-REPORT Response from a destination STORAGE-COMMIT-SCU:

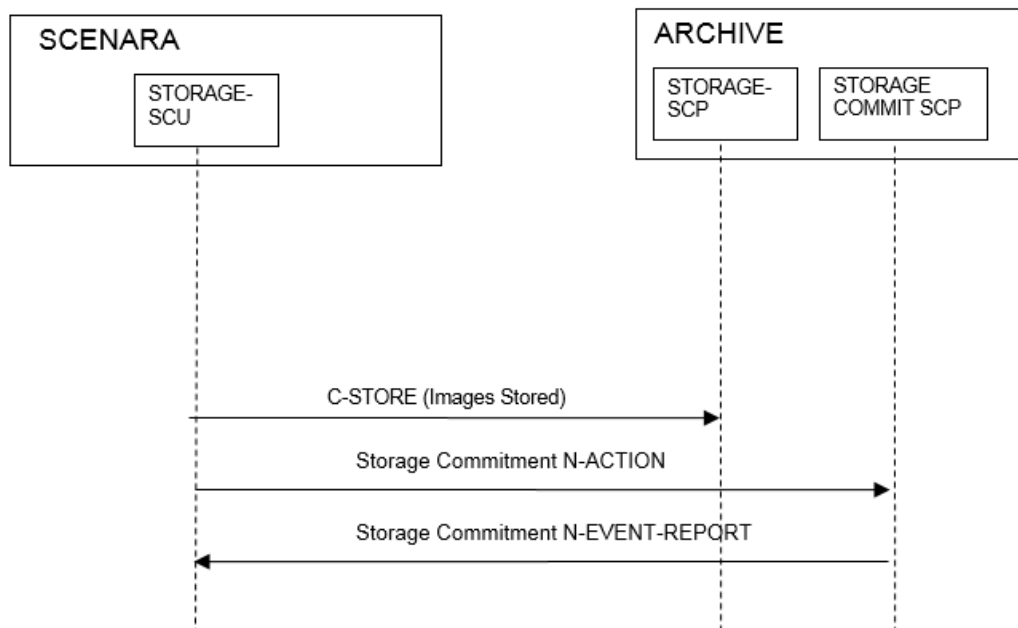
Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully send the N-ACTION-REPORT. Success indication message is output to the Service Logs. No message is posted to the User Interface.
*	*	Any other status code	This is treated as a permanent Failure. Error indication message is output to the Service Logs. No message is posted to the User Interface.

The behavior of STORAGE-COMMITMENT-SCP AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Association A-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure).	Error indication message is output to the Service Logs. No message is posted to the User Interface.

### 3.2.3 STORAGE-SCU Application Entity Specification

#### 3.2.3.1 Sequencing of Real-World Activities



SCENARA can be configured to automatically forward all or a subset of all objects received by the STORAGE-SCP to a remote STORAGE-SCU.

#### 3.2.3.2 SOP Classes

The STORAGE-SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

**NOTE:** By altering the configuration it is possible to support additional or fewer SOP Classes.

### 3.2.3.3 Association Policies

#### General Association Policies

##### General

SCENARA will utilize and understand the following Application Context Name:

- DICOM V3.0 Application Context 1.2.840.10008.3.1.1.1

SCENARA will attempt to establish an association whenever the user invokes a DICOM related operation (store images to a remote AE) in the user interface of SCENARA.

##### Number of Associations

SCENARA initiates only one association at a time. It accepts up to four open associations.

##### Asynchronous Nature

SCENARA does not use asynchronous communication (multiple outstanding transactions over a single association).

##### Implementation Identifying Information

The implementation information for this Application Entity is:

SCENARA Implementation Class UID	1.2.276.0.67.6
Implementation Version Name	STREAMCO01

### 3.2.3.4 Association Initiation Policy

SCENARA attempts to initiate a new association for the following service operations:

- Store Image(s) to a remote AE (Storage Service)
- Request Storage Commitment from a remote AE (if enabled)

#### Associated Real-World Activity – Store Image on a remote AE and request Commitment

The associated real-world activity is a storage request initiated by the user after the surgical procedure. All images taken during the surgery are stored to a remote provider (for example archive). If the storage response from the remote AE contains a status other than success, an error message is displayed to the user.

