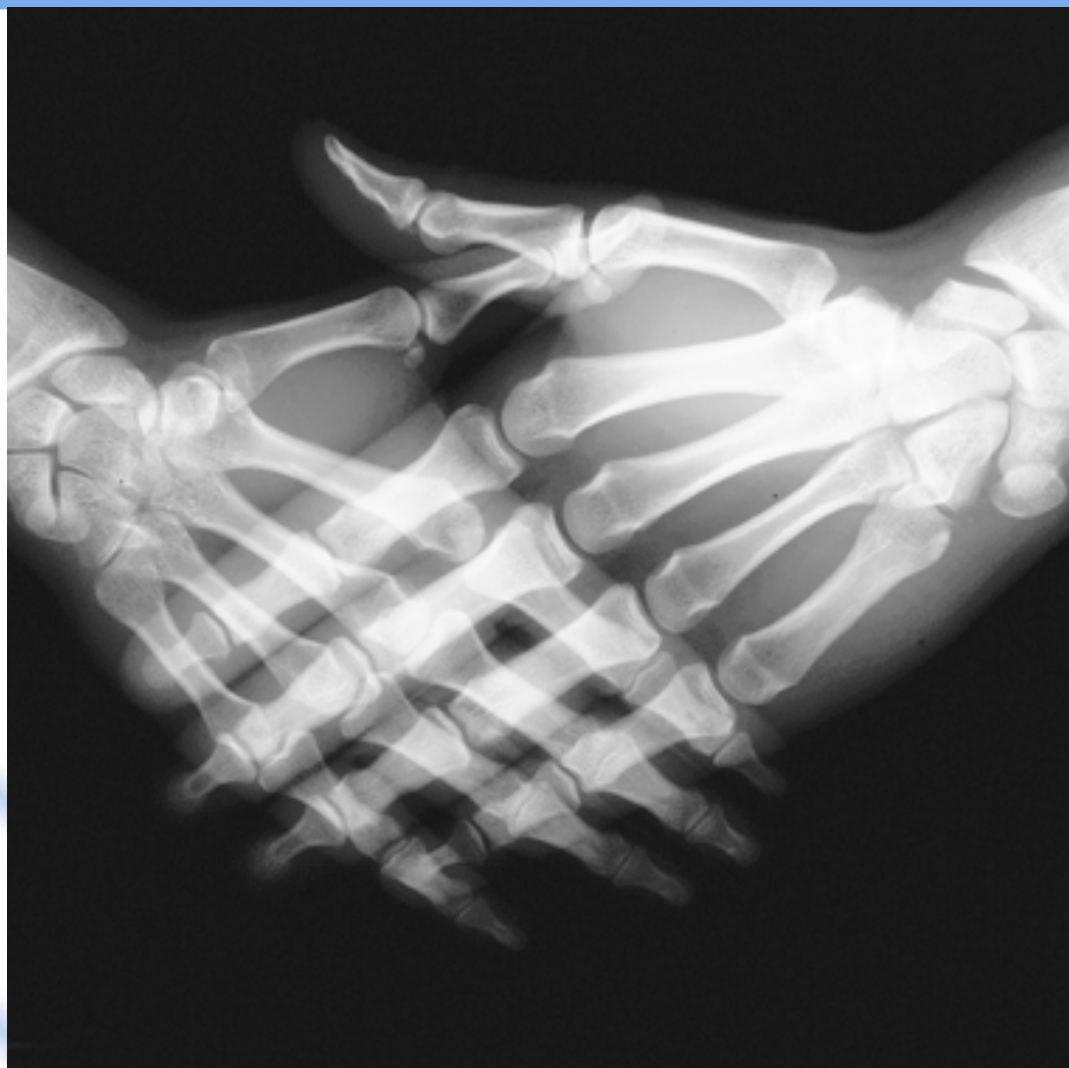


# DICOM Conformance Statement

IDS5 10.1, WISE 10.1, ImageServer/s 10.1, ImageServer/xd 10.1  
December 17, 2003



**SECTRA**

# DICOM Conformance Statement, IDS5 10.1, WISE 10.1, ImageServer/s 10.1, ImageServer/xd 10.1

As part of our commitment to providing the highest quality products and services, we would like to encourage feedback on the quality of this documentation.

If you think we can improve this document in any way, then please send your suggestions to **[info.imtec@sectra.se](mailto:info.imtec@sectra.se)**

Document Title	DICOM Conformance Statement, IDS5 10.1, WISE 10.1, ImageServer/s 10.1, ImageServer/xd 10.1
Revision	PACS_CORE_WIN_10_1, PACS_CORE_HPUX_10_1, IDS5_10_1
Date	2003-12-17

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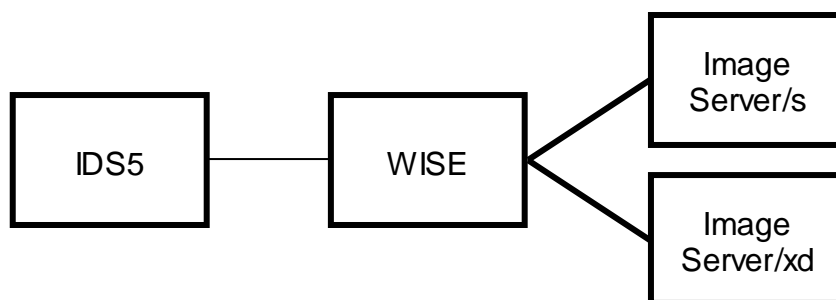
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# 1. Introduction

This document will describe the DICOM support in the IDS5, WISE, ImageServer/s and ImageServer/xd products. For better understanding this chapter will start with a short introduction of these products.

## 1.1 Products

These four products are main components in a SECTRA PACS.



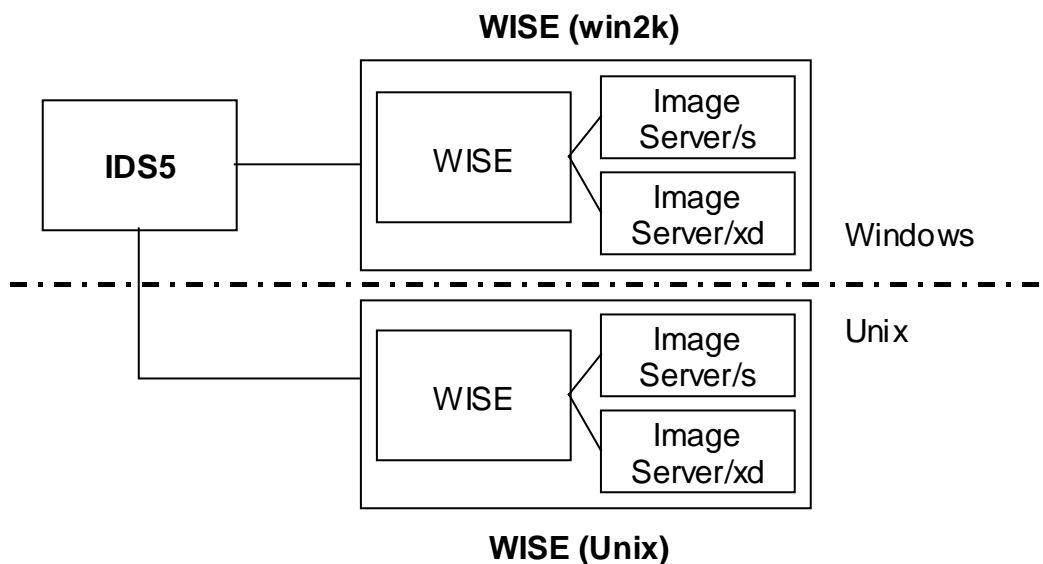
IDS5 – Workstation, graphical users interface.

WISE – Database, administration.

ImageServer/s – Short-term data storage.

ImageServer/xd – Interface to external DICOM archive

They are tightly coupled and hence described together in this Conformance Statement. WISE, ImageServer/s and ImageServer/xd have a very tight connection and are from now on called WISE.



WISE has two different versions, one on Windows 2000 (WISE (win2k)) and another on Unix (WISE (Unix)). These two abbreviations will be used throughout this document. Please consult [5], [7] and [11] for specific Unix version requirements.

IDS5 is available on Windows 2000 and Windows XP.

WARNING! There are some differences in functionality between WISE (win2k) and WISE (Unix), hence it is recommended to carefully read this document and don't make assumptions about functionality on different platforms.

## 1.2 DICOM Standard

This document should be read together with the DICOM standard [1]. Definitions and terms are used in this document according to the DICOM standard. It is assumed that the reader is familiar with the DICOM standard.

## 1.3 References

[1] Digital Imaging and Communications in Medicine (DICOM). NEMA Standard Publications PS 3.1-16 and Supplements.

[2] Installation Guide IDS5 10.1

[3] System Administrator's Guide IDS5 10.1

[4] User's Guide IDS5 10.1

[5] Installation Guide WISE HP-UX 10.1

[6] System Administrator's Guide WISE HP-UX 10.1

[7] Installation Guide ImageServer/s HP-UX 10.1

[8] System Administrator's Guide ImageServer/s HP-UX 10.1

[9] Installation Guide WISE Win 10.1 /

Installation Guide Sectra PACS Clinical Edition 10.1

[10] System Administrator's Guide WISE & ImageServer/s Win 10.1 Win

[11] Installation Guide ImageServer/fs, ImageServer/xd HP-UX 10.1

[12] System Administrator's Guide ImageServer/fs, ImageServer/dx 10.1

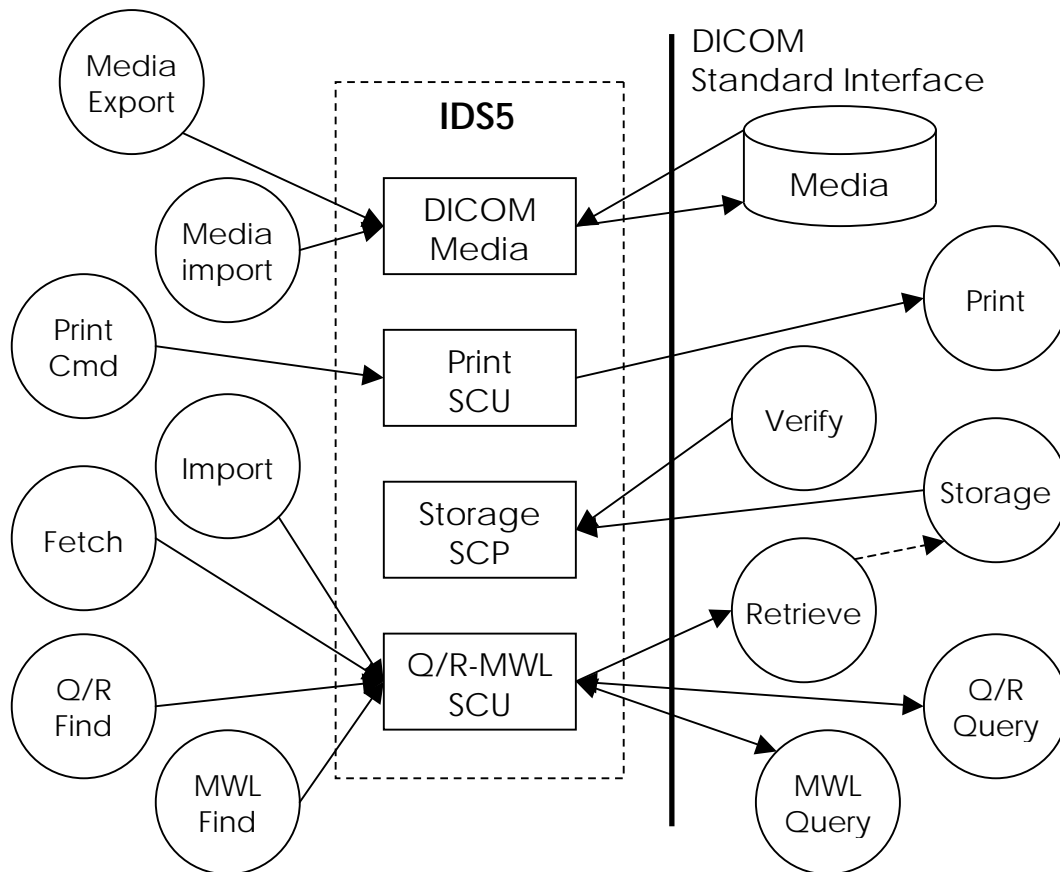
[13] Installation Guide ImageServer/fs & ImageServer/xd Win 10.1 /

Installation Guide Sectra PACS Clinical Edition 10.1

## 2. Implementation model

### 2.1 Application Data Flow Diagram

#### 2.1.1 IDS5 Application Flow Diagram



**IDS5** is a multi-modality viewing station for DICOM images. It provides (among other things) the following features:

Store and retrieve of images stored on a CD media.

Reply on communication tests from remote applications.

Print images.

Query a remote application (typically a Radiology Information System, RIS) for a modality work list.

Query a remote application (typically a DICOM archive) for images and other objects.

View images fetched to a temporary location from a remote application.

