



DICOM[®] Conformance Statement

For

**B-K Medical Ultrasound System, 2202
DICOM Release 2.1.1**

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1 Introduction

This section provides general information about the purpose, scope and contents of this Conformance Statement.

This document describes the conformance to the DICOM 3.0 Standard of the B-K Medical ultrasound system.

The B-K Medical ultrasound system is a device that:

- Generates ultrasound images and other data that:
 - Can be sent using DICOM standard protocols and definitions to network archive servers.
 - Can be printed on a remote printer.
- Can retrieve data from a Radiology Information System (RIS).
- Can notify the Remote Modality Performed Procedure Step server on the Procedures performed.

1.1 Scope and Field of Application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment from B-K Medical. This document specifies the compliance to the DICOM standard, formally called the NEMA PS 3.X standards. It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Application Profiles, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the B-K Medical equipment into an environment of medical devices.

This Conformance Statement should be read in conjunction with the DICOM standard and its addenda.

1.2 Intended Audience

This Conformance Statement is intended for:

- (Potential) customers.
- System integrators of medical equipment.
- Marketing staff interested in system functionality.
- Software designers implementing DICOM interfaces.

It is assumed that the reader is familiar with the DICOM standard.

1.3 Used Definitions, Terms, Symbols and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3 and PS 3.4.

The following symbols and abbreviations are used in this document:

AE	Application Entity
AP	Application Profile
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normalized
HIS	Hospital Information System
IE	Information Entity
IOD	Information Object Definition
ISO	International Standards Organization
MPPS	Modality Performed Procedure Step
NEMA	National Electrical Manufacturers Association
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real-World Activity
SC	Service Class
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
VR	Value Representation

1.4 References

DICOM	The Digital Imaging and Communications in Medicine (DICOM) standard: NEMA PS 3.X (X refers to the part 1 - 18 and Supplements). National Electrical Manufacturers Association (NEMA) Publication Sales 1300 N. 17th Street, Suite 1752, Rosslyn, Virginia 22209, United States of America. Can also be downloaded from http://medical.nema.org/
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1.5 Important Note to the Reader

This Conformance Statement by itself does not guarantee successful interoperability of B-K Medical equipment with non-B-K Medical equipment. The user should be aware of the following issues:

- Interoperability.
- Validation.
- New (or old) versions of the DICOM standard.

1.5.1 Interoperability

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of B-K Medical equipment with non-B-K Medical equipment.

It is the user's responsibility to thoroughly analyze the application requirements and to specify a solution that integrates B-K Medical equipment with non-B-K Medical equipment.

1.5.2 Validation

B-K Medical equipment has been tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where B-K Medical equipment is linked to non-B-K Medical equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data.

It is the user's responsibility to specify the appropriate test and to carry out the additional validation tests.

1.5.3 New Versions of the DICOM Standard

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. B-K Medical plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, B-K Medical reserves the right to make changes to its products or to discontinue their delivery.

2 Implementation Model - Network

B-K Medical's Ultrasound Systems with DICOM option activated has implemented the DICOM functionality as one Application Entity.

The AE contains the following DICOM functionality:

- Verify communication to a remote AE.
- Retrieve a worklist for ultrasound modality from a Radiology Information System (RIS) or a Hospital Information System (HIS).
- Send Step by Step information on the procedures performed to a remote server.
- Transfer ultrasound images to a remote storage system.
- Transfer ultrasound video clips as multi-frame images to a remote system.
- Request Storage Commitment of images to the remote storage system.
- Print ultrasound images on a remote printer.

2.1 Application Data Flow Diagram

The Implementation Model for the AE, the DICOM networking service for the B-K Medical Ultrasound System, is depicted in Figure 2-1.

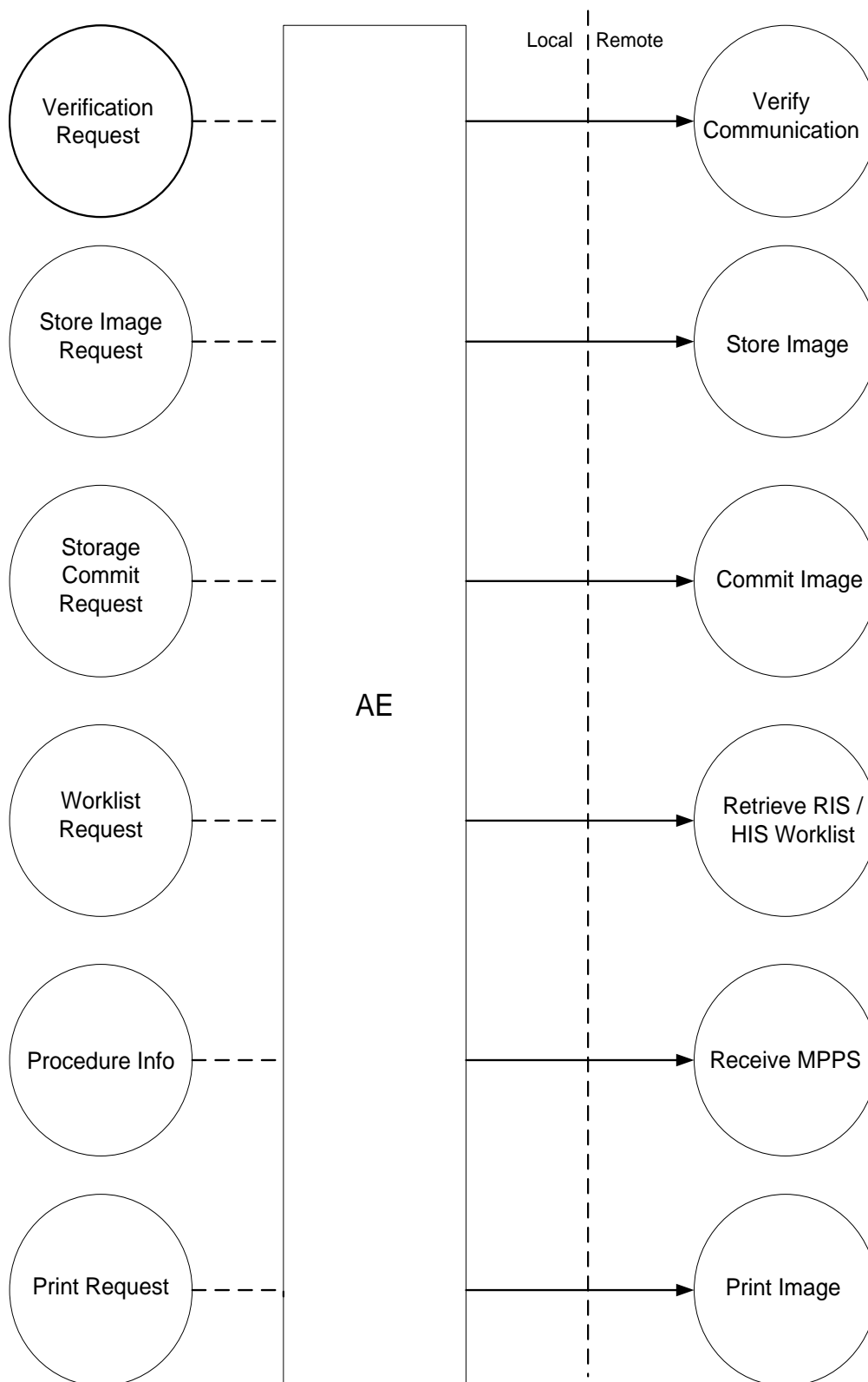


Figure 2-1 AE Implementation Model

The AE can send image storage objects. It receives requests from the operator to transmit an image to a specific DICOM destination. It receives the Storage Commitment reports from the remote storage server and passes it to the Modality. It can query for information from external sources. Worklist demographic queries can be initiated and executed by the AE. It receives the performed procedure step notifications from the Modality and initiates an association and transmits the information to the remote MPPS Server. The operator can initiate an association with a DICOM-compliant grayscale or color printer to print a selected image.