If Storage Commitment is enabled, SCENARA requests automatically a storage commitment after the storage. Based on the settings the Storage Commitment is requested in one request for all images or image-by-image. Also based on the settings a timed-out commit request is automatically repeated once or twice.

## Proposed Presentation Contexts – Store Image to a remote AE and request Commitment

The Presentation Contexts proposed by SCENARA are defined in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
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	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.1.00	SCU	None
		MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.1.02		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

## SOP Specific Conformance for Storage SOP Classes

For storage, SCENARA establishes an association to the remote AE, sends the storage requests and closes it after receiving the responses.

For storage commitment, SCENARA establishes an association to the remote AE, sends the storage commitment requests and closes it after receiving the responses.

If Storage Commitment is disabled, SCENARA sends all images on one association. If Storage Commitment is enabled, SCENARA sends first all images on one association and then requests the Storage Commitment on a new association.

It accepts the Storage Commitment N-EVENT-RQ either immediately afterwards on that association, or later on a separate association.

The DICOM images sent by SCENARA conform to the DICOM IOD definitions. Extended negotiation is not supported. SCENARA supports ISO IR 100 and ISO IR 192 character sets.

### 3.2.3.5 Association Acceptance Policy

SCENARA accepts an association request for the following service operation:

- Receive Storage Commitment from a remote AE (if enabled)

SCENARA accepts an association request for storage commitment events if the requested AE title and the requestor's AE title and IP address correspond to the configured values.

### Associated Real-World Activity – Receive Storage Commitment

The remote provider (archive) sends a storage commitment when he takes over the responsibility for the stored image. After receiving this commitment, SCENARA marks the procedure as committed.

### Accepted Presentation Contexts – Receive Storage Commitment

The Presentation Contexts accepted by SCENARA are defined in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

## 3.3 Network Interfaces

### 3.3.1 Physical Network Interface

The SCENARA DICOM applications are indifferent to the physical medium over which TCP/IP executes.

### 3.3.2 Additional Protocols

DHCP support can be configured using the Windows Network Configuration. If DHCP is not configured a static IP address is assigned.

If DNS support exists on the local network, then DNS is used for address resolution (if configured so in Windows). The address of the DNS server is retrieved using DHCP if the DHCP option is enabled. If DNS is not supported then the hostnames and addresses are configured in the local hosts file.

## 3.4 Configuration

### 3.4.1 AE Title/Presentation Address Mapping

#### 3.4.1.1 Local AE Titles

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel:

Application Entity	Role	Default AE Title	Default TCP/IP Port
STORAGE-SCU	SCU	MNSTORESCU	None
STORAGE-SCP	SCP	MNSTORESCP	111

#### 3.4.1.2 Remote AE Title/Presentation Address Mapping

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel. This mapping is necessary for resolving the IP address and port of Destination Application Entities addressed by the MDS and must be correctly configured for the STORAGE-SCP.

#### 3.4.1.3 Parameters

Parameter	Configurable	Default value
<b>General parameters</b>		
Maximum PDU size I can receive	Yes	1mb
Maximum PDU size I can send	Yes	128kbytes
ACSE timeout	Yes	30 s
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level time-out)	No	60 s
DIMSE timeout	Yes	5 minutes

## 4 Media interchange

SCENARA does not support Media Storage.

## 5 Support of Extended Character Sets

All DWS DICOM applications support the following:

- ISO\_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)
- ISO\_IR 192 (UTF-8)

As well as supporting this Extended Character Set for DICOM messaging, the MDS database and user interface can support the expected display of this character set.



## 6 Security

### 6.1 Security Profiles

The DWS does not conform to any security profile.

### 6.2 Association Level Security

The STORAGE-SCP AE can be configured to check the following DICOM values when determining whether to accept Association Open Requests:

- Calling AE Title
- Application Context

The SCP AE can be configured to accept Association Requests from only a limited list of Calling AE Titles.

## 7 Annexes

### 7.1 IOD Contents

#### 7.1.1 Created SOP Instance(s)

The SCENARA application creates the following IODs for SOP Instances:

- VL Endoscopic Image Storage
- VIDEO Endoscopic Image Storage
- Secondary Capture Storage

The table in chapter VL Endoscopic Image IOD [p. 26] specifies the attributes of a VL Endoscopic Image transmitted by the SCENARA system.