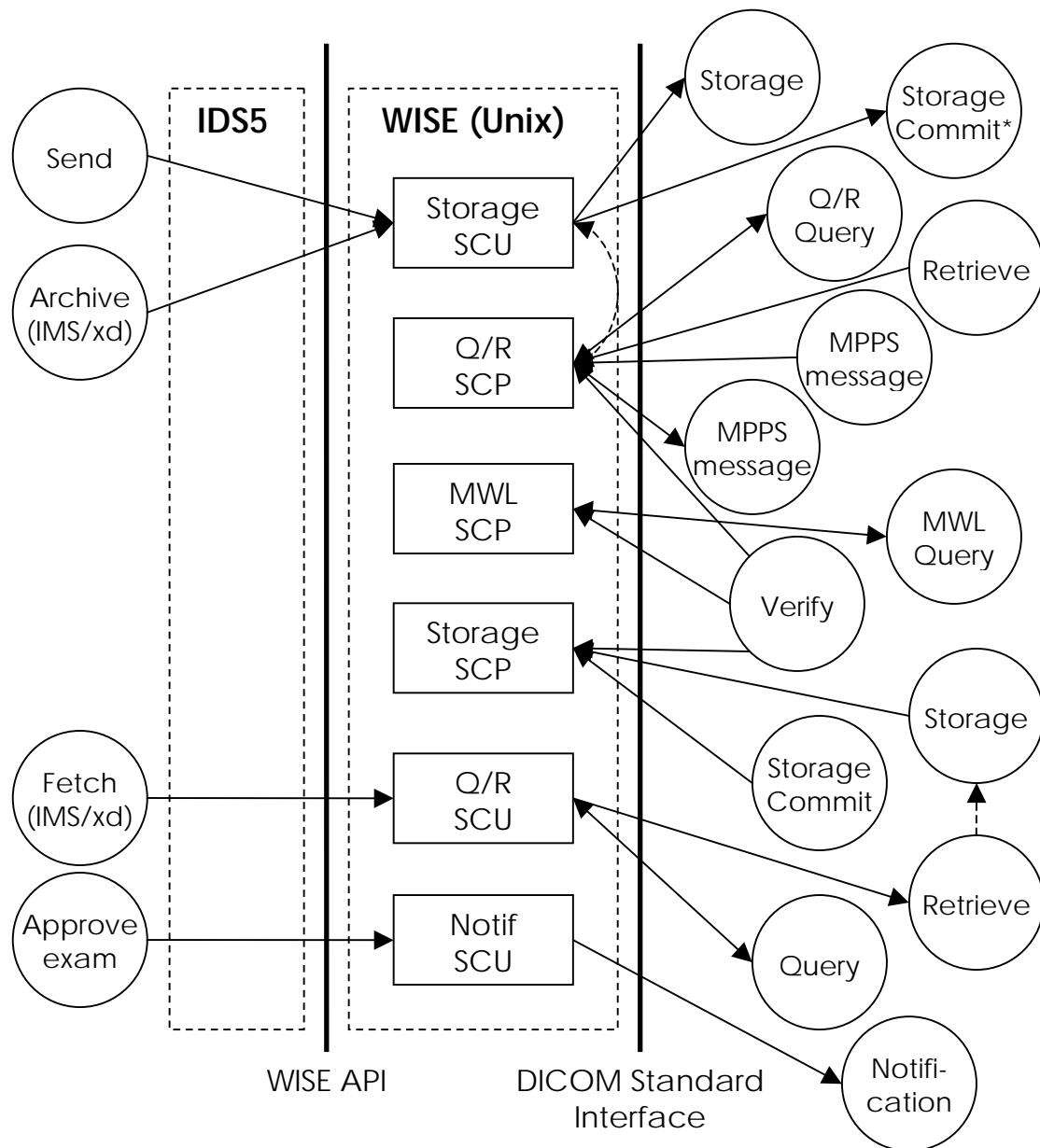
Import images from a remote application to WISE.

IDS5 contains four different Application Entities (AE), DICOM Media, Print SCU, Storage SCP and Q/R-MWL SCU.

Each AE only has one instance.

DICOM Media functionality is described separately in chapter 6.

### 2.1.2 WISE (Unix) Application Flow Diagram



\* Only ImageServer/xd

**WISE (Unix)** provides (among other things) the following features:

It relies on communication tests from remote applications.

It allows remote applications (typically modalities and workstations) to send images to it.

It allows remote applications to commit storage of sent images.

It allows remote applications to query the WISE database and retrieve images.

It handles incoming messages about Performed Procedure Steps and relay this information to other applications.

Send images to remote applications (typically workstations or DICOM archives).

Fetch images from remote applications (typically a DICOM archive)

Approve exams, which will generate a Study Content Notification.

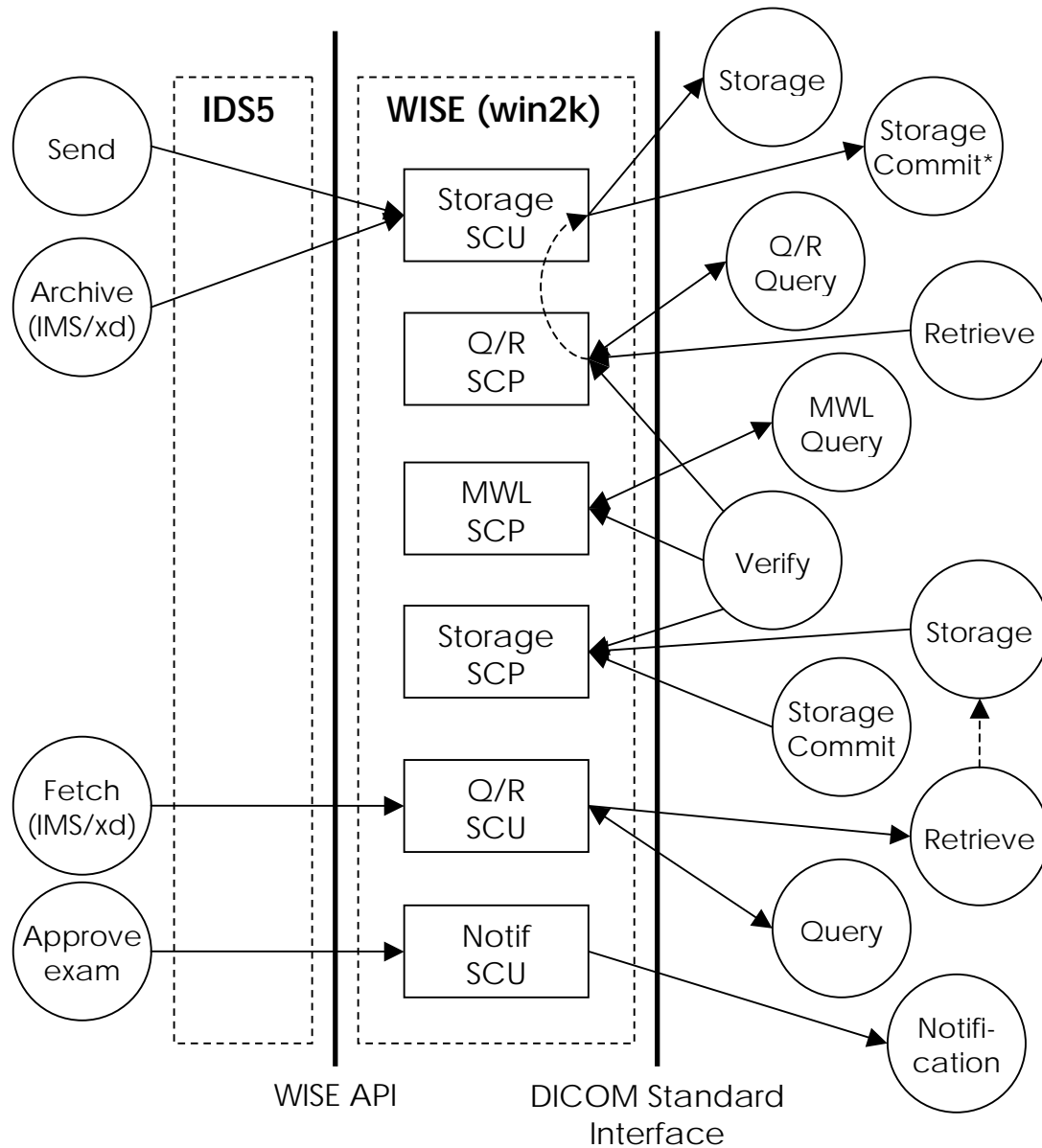


It allows remote applications to query the WISE database for worklists.

WISE (Unix) contains six different Application Entities (AE), Storage SCU, Q/R SCP, Storage SCP, Q/R SCU, Notif SCU and MWL SCP.

Each AE only has one instance **except** for Storage SCP, Q/R SCP and MWL SCP which can have many instances.

### 2.1.3 WISE (win2k) Application Flow Diagram



**WISE (win2k)** provides (among other things) the following features:

It replies on communication tests from remote applications.

It allows remote applications (modalities and image workstations) to send images to it.

It allows remote applications to commit storage of sent images.

It allows remote applications to query the WISE database and retrieve images.

Send images to a remote application (e.g. a workstation or a DICOM archive).

Fetch images from remote applications (typically a DICOM archive)

Approve exams, which will generate a Study Content Notification.

It allows remote applications to query the WISE database for worklists.

WISE (win2k) contains six different Application Entities (AE), Storage SCU, Q/R SCP, Storage SCP, Q/R SCU, Notif SCU and MWL SCP

Each AE only has one instance **except** for Storage SCP, Q/R SCP and MWL SCP which can have many instances.

## 2.2 Functional Definitions of AE's

### 2.2.1 General – Storage SOP Classes

The following table lists all Storage SOP Classes supported by different application entities covered by this Conformance Statement.

**Table 1. List of supported Storage SOP classes**

SOP Class Name	SOP Class UID
CR Image Storage	1.2.840.10008.5.1.4.1.1.1
DX Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1
DX Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
MG Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2
MG Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
IO Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3
IO Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US Multi-Frame Image Storage (Ret.)	1.2.840.10008.5.1.4.1.1.3
US Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
NM Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
SC Image Storage	1.2.840.10008.5.1.4.1.1.7
MF SC Single Bit Image Storage	1.2.840.10008.5.1.4.1.1.7.1
MF SC Grayscale Byte Image Storage	1.2.840.10008.5.1.4.1.1.7.2
MF SC Grayscale Word Image Storage	1.2.840.10008.5.1.4.1.1.7.3
MF SC True Color Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Stand-alone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Stand-alone Curve Storage	1.2.840.10008.5.1.4.1.1.9
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform St.	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Stand-alone Modality LUT	1.2.840.10008.5.1.4.1.1.10
Stand-alone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
Grayscale Softcopy Pres. State Storage	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angio. Bi-plane Image St. (Ret.)	1.2.840.10008.5.1.4.1.1.12.3
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Micros. Image St.	1.2.840.10008.5.1.4.1.1.77.1.3

VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Stand-alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Stored Print Storage	1.2.840.10008.5.1.1.27
Philips Private CX Image Storage	1.3.46.670589.2.4.1.1
Philips Private Volume Storage	1.3.46.670589.5.0.1
Philips Private 3D Object Storage	1.3.46.670589.5.0.2
Philips Private 3D Object 2 Storage	1.3.46.670589.5.0.2.1
Philips Private Surface Storage	1.3.46.670589.5.0.3
Philips Private Surface 2 Storage	1.3.46.670589.5.0.3.1
Philips Private Composite Object Storage	1.3.46.670589.5.0.4
Philips Private MR Cardio Profile	1.3.46.670589.5.0.7
Philips Private MR Cardio	1.3.46.670589.5.0.8
Philips Private CT Synthetic Image St.	1.3.46.670589.5.0.9
Philips Private MR Synthetic Image St.	1.3.46.670589.5.0.10
Philips Private MR Cardio Analysis St.	1.3.46.670589.5.0.11
Philips Private CX Synthetic Image St.	1.3.46.670589.5.0.12
Philips Private Gyroscan MR Spectrum	1.3.46.670589.11.0.0.12.1
Philips Private Gyroscan MR Serie Data	1.3.46.670589.11.0.0.12.2
Philips Private Specialised XA Storage	1.3.46.670589.2.3.1.1

### 2.2.2 IDS5 - SOP Classes and Transfer syntaxes supported

DICOM Media functionality is described separately in chapter 6.

The three following tables (Table 2, 3 and 4) use these abbreviations to identify AE:s:

Storage SCP    SP

Q/R SCU        QU

Print SCU       PU

**Table 2. Supported SOP classes as SCU (IDS5)**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)		
		SP	QU	PU

Study Root Q/R Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	-	Y	-
Study Root Q/R Info. Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	-	Y	-
Modality Worklist Info. Model – FIND	1.2.840.10008.5.1.4.3.1	-	Y	-
Basic Grayscale Print Mgm Meta	1.2.840.10008.5.1.1.9	-	-	Y
> Basic Film Session	1.2.840.10008.5.1.1.1	-	-	Y
> Basic Film Box	1.2.840.10008.5.1.1.2	-	-	Y
> Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	-	-	Y
> Printer	1.2.840.10008.5.1.1.16	-	-	Y

The > signs for the Print Management SOP Classes indicates that the SOP Class is mandatory part of the above mentioned meta SOP Class.