The AE is implemented as a Windows®-based application.

2.1.1 Verify Communication

The B-K Medical Ultrasound System is able to verify DICOM communication with a remote system, i.e., PACS and Storage Commitment, RIS, MPPS or a remote printer. This is done at the operator's request. This function is used for network diagnostic purposes.

2.1.2 Store Image

The B-K Medical Ultrasound System is able to store ultrasound images and clips on a remote system. This is done at the operator's request. The remote destination (PACS) can be set in the DICOM setup. Image data to be transferred are instances of the Ultrasound Image Storage or Ultrasound Multi-frame Image Storage SOP class.

Graphics, both within the ultrasound image and surrounding the image, are transferred as burned-in graphics, so it is the operator's responsibility to put in or leave out the desired graphics before transferring the image.

2.1.3 Storage Commitment

The B-K Medical Ultrasound system is capable of supporting a remote Storage Commitment System. The user can enable or disable Storage Commitment. If Storage Commitment is configured, the user can choose to configure a separate SCP for Storage Commitment or can configure the Storage SCP to act also as Storage Commitment SCP. The Storage Commitment SCP can be set as part of the PACS Configuration in the DICOM setup.

If Storage Commitment SCP is configured, the Storage SCU issues a Commit request for the images transferred to the Storage SCP by the Storage AE, and the Commitment SCP issues an acknowledgement to the Storage AE on successful commitment of the images.

2.1.4 Retrieve HIS/RIS Worklist

The B-K Medical Ultrasound System is able to retrieve the ultrasound modality Worklist from a RIS. This is done both at the operator's request and automatically at a specified time interval. From the received list, a selection of one Worklist item can be made, i.e. the examination to be performed. The data received from the RIS consists of patient demographic data and procedure step information.

2.1.5 Performed Procedure Step

The B-K Medical Ultrasound System is able to notify a remote Modality Performed Procedure Step System (MPPS) on the procedures performed. The remote system can be configured in the DICOM Setup. It initiates an association with the MPPS to notify the Start, Stop or Discontinued Examinations / Procedures.

2.1.6 Print Image

The B-K Medical Ultrasound System is able to print ultrasound images on a remote grayscale or color printer. The images are sent to the printer at the operator's request or at the end of the current examination.

2.2 Functional Definition of Application Entities

The AE acts as a Service Class User (SCU) for the following SOP classes:

- Verification.
- Storage (PACS and Storage Commitment).
- Basic worklist management.
- Modality Performed Procedure Step (MPPS).
- Basic grayscale print management.
- Basic color print management.

2.2.1 Application Entity: Verification

The Verification AE supports as an SCU the following functions:

- Negotiates and establishes DICOM association with remote AEs, i.e., PACS, Storage Commitment Server, RIS, MPPS, and remote printer.
- Verifies communication to a remote AE by issuing an echo request.
- Releases the association with a remote AE.
- Notifies the operator of the communication status.

2.2.2 Application Entity: Storage

The Storage AE supports as an SCU the following functions:

- Negotiates and establishes DICOM association with a remote PACS (Storage SCP).
- Sends DICOM Information Objects (US & US-mf) to the remote SCP.
- Requests Commit (Storage Commitment SCP) for the images transferred to the remote PACS.
- Awaits the acknowledgement from the Storage Commitment SCP on successful "Commit" of the images.
- Updates the status of the transferred images as "Committed" in the Local Archive (Modality).
- Provides the option of enabling or disabling Storage Commitment.
- The user can choose the PACS SCP to act as both Storage Commitment and PACS or configure a separate Server to act as a Storage Commitment server.
- Releases the association with the remote SCP.
- Notifies the operator of the communication status.

2.2.3 Application Entity: Request Worklist

The Request Worklist AE supports as an SCU the following functions:

- Negotiates and establishes DICOM association with a remote RIS system (SCP).
- Queries for patient and procedure step information using the Modality Worklist Information Model.
- Releases the association with a remote RIS system.
- Shows the received worklist information to the operator.

2.2.4 Application Entity: Performed Procedure Step

The Modality Performed Procedure Step AE supports as an SCU the following functions:

- Negotiates and establishes DICOM association with a remote MPPS system (SCP).
- Notifies the MPPS on the Start, Stop and Discontinue of an examination.
- Updates the status of the examination in the local patient database.
- Releases the association with the remote MPPS system.

2.2.5 Application Entity: Print

The Print AE supports as an SCU the following functions:

- Negotiates and establishes DICOM association with a remote printer (SCP).
- Creates a Film Session.
- Creates one Film Box.
- Sets (updates) one or more Grayscale or Color Image Box.
- Prints (action) a Film Box, i.e., prints one copy of a single film of the film session.
- Releases the association with a remote printer.

2.3 Sequencing of Real-World Activities

Not applicable.

3 AE Specifications

3.1 AE Specification

The Application Entity provides Standard Conformance to the following DICOM 3.0 SOP classes as an SCU:

Table 3.1-1: Supported SOP Classes by the AE as SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Storage Commitment Push Model	1.2.840.10008.1.20.1
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

The Application Entity does not support DICOM 3.0 SOP classes as an SCP.

3.1.1 Association Establishment Policies

3.1.1.1 General

The Application Context Name that is always proposed is:

DICOM 3.0 Application Context: “1.2.840.10008.3.1.1.1”

The maximum Protocol Data Unit (PDU) size for PDUs sent to the B-K Medical Ultrasound System is fixed at 32Kb (64Kb for verification). The minimum PDU size accepted for sending from the scanner is 512 bytes. In case the receiving SCP claims PDUs smaller than 512 bytes, then 512 bytes is used.

3.1.1.2 Number of Associations

The AE will attempt only one association establishment at a time.

3.1.1.3 Asynchronous Nature

The AE does not support asynchronous mode.

3.1.1.4 Implementation Identifying Information

The implementation information for Part 10 files is:

The Implementation Class UID (0002,0012) is: “1.2.208.154.1”

The Implementation Version Name (0002,0013) is: “BKM DICOM 2.1.1”

3.1.2 Association Initiation Policy

The AE initiates associations for the following activities:

- Verify Communication. See section 3.1.2.1.
- Store Image. See section 3.1.2.2.
- Storage Commitment. See section 3.1.2.3
- Request Worklist. See section 3.1.2.4
- Performed Procedure Step. See section 3.1.2.5
- Print Image. See section 3.1.2.6

3.1.2.1 Verify Communication

3.1.2.1.1 Associated Real-World Activity

The Associated Real-World Activity is the attempt to verify communications with a remote AE. This occurs when the operator selects the Echo function from the dialog box of the DICOM setup. In the event that the remote AE does not respond for some reason, the operations will time out after 120 seconds and the association will be released.