The table in chapter VIDEO Endoscopic Image IOD [p. 27] specifies the attributes of a Video Endoscopic Image transmitted by the SCENARA system.

The table in chapter Secondary Capture Image IOD [p. 28] specifies the attributes of a Secondary Capture Image transmitted by the SCENARA system.

The following tables use a number of abbreviations. The abbreviations used in the “Presence” column are:

ALWAYS	Always Present
ANAP	Attribute Not Always Present
VNAP	Value Not Always Present (attribute sent with zero length if no value is present)
EMPTY	Attribute is sent without a value
NEVER	Never Present

The abbreviations used in the “Source” column are:

MWL	The attribute value source is Modality Worklist
USER	The attribute value source is User input
AUTO	The attribute value is generated automatically
MPPS	The attribute value is the same as that used for Modality Performed Procedure Step
CONFIG	The attribute value source is a configurable parameter

All dates and times are encoded in the local configured calendar and time. Date, Time and Time zone.

#### 7.1.1.1 VL Endoscopic Image IOD

IE	Module	Reference	Presence of Module
Patient	Patient	Patient module of created SOP instances [p. 29]	ALWAYS
	Clinical Trial Subject		NEVER
Study	General Study	General study module of created SOP instances [p. 30]	ALWAYS
	Patient Study		NEVER
	Clinical Trial Study		NEVER

IE	Module	Reference	Presence of Module
Series	General Series	General series module of created SOP instances [p. 30]	ALWAYS
	Clinical Trial Series		NEVER
Equipment	General Equipment	General equipment module of created SOP instances [p. 31]	ALWAYS
Image	General Image	General image module of created SOP instances [p. 32]	ALWAYS
	Image Pixel	Image pixel module of created SOP instances [p. 32]	ALWAYS
	SOP Common	SOP common module of created SOP instances [p. 33]	ALWAYS
	Acquisition Context	Acquisition context module of created VL endoscopic SOP instances [p. 33]	ALWAYS
	VL Image	VL image module of created VL endoscopic SOP instances [p. 33]	ALWAYS
	Overlay Plane		NEVER
	VOI LUT	VOI LUT module of created VL endoscopic SOP instances [p. 34]	ALWAYS

Table 1: IOD of created video endoscopic image IOD

**See also**

- 📄 Common Modules [▶ 29]
- 📄 Common Modules [▶ 30]
- 📄 Common Modules [▶ 30]
- 📄 Common Modules [▶ 31]
- 📄 Common Modules [▶ 32]

**7.1.1.2 VIDEO Endoscopic Image IOD**

IE	Module	Reference	Presence of Module
Patient	Patient	Patient module of created SOP instances [p. 29]	ALWAYS
	Clinical Trial Subject		NEVER
Study	General Study	General study module of created SOP instances [p. 30]	ALWAYS
	Patient Study		NEVER
	Clinical Trial Study		NEVER

IE	Module	Reference	Presence of Module
Series	General Series	General series module of created SOP instances [p. 30]	ALWAYS
	Clinical Trial Series		NEVER
Equipment	General Equipment	General equipment module of created SOP instances [p. 31]	ALWAYS
Image	General Image	General image module of created SOP instances [p. 32]	ALWAYS
	Image Pixel	Image pixel module of created SOP instances [p. 32]	ALWAYS
	SOP Common	SOP common module of created SOP instances [p. 33]	ALWAYS
	Acquisition Context	Acquisition context module of created video endoscopic SOP instances [p. 34]	ALWAYS
	VL Image	VL image module of created video endoscopic SOP instances [p. 34]	ALWAYS
	Cine	CINE module of created video endoscopic SOP instances [p. 35]	ALWAYS
	Multi-frame	Multi frame module of created video endoscopic SOP instances [p. 35]	ALWAYS
	Overlay Plane		NEVER
	VOI LUT		NEVER

Table 2: IOD of created video endoscopic image IOD

### 7.1.1.3 Secondary Capture Image IOD

IE	Module	Reference	Presence of Module
Patient	Patient	Patient module of created SOP instances [p. 29]	ALWAYS
	Clinical Trial Subject		NEVER
Study	General Study	General study module of created SOP instances [p. 30]	ALWAYS
	Patient Study		NEVER
	Clinical Trial Study		NEVER