**Table 3. Supported SOP classes as SCP (IDS5)**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)		
		SP	QU	PU
Verification	1.2.840.10008.1.1	Y	-	-
All Storage SOP Classes. see Table 1	See Table 1	Y	-	-

**Table 4. Supported transfer syntaxes (IDS5)**

Transfer Syntax Name	Transfer Syntax UID	Supported for AE Y/- (Yes/No)		
		SP	QU	PU
Spectra Compression ( <b>Private Syntax</b> )	1.2.752.24.3.7.6	Y	-	-
Spectra Compression LS ( <b>Private Syntax</b> )	1.2.752.24.3.7.7	Y	-	-
Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	-	-
Explicit VR Big Endian	1.2.840.10008.1.2.2	Y	-	-
JPEG Lossless, Non-Hier. (Process 14)	1.2.840.10008.1.2.4.57	Y	-	-
JPEG Lossless, Hier., First-Order Pred.	1.2.840.10008.1.2.4.70	Y	-	-
Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y	Y
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	Y	-	-
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	Y	-	-
JPEG Full prog., Non-Hier. (Proc. 10 & 12)	1.2.840.10008.1.2.4.55	Y	-	-

### 2.2.3 WISE (Unix) – SOP Classes and Transfer syntaxes supported

The three following tables (Table 5, 6 and 7) use these abbreviations to identify AE:s:

Storage SCU SU

Storage SCP SP

Q/R SCU QU

Q/R SCP QP

MWL SCP MP

Notif SCU NU

**Table 5. Supported SOP classes as SCU (WISE (Unix))**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Study Root Q/R Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.	-	-	Y	-	-	-
Study Root Q/R Info. Mod. – MOVE	1.2.840.10008.5.1.4.1.2.2.	-	-	Y	-	-	-
All Storage SOP Classes. see Table 1	See Table 1	Y	-	-	-	-	-
Storage Commitment Push Model	1.2.840.10008.1.20.1	Y*	-	-	-	-	-
Basic Study Content Notification	1.2.840.10008.1.9	-	-	-	-	-	Y
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	-	-	-	Y	-	-

\* Only ImageServer/xd

**Table 6. Supported SOP classes as SCP (Wise (Unix))**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Verification	1.2.840.10008.1.1	-	Y	-	Y	Y	-
All Storage SOP Classes. see Table 1	See Table 1	-	Y	-	-	-	-
Storage Commitment Push Model	1.2.840.10008.1.20.1	-	Y	-	-	-	-
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	-	-	-	Y	-	-
Patient Root O/R Info. Mod. – FIND	1.2.840.10008.5.1.4.1.2.1.1	-	-	-	Y	-	-
Study Root Q/R Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	-	-	-	Y	-	-
Patient/Study Only Q/R I M – FIND	1.2.840.10008.5.1.4.1.2.3.1	-	-	-	Y	-	-
Patient Root Q/R Info. Mod – MOVE	1.2.840.10008.5.1.4.1.2.1.2	-	-	-	Y	-	-
Study Root Q/R Info. Mod. – MOVE	1.2.840.10008.5.1.4.1.2.2.2	-	-	-	Y	-	-
Patient/Study Only Q/R I M – MOVE	1.2.840.10008.5.1.4.1.2.3.2	-	-	-	Y	-	-
Modality Worklist Info. Mod. – FIND	1.2.840.10008.5.1.4.3.1	-	-	-	-	Y	-

**Table 7. Supported transfer syntaxes (Wise (Unix))**

Transfer Syntax Name	Transfer Syntax UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Sectra Compression ( <b>Private Syntax</b> )	1.2.752.24.3.7.6	Y	Y	-	-	-	-
Sectra Compression LS ( <b>Private Syntax</b> )	1.2.752.24.3.7.7	Y	Y	-	-	-	-
Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	Y	-	Y	-	-
Explicit VR Big Endian	1.2.840.10008.1.2.2	Y	Y	-	Y	-	-
JPEG Lossless, Non-Hier. (Process 14)	1.2.840.10008.1.2.4.57	Y	Y	-	-	-	-
JPEG Lossless, Hier., First-Order Pred.	1.2.840.10008.1.2.4.70	Y	Y	-	-	-	-
Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y	Y	Y	Y	Y
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	Y	Y	-	-	-	-
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	Y	Y	-	-	-	-
JPEG Full prog., Non-Hier. (Proc. 10 & 11)	1.2.840.10008.1.2.4.55	Y	Y	-	-	-	-

**Note:** The Verification SOP Class of AE:s SP and QP only supports Explicit Little Endian, Explicit Big Endian and Implicit Little Endian Transfer Syntaxes.

## 2.2.4 Wise (win2k) – Summary of SOP classes supported

The three following tables (Table 8, 9 and 10) use these abbreviations to identify AE:s:

Storage SCU    SU

Storage SCP    SP

Q/R SCU      QU  
 Q/R SCP      QP  
 MWL SCP      MP  
 Notif SCU    NU

**Table 8. Supported SOP classes as SCU (Wise (win2k))**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Study Root Q/R Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.	-	-	Y	-	-	-
Study Root Q/R Info. Mod. – MOVE	1.2.840.10008.5.1.4.1.2.2.	-	-	Y	-	-	-
All Storage SOP Classes. see Table 1	See Table 1	Y	-	-	-	-	-
Storage Commitment Push Model	1.2.840.10008.1.20.1	Y*	-	-	-	-	-
Basic Study Content Notification	1.2.840.10008.1.9	-	-	-	-	-	Y

\* Only ImageServer/xd

**Table 9. Supported SOP classes as SCP (WISE (win2k))**

SOP Class Name	SOP Class UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Verification	1.2.840.10008.1.1	-	Y	-	Y	Y	-
All Storage SOP Classes. see Table 1	See Table 1	-	Y	-	-	-	-
Storage Commitment Push Model*	1.2.840.10008.1.20.1	-	Y	-	-	-	-
Patient Root Q/R Info. Mod. – FIND	1.2.840.10008.5.1.4.1.2.1.1	-	-	-	Y	-	-
Study Root Q/R Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	-	-	-	Y	-	-
Patient/Study Only Q/R I M – FIND	1.2.840.10008.5.1.4.1.2.3.1	-	-	-	Y	-	-
Patient Root Q/R Info. Mod – MOVE	1.2.840.10008.5.1.4.1.2.1.2	-	-	-	Y	-	-
Study Root Q/R Info. Mod. – MOVE	1.2.840.10008.5.1.4.1.2.2.2	-	-	-	Y	-	-
Patient/Study Only Q/R I M – MOVE	1.2.840.10008.5.1.4.1.2.3.2	-	-	-	Y	-	-
Modality Worklist Info. Mod. – FIND	1.2.840.10008.5.1.4.3.1	-	-	-	-	Y	-

\*Only Implicit VR Little Endian Transfer Syntax is supported

**Table 10. Supported Transfer Syntaxes (WISE (win2k))**

Transfer Syntax Name	Transfer Syntax UID	Supported for AE Y/- (Yes/No)					
		SU	SP	QU	QP	MP	NU
Spectra Compression ( <b>Private Syntax</b> )	1.2.752.24.3.7.6	Y	Y	-	-	-	-
Spectra Compression LS ( <b>Private Syntax</b> )	1.2.752.24.3.7.7	Y	Y	-	-	-	-
Explicit VR Little Endian	1.2.840.10008.1.2.1	Y	Y	-	-	-	-
Explicit VR Big Endian	1.2.840.10008.1.2.2	Y	Y	-	-	-	-
JPEG Lossless, Non-Hier. (Process 14)	1.2.840.10008.1.2.4.57	Y	Y	-	-	-	-
JPEG Lossless, Hier., First-Order Pred.	1.2.840.10008.1.2.4.70	Y	Y	-	-	-	-
Implicit VR Little Endian	1.2.840.10008.1.2	Y	Y	Y	Y	Y	Y
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	Y	Y	-	-	-	-
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51	Y	Y	-	-	-	-
JPEG Full prog., Non-Hier. (Proc. 10 &	1.2.840.10008.1.2.4.55	Y	Y	-	-	-	-

**Note:** The Storage Commitment Push Model SOP Class is only supported with Implicit VR Little Endian Transfer Syntax for WISE (win2k).

## 2.2.5 IDS5 – AE descriptions

DICOM Media functionality is described separately in chapter 6.

### Storage SCP

Storage SCP is the AE responsible for receiving images. The IDS5 Storage SCP is used **only** for receiving Q/R images fetched from a Q/R SCP. It will only store the images temporary and should not be used for long-term storage.

Each time the IDS5 is exited, all stored images are removed.

Read more about this functionality in [4].

### Q/R-MWL SCU

Q/R-MWL handles queries and retrieve requests from an IDS5 user. User can define search criteria and request information from several Q/R SCPs and/or MWL SCPs at the same time.

When responses are received from a Q/R SCP the user can select examinations and import them to the WISE Storage SCP or choose to fetch them temporarily to the IDS5 Storage SCP and view them locally.

Read more about this functionality in IDS5 Storage SCP above and in [4].

### Print SCU

Print SCU is the AE responsible for sending print request to DICOM printers. It is connected to the IDS5 product. There is only one Print SCU AE per IDS5.

As described in the IDS5 User's Documentation [4] the IDS5 workstation user chooses images to print from the matrix or image windows. When the user has collected the images to print, he or she issues the print command. This will open the print preview. From the preview the user can do some further arrangement for the print, choose the printer to print to and send the images to this printer. When this happens the Print SCU AE is activated, acts as a SCU and initiates an association with the remote AE, supporting DICOM Print Management as SCP (a DICOM printer).

## 2.2.6 WISE (Unix/win2k) – AE descriptions

### Storage SCU

Storage SCU is the AE responsible for sending images to remote applications. There is only one Storage SCU AE. Sending is initiated in the following situations:

- by a retrieve operation from Q/R SCP,
- from an IDS5 or
- as a result of archiving command when using ImageServer/xd

The second situation is described in the IDS5 User's Documentation [4]. When the IDS5 workstation user selects examinations to send from the information window, he or she issues the send command by selecting the desired destination. The command is forwarded to WISE, which will activate the Storage SCU AE indicating the examinations and destination that the user has chosen. The Storage SCU AE will then initiate an association with the remote AE, supporting DICOM Storage as SCP.

### Storage SCP

Storage SCP is the AE responsible for receiving images. There can be any number of Storage SCP AEs set up, each with its own AE title.



A Storage SCP AE can receive images from a remote application entity. A Storage SCP AE also supports verification of the DICOM communication from a remote AE and Storage Commitment of images.

### **Q/R SCU**

Q/R SCU is used only when the ImageServer/xd (interface to external DICOM archive) product is used in the PACS. It is invoked when an archive retrieval is preformed. It will search and retrieve requested studies from the external DICOM archive. There is only one Q/R SCU AE.

### **Q/R SCP**

Q/R SCP is the AE responsible for receiving queries and sending images to other application entities as a response to a move request. The Q/R SCP AE is connected to the WISE product. There can be one or more Q/R SCP AEs, each with its own AE title.

When the Q/R SCP AE receives a query (C-FIND request) it will search in the WISE database for information matching the conditions in the request message. It will search both on-line and in the archive. It returns any found information to the requesting remote AE.

When the Q/R SCP AE receives a retrieve request (C-MOVE request) it will search for images in the WISE database identified by the conditions in the request message. It will search both on-line and in the archive. If any images are found the Q/R SCP AE will change into a Storage SCU and send the images found to the requested destination AE. If the retrieve request refers to images in the archive the images will be fetched from the archive and temporarily put on-line. When the retrieve is done, the temporary images on-line will be removed. Only C-MOVE requests are handled in order to supply retrieve functionality, not C-GET requests.

The Q/R SCP AE supports verification of the DICOM communication from a remote AE.

The Q/R SCP AE on WISE (Unix) also supports handling of Modality Performed Procedure Steps through the N-SET and N-CREATE commands. The received messages can be relayed to other Modality Performed Procedure Step SCU:s. Modality Performed Procedure Step is currently not supported on WISE (win2k).

### **MWL SCP**

MWL SCP is the AE responsible for handling requests for worklists from external devices. The MWL SCP AE is connected to the WISE product. There can be one or more MWL SCP AEs, each with its own AE title.

When the MWL SCP AE receives a query (C-FIND request) it will search in the WISE database for information matching the conditions in the request message. It returns any found information to the requesting remote AE.

The MWL SCP AE supports verification of the DICOM communication from a remote AE.

### **Notif SCU**

If WISE is configured so, the Notif SCU sends a Basic Study Descriptor instance for a specific Study when the corresponding exam is approved. The Basic Study Descriptor object is typically sent to a RIS to indicate that an exam is made, and to indicate the number of images in the exam.

## **2.3 Sequencing of Real-World Activities**

### **2.3.1 IDS5**

IDS5 will perform operations (Print, Send, Approve) on images found in WISE. It can also query DICOM archives and receive images locally for temporary viewing.

### 2.3.2 WISE (Unix/win2k)

WISE receives images and then it can be queried through both Q/R and WISE API. Sending images, storage commitment and notification can be performed on images stored.

