

STORZ

KARL STORZ — ENDOSKOPE

en

DICOM Conformance Statement
SCENARA .procedures Version 3 - WS11120



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Table of contents

1	Abbreviations	4
2	Definitions	5
3	References	6
4	Conformance Statement Overview	7
5	Introduction	9
5.1	Audience	9
5.2	Remarks	9
6	Networking	10
6.1	Implementation Model	10
6.1.1	Application Data Flow	10
6.1.2	Functional Definition of AEs	10
6.1.3	Sequencing of Real World Activities	11
6.2	Application Entities Specification	11
6.2.1	General Association Policies	11
6.2.2	WLM-SCP AE Specification	12
6.2.3	MPPS-SCP AE Specification	15
6.3	Network Interfaces	17
6.3.1	Physical Network Interface	17
6.3.2	Physical Media Support	17
6.4	Configuration	17
6.4.1	AE Title/Presentation Address Mapping	18
6.4.2	Parameters	18
7	Media Interchange	19
8	Support of Character Sets	20
8.1	Overview	20
8.2	Character Sets	20
8.3	Character Set Configuration	20
9	Security	21
9.1	Security Profiles	21
9.2	Managment Profiles	21
9.3	Association Level Security	21
9.4	Application Level Security	22
10	Annexes	23
10.1	Data Dictionary of Private Attributes	23
10.2	Coded Terminology and Templates	23
10.3	Grayscale Image Consistency	23
10.4	Standard Extended/Specialized/Private SOP Classes	23
10.5	Private Transfer Syntaxes	23

1 Abbreviations

General abbreviations	
DICOM	Digital Imaging and Communication in Medicine - Communication Standard in Medicine
DSS	Department System Scheduler/Order Filler
GUI	Graphic User Interface
HL7	Health Level Seven - Communication Standard in Medicine
HIS	Hospital Information System
IHE	Integrating the Healthcare Enterprise
KST	KARL STORZ SE & Co. KG
PACS	Picture Archiving and Communication System
SCB	Storz Communication Bus
Network specific abbreviations	
IP	Internet Protocol
PDU	Protocol Data Unit
TCP	Transport Control Protocol
TLS	Transport Layer Security
DICOM specific abbreviations	
AE	Application Entity
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
SOP	Service Object Pair
SCP	Service Class Provider (= Server)
SCU	Service Class User (= Client)
UID	Unique Identifier
UTF-8	Unicode Transformation Format (8 bit)
VL	Visible Light
VR	Value Representation

2 Definitions

IHE Integration Profiles	IHE Integration Profiles define the workflow processes and data contents which must be supported by IHE compliant applications.
Acquisition Modality	A system that acquires and creates medical images while a patient is present, e.g. an endoscope. A modality may also create other evidence objects such as Grayscale Softcopy Presentation States for the consistent viewing of images or Evidence Documents containing measurements. [IHE TF, Vol 1, Ch 2.3]
Department System Scheduler/Order Filler	A department-based information system (for instance, Radiology or Laboratory) that provides functions related to the management of orders received from external systems or through the department system's user interface. Upon a defined workflow action, makes procedures available for charge posting. The action/event that actually causes charges to post is defined by the actor. [IHE TF, Vol 1, Ch 2.3]
Performed Procedure Step Manager	A system that re-distributes the Modality Performed Procedure Step information from the Acquisition Modality or Evidence Creator to the Department System Scheduler/Order Filler, Image Manager and Report Manager. [IHE TF, Vol 1, Ch 2.3]

3 References

[DICOM]	Digital Imaging and Communications in Medicine (DICOM), DICOM PS 3.1-3.21, 2020b
[IHE TF]	IHE Radiology Technical Framework Rev. 18.0, 2019

4 Conformance Statement Overview

This document is a DICOM conformance statement in accordance with the standard as specified in DICOM PS 3.2-2020b.

The KARL STORZ DICOM Worklist Service for SCENARA allows participation of the service in the actor roles of “Department System Scheduler/Order Filler” and “Performed Procedure Step Manager” in the IHE Radiology Integration Profile.

Acquisition Modality is a device that acquires and creates medical images while a patient is present.

Department System Scheduler/Order Filler is an information system that provides order management related functions by user interface or external systems. SCENARA acts this way by interactions of several services, such as this DICOM service and other connectivity services and management applications within SCENARA.

Performed Procedure Step Manager is system that re-distributes Modality Performed Procedure Step information from the Acquisition Modality to Department System Scheduler and other services. SCENARA provides this function as an integrated part of its data repository and internal communication ways.