IE	Module	Reference	Presence of Module
Series	General Series	General series module of created SOP instances [p. 30]	ALWAYS
	Clinical Trial Series		NEVER
Equipment	General Equipment	General equipment module of created SOP instances [p. 31]	NEVER
	SC Equipment	SC equipment module of created sec. capture SOP instances [p. 35]	ALWAYS
Image	General Image	General image module of created SOP instances [p. 32]	ALWAYS
	Image Pixel	Image pixel module of created SOP instances [p. 32]	ALWAYS
	SOP Common	SOP common module of created SOP instances [p. 33]	ALWAYS
	SC Image	Secondary capture image module of created sec. capt. SOP instances [p. 35]	ALWAYS
	Overlay Plane		NEVER
	VOI LUT	VOU LUT module of created sec. capture SOP instances [p. 35]	ALWAYS

Table 3: IOD of created secondary image IOD

#### 7.1.1.4 Common Modules

Attribute Name	Tag	VR	Value	Presence	Source
Patient's Name	(0010,0010)	PN	Values supplied by Modality Worklist are sent as received (no checks made).	VNAP	MWL/USER
Patient ID	(0010,0020)	LO		VNAP	MWL/USER
Patient's Birth Date	(0010,0030)	DA		VNAP	MWL/USER
Patient's Birth Time	(0010,0032)	TM		NEVER	
Patient's Sex	(0010,0040)	CS		VNAP	MWL/USER
Other Patient IDs	(0010,1000)	LO		ANAP	MWL

Attribute Name	Tag	VR	Value	Presence	Source
Other Patient Names	(0010,1001)	PN		NEVER	
Ethnic Group	(0010,2160)	SH		NEVER	
Patient Comments	(0010,4000)	LT		NEVER	

Table 4: Patient module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Study Date	(0008,0020)	DA		VNAP	MWL/AUTO
Study Time	(0008,0030)	TM		VNAP	MWL/AUTO
Accession Number	(0008,0050)	SH		VNAP	MWL/USER
Referring Physician's Name	(0008,0090)	PN		ANAP	MWL
Study Description	(0008,1030)	LO		ANAP	MWL
Physician(s) of Record	(0008,1048)	PN		NEVER	
Name of Phycisian(s) Reading Study	(0008,1060)	PN		NEVER	
Study Instance UID	(0020,000D)	UI		ALWAYS	MWL/AUTO
Study ID	(0020,0010)	SH		VNAP	MWL
Admission ID	(0038,0010)	LO		ANAP	MWL

Table 5: General study module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Series Date	(0008,0021)	DA		ALWAYS	AUTO
Series Time	(0008,0031)	TM		ALWAYS	AUTO
Series Description	(0008,103E)	LO		ANAP	MWL/USER
Performing Phycisian's Name	(0008,1050)	PN		ANAP	MWL/USER
Operator's Name	(0008,1070)	PN		ANAP	MWL/USER
Ref. Performed Proc. Step Seq.	(0008,1111)	SQ		ANAP	
> Referenced SOP Class UID	(0008,1150)	UI		ANAP	MPPS

Attribute Name	Tag	VR	Value	Presence	Source
> Referenced SOP Instance UID	(0008,1155)	UI		ANAP	MPPS
Body Part Examined	(0018,0015)	CS		NEVER	
Protocol Name	(0018,1030)	LO		ALWAYS	MWL/USER
Patient Position	(0018,5100)	CS		NEVER	
Series Instance UID	(0020,000E)	UI		ALWAYS	AUTO
Series Number	(0020,0011)	IS		ALWAYS	AUTO
Laterality	(0020,0060)	CS		NEVER	
Performed Proc. Step Start Date	(0040,0244)	DA		NEVER	
Performed Proc. Step Start Time	(0040,0245)	TM		NEVER	
Performed Proc. Step ID	(0040,0253)	LO		ANAP	MWL/USER
Performed Proc. Step Description	(0040,0254)	LO		ANAP	MWL/USER
Comments on the Perf. Proc. Step	(0040,0280)	ST		ANAP	USER