## 3. IDS5 AE Specifications

### 3.1 Storage SCP AE Specifications (IDS5)

#### 3.1.1 Association Establishment Policies

##### General

The maximum PDU-length, which a Storage SCP AE will use, is configurable. The default is 28672 bytes (28 kB). Only Sectra authorized personnel can do configuration. Allowed values are between 4096 bytes (4kB) and 131072 bytes (128 kB) including these values.

##### Number of Associations

Each Storage SCP AE can handle five simultaneous associations at a time by default. This number is configurable. Only Sectra authorized personnel can do configuration.

##### Asynchronous Nature

A Storage SCP AE will only allow a single outstanding operation on an association. Therefore, a Storage SCP AE will not perform asynchronous operations window negotiation.

##### Implementation Identifying Information

A Storage SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WISTOSCP_10_10

#### 3.1.2 Association Initiation Policy

The IDS5 Storage SCP will not initiate associations.

#### 3.1.3 Association Acceptance Policy

A Storage SCP AE **rejects** associations in the following situations:

- Association requests from applications that do not address it, i.e. specify an incorrect called AE title.
- Association requests from hosts with host names not known to the Storage SCP AE host.
- For image transfers if it is already processing the maximum number of associations that it can handle (default: 5).
- For image transfers and if configured so, if the WISE server is not responding.

A Storage SCP AE **accepts** associations for the following events:

- Verification of the DICOM communication between a remote system and a Storage SCP AE.
- Transfer of images from a remote system to the WISE database.

##### Verification of the Communication

##### Associated Real-World Activity

A remote system wants to verify the DICOM communication with a Storage SCP AE.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 3 and Table 4. Role is SCP.

### **SOP Specific Conformance**

A Storage SCP AE provides standard conformance to the DICOM Verification Service Class.

### **Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 4.

## **Transfer of Images from a Remote System to the local storage**

### **Associated Real-World Activity**

A remote system wants to store images temporary on IDS5 workstation.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes can be found by investigating Table 3 and Table 4. Role is SCP.

### **SOP Specific Conformance**

When images arrive to Storage SCP, they are sorted into temporary directories from their source AE title, Study Instance UID and Series Instance UID. Images with same Series Instance UID will be interpreted as a stack and shown as one in IDS5. Receiving the same image twice will not overwrite the first one; instead a duplicate image will be created. Only information available in images and their preceding queries will be shown and used.

Regarding viewing capabilities of IDS5 the following points must be noted

- Multi-frame images in one dimension can be viewed in IDS5; multi-dimensional on the other hand cannot be viewed correctly. They will behave as a one-dimensional image; showing them will do so with images in a random order.
- IDS5 shows images with non-square pixels as if the pixels where square. It is possible to configure image import so that non-square pixels are transformed to square pixels.

Regarding color images, IDS5 can only view those with (0028,0004), Photometric interpretation, equal to

- RGB with 24 bits (8 bits per channel)
- PALETTE\_COLOR
- YBR\_FULL\_422

Images are handled color-by-pixel internally in WISE and IDS5. Under certain circumstances images that are sent color-by-plane to WISE/IDS5 can be sent color-by-pixel if fetched from IDS5/WISE.

The first LUT in a Modality LUT sequence (attribute (0028,3000), Modality LUT Sequence, etc.) is handled. The rest (second, third and so on) are ignored.

IDS5 has full support of DICOM Overlays, however if multiple overlays are present in an image you can only choose between showing no DICOM overlays or all DICOM overlays.

### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 4.

## 3.2 Q/R-MWL SCU AE Specification

### 3.2.1 Association Establishment Policies

#### General

The maximum PDU size that the Q/R-MWL SCU AE will use is 16384 bytes (16kB).

#### Number of Associations

The Q/R-MWL SCU AE can only handle one association at a time. One Q/R-MWL request is finished before the next is started.

#### Asynchronous Nature

The Q/R-MWL SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

#### Implementation Identifying Information

The Q/R-MWL SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIQRSCU_10_10

### 3.2.2 Association Initiation Policy

#### Real-World Activity – Q/R Find

##### Associated Real-World Activity

A user creates a search or a worklist containing one or several Q/R SCP:s. Then the user defines the search criteria to be used and the search or worklist search is performed. When several Q/R SCP:s are defined for a search or worklist they are queried in sequence.

##### Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 2 and Table 4. Role is SCU.

##### SOP-Specific Conformance

The Q/R-MWL SCU provides standard conformance to the Q/R service class.

See table below in section on Real-World Activity – MWL Find for attributes used in Q/R C-FIND requests.

#### Real-World Activity – MWL Find

##### Associated Real-World Activity

A user creates a search or a worklist containing one or several MWL SCP:s. Then the user defines the search criteria to be used and the search or worklist search is performed. When several MWL SCP:s are defined for a search or worklist they are queried in sequence.

##### Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 2 and Table 4. Role is SCU.

##### SOP-Specific Conformance

The Q/R-MWL SCU provides standard conformance to the Q/R service class.

The following attributes can be used by the Q/R-MWL SCU in Q/R and MWL C-FIND requests.

Attribute Name	Tag	Used for matching	Required in response	Remarks
Scheduled Procedure Step Sequence	(0040,0100)			
>Scheduled Station AE Title	(0040,0001)	Yes	Yes	
>Modality	(0008,0060)	Yes	Yes	
>Scheduled Station Name	(0040,0010)	Yes	Yes	
>Scheduled Procedure Step Start Date	(0040,0002)	Yes	Yes	
>Scheduled Procedure Step Start Time	(0040,0003)	Yes	Yes	
Patient ID	(0010,0020)	Yes	Yes	
Patient's Name	(0010,0010)	Yes	Yes	
Patient's Birth Date	(0010,0030)	No	Yes	
Patient's Sex	(0010,0040)	No	Yes	
Study Instance UID	(0020,000D)	No	Yes	
Study ID	(0020,0010)	Yes	Yes	
Accession Number	(0008,0050)	No	Yes	
Study Description	(0008,1030)	No	Yes	

### **Real-World Activity - Import**

#### **Associated Real-World Activity**

When responses are received from a search, as described in section above, the user can select one or several of the matching studies to fetch them from the Q/R SCP. The images are sent to a configured destination, usually a Storage SCP AE on the WISE.

#### **Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 2 and Table 4. Role is SCU.

#### **SOP-Specific Conformance**

The Q/R-MWL SCU provides standard conformance to the Q/R service class.

### **Real-World Activity - Fetch**

#### **Associated Real-World Activity**

When responses are received from a search, as described in section above, the user can select one or several of the matching studies to fetch them from the Q/R SCP. The images are sent to IDS5 workstation for temporary storage.

#### **Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 2 and Table 4. Role is SCU.

#### **SOP-Specific Conformance**

The Q/R-MWL SCU provides standard conformance to the Q/R service class.

### 3.2.3 Association Acceptance Policy

The Q/R-MWL SCU AE does not handle incoming associations.

## 3.3 Print SCU AE Specification

### 3.3.1 Association Establishment Policies

#### General

The maximum PDU size that the Print SCU AE will use is 16 Kbytes (16 kB).

#### Number of Associations

The Print SCU AE can only handle one association at a time. One print request has to be finished before the next can be started.

#### Asynchronous Nature

The Print SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

#### Implementation Identifying Information

The Print SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIPRISCU_10_10

### 3.3.2 Association Initiation Policy

#### Real-World Activity - Print Command

##### Associated Real-World Activity

As described in the IDS5 User's Documentation [4] the IDS5 workstation user chooses images to print from the matrix or image windows. When the user has collected the images to print, he or she issues the print command. This will open the print preview. From the preview the user can do some further arrangement for the print, choose the printer to print to and send the images to this printer. When this happens the Print SCU AE is activated, acts as an SCU and initiates an association with a remote AE, hopefully supporting DICOM Print Management as SCP (a DICOM printer).

##### Proposed Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 2 and Table 4. Role is SCU.

##### SOP-Specific Conformance

The Print SCU AE supports the mandatory SOP classes, which are defined under the Basic Grayscale Print Management Meta SOP Class, see Table 2. No optional SOP classes are supported.

The Print SCU AE uses the following DIMSE Service Elements:

**Table 11. DIMSE Service Elements**

SOP Class	DIMSE Service Element
Basic Film Session SOP Class	N-CREATE, N-DELETE
Basic Film Box SOP Class	N-CREATE, N-DELETE, N-ACTION
Basic Grayscale Image Box SOP Class	N-SET
Printer SOP Class	N-GET

N-EVENT-REPORT is not supported.

Immediately after establishing an association, the Print SCU AE will execute an N-GET on the Printer SOP Class. This operation can be configured into two modes, one for fetching all available printer attributes and one for fetching a minimal set of printer attributes.

If configured to fetch all attributes, the following attributes will be requested:

**Table 12. Attributes, when fetching all available attributes**

Attribute name	Tag	Optional according to standard
Printer Status	(2110,0010)	NO
Printer Status Info	(2110,0020)	NO
Printer Name	(2110,0030)	YES
Manufacturer	(0008,0070)	YES
Manufacturer Model Name	(0008,1090)	YES
Device Serial Number	(0018,1000)	YES
Software Versions	(0018,1020)	YES
Date Of Last Calibration	(0018,1200)	YES
Time Of Last Calibration	(0018,1201)	YES

If configured to fetch a minimum set of attributes, the following attributes will be requested:

**Table 13. Attributes, when fetching minimum set of attributes**

Attribute name	Tag	Optional according to standard
Printer Status	(2110,0010)	NO
Printer Status Info	(2110,0020)	NO
Printer Name	(2110,0030)	YES

If the Printer Status tag is returned as NORMAL, the print job will continue immediately.

If the status is WARNING, the user will be notified and the value of the Printer Status Info tag will be displayed. The print job is then continued.

If the status is FAILURE, the user will be notified and the value of the Printer Status Info tag will be displayed. The print job is then aborted.

The Print SCU AE supports the following SOP class attributes:

**Table 14. SOP Class Attributes**

SOP Class, DIMSE Service Element	Attribute name	Tag	Optional according to standard	Configurable	Default value
Basic Film Session N-CREATE	Number of Copies	(2000,0010)	YES	YES	1
Basic Film Session N-CREATE	Print Priority	(2000,0020)	YES	YES	MED
Basic Film Session N-CREATE	Medium Type	(2000,0030)	YES	YES	BLUE FILM
Basic Film Session N-CREATE	Film Destination	(2000,0040)	YES	YES	MAGAZINE

Basic Film Box N-CREATE	Image Display Format	(2010,0010)	NO	NO	STANDARD\1,1
Basic Film Box N-CREATE	Film Orientation	(2010,0040)	YES	YES	PORTRAIT
Basic Film Box N-CREATE	Film Size ID	(2010,0050)	YES	YES	14INX17IN
Basic Film Box N-CREATE	Magnification Type	(2010,0060)	YES	YES	(none)
Basic Film Box N-CREATE	Max Density	(2010,0130)	YES	YES	(none)
Basic Film Box N-CREATE	Configuration Information	(2010,0150)	YES	YES	(none)
Basic Film Box N-CREATE	Smoothing Type	(2010,0080)	YES	YES	(none)
Basic Film Box N-CREATE	Border Density	(2010,0100)	YES	YES	BLACK
Basic Film Box N-CREATE	Empty Image Density	(2010,0110)	YES	YES	BLACK
Basic Film Box N-CREATE	Min Density	(2010,0120)	YES	YES	(none)
Basic Film Box N-CREATE	Trim	(2010,0140)	YES	YES	YES
Basic Grayscale Image Box N-SET	Polarity	(2020,0020)	YES	YES	NORMAL

Several images per film can be printed. They are arranged in IDS5, which composes them and sends them as one big image (Image Display Format "STANDARD\1,1").

### 3.3.3 Association Acceptance Policy

The Print SCU AE does not handle incoming associations.

## 4. WISE (Unix) AE Specifications

### 4.1 Storage SCU AE Specification (WISE (Unix))

#### 4.1.1 Association Establishment Policies

##### General

The maximum PDU size that the Storage SCU AE will use is 28672 bytes (28 kB).

##### Number of Associations

The Storage SCU AE can only handle one association at a time. One send-request has to be finished before the next is started.

##### Asynchronous Nature

The Storage SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

##### Implementation Identifying Information

The Storage SCU AE will provide the following implementation identifying information



Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	UXSTOSCU_10_10

### 4.1.2 Association Initiation Policy

#### Real-World Activity - Send Command

##### Associated Real-World Activity

As described in the IDS5 User's Documentation [4] the IDS5 workstation user selects examinations to send from the information window. Then he or she issues the send command by selecting the desired destination. The command is forwarded to WISE, which will activate the Storage SCU AE indicating the examinations, and destination that the user has chosen. The Storage SCU AE will then initiate an association with the remote AE, hopefully supporting DICOM Storage as SCP.

Image Sending can also be activated as a result of a C-MOVE request towards the Q/R SCP or when archiving images using ImageServer/xd.

##### Proposed Presentation Contexts

Possible proposed abstract syntaxes and transfer syntaxes can be found by investigating Table 5 and Table 7. Role is SCU.

##### SOP-Specific Conformance

The Storage SCU provides standard conformance to the SOP Classes of the Storage Service Class.