3.1.2.1.2 Implementation Identifying Information

The implementation information for this Application Entity is:
 Implementation Class UID: 2.16.124.113531.9
 Implementation Version Name: DSM Version 1.0

3.1.2.1.3 Proposed Presentation Contexts

The AE will include the following presentation contexts:

Table 3.1-2: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 3.1-3: Proposed Presentation Contexts for Sending Verification Request

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Verification	1.2.840.10008.1.1	See Table 3.1-2	SCU / SCP	None

3.1.2.1.3.1 SOP-Specific Conformance to Verification SOP Class

The AE provides standard conformance. Extended negotiation is not supported.

Verification Service Class is a feature used for network diagnostic purposes. Association is released upon receipt of each C-ECHO confirmation.

3.1.2.2 Store Image(s)

3.1.2.2.1 Associated Real-World Activity

The B-K Medical Ultrasound System operator sends a request for storage of an image or a Multi-frame image to a remote system. The image or Multi-frame is transferred to the remote system.

The remote system is one of the DICOM system settings. After the transfer, the association is released. In the event that the remote system does not respond for some reason, the operations will time out after 120 seconds and the association will be released.

In the event of failure to transfer the Image to the Remote device, the modality tries to re-send the images every 30 seconds, till the configured Max retry attempts are

reached. Once the maximum retry limit is reached, the modality stops retrying and notifies the operator on the failed transfer.

The images can either be sent to the Remote system one by one, or as a batch of images together.

3.1.2.2.2 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID: 2.16.124.113531.1.10.4

Implementation Version Name: CedaraDSSCUC1.1

3.1.2.2.3 Proposed Presentation Contexts

The AE will include the following presentation contexts:

Table 3.1-4: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50

Table 3.1-5: Proposed Presentation Contexts for Image Storage

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	1.2.840.10008.1.2 (default) or 1.2.840.10008.1.2.1 See Table 3.1-4	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	1.2.840.10008.1.2.4.50 (default) or 1.2.840.10008.1.2 or 1.2.840.10008.1.2.1 See Table 3.1-4	SCU	None

Note: Transfer Syntax for Multi-frame Image Storage or Image Storage can only be changed by trained service personnel. Default for Multi-frame Image Storage is JPEG Baseline (1.2.840.10008.1.2.4.50), and for Image Storage is Implicit VR Little Endian (1.2.840.10008.1.2)

3.1.2.2.3.1 SOP-Specific Conformance to Storage SOP Class

The AE provides standard conformance. Extended negotiation is not supported.

A detailed overview of the applied US Image IOD is given in appendix 9.1.

If a RIS connection is present, Patient and Study related information is retrieved by the AE from the RIS via the Worklist and written in the image headers of the images and Multi-frames to be stored.

The UIDs – (Study Instance UID, Series Instance UID and SOP Instance UID) in the images are generated when the related Study, Series and Image are created. This means that two storages/transfers of the same image will have the same UIDs. The Study Instance UID will be retrieved from the RIS if it is present in the Worklist.

In the following cases, the images and Multi-frames will be resent until the transmission succeeded or the user cancels the jobs:

- If the AE is unable to open an association with the selected destination AE.
- If the Abstract Syntax for an image is not supported by the receiving AE.
- If a failed or refused response to the C-STORE operation is received.

The following are the status codes that are more specifically processed when receiving messages from the Storage SCP equipment:

Table 3.1-6: Storage Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success		0000	
	<i>All others</i>		Association is terminated; Transfer will be retried until aborted by user.

3.1.2.3 Storage Commitment

3.1.2.3.1 Associated Real-World Activity

The Storage AE requests the Storage Commitment of the Storage SOP Classes if a remote AE is configured as Storage Commitment Server (SCP) through the PACS listed in Table 3.1-8 (Storage SCP).

The remote system is one of the DICOM system settings. The Storage commitment acknowledgement can be received in the association requesting the commitment. The Storage AE waits on a configurable listener port, for incoming associations for the Storage Commitment SCP reporting a successful Storage Commitment.

3.1.2.3.2 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID: 2.16.124.113531.1.10.4
 Implementation Version Name: CedaraDSSCUC1.1

3.1.2.3.3 Proposed Presentation Contexts

The AE will include the presentation context for the Storage Commitment Push Model.

Table 3.1-7: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 3.1-8: Proposed Presentation Contexts for Storage Commitment

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Storage Commitment Push Model	1.2.840.10008.1.20.1	1.2.840.10008.1.2 See Table 3.1-7	SCU	None

3.1.2.3.3.1 SOP-Specific Conformance to Storage Commitment SOP Class

The AE provides standard conformance. Extended negotiation is not supported.

A detailed overview of the applied Storage Commitment IOD is given in appendix 9.6.

The Storage AE will send an N-ACTION request to the Storage commitment through the PACS and close the existing association. Then it will wait for a successful event report from the SCP, after successful transfer of an Image or a batch of Images to the PACS. The SCP shall open a new association with the Storage AE and send an N-EVENT-REPORT (Storage Commitment Response) and then the association shall be released by the SCP.

If the report is not received within the applicable time limit for the transaction UID, that specific Storage Commitment will be considered as a failure and the transaction UID is considered as invalid. When ever the Storage AE tries to resend documents to the PACS, it also resends the Storage Commit requests.

The Storage AE doesn't send the optional image attributes with the Storage Commitment request. The Storage Commitment Status for the various jobs will be stored in the Patient database. The successful / pending / failed Storage commitment status will be updated in the DICOM Status window.

The following table shows the status of the N-ACTION request.

Table 3.1-9: Storage Commitment Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success		0000	
	<i>All others</i>		Association is terminated. The status will be updated as pending till the time out. Once the time out occurs the status will be updated as failure.

The N-EVENT-REPORT transports the status of the Storage Commitment.

3.1.2.4 Retrieve HIS/RIS Worklist

3.1.2.4.1 Associated Real-World Activity

This function can be triggered at the operator’s request or automatically when the Worklist Window is opened. An association is set up to the pre-configured remote system, the RIS. After receiving the Worklist, the association is released. In the event that the remote system does not respond for some reason, the operations will time out after 90 seconds and the association will be released.

3.1.2.4.2 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID: 2.16.124.113531.1.10.5
 Implementation Version Name: CedaraDMWLC1.0

3.1.2.4.3 Proposed Presentation Contexts

The AE will include the following presentation contexts:

Table 3.1-10: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1

Table 3.1-11: Proposed Presentation Contexts for Request for Modality Worklist

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	See Table 3.1-10	SCU	None

3.1.2.4.3.1 SOP Specific Conformance to Modality Worklist Management

The AE provides standard conformance. Extended negotiation is not supported.

An overview of all requested Matching and Return keys with additional attribute information is given in appendix 9.2. The matching type (Single Value, Wild Card Matching or Range Matching) is also specified.

The user can chose between four date/time queries and one patient query.

The four date/time queries are: Today only, +/- 12 hours, +/- 24 Hours and +/- 3 Days.