Supported IHE Radiology Integration Profiles as Department System Scheduler/Order Filler and as Performed Procedure Step Manager are:

- Scheduled Workflow (SWF)

This product of KARL STORZ SE & Co. KG implements the necessary DICOM services to provide the following functionality:

Query Modality Worklist – Based on a query entered at the Acquisition Modality, a modality worklist is generated listing all the items that satisfy the query. This list of Scheduled Procedure Steps with selected demographic information is returned to the Acquisition Modality.

Modality Procedure Step In Progress – The Acquisition Modality notifies the Performed Procedure Step Manager of the start of a new Procedure Step. SCENARA acts as Department System as well, therefore the information of other SCENARA components is handled internally.

Modality Procedure Step Completed – The Acquisition Modality notifies the Performed Procedure Step Manager of the completion of a Procedure Step. SCENARA acts as Department System as well, therefore the information of other SCENARA components is handled internally.

Modality Procedure Step Discontinued – The Acquisition Modality notifies the Performed Procedure Step Manager of the discontinuation of a formerly started Procedure Step. SCENARA acts as Department System as well, therefore the information of other SCENARA components is handled internally.

The following table provides an overview of the supported network services.

SOP Classes	Service User (SCU)	Service Provider (SCP)
Transfers		
None		
Workflow Management		
Modality Worklist Information Model – FIND	No	Yes
Modality Performed Procedure Step SOP Class	No	Yes
Print Management		
None		

Table 1: Supported Network Services

5 Introduction

5.1 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.

5.2 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 DICOM Workflow Server for SCENARA product component 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:

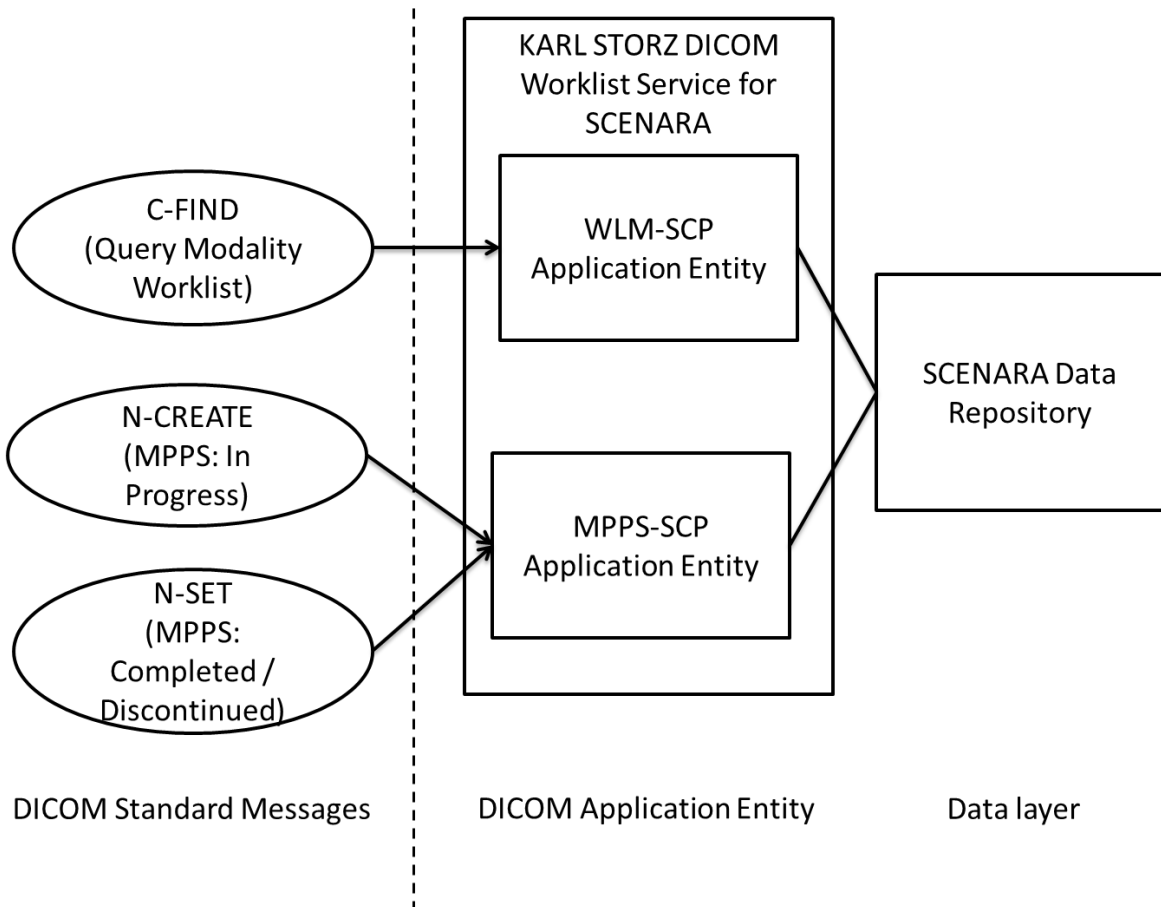
- The comparison of different conformance statements is the first step towards assessing interconnectivity between KARL STORZ SE & Co. KG and non-KARL STORZ SE & Co. KG equipment.
- Test procedures should be defined to validate the desired level of connectivity.