If settings and annotations have been made in the default setting for images in IDS5, this information will be exported as Standard Grayscale Presentation State if the receiving side supports such (see Appendix D for details), otherwise the annotations will be exported as standard DICOM overlays incorporated into the images (i.e. no stand-alone DICOM overlays will be used).

If the IDS5 user changes an existing default setting of an image the SOP Instance UID of the associated presentation state will be changed. The old setting will not be saved.

If configured so, the Storage SCU AE will export Sectra private attributes. These are documented in Appendix C.

#### Read-World Activity – Storage Commit

##### Associated Real-World Activity

Storage Commitment will be used when images are archived using ImageServer/xd and the remote DICOM archive supports Storage Commitment as SCP.

##### Proposed Presentation Contexts

Possible proposed abstract syntaxes and transfer syntaxes can be found by investigating Table 5 and Table 7. Role is SCU.

##### SOP Specific Conformance

The Storage SCU will send the N-ACTION-RQ message and wait for the N-ACTION-RSP. The association will then be closed. A Storage SCP of the same PACS will accept and handle the associated N-EVENT-REPORT-RQ with the same Transaction UID.

### 4.1.3 Association Acceptance Policy

The Storage SCU AE does not handle incoming associations.

## 4.2 Storage SCP AE Specification (WISE (Unix))

### 4.2.1 Association Establishment Policies

#### General

The maximum PDU-length, which a Storage SCP AE will use, is configurable. The default is 28672 bytes (28 kB). Only Sectra authorized personnel can do configuration.

#### Number of Associations

Each Storage SCP AE can handle five simultaneous associations at a time by default. This number is configurable. Only Sectra authorized personnel can do configuration.

Any number of Storage SCP AEs can be set up, meaning that a great number of C-STORE associations can be handled at the same time. Typically one Storage SCP AE per sending application is set up.

#### Asynchronous Nature

A Storage SCP AE will only allow a single outstanding operation on an association. Therefore, a Storage SCP AE will not perform asynchronous operations window negotiation.

#### Implementation Identifying Information

A Storage SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	UXSTOSCP_10_10

### 4.2.2 Association Initiation Policy

The only situation in which a Storage SCP AE will initiate associations with a remote AE is in case a remote application has sent a Storage Commitment N-ACTION and the Storage SCP is configured to always send the N-EVENT-REPORT on a new association or if the SCU has shut down the association instead of waiting for the N-EVENT-REPORT response. This is described in a section below.

### 4.2.3 Association Acceptance Policy

A Storage SCP AE **rejects** associations in the following situations:

- Association requests from applications that do not address it, i.e. specify an incorrect called AE title.
- Association requests from hosts with host names not known to the Storage SCP AE host.
- For image transfers if it is already processing the maximum number of associations that it can handle (default: 5).
- For image transfers and if configured so, if the WISE server is not responding.

A Storage SCP AE **accepts** associations for the following events:

- Verification of the DICOM communication between a remote system and a Storage SCP AE.
- Transfer of images from a remote system to the WISE database.
- Request for Storage Commitment to store images in WISE.

#### Verification of the Communication

##### Associated Real-World Activity

A remote system wants to verify the DICOM communication with a Storage SCP AE.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

### **SOP Specific Conformance**

A Storage SCP AE provides standard conformance to the DICOM Verification Service Class.

### **Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

## **Transfer of Images from a Remote System to the WISE database**

### **Associated Real-World Activity**

A remote system wants to store images in the WISE database.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

### **SOP Specific Conformance**

A Storage SCP AE provides standard level 2 (full) conformance to the DICOM Storage Service Class as SCP. Full conformance means that all type 1, 2 and 3 attributes sent are stored. All private and retired attributes are also stored.

A Storage SCP AE needs a value of the attribute (0010,0020), Patient ID. If the attribute is empty it will use the attribute (0010,0010), Patient Name, as patient ID. If the patient name is empty as well it will use the request number (see [8]) as patient ID. Applications sending images to a Storage SCP AE must take care when filling in the Patient ID attribute. If it is not filled in, there is a risk that images of different patients can be mixed!

If the image storage should fail on the WISE side, a status of refused, “Out of resources”, will be returned to the association initiator.

WISE can be configured to overwrite images with same SOP Instance UID or to store all images it receives. Default is the second alternative, i.e. not to overwrite images with same SOP Instance UID. This means that if the same image is sent twice to a Storage SCP AE it will be stored two times in WISE. This implicates that two images with the same SOP Instance UID will be sent if a MOVE request is received by the Q/R SCP AE on that image.

For more detailed information about the handling of specific attributes by WISE and IDS5, see Appendix A.

If DICOM attributes are illegal, no responsibilities for consequences are taken. The following consequence has been noted:

- If (0020,0011) Series Number is outside the allowed range,  $-(2^{32}-1) \times (2^{32}-1)$ , WISE will truncate all bits above the 32<sup>nd</sup> position.

Regarding viewing capabilities of IDS5 the following points must be noted

- Multi-frame images in one dimension can be viewed in IDS5; multi dimensional on the other hand cannot be viewed correctly. They will behave as a one-dimensional image; showing them will do so with images in a random order.
- IDS5 shows images with non-square pixels as if the pixels where square. It is possible to configure image import in WISE so that non-square pixels are transformed to square pixels.

Regarding color images, IDS5 can only view those with (0028,0004), Photometric interpretation, equal to

- RGB with 24 bits (8 bits per channel)
- PALETTE\_COLOR
- YBR\_FULL\_422

Images are handled color-by-pixel internally in WISE and IDS5. In certain circumstances image that are sent color-by-plane to WISE/IDS5 are sent color-by-pixel if fetched from IDS5/WISE.

The first LUT in a Modality LUT sequence (attribute (0028,3000), Modality LUT Sequence, etc.) is handled. The rest (second, third and so on) are ignored.

IDS5 has full support of DICOM Overlays, however if multiple overlays are present in an image you can only choose between showing no DICOM overlays or all DICOM overlays.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

#### **Request to Commit to Store Images in the WISE Database**

##### **Associated Real-World Activity**

A remote system makes a request for WISE to commit to store a number of images.

##### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

##### **SOP Specific Conformance**

The Storage SCP AE provides standard conformance to the Storage Commitment Push Model SOP Class.

Notes about the implementation:

If configured so, the N-EVENT-REPORT-RQ message will be sent in a separate association to a configurable AE (as recommended by IHE).

If not, an attempt will be made to transmit the N-EVENT-REPORT-RQ message on the same association as the N-ACTION-RQ message was received. If the association is down, the Storage SCP AE will open a new association to the Storage Commitment SCU and send the N-EVENT-REPORT-RQ message on the new association. The time between the reception of the N-ACTION-RQ message and the sending of the N-EVENT-REPORT-RQ message is dependent on the WISE server load, but it can be expected to be short (seconds).

Any time after the images have been committed with Storage Commitment, they can be deleted by a IDS5 user, i.e. a Storage Commitment will not make sure that the images will be stored permanently.

Committed images can be retrieved using DICOM Query/Retrieve towards a Q/R SCP AE connected to the same WISE server. If an Q/R SCP is connected towards the WISE server at time of commitment, the AE title of it will be returned in the N-EVENT-REPORT message sent to the SCU.

Storage Commitment can be made for images stored on short-term (RAID) or long-term storage (Archive).

The optional Storage Media File-Set ID & UID attributes will never be filled in by the Storage SCP AE.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

### **4.3 Q/R SCU AE Specification (WISE (Unix))**

#### **4.3.1 Association Establishment Policies**

##### **General**

The maximum PDU size that the Q/R SCU AE will use is 28672 bytes (28 kB).

##### **Number of Associations**

The Q/R SCU AE can only handle one association at a time.

##### **Asynchronous Nature**

The Q/R SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

##### **Implementation Identifying Information**

The Q/R SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIQRSCU_10_10

#### **4.3.2 Association Initiation Policy**

##### **Real-World Activity – Fetch from DICOM archive Command**

###### **Associated Real-World Activity**

This command is invoked when an archive retrieval from an external DICOM archive is preformed. It will search and retrieve requested studies from the external DICOM archive.

###### **Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 5 and Table 7. Role is SCU.

###### **SOP-Specific Conformance**

The Q/R SCU provides standard conformance to used SOP Classes in the Q/R Service Class.

#### **4.3.3 Association Acceptance Policy**

The Q/R SCU AE does not handle incoming associations.

### **4.4 Q/R SCP AE Specification (WISE (Unix))**

#### **4.4.1 Association Establishment Policies**

##### **General**

The maximum PDU length that the Q/R SCP AE will use is configurable. Default is 28672 bytes (28 kB). Only Sectra authorized personnel can change this configuration.

##### **Number of Associations**

The Q/R SCP AE can handle at most 100 simultaneous associations at a time.

**Asynchronous Nature**

The Q/R SCP AE will only allow a single outstanding operation on an association. Therefore, the Q/R SCP AE will not perform asynchronous operations window negotiation.

**Implementation Identifying Information**

The Q/R SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	UXQRSCP_10_10

**4.4.2 Association Initiation Policy**

The Q/R SCP AE will not initiate any associations. When a retrieve request is forwarded to the Q/R SCP, the images will be copied using the Storage SCU AE.

**4.4.3 Association Acceptance Policy**

The Q/R SCP AE will reject associations from applications that do not address it, i.e. specify an incorrect called AE title. The Q/R SCP AE will also reject associations with C-MOVE requests from hosts not present in the `/etc/hosts` file.

The Q/R SCP AE accepts associations for the following events:

- Verification of the DICOM communication between a remote system and the Q/R SCP AE
- Query of the WISE database
- Retrieve images from the WISE database
- Information about Modality Performed Procedure steps

**Verification of the Communication****Associated Real-World Activity**

A remote system wants to verify the DICOM communication with the Q/R SCP AE.

**Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

**SOP Specific Conformance**

The Q/R SCP AE provides standard conformance to the DICOM Verification Service Class.

**Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

**Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

**Query of the WISE Database****Associated Real-World Activity**

A remote system wants to query the WISE database using the C-FIND command.

**Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP. Extended negotiation is supported.

**SOP Specific Conformance**

The Q/R SCP AE provides standard conformance to the FIND SOP classes of the Q/R service class as SCP with the following exceptions:

- Fractions of seconds are ignored.
- At most 500 matches are returned. The hit limit can be configured. If there are more items than the hit limit in the WISE database, zero matches are returned.

Appendix B lists all attributes that are supported as matching and return keys.

Relational queries are supported.

Case insensitive matching is used for patient name. For all other attributes, case sensitive matching is used.

Range matching is supported for both Study Date and Study Time. If both Study Date and Study Time is specified as a range, e.g. date1 – date2 and time1 – time2, all studies between date1.time1 and date2.time2 are returned. I.e. the result is **not** all studies between two time points on consecutive dates. If this is required, the SCU must do a query on date range only, requiring time in return and filter out the required studies himself. If Study Date is not specified and Study Time is specified as a range an implicit Study Date of today is assumed, i.e. all studies between the two time points on the day the query is done is returned.

Wildcard matching on date and time is not supported. The result is undefined.

If no matches are found, a response with *SUCCESS* is sent.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

### **Retrieve Images from the WISE Database**

#### **Associated Real-World Activity**

A remote application entity wishes to retrieve images from the WISE database using the C-MOVE command.

#### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

#### **SOP Specific Conformance**

The Q/R SCP AE provides standard conformance to the MOVE SOP classes of the Q/R service class as SCP.

In case of no matching examinations, a response of *SUCCESS* is returned to the association initiator.

If the association to the move destination is rejected a response “Unable to process” (C001) is returned to the association initiator.

If the move destination is unknown (not defined in the configuration file) a response “Destination unknown” (A801) is returned to the association initiator.

For other errors a response "Out of resources" (A702) is returned to the association initiator.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

**Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

**Information about Modality Performed Procedure Steps****Associated Real-World Activity**

A remote application entity sends information about Modality Performed Procedure Steps using the N-CREATE or N-SET command.

**Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 6 and Table 7. Role is SCP.

**SOP Specific Conformance**

The Q/R SCP AE provides standard conformance to the Modality Performed Procedure Step SOP Class under the Study Management service class as both SCU and SCP.

The Q/R SCP can be configured to relay the received information to other Modality Performed Procedure Step SCU:s.

**Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

**Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

## **4.5 MWL SCP AE Specification (WISE (Unix))**

### **4.5.1 Association Establishment Policies**

**General**

The maximum PDU length that the MWL SCP AE will use is configurable. Default is 28672 bytes (28 kB). Only Sectra authorized personnel can change this configuration.

**Number of Associations**

The MWL SCP AE can handle at most 100 simultaneous associations at a time.

**Asynchronous Nature**

The MWL SCP AE will only allow a single outstanding operation on an association. Therefore, the MWL SCP AE will not perform asynchronous operations window negotiation.

**Implementation Identifying Information**

The MWL SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	UXMWLSCP_10_10

### **4.5.2 Association Initiation Policy**

The MWL SCP AE will not initiate any associations.

### **4.5.3 Association Acceptance Policy**

The MWL SCP AE will reject associations from applications that do not address it, i.e. specify an incorrect called AE title. The MWL SCP AE will also reject associations with C-FIND requests from hosts not present in the "hosts" database (DNS, /etc/hosts, etc.)