The patient query is made from Patient Name (only Last is used), Patient ID, Accession Number and Requested Procedure ID. The user can enter data in one or more of these fields to query for patients i.e. the user can enter data in the Accession Number field only to query on Accession Number only.

The system will expect the extended character set in the worklist (used on the RIS) to match the extended character set on the scanner. The user will be notified if the two

extended character sets do not match. The extended character set used on the scanner depends on the selected language. See section 7 for a list of language and extended character sets.

The following are the status codes that are more specifically processed when messages are received from the Modality Worklist SCP equipment:

Table 3.1-12: Modality Worklist Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Refused	Out of Resources	A700	Process terminated. No patient data received.
Failed	Identifier does not match SOP Class	A900	Process terminated. No patient data received.
	Unable to process	Cxxx	Process terminated. No patient data received.
Cancel	Matching terminated due to Cancel request	FE00	Process terminated. No patient data received.
Success	Matching is complete – No final identifier is supplied	0000	
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	The process of receiving matches continues.
	Matches are continuing – Warnings that one or more Option Keys were not supported for existence and/or matching for this identifier.	FF01	The process of receiving matches continues without any warnings or errors.
	Unknown	None of above	Process terminated. No patient data received.

If the response of a query to the RIS/Worklist-server somehow fails, the user will see an empty list of patients and examinations. The operator can retry by pushing an update key or can enter the patient and examination information manually.

3.1.2.5 Performed Procedure(s)

3.1.2.5.1 Associated Real-World Activity

An association is created with the specific remote Modality Performed Procedure Step (MPPS) System when the user selects the patient and on OK in the Patient Entry window or triggers a new examination for the existing patient. The related MPPS SOP instance is created at once.

The status message is sent to the MPPS during Start, Stop or Discontinued Examination. After every message transfer the association is released.

3.1.2.5.2 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID: 2.16.124.113531.1.10.6
 Implementation Version Name: CedaraDMPPSC2.0

3.1.2.5.3 Proposed Presentation Contexts

The AE will include the following presentation contexts for notification of the performed procedures:

Table 3.1-13: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 3.1-14: Proposed Presentation Contexts for MPPS

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	1.2.840.10008.1.2 See Table 3.1-13	SCU	None

3.1.2.5.3.1 SOP Specific Conformance to Modality Performed Procedure Step SOP Classes

The AE provides standard conformance. Extended negotiation is not supported.

A detailed overview of the applied Modality Performed Procedure Step IOD is given in appendix 9.5.

The N-CREATE Service Element is used to create the MPPS instance. The N-SET Service Element is used to indicate the end of the MPPS.

Table 3.1-15: MPPS Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success		0000	
	<i>All others</i>		Association is terminated; the status is updated as failure.

3.1.2.6 Print Image(s)

3.1.2.6.1 Associated Real-World Activity

An association is initiated with the named DICOM printer when the operator requests the image to be printed. After the printing is finished, the association is released. In

the event that the printer does not respond for some reason, the operations will time out after 120 seconds and the association will be released.

3.1.2.6.2 Implementation Identifying Information

The implementation information for this Application Entity is:

Implementation Class UID: 2.16.124.113531.1.10.2
 Implementation Version Name: CedaraDPC1.0

3.1.2.6.3 Proposed Presentation Contexts

The AE will include the following presentation contexts for printing an image as a grayscale image:

Table 3.1-16: Transfer Syntax

Name List	UID List
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 3.1-17: Proposed Presentation Contexts for Grayscale Print Management

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	See Table 3.1-16	SCU	None

Table 3.1-18: Proposed Presentation Contexts for Color Print Management

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	See Table 3.1-16	SCU	None

3.1.2.6.3.1 SOP Specific Conformance to Print SOP Classes

The AE provides standard conformance. Extended negotiation is not supported.

The N-CREATE Service Element is used for the Basic Film Session and Basic Film Box. The N-SET Service Element is used for Basic Grayscale Image Box and Basic Color Image Box. The N-ACTION Service Element is used for Basic Film Box to print the image.

The color/monochrome configuration must be correctly set for the printer. A color printer that is set up as a monochrome printer (or vice versa) will not produce any output. A printer that supports both color and monochrome must be installed as a color printer.

The implementation does make use of certain User Optional attributes that are mandatory for the DICOM printer. See appendix 9.3 and 9.4 for details.

The following are the status codes that are more specifically processed when messages are received from the Print SCP equipment:

Table 3.1-19: Create Basic Film Session Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film session successfully created	0000	
	<i>All others</i>		Association is terminated; Creation will be retried until aborted by user.

Table 3.1-20: Create Basic Film Box Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film box successfully created	0000	
	<i>All others</i>		Association is terminated; Creation will be retried until aborted by user.

Table 3.1-21: Set Basic Grayscale and Color Image Box Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Image successfully stored in image box	0000	
	<i>All others</i>		Association is terminated; Update (set) will be retried until aborted by user.

Table 3.1-22: Print Basic Film Box Status Codes

Service Status	Further Meaning	Status Codes	Application behavior when receiving Status Codes
Success	Film accepted for printing	0000	
	<i>All others</i>		Association is terminated; Print job will be retried until aborted by user.

3.1.3 Association Acceptance Policy

The AE does not accept associations proposed by another application entity.

4 Communication Profiles

4.1 TCP/IP Stack

The AE provides DICOM 3.0 TCP/IP Network Communication Support as defined in NEMA PS 3.8.

The TCP/IP stack is inherited from the underlying Microsoft Windows®-based operating system.

4.1.1 Physical Media Support

The system is indifferent to the physical medium; it inherits the medium from the Windows® Operating System.

5 Extensions / Specializations / Privatizations

Not applicable.

6 Configuration

The system is configured in the DICOM setup menu. Only an operator with the correct level of knowledge should change the configuration. The Configuration menu is intended to be used during installation, by a service engineer only.

6.1 AE Title/Presentation Address Mapping

The Local AE Title is configurable. A service engineer must configure it during installation.

6.2 Configurable Parameters

6.2.1 Local AE

The following fields are configurable:

- Local AE Title.

The following fields can be configured through Windows Network Setup dialog:

- Local IP Address.
- Local IP Net mask.

6.2.2 Remote AE

The following fields are configurable for every remote DICOM AE:

- Remote AE Title.
- Remote IP Address or hostname.
- Responding TCP/IP Port.

6.2.3 Storage

The default transfer syntax for Image Storage is Implicit VR Little Endian. The transfer syntax can be changed to Explicit VR Little Endian by B-K Medical trained service personnel.

The default transfer syntax for Multi-frame images (clips) is JPEG. The transfer syntax can be changed to Implicit Little Endian by B-K Medical trained service personnel.

6.2.4 Storage Commitment

The Storage Commitment support for the Modality can be configured. By default Storage Commitment support is disabled. The Storage Commitment support can be enabled or disabled & either the Storage SCP can be configured as Storage Commitment SCP or a new Storage Commitment SCP can be configured. For the Storage commitment SCU, a listener port can be configured. Only B-K Medical trained service personnel can do these changes.

6.2.5 Printing

The color/monochrome configuration must be correctly set for the printer. A color printer that is set up as a monochrome printer (or vice versa) will not produce any output. A printer that supports both color and monochrome must be installed as a color printer.