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.

6 Networking

6.1 Implementation Model

6.1.1 Application Data Flow



Conceptually the network services may be modeled as the following separate AEs, though in fact all the AEs share a single configurable AE Title and network port:

- WLM-SCP returns a modality worklist based on a query entered.
- MPPS-SCP responds to notifications of the start of a new procedure step or the completion or cancellation of a procedure step.

6.1.2 Functional Definition of AEs

6.1.2.1 WLM-SCP Application Entity

The WLM-SCP AE is invoked by the real-world action 'Query Modality Worklist'. Based on a query entered a modality worklist is requested. The query supports:

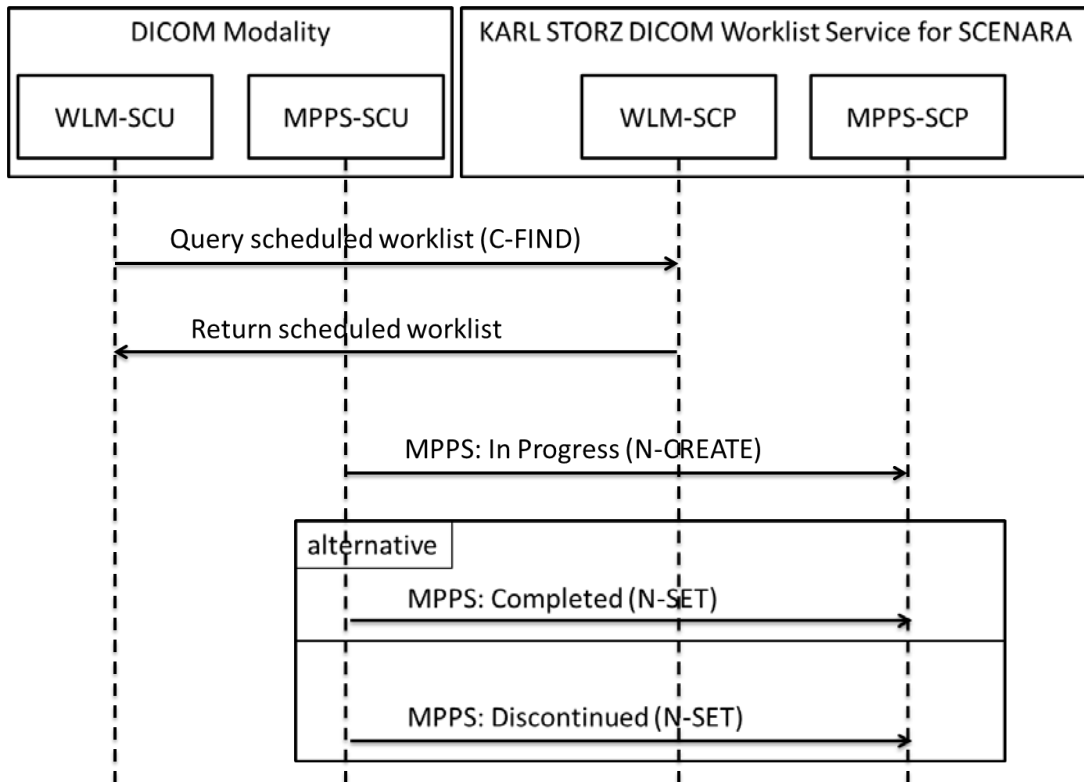
- Patient Based Worklist Query
- Broad Worklist Query

The supported matching-query-keys and return-query-keys are listed in this document.