The MWL SCP AE accepts associations for the following events:

- Verification of the DICOM communication between a remote system and the MWL SCP AE
- Query of the WISE database for a worklist

### **Verification of the Communication**

#### **Associated Real-World Activity**

A remote system wants to verify the DICOM communication with the MWL SCP AE.

#### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 6 and Table 7. Role is SCP.

#### **SOP Specific Conformance**

The MWL SCP AE provides standard conformance to the DICOM Verification Service Class.

#### **Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

### **Query of the WISE Database**

#### **Associated Real-World Activity**

A remote system requests a worklist using the C-FIND command.

#### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 6 and Table 7. Role is SCP.

#### **SOP Specific Conformance**

The MWL SCP AE provides standard conformance to the DICOM Basic Worklist Management service class as SCP with the following exceptions:

- Fractions of seconds are ignored.
- At most 500 matches are returned. The hit limit can be configured. If there are more items than the hit limit in the WISE database, zero matches are returned.

Appendix F lists all attributes that are supported as matching and return keys.

Case insensitive matching is used for patient name. For all other attributes, case sensitive matching is used.

Range matching is supported for both Study Date and Study Time. If both Study Date and Study Time are specified as a range, e.g. date1 – date2 and time1 – time2, all studies between date1.time1 and date2.time2 are returned. I.e. the result is **not** all studies between two time points on consecutive dates. If this is required, the SCU must do a query on date range only, requiring time in return and filter out the required studies himself. If Study Date is not specified and Study Time is specified as a range an implicit Study Date of today is assumed, i.e. all studies between the two time points on the day the query is done is returned.

Wildcard matching on date and time is not supported. The result is undefined.

If no matches are found, a response with *SUCCESS* is sent.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

## **4.6 Notif SCU AE Specification (WISE (Unix))**

### **4.6.1 Association Establishment Policies**

#### **General**

The maximum PDU size that the Notif SCU AE will use is 28672 bytes (28 kB).

#### **Number of Associations**

The Notif SCU AE can only handle one association at a time. One send-request has to be finished before the next is started.

#### **Asynchronous Nature**

The Notif SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

#### **Implementation Identifying Information**

The Notif SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	SINOTSCU_10_10

### **4.6.2 Association Initiation Policy**

#### **Real-World Activity - Send Command**

##### **Associated Real-World Activity**

If WISE is configured so, the Notif SCU sends a Basic Study Descriptor instance for a specific Study when the corresponding exam is approved. The Basic Study Descriptor object is typically sent to a RIS to indicate that an exam is made, and to indicate the number of images in the exam.

##### **Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 5 and Table 7. Role is SCU.

##### **SOP Specific Conformance**

The Notif SCU sends all type 1 and type 2 attributes of the Basic Study Descriptor IOD. No type 3 attributes are sent.

If configured so the Notif SCU can send a standard extended type of the Basic Study Descriptor IOD, see section 8.3.1 for details.

### **4.6.3 Association Acceptance Policy**

The Notif SCU AE does not handle incoming associations.

## 5. WISE (win2k) AE Specifications

### 5.1 Storage SCU AE Specification (WISE (win2k))

#### 5.1.1 Association Establishment Policies

##### General

The maximum PDU size that the Storage SCU AE will use is 28672 bytes (28 kB).

##### Number of Associations

The Storage SCU AE can only handle one association at a time. One send request has to be finished before the next is started.

##### Asynchronous Nature

The Storage SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

##### Implementation Identifying Information

The Storage SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WISTOSCU_10_10

#### 5.1.2 Association Initiation Policy

##### Real-World Activity - Send Command

###### Associated Real-World Activity

As described in the IDS5 User's Documentation [4] the IDS5 workstation user selects examinations to send from the information window. Then he or she issues the send command by selecting the desired destination. The command is forwarded to WISE, which will activate the Storage SCU AE indicating the examinations, and destination that the user has chosen. The Storage SCU AE will then initiate an association with the remote AE, hopefully supporting DICOM Storage as SCP.

Image Sending can also be activated as a result of a C-MOVE request towards the Q/R SCP or when archiving images using ImageServer/xd.

###### Proposed Presentation Contexts

Possible proposed abstract syntaxes and transfer syntaxes can be found by investigating Table 8 and Table 10. At most three transfer syntaxes are proposed at the same time. Implicit Little Endian is always proposed. If the image is internally stored in another transfer syntax, that syntax is proposed too. If configured so, compression transfer syntax will be proposed too.

Role is SCU.

###### SOP Specific Conformance

The Storage SCU provides standard conformance to the supported SOP classes in the Storage Service Class.

If patient or exam data for exported images has been changed in WISE, the exported images will contain the values from WISE.

If settings and annotations have been made in the default setting for images in IDS5, this information will be exported as Standard Grayscale Presentation State if the receiving side supports such (see Appendix D for details), otherwise the annotations will be exported standard DICOM overlays.

If the IDS5 user changes an existing default setting the SOP Instance UID of the associated presentation state will be changed. The old setting will not be saved.

If configured so, the Storage SCU AE will export Sectra private attributes. These are documented in Appendix C.

### 5.1.3 Association Acceptance Policy

The Storage SCU AE does not handle incoming associations.

## 5.2 Storage SCP AE Specification (WISE (win2k))

### 5.2.1 Association Establishment Policies

#### General

The maximum PDU-length, which a Storage SCP AE will use, is configurable. The default is 28672 bytes (28 kB). Configuration can only be done by Sectra authorized personnel. Allowed values are between 4096 bytes (4 kB) and 131072 bytes (128 kB) including these values.

#### Number of Associations

Each Storage SCP AE can handle five simultaneous associations at a time by default. This number is configurable. Configuration can only be done by Sectra authorized personnel.

Any number of Storage SCP AEs can be set up, meaning that a great number of C-STORE associations can be handled at the same time. Typically one Storage SCP AE per sending application is set up.

#### Asynchronous Nature

A Storage SCP AE will only allow a single outstanding operation on an association. Therefore, a Storage SCP AE will not perform asynchronous operations window negotiation.

#### Implementation Identifying Information

A Storage SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WISTOSCP_10_10

### 5.2.2 Association Initiation Policy

Storage SCP will not initiate association.

### 5.2.3 Association Acceptance Policy

A Storage SCP AE **rejects** associations in the following situations:

- Association requests from applications that do not address it, i.e. specify an incorrect called AE title.
- If configured so, association requests from hosts with host names not known to the Storage SCP AE host.
- For image transfers if it is already processing the maximum number of associations that it can handle (default: 5).
- For image transfers and if configured so, if the WISE server is not responding.

A Storage SCP AE **accepts** associations for the following events:

Verification of the DICOM communication between a remote system and a Storage SCP AE.

- Transfer of images from a remote system to the WISE database.

- Request for Storage Commitment to store images in WISE.

## **Verification of the Communication**

### **Associated Real-World Activity**

A remote system wants to verify the DICOM communication with a Storage SCP AE.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP.

### **SOP Specific Conformance**

A Storage SCP AE provides standard conformance to the DICOM Verification Service Class.

### **Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 10.

## **Transfer of Images from a Remote System to the WISE database**

### **Associated Real-World Activity**

A remote system wants to store images in the WISE database.

### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP.

### **SOP Specific Conformance**

A Storage SCP AE provides standard level 2 (full) conformance to the DICOM Storage Service Class as SCP. Full conformance mean that all type 1, 2 and 3 attributes sent are stored. All private and retired attributes are also stored.

A Storage SCP AE needs a value of the attribute (0010,0020), Patient ID. If the attribute is empty it will use the attribute (0010,0010), Patient Name, as patient ID. If the patient name is empty as well it will use the request number (see [8]) as patient ID. Applications sending image to a Storage SCP AE must take care when filling in the Patient ID attribute. If it is not filled in, there is a risk that images of different patients can be mixed!

If the image storage should fail on the WISE side, a status of refused, “Out of resources”, will be returned to the association initiator.

WISE can be configured to overwrite images with same SOP Instance UID or to store all images it receives. Default is the second alternative, i.e. not to overwrite images with same SOP Instance UID. This means that if the same image is sent twice to a Storage SCP AE it will be stored two times in WISE. This implicates that two images with the same SOP Instance UID will be sent if a MOVE request is received by the Q/R SCP AE on that image.

For more detailed information about the handling of specific attributes by WISE and IDS5, see Appendix A.

If DICOM attributes are illegal, no responsibilities for consequences are taken.

Regarding viewing capabilities of IDS5 the following points must be noted

- Multi-frame images in one dimension can be viewed in IDS5; multi dimensional on the other hand cannot be viewed correctly. They will behave as a one-dimensional image; showing them will do so with images in a random order.

- IDS5 shows images with non-square pixels as if the pixels were square. It is possible to configure image import in WISE so that non-square pixels are transformed to square pixels.

Regarding color images, IDS5 can only view those with (0028,0004), Photometric interpretation, equal to

- RGB with 24 bits (8 bits per channel)
- PALETTE\_COLOR
- YBR\_FULL\_422

Images are handled color-by-pixel internally in WISE and IDS5. In certain circumstances image that are sent color-by-plane to WISE/IDS5 are sent color-by-pixel if fetched from IDS5/WISE.

The first LUT in a Modality LUT sequence (attribute (0028,3000), Modality LUT Sequence, etc.) is handled. The rest (second, third and so on) are ignored.

IDS5 has full support of DICOM Overlays, however if multiple overlays are present in an image you can only choose between showing no DICOM overlays or all DICOM overlays.

### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 10.

### **Request to Commit to Store Images in the WISE Database**

#### **Associated Real-World Activity**

A remote system makes a request for WISE to commit to store a number of images.

#### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP.

#### **SOP Specific Conformance**

The Storage SCP AE provides standard conformance to the Storage Commitment Push Model SOP Class.

Notes about the implementation:

An attempt will be made to transmit the N-EVENT-REPORT-RQ message on the same association as the N-ACTION-RQ message was received. If the association is down, the Storage SCP AE will open a new association to the Storage Commitment SCU and send the N-EVENT-REPORT-RQ message on the new association. The time between the reception of the N-ACTION-RQ message and the sending of the N-EVENT-REPORT-RQ message is dependent on the WISE server load, but it can be expected to be short (seconds). To minimize possible error situations the SCU is recommended to keep the association open after the N-ACTION is sent.

Any time after the images have been committed with Storage Commitment, they can be deleted by an IDS5 user, i.e. a Storage Commitment will not make sure that the images will be stored permanently.

Committed images can be retrieved using DICOM Query/Retrieve towards a Q/R SCP AE connected to the same WISE server. If an Q/R SCP is connected towards the WISE server at time of commitment, the AE title of it will be returned in the N-EVENT-REPORT message sent to the SCU.

Storage Commitment can be made for images stored on short-term (RAID) or long-term storage (Archive).

The optional Storage Media File-Set ID & UID attributes will never be filled in by the Storage SCP AE.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 10.

### **5.3 Q/R SCU AE Specification (WISE (win2k))**

#### **5.3.1 Association Establishment Policies**

##### **General**

The maximum PDU size that the Q/R SCU AE will use is 16384 bytes (16 kB).

##### **Number of Associations**

The Q/R SCU AE can only handle one association at a time.

##### **Asynchronous Nature**

The Q/R SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

##### **Implementation Identifying Information**

The Q/R SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIQRSCU_10_10

#### **5.3.2 Association Initiation Policy**

##### **Real-World Activity – Fetch from DICOM archive Command**

###### **Associated Real-World Activity**

This command is invoked when an archive retrieval from an external DICOM archive is preformed. It will search and retrieve requested studies from the external DICOM archive.

###### **Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 8 and Table 10. Role is SCU.

###### **SOP Specific Conformance**

The Q/R SCU provides standard conformance to used SOP Classes in the Q/R Service Class.

#### **5.3.3 Association Acceptance Policy**

The Q/R SCU AE does not handle incoming associations.

## 5.4 Q/R SCP AE Specification (WISE (win2k))

### 5.4.1 Association Establishment Policies

#### General

The maximum PDU-length that the Q/R SCP AE will use is configurable. Default is 28672 bytes (28 kB). Configuration can only be done by Sectra authorized personnel. Allowed values are between 4096 bytes (4 kB) and 131072 bytes (128 kB) including these values.

#### Number of Associations

The Q/R SCP AE can handle at most 100 simultaneous associations at a time.

#### Asynchronous Nature

The Q/R SCP AE will only allow a single outstanding operation on an association. Therefore, the Q/R SCP AE will not perform asynchronous operations window negotiation.

#### Implementation Identifying Information

The Q/R SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIQRSCP_10_10

### 5.4.2 Association Initiation Policy

The Q/R SCP AE will not initiate any associations. When a retrieve request is forwarded to the Q/R SCP, the images will be copied using the Storage SCU AE.

### 5.4.3 Association Acceptance Policy

The Q/R SCP AE will reject associations from applications that do not address it, i.e. specify an incorrect called AE title. The Q/R SCP AE will also reject associations with C-MOVE requests from hosts not present in the `/etc/hosts` file.