7 Support of Extended Character Sets

The system supports the following character sets depending upon the language selected on the scanner:

Language	DICOM Character Set
BULGARIAN	ISO_IR 144
CZECH	ISO_IR 101
<i>DEFAULT¹</i>	ISO_IR 100 / ISO_IR 6 ²
GREEK	ISO_IR 126
HUNGARIAN	ISO_IR 101
ICELANDIC	ISO_IR 100
LATVIAN	ISO_IR 110
LITHUANIAN	ISO_IR 110
NORWEGIAN	ISO_IR 100
POLISH	ISO_IR 101
ROMANIAN	ISO_IR 101
RUSSIAN	ISO_IR 144
SLOVAK	ISO_IR 101

8 Security Profiles

The product does not conform to any defined DICOM Security Profiles.

It is assumed that the product is used within a secured environment.

It is assumed that a secured environment includes at a minimum:

1. Firewall or router protections to ensure that only approved external hosts have network access to the product.
2. Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
3. Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN)).

¹ Default refers to the following languages:

Danish, Dutch, English, Finnish, French, German, Italian, Portuguese, Spanish, Swedish

² ISO_IR 6 if no extended characters are used.

9 Appendix: Overview of the Applied Information Object Definitions

Definitions

Usage Specification	M = Mandatory	C = Conditional	U = User Option
Matching Key	U = Unique	R = Required	O = Optional
Type/Return Key	1 = Mandatory	2 = Mandatory, may be empty	3 = Optional
	1C = Conditional	2C = Conditional	

9.1 Overview of the Applied Ultrasound (US) Storage SOP Classes

The modules selected from the IOD module table of DICOM 3.0 are given in the table below.

Table 9.1-1: Applied Modules in the US Image IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 9.1-3
Study	General Study	M	See Table 9.1-4
	Patient Study	U	See Table 9.1-5
Series	General Series	M	See Table 9.1-6
Equipment	Equipment	M	See Table 9.1-7
Image	General Image	M	See Table 9.1-8
	Image Pixel	M	See Table 9.1-9
	Contrast/Bolus	C	See Table 9.1-10
	US Region Calibration	U	See Table 9.1-14
	US Image	M	See Table 9.1-15
	SOP Common	M	See Table 9.1-16

Table 9.1-2: Applied Modules in the US Multi-frame Image IOD

Information Entity	Module	Usage	Details
Patient	Patient	M	See Table 9.1-3
Study	General Study	M	See Table 9.1-4
	Patient Study	U	See Table 9.1-5
Series	General Series	M	See Table 9.1-6
Equipment	Equipment	M	See Table 9.1-7
Image	General Image	M	See Table 9.1-8
	Image Pixel	M	See Table 9.1-9
	Contrast/Bolus	C	See Table 9.1-10
	Cine	M	See Table 9.1-11
	Multi-frame	M	See Table 9.1-12
	Frame Pointers	U	See Table 9.1-13
	US Image	M	See Table 9.1-15
	SOP Common	M	See Table 9.1-16

The details of these applied modules are given in the tables below. The list of possible values is given, if applicable. If an attribute may be present conditionally/optionally or may contain a zero length value, this is also indicated.

Table 9.1-3: Patient Module

Attribute Name	Tag	Type	Note
Patient's Name	(0010,0010)	1	Received from RIS or entered by user
Patient ID	(0010,0020)	1	Received from RIS or entered by user
Patient's Birth Date	(0010,0030)	2	Received from RIS or entered by user
Patient's Sex	(0010,0040)	2	Received from RIS or entered by user
Other Patient ID's	(0010,1000)	2	Received from RIS or entered by user

Table 9.1-4: General Study Module

Attribute Name	Tag	Type	Note
Study Instance UID	(0020,000D)	1	Generated at creation of the Study or received from RIS
Study Date	(0008,0020)	1	Generated at creation of the Study
Study Time	(0008,0030)	1	Generated at creation of the Study
Referring Physician's Name	(0008,0090)	2	Received from RIS or entered by user
Study ID	(0020,0010)	2	Auto-generated from Study Date and Study Time if not entered by user
Accession Number	(0008,0050)	2	Received from RIS or entered by user
Study Description	(0008,1030)	2	Received from RIS (copied from Scheduled Procedure Step Description (0040,0007)) or entered by the user
Name of Physician(s) Reading Study	(0008,1060)	2	Received from RIS (copied from Names of Intended Recipients of Results (0040,1010)) or entered by the user

Table 9.1-5: Patient Study Module

Attribute Name	Tag	Type	Note
Admitting Diagnosis Description	(0008,1080)	2	Present if received from RIS or entered by user or empty
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters. Not present if neither received from RIS nor entered by user
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms. Not present if neither received from RIS nor entered by user
Admission ID	(0038,0010)	3	Present if received from RIS or entered by user or empty

Table 9.1-6: General Series Module

Attribute Name	Tag	Type	Note
Modality	(0008,0060)	1	US
Series Instance UID	(0020,000E)	1	Generated at creation of the Series
Series Number	(0020,0011)	2	Auto generated
Performing Physician's Name	(0008,1050)	3	Entered by user
Protocol Name	(0018,1030)	3	User defined
Operator's Name	(0008,1070)	3	Entered by user
Body Part Examined	(0018,0015)	3	Entered by user
Requested Attribute Sequence	(0040,0275)	2	Active only if MPPS & MWL are available.
Requested Procedure ID	(0040,1001)	1C	From MWL
Scheduled Procedure Step ID	(0040,0009)	1C	From MWL
Scheduled Procedure Step Description	(0040,0007)	3	From MWL
Performed Procedure Step ID	(0040,0253)	3	Auto generated – only if MPPS is active
Performed Procedure Step Start Date	(0040,0244)	3	Auto generated– only if MPPS is active
Performed Procedure Step Start Time	(0040,0245)	3	Auto generated– only if MPPS is active
Performed Procedure Step Description	(0040,0254)	3	Entered by user – active only if MPPS is available.
Performed Protocol Code Sequence	(0040,0260)	3	Auto generated – only if MPPS is active

Table 9.1-7: General Equipment Module

Attribute Name	Tag	Type	Note
Manufacturer	(0008,0070)	2	“B-K Medical”
Institution Name	(0008,0080)	1	Institution where the equipment that produced the composite instance is located. Set up by the user.
Institution Address	(0008,0081)	3	Mailing address of the institution where the equipment that produced the composite instances is located. Set up by the user.
Station Name	(0008,1010)	1	User defined name identifying the machine that produced the composite instances. Set up by the user.
Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that produced the composite instances is located. Set up by the user.
Manufacturer's Model Name	(0008,1090)	1	Scanner model name e.g. “2202”
Device Serial Number	(0018,1000)	3	The serial number of the scanner
Software Version(s)	(0018,1020)	1	Software version of the current software

Table 9.1-8: General Image Module

Attribute Name	Tag	Type	Note
Instance Number	(0020,0013)	2	Images are numbered in chronological order, starting from 1 at the beginning of a new examination
Patient Orientation	(0020,0020)	2C	
Content Date	(0008,0023)	2C	Date when the image was captured. Note: This Attribute was formerly known as Image Date
Content Time	(0008,0033)	2C	Time when the image was captured. Note: This Attribute was formerly known as Image Time
Image Type	(0008,0008)	2	
Burned In Annotation	(0028,0301)	3	“YES”
Lossy Image Compression	(0028,2110)	3	01H for Multi-frame Image with JPEG Transfer Syntax. Otherwise: Not present.