6.1.2.2 MPPS-SCP Application Entity

The MPPS-SCP AE is invoked by the system on start and end or cancellation of a procedure step. The possible real-world events are 'Procedure Start', 'Procedure Completed' and 'Procedure Discontinued'.

6.1.3 Sequencing of Real World Activities



6.2 Application Entities Specification

6.2.1 General Association Policies

6.2.1.1 General

KARL STORZ DICOM Worklist Service for SCENARA utilizes and understands the following Application Context Name:

- DICOM V3.0 Application Context 1.2.840.10008.3.1.1.1

KARL STORZ DICOM Worklist Service for SCENARA attempts to establish an association (response) whenever a DICOM related operation (receiving a query for a worklist or MPPS commands from a remote AE) is encountered.

The maximum PDU size which KARL STORZ DICOM Worklist Service for SCENARA uses is configurable. The default value is 1022000 Bytes.

6.2.1.2 Number of Associations

The KARL STORZ DICOM Worklist Service for SCENARA does not initiate association by itself. It has no limit for the number of concurrent associations.

6.2.1.3 Asynchronous Nature

KARL STORZ DICOM Worklist Service for SCENARA does not use asynchronous communication (multiple outstanding transactions over a single association).

6.2.1.4 Implementation Identifying Information

KARL STORZ DICOM Worklist Service for SCENARA Implementation Class UID:
1.2.276.0.67.10

KARL STORZ DICOM Worklist Service for SCENARA Implementation Version Name:
KSDCM10

6.2.2 WLM-SCP AE Specification

6.2.2.1 SOP Classes

The KARL STORZ DICOM Worklist Service for SCENARA system provides Standard Conformance to the following SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	No	Yes

Table 2: SOP Classes for WLM-SCU AE

6.2.2.2 Association Policies

See General Association Policies [p. 11]

6.2.2.3 Association Initiation Policy

KARL STORZ DICOM Worklist Service for SCENARA does not attempt to initiate any new associations.

6.2.2.4 Associated Real-World Activity – Query Worklist by a remote AE

If a query command (C-FIND) is received from an acquisition modality, a query is initiated.

6.2.2.5 Accepted Presentation Contexts – Query Worklist by a remote AE

The Presentation Contexts accepted by KARL STORZ DICOM Worklist Service for SCENARA are defined in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

Table 3: SOP Presentation Context Table - Query Worklist by a remote AE

6.2.2.6 SOP Specific Conformance Statement – Query Worklist by a remote AE

KARL STORZ DICOM Worklist Service for SCENARA establishes an association to the remote AE, receives the C-FIND request and closes it after sending the responses. It uses the following query keys from the C-FIND request:

Attribute Name	Tag	Addition information
SOP Common Module		
Specific Character Set	(0008,0005)	ISO IR 100 or ISO IR 192
Modality Worklist Module		
Scheduled Procedure Step Sequence	(0040,0100)	
Scheduled Procedure Step Start Date	>(0040,0002)	Single value or date range allowed
Scheduled Performing Physician	>(0040,0006)	
Patient Name	(0010,0010)	
Patient ID	(0010,0020)	
Accession Number	(0008,0050)	
Admission ID / Case ID	(0038,0010)	
Requested Procedure ID	(0040,1001)	

Table 4: Modality Worklist Query Keys

KARL STORZ DICOM Worklist Service for SCENARA sends the following status codes in the responses to the C-FIND request:

- SUCCESS (0000)
- PENDING (FF00)
- UNABLE TO PROCESS (C000)

KARL STORZ DICOM Worklist Service for SCENARA does not support optional return key attributes. It supports ISO IR 100 and ISO IR 192 character sets.

Attribute Name	Tag	Addition information
SOP Common Module		
Specific Character Set	(0008,0005)	ISO IR 100 or ISO IR 192
Patient Module		
Patient Name	(0010,0010)	
Patient ID	(0010,0020)	
Patient's Birth Date	(0010,0030)	
Patient's Sex	(0010,0040)	
Other Patient IDs	(0010,1000)	
Visit Module		
Admission ID	(0038,0010)	
Referenced Patient Sequence	(0008,1120)	Always empty
Imaging Service Request Module		
Accession Number	(0008,0050)	
Referring Physician's Name	(0008,0090)	
Requested Procedure Module		
Study Date	(0008,0020)	
Study Time	(0008,0030)	
Referenced Study Sequence	(0008,1110)	Always empty
Study Instance UID	(0020,000D)	
Study ID	(0020,0010)	Always empty
Requested Procedure Description	(0032,1060)	
Requested Procedure Code Sequence	(0032,1064)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Code Meaning	(0008,0104)	
Requested Procedure ID	(0040,1001)	
Scheduled Procedure Step Module		
Scheduled Procedure Step Sequence	(0040,0100)	
>Modality	(0008,0060)	Configurable fallback value, always "ES" by default
>Scheduled Station AE Title	(0040,0001)	Configurable fallback value, always empty by default
>Scheduled Procedure Step Start Date	(0040,0002)	
>Scheduled Procedure Step Start Time	(0040,0003)	
>Scheduled Procedure Step End Date	(0040,0004)	
>Scheduled Procedure Step End Time	(0040,0005)	