The Q/R SCP AE accepts associations for the following events:

Verification of the DICOM communication between a remote system and the Q/R SCP AE

Query of the WISE database

Retrieve images from the WISE database

#### Verification of the Communication

##### Associated Real-World Activity

A remote system wants to verify the DICOM communication with the Q/R SCP AE.

##### Accepted Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP.

##### SOP Specific Conformance

The Q/R SCP AE provides standard conformance to the DICOM Verification Service Class.

##### Presentation Context Acceptance Criterion

There are no specific rules for acceptance.

##### Transfer Syntax Selection Policies

The transfer syntax selection is done according to the order in Table 10.



## Query of the WISE Database

### Associated Real-World Activity

A remote system wants to query the WISE database using the C-FIND command.

### Accepted Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP. Extended negotiation is not supported.

### SOP Specific Conformance

The Q/R SCP AE provides standard conformance to the FIND SOP classes of the Q/R Service Class as SCP with the exceptions below:

- Fractions of seconds are ignored.
- At the most 500 matches are returned. This hit limit can be configured. If more items than the hit limit in the WISE database matches, zero matches are returned.

Appendix B summarizes which keys can be used for searching.

Relational queries are not supported.

Case insensitive matching is used for patient name. For all other attributes, case sensitive matching is used.

Range matching is supported for both Study Date and Study Time. If both Study Date and Study Time are specified as a range, e.g. date1 – date2 and time1 – time2, all studies between date1.time1 and date2.time2 are returned. I.e. the result is **not** all studies between two time points on consecutive dates. If this is required, the SCU must do a query on date range only, requiring time in return and filter out the required studies himself. If Study Date is not specified and Study Time is specified as a range an implicit Study Date of today is assumed, i.e. all studies between the two time points on the day the query is done is returned.

Wildcard matching on date and time is not supported. The result is undefined.

In case of no matching examinations, a response of *SUCCESS* is sent.

### Presentation Context Acceptance Criterion

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

### Transfer Syntax Selection Policies

The transfer syntax selection is done according to the order in Table 10.

## Retrieve Images from the WISE Database

### Associated Real-World Activity

A remote application entity wishes to retrieve images from the WISE database using the C-MOVE command.

### Accepted Presentation Contexts

The proposed abstract syntaxes and transfer syntaxes is found by investigating Table 9 and Table 10. Role is SCP.

### SOP Specific Conformance

The Q/R SCP AE provides standard conformance to the MOVE SOP classes of the Q/R Service Class as SCP.

In case of no matching examinations, a response of *SUCCESS* is returned to the association initiator.

If the association to the move destination is rejected a response “Unable to process” (C001) is returned to the association initiator.

If the move destination is unknown (not defined in the configuration file) a response "Destination unknown" (A801) is returned to the association initiator.

For other errors a response "Out of resources" (A702) is returned to the association initiator.

#### **Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

#### **Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 10.

## **5.5 MWL SCP AE Specification (WISE (win2k))**

### **5.5.1 Association Establishment Policies**

#### **General**

The maximum PDU length that the MWL SCP AE will use is configurable. Default is 28672 bytes (28 kB). Only Sectra authorized personnel can change this configuration.

#### **Number of Associations**

The MWL SCP AE can handle at most 100 simultaneous associations at a time.

#### **Asynchronous Nature**

The MWL SCP AE will only allow a single outstanding operation on an association. Therefore, the MWL SCP AE will not perform asynchronous operations window negotiation.

#### **Implementation Identifying Information**

The MWL SCP AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIMWLSCP_10_10

### **5.5.2 Association Initiation Policy**

The MWL SCP AE will not initiate any associations.

### **5.5.3 Association Acceptance Policy**

The MWL SCP AE will reject associations from applications that do not address it, i.e. specify an incorrect called AE title. The MWL SCP AE will also reject associations with C-FIND requests from hosts not present in the "hosts" database (DNS, /etc/hosts, etc.)

The MWL SCP AE accepts associations for the following events:

- Verification of the DICOM communication between a remote system and the MWL SCP AE
- Query of the WISE database for a worklist

#### **Verification of the Communication**

##### **Associated Real-World Activity**

A remote system wants to verify the DICOM communication with the MWL SCP AE.

##### **Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 9 and Table 10. Role is SCP.

**SOP Specific Conformance**

The MWL SCP AE provides standard conformance to the DICOM Verification Service Class.

**Presentation Context Acceptance Criterion**

There are no specific rules for acceptance.

**Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 10.

**Query of the WISE Database****Associated Real-World Activity**

A remote system requests a worklist using the C-FIND command.

**Accepted Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 9 and Table 10. Role is SCP.

**SOP Specific Conformance**

The MWL SCP AE provides standard conformance to the DICOM Basic Worklist Management service class as SCP with the following exceptions:

- Fractions of seconds are ignored.
- At most 500 matches are returned. The hit limit can be configured. If there are more items than the hit limit in the WISE database, zero matches are returned.

Appendix F lists all attributes that are supported as matching and return keys.

Case insensitive matching is used for patient name. For all other attributes, case sensitive matching is used.

Range matching is supported for both Study Date and Study Time. If both Study Date and Study Time are specified as a range, e.g. date1 – date2 and time1 – time2, all studies between date1.time1 and date2.time2 are returned. I.e. the result is **not** all studies between two time points on consecutive dates. If this is required, the SCU must do a query on date range only, requiring time in return and filter out the required studies himself. If Study Date is not specified and Study Time is specified as a range an implicit Study Date of today is assumed, i.e. all studies between the two time points on the day the query is done is returned.

Wildcard matching on date and time is not supported. The result is undefined.

If no matches are found, a response with *SUCCESS* is sent.

**Presentation Context Acceptance Criterion**

The intersection between the proposed and acceptable Presentation Contexts is taken for the established association.

**Transfer Syntax Selection Policies**

The transfer syntax selection is done according to the order in Table 7.

## **5.6 Notif SCU AE Specification (WISE (win2k))**

### **5.6.1 Association Establishment Policies**

**General**

The maximum PDU size that the Notif SCU AE will use is 28672 bytes (28 kB).

**Number of Associations**

The Notif SCU AE can only handle one association at a time. One send-request has to be finished before the next is started.

**Asynchronous Nature**

The Notif SCU AE does not support asynchronous operations and will not perform asynchronous window negotiation.

**Implementation Identifying Information**

The Notif SCU AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	SINOTSCU_10_10

**5.6.2 Association Initiation Policy****Real-World Activity - Send Command****Associated Real-World Activity**

If WISE is configured so, the Notif SCU sends a Basic Study Descriptor instance for a specific Study when the corresponding exam is approved. The Basic Study Descriptor object is typically sent to a RIS to indicate that an exam is made, and to indicate the number of images in the exam.

**Proposed Presentation Contexts**

The proposed abstract syntaxes and transfer syntaxes are found by investigating Table 8 and Table 10. Role is SCU.

**SOP Specific Conformance**

The Notif SCU sends all type 1 and type 2 attributes of the Basic Study Descriptor IOD. No type 3 attributes are sent.

If configured so the Notif SCU can send a standard extended type of the Basic Study Descriptor IOD, see section 8.3.1 for details.

**5.6.3 Association Acceptance Policy**

The Notif SCU AE does not handle incoming associations.

## **6. DICOM Media AE Specification**

### **6.1 Implementation Model**

#### **6.1.1 Application Data Flow Diagram**

See section 2.1.1.

#### **6.1.2 Functional Definitions of AE:s**

The DICOM Media AE is located in IDS5 product and provides Standard Conformance to the DICOM Media Storage Service and File Format (PS 3.10 in [1]). It supports the General Purpose CD-R and DVD Interchange Profiles with the exceptions mentioned below. The functionality is intended for the CD-R media but the implementation has left the actual CD creation to any third party product that can write a directory structure to a CD. For this reason DVD-RAM can also be used as media, if a third party DVD-RAM product is used.

### 6.1.3 Sequencing of Real World Activities

Not applicable.

### 6.1.4 File Meta Information

The DICOM Media AE will provide the following implementation identifying information

Implementation Class UID	1.2.752.24.3.3.25.7
Implementation version name	WIMEFSCR_10_10

## 6.2 AE specifications

### 6.2.1 IDS5 AE specification

Supported APs	Real-World Activity	Roles	SC Option
STD-GEN-CD	Import Media	FSR	Interchange
	Export Media	FSC	Interchange
STD-GEN-DVD-RAM	Import Media	FSR	Interchange
	Export Media	FSC	Interchange

See Table 1 for a list of SOP Classes supported for both import and export of media.

#### File Meta Information

The Source Application Entity Title is not used by IDS5.

Private Information from the IDS5 is not stored with the images. Private information, being part of the images before imported to the Sectra PACS, are not removed, thus are retained in the images upon export on media.

#### Real-World Activities

##### Import Media

IDS5 can choose to import a complete or parts of a complete file set acting as FSR. User will be presented with a tree structure presenting the selected file-set and can select which part to import.

Read more about this functionality in [4].

##### *DICOMDIR keys*

The mandatory DICOMDIR keys are required to present the tree structure in a correct way. This structure will show Patients, Studies and Series.

Optional keys are displayed if available.

##### Export Media

IDS5 can create a complete Multipatient file set to be written on CD acting as FSC.

When exporting to media, images are stored in one of the following transfer syntaxes

Transfer Syntax Name	Transfer Syntax UID
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
Implicit VR Little Endian	1.2.840.10008.1.2

Read more about this functionality in [4].

#### *Creating DICOMDIR*

All values needed for DICOMDIR file will be fetched from WISE, if a value does not exist; actual image file will be checked for information. If WISE data is used, image file will be updated according to it. This will ensure that the same information that is written in DICOMDIR file is in the image file.

Referenced Image Sequence are not written into the DICOMDIR file.

### **6.3 Augmented and Private Application Profiles**

Not used.

### **6.4 Extensions, Specializations, and Privatizations of SOP Classes and Transfer Syntaxes**

Not applicable.

### **6.5 Configuration**

See section 9.

### **6.6 Support of Extended Character Sets**

See section 10.

### **6.7 Codes and Controlled Terminology**

Not supported.

### **6.8 Security Profiles**

Not supported.

## **7. Communication Profiles**

### **7.1 Supported Communication Stacks**

All AEs described in this conformance statement provide DICOM 3.0 TCP/IP Network Communication Support as defined in part eight of the DICOM Standard.

### **7.2 TCP/IP Stack**

The AEs uses the TCP/IP stack built into their respective operating system. For more information about operating systems consult their manuals.

#### **7.2.1 Physical Media Support**

All AEs are neutral to the physical medium over which TCP/IP executes. They can e.g. be used with fiber optics, token ring, Ethernet and twisted pair.

### **7.3 OSI Stack**

Not supported.

## **7.4 Point-To-Point Stack**

Not supported.

## 8. Extensions / Specializations / Privatizations

### 8.1 Transfer Syntaxes

The Sectra Compression and Sectra Compression LS Transfer Syntaxes can be used between different components of Sectra PACS. The UID of the Transfer Syntaxes are 1.2.752.24.3.7.6 and 1.2.752.24.3.7.7.

### 8.2 Private Attributes

See Appendix C.

### 8.3 Standard extended SOP Classes

#### 8.3.1 Basic Study Content Notification SOP Class

If configured so the Notif SCU AE of WISE (both Unix and win2k) can send an extended version of the Basic Study Content Notification SOP Class, were the Basic Study Descriptor IOD is enhanced with the following attributes:

Attribute Name	Tag	Type	Attribute Description
Study Date	(0008,0020)	3	Date the study started
Study Time	(0008,0030)	3	Time the study started
Accession Number	(0008,0050)	3	A RIS generated number that identifies the order for the study
Patient's Birth Date	(0010,0030)	3	Birth date of the patient
Patient's Sex	(0010,0040)	3	Sex of the named patient
Study Comments	(0032,4000)	3	User-defined comments about the study. Used values: ADD (indicating that the study has been added to the PACS)

## 9. Configuration

### 9.1 IDS5

Configuration files are found in the XXX\Sectra\IDS5\config\... directory where XXX is specified at installation. See installation guide for IDS5 [2].

#### 9.1.1 Storage SCP

More information about configuration for Storage SCP can be found in IDS5 System Administrators Guide [3].

##### Configuration file

The file ctystore\_scp.def contains configuration for Storage SCP.



### **AE title**

Default AE Title is first part of host name in uppercase with an additional STORE behind it.

Exampel: host = john.net => AE title = JOHNSTORE

### **Port**

Default port is 7820.

## **9.1.2 Q/R-MWL SCU**

More information about configuration for Q/R-MWL SCU can be found in IDS5 System Administrators Guide [3].

### **Configuration file**

The file data\_cache.def contains configuration for Q/R-MWL SCU.

## **9.1.3 Print SCU**

More information about configuration for Print SCU can be found in IDS5 System Administrators Guide [3].

### **Configuration file**

The file dicom\_printer.def contains configuration for Print SCU.

### **AE Title**

The default AE title is DICOM\_PRINT\_SCU.

### **Remote AE**

The remote Applications Entity's AE-title, host name and port number are specified the above-mentioned configuration file. Each remote AE is specified in its own section of the file. Default AE title is PRINT\_SERVER\_SCP.

## **9.1.4 DICOM Media**

More information about configuration for DICOM Media can be found in IDS5 System Administrators Guide [3].