Table 9.1-9: Image Pixel Module

Attribute Name	Tag	Type	Note
Samples per Pixel	(0028,0002)	1	0003H
Photometric Interpretation	(0028,0004)	1	Multi-frame with JPEG Transfer Syntax: “YBR_FULL_422” Otherwise: “RGB”
Rows	(0028,0010)	1	Image height
Columns	(0028,0011)	1	Image width
Bits Allocated	(0028,0100)	1	0008H
Bits Stored	(0028,0101)	1	0008H
High Bit	(0028,0102)	1	0007H
Pixel Representation	(0028,0103)	1	0000H (= unsigned integer)
Planar Configuration	(0028,0006)	1C	1 (color-by-plane)
Pixel Data	(7FE0,0010)	1	

Table 9.1-10: Contrast/Bolus Module

Attribute Name	Tag	Type	Note
Contrast/Bolus Agent	(0018,0010)	2	Present and empty if Contrast Harmonic is activated. Otherwise not present.

Table 9.1-11: Cine Module

Attribute Name	Tag	Type	Note
Preferred Playback Sequencing	(0018,1244)	3	0 (looping playback)
Frame Time	(0018,1063)	1C	1000 / Frame rate of Multi-frame in Hz (Nominal time in msec per individual frame)
Recommended Display	(0008,2144)	3	Frame rate of Multi-frame in Hz

Frame Rate			(Recommended rate (frames/sec) for display of multi-frame sequence)
Cine Rate	(0018,0040)	3	Frame rate of Multi-frame in Hz (Number of frames per seconds)
Frame Delay	(0018,1066)	3	000H (Time in msec to start of first frame)

Table 9.1-12: Multi-frame Module

Attribute Name	Tag	Type	Note
Number of Frames	(0028,0008)	1	Number of frames in Multi-frame
Frame Increment Pointer	(0028,0009)	1	Set to Frame Time (0018,1063) from Table 9.1-11: Cine Module

Table 9.1-13: Frame Pointers Module

Attribute Name	Tag	Type	Note
Representative Frame Number	(0028,6010)	3	1 (Number of frame selected for use as icon)

Table 9.1-14: US Region Calibration Module

Attribute Name	Tag	Type	Note
Sequence of Ultrasound Regions	(0018,6011)	1	A sequence for each B-mode view. One sequence for each D/M/CW view.
>Region Location Min x0	(0018,6018)	1	
>Region Location Min y0	(0018,601A)	1	
>Region Location Max x1	(0018,601C)	1	
>Region Location Max y1	(0018,601E)	1	
>Physical Units X Direction	(0018,6024)	1	B-mode: 03H (cm) D-mode: 04H (sec) M-mode: 04H (sec) CW-mode: 04H (sec)
>Physical Units Y Direction	(0018,6026)	1	B-mode: 03H (cm) D-mode: 07H (cm/sec) M-mode: 03H (cm) CW-mode: 07H (cm/sec)
>Physical Delta X	(0018,602C)	1	
>Physical Delta Y	(0018,602E)	1	
>Reference Pixel x0	(0018,6020)	3	
>Reference Pixel y0	(0018,6022)	3	
>Ref. Pixel Physical Value X	(0018,6028)	3	0
>Ref. Pixel Physical Value Y	(0018,602A)	3	0
>Region Spatial Format	(0018,6012)	1	B-mode: 01H (2D) D-mode: 03H (Spectral) M-mode: 02H (M-Mode)

>Region Data Type	(0018,6014)	1	CW-mode: 03H (Spectral) B-mode: 01H (Tissue) D-mode: 03H (PW Spectral Doppler) M-mode: 01H (Tissue) CW-mode: 04H (CW Spectral Doppler)
>Region Flags	(0018,6016)	1	0
>Doppler Correction Angle	(0018,6034)	3	B-mode: Not applied. D-mode: Angle Correction (Degrees) M-mode: Not applied. CW-mode: Not applied

Table 9.1-15: US Image Module

Attribute Name	Tag	Type	Note
Samples per Pixel	(0028,0002)	1	See Table 9.1-9: Image Pixel Module
Photometric Interpretation	(0028,0004)	1	See Table 9.1-9: Image Pixel Module
Bits Allocated	(0028,0100)	1	See Table 9.1-9: Image Pixel Module
Bits Stored	(0028,0101)	1	See Table 9.1-9: Image Pixel Module
High Bit	(0028,0102)	1	See Table 9.1-9: Image Pixel Module
Planar Configuration	(0028,0006)	1C	See Table 9.1-9: Image Pixel Module
Pixel Representation	(0028,0103)	1	See Table 9.1-9: Image Pixel Module
Frame Increment Pointer	(0028,0009)	1C	See Table 9.1-12: Multi-frame Module
Image Type	(0008,0008)	2	See Table 9.1-8: General Image Module
Lossy Image Compression	(0028,2110)	1C	See Table 9.1-8: General Image Module
Transducer Data	(0018,5010)	3	Name of transducer e.g. "8801". Only set for single frame images
Mechanical Index	(0018,5022)	3	Only sent for single view images
Bone Thermal Index	(0018,5024)	3	Only sent for single view images. Only sent if TI type is TIB.
Cranial Thermal Index	(0018,5026)	3	Only sent for single view images. Only sent if TI type is TIC.
Soft Tissue Thermal Index	(0018,5027)	3	Only sent for single view images. Only sent if TI type is TIS.

Table 9.1-16: SOP Common Module

Attribute Name	Tag	Type	Note
SOP Class UID	(0008,0016)	1	For US Image: "1.2.840.10008.5.1.4.1.1.6.1" For US Multi-Frame Image: "1.2.840.10008.5.1.4.1.1.3.1"
SOP Instance UID	(0008,0018)	1	Generated when image is created
Specific Character Set	(0008,0005)	1C	Set according to selected language on the scanner. See section 7.
Instance Creation Date	(0008,0012)	3	Document creation date
Instance Creation Time	(0008,0013)	3	Document creation time
Time zone Offset From	(0008,0201)	3	

UTC			
Instance Number	(0020,0013)	3	See Table 9.1-8: General Image Module

9.2 Overview of the Applied Modality Worklist IOD

This section specifies in detail the applied attributes in the C-FIND Service Element of this supported SOP Class.

If an attribute is present conditionally/optionally or if the attribute may contain a zero length value, this is indicated.

The scanner will use predefined DICOM Character Sets depending upon the selected language. See table in section 7.

The user will be warned if the Character Set of the worklist does not match the Character Set of the scanner.

The search filter mentioned is set in the worklist setup for the modality. The queries mentioned are selected in the patient dialog where the worklist is displayed.