Attribute Name	Tag	Addition information
>Scheduled Performing Physician's Name	(0040,0006)	
>Scheduled Procedure Step Description	(0040,0007)	
>Scheduled Protocol Code Sequence	(0040,0008)	
>>Code Value	(0008,0100)	
>>Coding Scheme Designator	(0008,0102)	
>>Coding Scheme Version	(0008,0103)	
>>Code Meaning	(0008,0104)	
>Scheduled Procedure Step ID	(0040,0009)	
>Scheduled Station Name	(0040,0010)	Always empty
>Scheduled Procedure Step Location	(0040,0011)	

Table 5: Modality Worklist Attributes

6.2.3 MPPS-SCP AE Specification

6.2.3.1 SOP Classes

KARL STORZ DICOM Worklist Service for SCENARA provides Standard Conformance to the following SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	No	Yes

Table 6: SOP Classes for WLM-SCU AE

6.2.3.2 Association Policies

See General Association Policies [p. 11] .

6.2.3.3 Association Initiation Policy

KARL STORZ DICOM Worklist Service for SCENARA does not initiate any new associations. It understands the following service operations:

- Start Procedure Step
- Finish Procedure Step
- Discontinue Procedure Step

6.2.3.4 Associated Real-World Activity – Query Worklist by a remote AE

When a surgery is started or is ending KARL STORZ DICOM Worklist Service for SCENARA is able to receive MPPS (Modality Performed Procedure Step) objects to update information in the SCENARA data repository.

Information updates are handled in the context of surgery start (N-CREATE message) and surgery end (N-SET message with status 'Completed' or 'Discontinued').

6.2.3.5 Proposed Presentation Contexts – Receive Status message by remote AE

The Presentation Contexts proposed by KARL STORZ DICOM Worklist Service for SCENARA are defined in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1.2.1 1.2.840.10008.1.2.2	SCU	None

Table 7: SOP Presentation Context Table - Receive MPPS Message by remote AE

6.2.3.6 SOP Specific Conformance Statement – Receive Status message by remote AE

Once the MPPS association has been established, KARL STORZ DICOM Worklist Service for SCENARA receives an N-CREATE-RQ or N-SET-RQ message by the MPPS SCU. After the response is sent the association is closed. The table below lists all Modality Performed Procedure Step attributes, which may be created by N-CREATE and updated by N-SET.

Attribute Name	Tag	N-CREATE	N-SET	Additional Information
SOP Common Module				
Specific Character Set	(0008,0005)	Y	N	ISO IR 100 or ISO IR 192
Performed Procedure Step Relationship Module				
Patient Name	(0010,0010)	Y	N	
Patient ID	(0010,0020)	Y	N	
Patient's Birth Date	(0010,0030)	Y	N	
Patient's Sex	(0010,0040)	Y	N	
Admission ID	(0038,0010)	Y	N	
Scheduled Step Attribute Sequence	(0040,0270)	Y	N	
>Accession Number	(0008,0050)	Y	N	
>Study Instance UID	(0020,000D)	Y	N	
Performed Procedure Step Information				
Procedure Code Sequence	(0008,1032)	Y	Y	
>Code Value	(0008,0100)	Y	Y	
>Coding Scheme Designator	(0008,0102)	Y	Y	
>Coding Scheme Version	(0008,0103)	Y	Y	
>Code Meaning	(0008,0104)	Y	Y	

Attribute Name	Tag	N-CREATE	N-SET	Additional Information
Performed Procedure Step Start Date	(0040,0244)	Y	N	
Performed Procedure Step Start Time	(0040,0245)	Y	N	
Performed Procedure Step End Date	(0040,0250)	Y	Y	
Performed Procedure Step End Time	((0040,0251)	Y	Y	
>Performed Procedure Step Status	(0040,0252)	Y	Y	
Performed Procedure Step ID	(0040,0253)	Y	N	
Performed Procedure Step Description	(0040,0254)	Y	Y	
Image Acquisition Results				
Performed Series Sequence	(0040,0340)	Y	Y	
>Performing Physician's Name	(0008,1050)	Y	Y	
>Protocol Name	(0018,1030)	Y	Y	

Table 8: Modality Performed Procedure Step Attributes

6.3 Network Interfaces

6.3.1 Physical Network Interface

The KARL STORZ DICOM Worklist Service for SCENARA system provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard (PS 3.8 Network Communication Support for Message Exchange).