Table 6: General series module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Manufacturer	(0008,0070)	LO	“Karl Storz”	ALWAYS	AUTO
Manufacturer's Model Name	(0008,1090)	LO	“SCENARA”	ALWAYS	AUTO
Software Versions	(0018,1020)	LO		ALWAYS	AUTO
Station Name	(0008,1010)	SH		ANAP	CONFIG
Institution Name	(0008,0080)	LO		ANAP	CONFIG
Institution Address	(0008,0081)	ST		EMPTY	
Institutional Department Name	(0008,1040)	LO		ANAP	CONFIG

Table 7: General equipment module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Image Type	(0008,0008)	CS		ALWAYS	AUTO
Acquisition Date	(0008,0022)	DA		NEVER	
Acquisition Time	(0008,0033)	TM		NEVER	
Content Date	(0008,0023)	DA		ALWAYS	AUTO
Content Time	(0008,0033)	TM		ALWAYS	AUTO
Acq. Datetime	(0008,002A)	DT		NEVER	
Derivation Descr.	(0008,2111)	ST		NEVER	
Acquisition Number	(0020,0012)	IS		NEVER	
Instance Number	(0020,0013)	IS		VNAP	AUTO
Patient Orientation	(0020,0020)	CS		EMPTY	
Image Comment	(0020,4000)	LT		ANAP	USER
Lossy Image Compression	(0028,2110)	CS		EMPTY	

Table 8: General image module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Samples per Pixel	(0028,0002)	US		ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS		ALWAYS	AUTO
Planar Configuration	(0028,0006)	US		ALWAYS	AUTO
Number of Frames	(0028,0008)	US		ALWAYS	AUTO
Rows	(0028,0010)	US		ALWAYS	AUTO
Columns	(0028,0011)	US		ALWAYS	AUTO
Pixel Aspect Ratio	(0028,0034)	IS		ANAP	AUTO
Bits Allocated	(0028,0100)	US		ALWAYS	AUTO
Bits Stored	(0028,0101)	US		ALWAYS	AUTO
High bit	((0028,0102)	US		ALWAYS	AUTO
Pixel Representation	(0028,0103)	US		ALWAYS	AUTO



Attribute Name	Tag	VR	Value	Presence	Source
Smallest Image Pixel Value	(0028,0106)	US		ALWAYS	AUTO
Largest Image Pixel Value	(0028,0107)	US		ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OW		ALWAYS	AUTO

Table 9: Image pixel module of created SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Spec. Character Set	(0008,0005)	CS	ISO_IR 100 or ISO_IR 192	ANAP	CONFIG
SOP Class UID	(0008,0016)	UI		ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI		ALWAYS	AUTO

Table 10: SOP common module of created SOP instances

### 7.1.1.5 VL Endoscopic Image Modules

Attribute Name	Tag	VR	Value	Presence	Source
Acquisition Context	(0040,0555)	SQ		EMPTY	
Acq. Context Descr.	(0040,0556)	ST		NEVER	

Table 11: Acquisition context module of created VL endoscopic SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Image Type	(0008,0008)	CS	“ORIGINAL”	ALWAYS	AUTO
Referenced Image Sequence	(0008,1140)	SQ		NEVER	
Samples per Pixel	(0028,0002)	US		ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	“RGB”	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US		ALWAYS	AUTO
Number of Frames	(0028,0008)	US		ALWAYS	AUTO
Rows	(0028,0010)	US		ALWAYS	AUTO
Columns	(0028,0011)	US		ALWAYS	AUTO
Pixel Aspect Ratio	(0028,0034)	IS		NEVER	
Bits Allocated	(0028,0100)	US		ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence	Source
Bits Stored	(0028,0101)	US		ALWAYS	AUTO
High bit	(0028,0102)	US		ALWAYS	AUTO
Pixel Representation	(0028,0103)	US		ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS		EMPTY	

Table 12: VL image module of created VL endoscopic SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Window Center	(0028,1050)	SQ		ALWAYS	AUTO
Window Width	(0028,1051)	ST		ALWAYS	AUTO

Table 13: VOI LUT module of created VL endoscopic SOP instances

### 7.1.1.6 Video Endoscopic Image Modules

Attribute Name	Tag	VR	Value	Presence	Source
Acquisition Context	(0040,0555)	SQ		EMPTY	
Acq. Context Descr.	(0040,0556)	ST		NEVER	