Table 9.2-1: Modality Worklist Information Model - FIND SOP Class - C-FIND

Description	Tag	Match	Return	Note
Scheduled Procedure Step				
Scheduled Procedure Step Sequence	(0040,0100)	R	1	Return key
> Scheduled Station AE Title	(0040,0001)	R	1	Single Value Matching is applied; the applied value is the configured AE Title. Only used if search filter is “This System Only”
> Scheduled Procedure Step Start Date	(0040,0002)	R	1	Range Value Matching is applied when using date/time queries.
> Scheduled Procedure Step Start Time	(0040,0003)	R	1	Range Value Matching is applied when using date/time queries.
> Modality	(0008,0060)	R	1	Single Value Matching is applied; the applied value is US. Only used if search filter is “Ultrasound Only”
> Scheduled Procedure Step Description	(0040,0007)	O	1C	Return key
> Scheduled Procedure Step Location	(0040,0011)	O	2	Return key
> Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Return key
> Scheduled Procedure Step ID	(0040,0009)	O	1	Return key
Requested Procedure				
Requested Procedure ID	(0040,1001)	R	1	Return key.

				Single Value Matching is applied when data has been entered by the user and “Patient” query has been selected.
Requested Procedure Description	(0032,1060)	R	1C	Return Key
Requested Procedure Code Sequence	(0032,1064)	R	1C	Return Key
> Code Value	(0008,0100)	R	1	Return Key
> Coding Scheme Designator	(0008,0102)	R	1	Return Key
> Code Meaning	(0008,0104)	R	2	Return key
Study Instance UID	(0020,000D)	R	1	Return key
Referenced Study Sequence	(0008,1110)	R	2	Return Key
> Referenced SOP Class UID	(0008,1150)	R	1	Return Key
> Referenced SOP Instance UID	(0008,1155)	R	1	Return Key
Requested Procedure Priority	(0040,1003)	O	2	Return key
Names of Intended Recipients of Results	(0040,1010)	O	3	Return key
Imaging Service Request				
Accession Number	(0008,0050)	R	1	Return key. Single Value Matching is applied when data has been entered by the user and “Patient” query has been selected.
Referring Physician’s Name	(0008,0090)	R	1	Return key
Visit Admission				
Admitting Diagnosis Description	(0008,1080)	O	2	Return key
Admission ID	(0038,0010)	O	3	Return key
Patient Identification				
Patient’s Name	(0010,0010)	R	1	Return key. Single Value Matching is applied when data has been entered by the user and “Patient” query has been selected.
Patient ID	(0010,0020)	R	1	Return key. Single Value Matching is applied when data has been entered by the user and “Patient” query has been selected.
Other Patient ID’s	(0010,1000)	R	2	Return key.
Patient Demographic				
Patient’s Birth Date	(0010,0030)	R	2	Return key
Patient’s Sex	(0010,0040)	R	2	Return key

Patient's Weight	(0010,1030)	R	2	Return key
Patient's Size	(0010,1020)	R	2	Return key
Patient's Address	(0010,1040)	O	3	Return key
Current Patient Location	(0038,0300)	O	3	Return key

9.3 Overview of the Applied Basic Grayscale Print Management Meta IOD

9.3.1 Overview of the Applied Basic Film Session IOD

This section specifies in detail the applied attributes in the N-CREATE Service Element of this supported SOP Class.

Table 9.3-1: Basic Film Session Presentation Module

Attribute Name	Tag	Usage	Note
Number of Copies	(2000,0010)	U	1
Print Priority	(2000,0020)	U	HIGH
Medium Type	(2000,0030)	U	PAPER, CLEAR FILM, BLUE FILM
Film Destination	(2000,0040)	U	PROCESSOR
Film Session Label	(2000,0050)	U	"B-K Medical"

9.3.2 Overview of the Applied Basic Film Box IOD

This section specifies in detail the applied attributes in the N-CREATE Service Element of this supported SOP Class.

Table 9.3-2: Basic Film Box Presentation Module

Attribute Name	Tag	Usage	Note
Image Display Format	(2010,0010)	M	STANDARD\C,R (C,R = 1,1 / 1,2 / 2,2 / 2,3 / 3,3 / 3,4 / 3,5 / 4,4 / 4,5 / 4,6 / 5,5 / 5,6 / <Custom>)
Referenced Film Session Sequence	(2010,0500)	M	
> Referenced SOP Class UID	(0008,1150)	M	Appl. value: 1.2.840.10008.5.1.1.1 (Basic Film Session SOP Class)
> Referenced SOP Instance UID	(0008,1155)	M	Appl. value: The SOP Instance UID of the parent film session
Film Orientation	(2010,0040)	U	PORTRAIT / LANDSCAPE
Film Size ID	(2010,0050)	U	See defined terms
Magnification Type	(2010,0060)	U	CUBIC

Film Size ID

The defined terms are:

8INX10IN 10INX12IN
 10INX14IN 11INX14IN
 14INX14IN 14INX17IN
 24CMX24CM 24CMX30CM
 and custom size (both CM and IN)

9.3.3 Overview of the Applied Basic Grayscale Image Box IOD

This section specifies in detail the applied attributes in the N-SET Service Element of this supported SOP Class.

Table 9.3-3: Basic Grayscale Image Box Presentation Module

Attribute Name	Tag	Usage	Note
Image Position	(2020,0010)	M	
Polarity	(2020,0020)	U	NORMAL
Basic Grayscale Image Sequence	(2020,0110)	M	
> Samples Per Pixel	(0028,0002)	M	0001H
> Photometric Interpretation	(0028,0004)	M	MONOCHROME2
> Rows	(0028,0010)	M	Image height
> Columns	(0028,0011)	M	Image width
> Pixel Aspect Ratio	(0028,0034)	U	“1\1”
> Bits Allocated	(0028,0100)	M	0008H
> Bits Stored	(0028,0101)	M	0008H
> High Bit	(0028,0102)	M	0007H
> Pixel Representation	(0028,0103)	M	0000H (= unsigned integer)
> Pixel Data	(7FE0,0010)	M	

9.4 Overview of the Applied Basic Color Print Management Meta IOD

9.4.1 Overview of the Applied Basic Film Session IOD

This section specifies in detail the applied attributes in the N-CREATE Service Element of this supported SOP Class.

Table 9.4-1: Basic Film Session Presentation Module

Attribute Name	Tag	Usage	Note
Number of Copies	(2000,0010)	U	1
Print Priority	(2000,0020)	U	HIGH
Medium Type	(2000,0030)	U	PAPER, CLEAR FILM, BLUE FILM
Film Destination	(2000,0040)	U	PROCESSOR

9.4.2 Overview of the Applied Basic Film Box IOD

This section specifies in detail the applied attributes in the N-CREATE Service Element of this supported SOP Class.

Table 9.4-2: Basic Film Box Presentation Module

Attribute Name	Tag	Usage	Note
Image Display Format	(2010,0010)	M	STANDARD\C,R (C,R = 1,1 / 1,2 / 2,2 / 2,3 / 3,3 / 3,4 / 3,5 / 4,4 / 4,5 / 4,6 / 5,5 / 5,6 / <Custom>)
Referenced Film Session	(2010,0500)	M	

Sequence			
> Referenced SOP Class UID	(0008,1150)	M	Appl. value: 1.2.840.10008.5.1.1.1 (Basic Film Session SOP Class)
> Referenced SOP Instance UID	(0008,1155)	M	Appl. value: The SOP Instance UID of the parent film session
Film Orientation	(2010,0040)	U	PORTRAIT / LANDSCAPE
Film Size ID	(2010,0050)	U	See defined terms
Magnification Type	(2010,0060)	U	CUBIC

Film Size ID

The defined terms are:

8INX10IN 10INX12IN
 10INX14IN 11INX14IN
 14INX14IN 14INX17IN
 24CMX24CM 24CMX30CM
 and custom size (both CM and IN)

9.4.3 Overview of the Applied Basic Color Image Box IOD

This section specifies in detail the applied attributes in the N-SET Service Element of this supported SOP Class.