6.3.1.1 OSI Stack

No OSI Stack communications are provided.

6.3.1.2 TCP/IP Stack

KARL STORZ DICOM Worklist Service for SCENARA uses the TCP/IP stack from the Windows Server system upon which it executes (see SCENARA product description for supported OS versions).

6.3.2 Physical Media Support

KARL STORZ DICOM Worklist Service for SCENARA is independent of the physical medium over which TCP/IP executes.

6.4 Configuration

The configuration of KARL STORZ DICOM Worklist Service for SCENARA is done by modifying the information stored in the SCENARA Configuration service.

6.4.1 AE Title/Presentation Address Mapping

The application entity title of KARL STORZ DICOM Worklist Service for SCENARA and the port number of KARL STORZ DICOM Worklist Service for SCENARA can be configured directly in the SCENARA Configuration service.

6.4.2 Parameters

The following DICOM parameters can be configured in the SCENARA Configuration service:

- Application entity title of KARL STORZ DICOM Worklist Service for SCENARA
- Own port of KARL STORZ DICOM Worklist Service for SCENARA
- Communication security (use of TLS, required certificate)
- Maximum PDU size
- Default modality type and default station application entity title for worklist results, if the data repository is missing this information
- Logging settings

7 Media Interchange

KARL STORZ DICOM Worklist Service for SCENARA does not support Media Storage.

8 Support of Character Sets

8.1 Overview

The application supports all character sets defined in the below. Support extends to correctly decoding and displaying the correct symbol for all names and strings received over the network.

8.2 Character Sets

In addition to the default character repertoire, the following Specific Character Sets are supported:

Character Set Description	Defined Term
Latin alphabet No.1	ISO_IR 100
Unicode in UTF-8	ISO_IR 192

Table 9: Supported Specific Character Sets

8.3 Character Set Configuration

The character set configuration of all components in the customers PACS (worklist server, modalities, archive) should agree. KARL STORZ DICOM Worklist Service for SCENARA sends worklist items with the same character set as was requested by the Special Character Set DICOM tag. In case of this tag not being used the default is ISO_IR 100 (Latin alphabet No. 1).

9 Security

9.1 Security Profiles

The implementation adheres to the following Security Profiles:

SECURE USE PROFILES

The implementation adheres to the following Secure Use Profiles:

- None

SECURE TRANSPORT CONNECTION PROFILES

The implementation adheres to the following Secure Transport Connection Profiles (when secured communication is activated in the configuration):

- BCP 195 TLS Secure Transport Connection Profile
The IP port on which the implementation accepts TLS connections can be configured through the configuration setting. The IP port “2762-dicom-tls” is recommended for this profile.
A mix of secured communications and unsecured communications is not supported.

DIGITAL SIGNATURE PROFILE

The implementation adheres to the following Digital Signature Profiles:

- None

MEDIA STORAGE SECURITY PROFILES

The implementation adheres to the following Media Storage Application Profiles which in turn require conformance to one or more Media Storage Security Profiles:

- None

9.2 Management Profiles

The implementation adheres to the following Management Profiles:

NETWORK ADDRESS MANAGEMENT PROFILES

The implementation adheres to the following Network Address Management Profiles:

- None

TIME SYNCHRONIZATION PROFILES

The implementation adheres to the following Time Synchronization Profiles:

- None

APPLICATION CONFIGURATION MANAGEMENT PROFILES

The implementation adheres to the following Application Configuration Management Profiles:

- None

9.3 Association Level Security

None

9.4 Application Level Security

None

10 Annexes

10.1 Data Dictionary of Private Attributes

None.

10.2 Coded Terminology and Templates

None.

10.3 Grayscale Image Consistency

None.

10.4 Standard Extended/Specialized/Private SOP Classes

None.

10.5 Private Transfer Syntaxes

None.

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