Table 14: Acquisition context module of created video endoscopic SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Image Type	(0008,0008)	CS	"ORIGINAL"	ALWAYS	AUTO
Referenced Image Sequence	(0008,1140)	SQ		NEVER	
Samples per Pixel	(0028,0002)	US		ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	"YBR_PARTIAL_420"	ALWAYS	AUTO
Planar Configuration	(0028,0006)	US		ALWAYS	AUTO
Number of Frames	(0028,0008)	US		ALWAYS	AUTO
Rows	(0028,0010)	US		ALWAYS	AUTO
Columns	(0028,0011)	US		ALWAYS	AUTO
Pixel Aspect Ratio	(0028,0034)	IS		ALWAYS	AUTO
Bits Allocated	(0028,0100)	US		ALWAYS	AUTO
Bits Stored	(0028,0101)	US		ALWAYS	AUTO

Attribute Name	Tag	VR	Value	Presence	Source
High bit	(0028,0102)	US		ALWAYS	AUTO
Pixel Representation	(0028,0103)	US		ALWAYS	AUTO
Lossy Image Compression	(0028,2110)	CS	"01"	ALWAYS	AUTO

Table 15: VL image module of created video endoscopic SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Frame Time	(0018,1063)	DS		ALWAYS	AUTO
Frame Time Vector	(0018,1065)	DS		NEVER	

Table 16: CINE module of created video endoscopic SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Number of Frames	(0028,0008)	IS		ALWAYS	AUTO
Frame Increment Pointer	(0028,0009)	AT		ALWAYS	AUTO

Table 17: Multi frame module of created video endoscopic SOP instances

### 7.1.1.7 Secondary Capture Modules

Attribute Name	Tag	VR	Value	Presence	Source
Modality	(0008,0060)	CS		ALWAYS	CONFIG
Conversion Type	(0008,0064)	CS	"DV"	ALWAYS	AUTO

Table 18: SC equipment module of created sec. capture SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Data of Secondary Capture	(0018,1012)	DA		NEVER	
Time of Secondary Capture	(0018,1014)	TM		NEVER	

Table 19: Secondary capture image module of created sec. capt. SOP instances

Attribute Name	Tag	VR	Value	Presence	Source
Window Center	(0028,1050)	SQ		ALWAYS	AUTO
Window Width	(0028,1051)	ST		ALWAYS	AUTO

Table 20: VOU LUT module of created sec. capture SOP instances

### 7.1.2 Storage-SCP AE Element Use

The following Elements of Composite SOP Instances received by the STORAGE-SCP AE are of particular importance in the received images:

Module	Attribute Name	Tag ID	Type	Significance
Patient	Patient Name	(0010,0010)	Opt	Value is saved to database as separate first and last names. Only first and last names are entered in the DWS database. Both first and last names can be a maximum of 30 characters each.  Names will be parsed correctly if they are in the format of 'lname^fname'. If space separation is used (i.e. 'lname fname') then the entire name will be treated as the last name.
	Patient ID	(0010,0020)	Opt	Value is saved to database
	Patient's Birth Date	(0010,0030)	Opt	Value is saved to database
	Patient's Sex	(0010,0040)	Opt	Value is saved to database
General Study	Study Instance UID	(0020,000D)	Mand	If matched value(s) in the MDS exam list database, Composite SOP instance will be assigned to existing exam
	Study Date	(0008,0020)	Opt	Value is saved to database
	Accession Number	(0008,0050)	Opt	If matched value(s) in the MDS exam list database, Composite SOP instance may be assigned to existing exam (configurable)
	Study Description	(0008,1030)	Opt	Value is saved to database

General Series	Series Instance UID	(0020,000E)	Mand	Value is saved to database
SOP Common	SOP Instance UID	(0008,0018)	Mand	If a duplicate SOP Instance UID is received the system preserves the original object but does not report any error

SOP Instances conforming to the following Composite Image SOP Classes are fully supported for display on the system workstations:

<b>US Image Storage (Retired)</b>
Secondary Capture Image Storage
VL Endoscopic Image Storage
Video Endoscopic Image Storage

**NOTE:** Note that only overlay information will be ignored for display purposes. Such information will still be stored and forwarded however.

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