Table 9.4-3: Basic Color Image Box Presentation Module

Attribute Name	Tag	Usage	Note
Image Position	(2020,0010)	M	
Polarity	(2020,0020)	U	NORMAL
Basic Color Image Sequence	(2020,0111)	M	
> Samples Per Pixel	(0028,0002)	M	3
> Photometric Interpretation	(0028,0004)	M	RGB
> Rows	(0028,0010)	M	Image height
> Columns	(0028,0011)	M	Image width
> Pixel Aspect Ratio	(0028,0034)	U	“1\1”
> Bits Allocated	(0028,0100)	M	0008H
> Bits Stored	(0028,0101)	M	0008H
> High Bit	(0028,0102)	M	0007H
> Pixel Representation	(0028,0103)	M	0000H (= unsigned integer)
> Pixel Data	(7FE0,0010)	M	

9.5 Overview of the Applied Modality Performed Procedure Step IOD

This section specifies in detail the applied attributes in the N-CREATE and N-SET Service Elements of this supported SOP Class.

Table 9.5-1: Performed Procedure Step Relationship Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Scheduled Step Attributes	(0040,0270)	1	Not	From MWL

Sequence			allowed	
>Study Instance UID	(0020,000D)	1	Not allowed	From MWL
>Referenced Study Sequence	(0008,1110)	1	Not allowed	From MWL
>>Referenced SOP Class UID	(0008,1150)	1	Not allowed	From MWL
>>Referenced SOP Instance UID	(0008,1155)	1	Not allowed	From MWL
>Accession Number	(0008,0050)	2	Not allowed	From MWL
>Requested Procedure ID	(0040,1001)	2	Not allowed	From MWL
>Requested Procedure Code Sequence	(0032,1064)	3	Not allowed	From MWL
>Requested Procedure Description	(0032,1060)	2	Not allowed	From MWL
>Scheduled Procedure Step ID	(0040,0009)	2	Not allowed	From MWL
>Scheduled Procedure Step Description	(0040,0007)	2	Not allowed	From MWL / Entered by User
>Scheduled Protocol Code Sequence	(0040,0008)	2	Not allowed	From MWL / Entered by User
Patient's Name	(0010,0010)	2	Not allowed	From MWL / Entered by User
Patient ID	(0010,0020)	2	Not allowed	From MWL / Entered by User
Patient's Birth Date	0010,0030)	2	Not allowed	From MWL / Entered by User
Patient's Sex	(0010,0040)	2	Not allowed	From MWL / Entered by User
Referenced Patient Sequence	(0008,1120)	2	Not allowed	From MWL / Entered by User
Protocol Name	(0018,1030)	Not allowed	1	Updated at the end of Examination

Table 9.5-2: Performed Procedure Step Information Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Performed Procedure Step ID	(0040,0253)	1	Not allowed	Returned by MPPS server after Begin Study
Performed Station AE Title	(0040,0241)	1	Not allowed	Returned by MPPS server after Begin Study
Performed Station Name	(0040,0242)	2	Not allowed	Returned by MPPS server after Begin Study
Performed Location	(0040,0243)	2	Not allowed	Returned by MPPS server after Begin Study
Performed Procedure Step Start Date	(0040,0244)	1	Not allowed	Returned by MPPS server after Begin Study
Performed Procedure Step Start Time	(0040,0245)	1	Not allowed	Returned by MPPS server after Begin Study
Performed Procedure	(0040,0252)	1	3	This value can be: In

Step Status				Progress, Completed or Discontinued. Returned by MPPS server after Begin Study
Performed Procedure Step Description	(0040,0254)	2	3	Returned by MPPS server after Begin Study
Performed Procedures Type Description	(0040,0255)	2	3	Returned by MPPS server after Begin Study
Performed Procedure Code Sequence	(0008,1032)	2	3	Returned by MPPS server after Begin Study
Performed Procedure Step End Date	(0040,0250)	3	2	Updated on End Study
Performed Procedure Step End Time	(0040,0251)	3	2	Updated on End Study

The following table specifies the attributes which describe the acquisition of Images during the Performance of the MPPS.

Table 9.5-3: Image Acquisition Results Module attributes

Attribute Name	Tag	Req.Type N-CREATE	Req.Type N-SET	Note
Modality	(0008,0060)	1	Not allowed	Type of Equipment =US. Retrieved from MWL / entered by user
Study ID	(0020,0010)	1	Not allowed	Retrieved from MWL / entered by user
Performed Protocol Code Sequence	(0040,0260)	2	2	Updated at the end study by MPPS
Performed Series Sequence	(0040,0340)	2	1	Updated at the end study by MPPS
>Performing Physician's Name	(0008,1050)	2	2	Updated at the end study by MPPS
>Protocol Name	(0018,1030)	1	1	Updated at the end study by MPPS
>Operators' Name	(0008,1070)	2	2	Updated at the end study by MPPS
>Series Instance UID	(0020,000E)	1	1	Updated at the end study by MPPS
>Series Description	(0008,103E)	2	2	Updated at the end study by MPPS
>Retrieve AE Title	(0008,0054)	2	2	Updated at the end study by MPPS
>Referenced Image Sequence	(0008,1140)	2	2	Updated at the end study by MPPS
>>Referenced SOP Class UID	(0008,1150)	1	1	Updated at the end study by MPPS
>>Referenced SOP Instance UID	(0008,1155)	1	1	Updated at the end study by MPPS
>Referenced Non Image composite SOP Instance Sequence	(0040,0220)	2	2	Updated at the end study by MPPS
>>Referenced SOP Class	(0008,1150)	1	1	Updated at the end study

UID				by MPPS
>>Referenced SOP Instance UID	(0008,1155)	1	1	Updated at the end study by MPPS

9.6 Overview of the Applied Storage Commitment IOD

This section specifies in detail the applied attributes in the N-ACTION service element of this supported SOP class.

Table 9.6-1: Storage Commitment Attribute Module

Attribute Name	Tag	Usage	Note
Transaction UID	(0008,1195)	M	Uniquely generated by the equipment
Retrieve AE Title	(0008,0054)	U	Not used
Storage Media File Set ID	(0088,0130)	U	Not used
Storage Media File Set UID	(0088,0140)	U	Not used
Referenced SOP Sequence	(0008,1199)	M	Supported
>Referenced SOP Class UID	(0008,1150)	M	Supported
>Referenced SOP Instance UID	(0008,1155)	M	Supported
>Retrieve AE Title	(0008,0054)	U	Not used
>Storage Media File Set ID	(0088,0130)	U	Not used
>Storage Media File – Set UID	(0088,0140)	U	Not used
Failed SOP Sequence	(0008,1198)	M	Supported
>References SOP Class UID	(0008,1150)	M	Supported
>Referenced SOP Instance UID	(0008,1155)	M	Supported
>Failure Reason	(0008,1197)	M	Supported