### **Configuration file**

The file cd\_export\_import.def contains configuration for DICOM Media.

## **9.2 WISE (Unix)**

### **9.2.1 Storage SCU**

Configuration is specified in the teleradiology section of the WISE System Administrator's Guide [6].

### **Configuration file**

The file /etc/opt/secra/wise\_send.rc contains configuration for Storage SCU.

### **Remote AE**

The remote Applications Entities AE-title, host name and port number are specified the configuration file /etc/opt/secra/wise\_send.def using the tool w\_config\_telerad. More details can be found in the teleradiology section of the WISE System Administrator's Guide [6].

## 9.2.2 Storage SCP

### AE title

The AE title of each AE can be configured. This is done running WISE/tools or the administration program `/opt/secetra/bin/dcm_adm` as described in the ImageServer/s Installation Guide [7]. Any number of AEs can be set up. The default AE title is `DICOM_STORAGE`.

### Port

The listen port of each AE can be also configured with WISE/tools or the administration program `/opt/secetra/bin/dcm_adm`. You can either set a listen port yourself or let the program automatically select a free listen port.

### Remote AE

The remote Applications Entity's AE-title does not have to be specified. A Storage SCP AE will accept any AE-title. However by default the remote hosts host name must be known to the Storage SCP hosts, e.g. be present in the `/etc/hosts` file.

### Additional configuration

For further configuration see the ImageServer/s (Unix) Installation Guide [7] and System Administrator's Guide [8].

## 9.2.3 Q/R SCU

Configuration of the Q/R SCU is done using the `w_config_xd` program. This program allows setting of the remote Application Entities AE-titles, host names and port numbers. More information can be found in the ImageServer/fs\_xd System's Administrators Guide for HP-UX [12].

## 9.2.4 Q/R SCP

### AE title

The AE title can be configured. This is done using the administration program `/opt/secetra/bin/w_config_qr` as described in the ImageServer/s Installation Guide [7]. Any number of AEs can be set up. The default AE-title is `QR_SCP_WISE`. The same AE title is also used when the Q/R SCP turns into a Storage SCU as a result of a C-MOVE request.

### Port

The listen port of the Q/R SCP AE can be configured. This is done using the administration program `/opt/secetra/bin/w_config_qr` as described in the ImageServer/s Installation Guide [7]. The default is 7632.

### Remote AE

The remote Applications Entity's AE-title, host name and port number are specified using the administration program `/opt/secetra/bin/w_config_qr` as described in the ImageServer/s Installation Guide [7]. By default the remote host's host name must be known to the Q/R SCP host, e.g. be present in the `/etc/hosts` file. Note that all C-MOVE destinations also have to be specified. The setup is described in detail in the ImageServer/s Installation Guide [7].

### Additional configuration

For further configuration see the ImageServer/s (Unix) Installation Guide [7] and System Administrator's Guide [8].

### 9.2.5 MWL SCP

Configuration of the MWL SCP is done using the program `/opt/sectra/bin/w_config_mwlsdp`. This program allows setting of the Application Entity title, listen port number, etc. More information can be found in the WISE System Administrator's Guide [6].

### 9.2.6 Notif SCU

Configuration is described in the WISE System Administrator's Guide [6].

#### Configuration file

The file `/etc/opt/sectra/wise_ris.def` contains configuration for Notif SCU.

#### Remote AE

The remote Application Entity's AE-title, host name and port number are specified in the above-mentioned file. The default value of the AE-title is `SCN_SCP`.

## 9.3 WISE (win2k)

Configuration files can be found in `XXX\Sectra\WISE\Config\...` where XXX is specified at installation. See installation guides for WISE on Windows.

### 9.3.1 Storage SCU

#### Configuration file

The file `ctn_qrscu.def` contains configuration for Storage SCU.

#### Remote AE

By default the Storage SCU must recognize remote hosts.

### 9.3.2 Storage SCP

#### Configuration file

The file `ctn_store.def` contains configuration for Storage SCP.

#### AE title

Default AE title is `DICOM_STORAGE`.

#### Port

Default port is 7810.

#### Remote AE

Storage SCP must recognize remote hosts.

### 9.3.3 Q/R SCU

Configuration of the Q/R SCU is done using the `w_config_xd` program. This program allows setting of the remote Application Entities AE-titles, host names and port numbers. More information can be found in the ImageServer/fs\_xd System's Administrators Guide for Windows [12].

### 9.3.4 Q/R SCP

#### Configuration file

The file `ctn_qrscp.def` contains configuration for Q/R SCP.

**AE title**

Default AE title is DICOM\_QR\_SCP.

**Port**

Default port is 7840.

**Remote AE**

Storage SCP must recognize remote hosts.

**9.3.5 MWL SCP**

Configuration of the MWL SCP is done using the program `w_config_mwlsdp`. This program allows setting of the Application Entity title, listen port number, etc. More information can be found in the WISE (Win) System Administrator's Guide [10].

**9.3.6 Notif SCU**

Configuration is described in the WISE (Win) System Administrator's Guide [10].

**Configuration file**

The file `wise_ris.def` contains configuration for Notif SCU.

**Remote AE**

The remote Application Entity's AE-title, host name and port number are specified in the above-mentioned file. The default value of the AE-title is `SCN_SCP`.

## 10. Support of Extended Character Sets

All AEs provide support for the ISO\_IR 100 (Latin 1) extended character set **except** Print SCU AE. However, note that all text in the images is passed to the printer in the image data itself. This means that all overlay text appears on the printed medium in the same way as on the screen. IDS5 handles most character repertoires used in Western Europe.

## Appendix A. Attribute List for Storage SCP

This list contains the DICOM attributes that are used by a Storage SCP AE by default. Please note that the default behavior can be changed for both WISE and IDS5. The comments give indication what the attributes are used for. If an attribute is not present in this list it is still stored by WISE but ignored by IDS5.

For the Print SCU AE attributes, see 3.3 Print SCU AE Specification. For supported attributes as keys for the Q/R SCP AE in a C-FIND request, see appendix B. For supported attributes in exported presentation states, see appendix D.

**Table 15. Attribute List for a Storage SCP AE**

DICOM Attribute	Comment
(0008,0005) Specific Character Set	"ISO_IR 100" is supported.
(0008,0008) Image Type	<ol style="list-style-type: none"> <li>Is used for determining default window setting in IDS5 if no window is included in the image.</li> <li>Third value used by w_store in default scanogram finding method, and method "-S A"</li> </ol>
(0008,0016) SOP Class UID	Stored in WISE image data (max 64 characters)
(0008,0018) SOP Instance UID	<ol style="list-style-type: none"> <li>Stored in WISE image data (max 64 characters)</li> <li>Required attribute for compression.</li> <li>Used in w_store to overwrite equivalent image (if -k is not specified).</li> </ol>
(0008,0020) Study Date	<ol style="list-style-type: none"> <li>Stored in WISE examination data if value not found in RIS</li> <li>Shown in all IDS5 image windows if present and (0008,0023) and (0008,0022) and (0008,0021) not present.</li> </ol>
(0008,0021) Series Date	Shown in all IDS5 image windows if present and (0008,0023) and (0008,0022) not present.
(0008,0022) Acquisition Date	Shown in all IDS5 image windows if present and (0008,0023) not present.
(0008,0023) Image Date	If present, shown in all IDS5 image windows.
(0008,0030) Study Time	<ol style="list-style-type: none"> <li>Stored in WISE examination data if value not found in RIS</li> <li>Shown in all IDS5 image windows if present and (0008,0033) and (0008,0022) and (0008,0021) not present.</li> </ol>
(0008,0031) Series Time	Shown in all IDS5 image windows if present and (0008,0033) and (0008,0032) not present.
(0008,0032) Acquisition Time	Shown in all IDS5 image windows if present and (0008,0033) not present.
(0008,0033) Image Time	If present, shown in all IDS5 image windows.

(0008,0050) Accession Number	<ol style="list-style-type: none"> <li>1. Stored in WISE examination data (max 16 characters).</li> <li>2. Default attribute for examination number in WISE. Used for connecting the image to RIS entities.</li> </ol>
(0008,0060) Modality	<ol style="list-style-type: none"> <li>1. Stored in WISE series data (max 32 characters).</li> <li>2. Stored in WISE exam data (max 16 characters).</li> <li>3. Defines modality for modality specific settings in IDS5 (e.g. information in images and selecting default print partition).</li> </ol>
(0008,0080) Institution Name	Stored in WISE examination data (max 32 characters).
(0008,0090) Referring Physician's Name	Stored in WISE request data (max 64 characters).
(0008,1010) Station Name	<ol style="list-style-type: none"> <li>1. Stored in WISE series data (max 64 characters).</li> <li>2. Stored in WISE exam data (max 32 characters).</li> </ol>
(0008,1030) Study Description	Stored in WISE examination data (max 64 characters).
(0008,1050) Performing Physician's Name	Stored in WISE examination data (max 32 characters).
(0008,1140) Referenced Image Sequence	Used by WISE in default method for locating scanograms.
(0008,1155) Referenced SOP Instance UID	Used by WISE in default method for locating scanograms.
(0010,0010) Patient Name	Stored in WISE patient data if value not found in RIS (max 64 characters).
(0010,0020) Patient ID	<ol style="list-style-type: none"> <li>1. Must be set. If not, (0010,0010) Patient Name is used as Patient ID in WISE. If both (0010,0020) Patient ID and (0010,0010) Patient Name are empty, the request number is used as Patient ID in WISE.</li> <li>2. Stored in WISE patient data if value not found in RIS (max 64 characters).</li> <li>3. Used as request number in WISE if attribute for request number (default: (0020,0010) Study ID) is empty.</li> </ol>
(0010,0030) Patient's Birth Date	Stored in WISE patient data if value not found in RIS.
(0010,0040) Patient's Sex	Stored in WISE patient data if value not found in RIS.
(0018,0010) Contrast/Bolus Agent	Shown in IDS5 image window for all CT images
(0018,0015) Body Part Examined	Stored in WISE examination data (max 32 characters).
(0018,0020) Scanning Sequence	Shown in IDS5 image window for all MR images if (0018,0024) not present.
(0018,0024) Sequence Name	If present, shown in IDS5 image window for all MR images
(0018,0050) Slice Thickness	Shown in IDS5 image window for all CT and

	MR images
(0018,0060) KVP	Shown in IDS5 image window for all CT images
(0018,0080) Repetition Time	Shown in IDS5 image window for all MR images
(0018,0081) Echo Time	Shown in IDS5 image window for all MR images
(0018,0083) Number of Averages	Shown in IDS5 image window for all MR images
(0018,1041) Contrast/Bolus Volume	Shown in IDS5 image window for all CT and MR images
(0018,1100) Reconstruction Diameter	Shown in IDS5 image window for all CT and MR images
(0018,1120) Gantry/Detector Tilt	Shown in IDS5 image window for all CT images
(0018,1150) Exposure Time	Shown in IDS5 image window for all CT images
(0018,1151) X-ray Tube Current	Shown in IDS5 image window for all CT images
(0018,1164) Imager Pixel Spacing	Used for calibrating the image in IDS5 if (0028,0030) is not set.
(0018,1210) Convolution Kernel	Shown in IDS5 image window for all CT images
(0018,1602) Shutter Left Vertical Edge	Is used for IDS5 cropping.
(0018,1604) Shutter Right Vertical Edge	Is used for IDS5 cropping.
(0018,1606) Shutter Upper Horizontal Edge	Is used for IDS5 cropping.
(0018,1608) Shutter Lower Horizontal Edge	Is used for IDS5 cropping.
(0018,1610) Center of Circular Shutter	If present and (0018,1602) - (0018,1608) not present, defines an IDS5 square cropping.
(0018,1612) Radius of Circular Shutter	If present and (0018,1602) - (0018,1608) not present, defines an IDS5 square cropping.
(0018,5100) Patient Position	Shown in IDS5 image window for all CT and MR images
(0020,000D) Study Instance UID	Stored in WISE examination data (max 64 characters).
(0020,000E) Series Instance UID	<ol style="list-style-type: none"> <li>1. Stored in WISE series data (max 64 characters).</li> <li>2. Is used for non-default method for identifying scanogram images if "-S U" option is used with w_store.</li> <li>3. By default, must be equal for all images within a stack.</li> </ol>
(0020,0010) Study ID	<ol style="list-style-type: none"> <li>1. Stored in WISE examination data (max 16 characters).</li> <li>2. Default attribute for request number in WISE. Used for connecting the image to RIS entities.</li> </ol>
(0020,0011) Series Number	<ol style="list-style-type: none"> <li>1. Stored in WISE series data</li> <li>2. Is used for non-default method for identifying scanogram images if "-S S" option is used with w_store.</li> </ol>
(0020,0013) Instance (Image) Number	<ol style="list-style-type: none"> <li>1. Stored in WISE image data</li> <li>2. Is used for non-default method for identifying scanogram images if "-S I" option is used with w_store.</li> </ol>

	3. Shown in IDS5 image window for all CT and MR images
(0020,0020) Patient Orientation	Always shown in IDS5 image windows for showing anatomical orientation of the image (anterior, posterior, right, left, head, foot). If not present, this information is calculated from tags (0020,0032) and (0020,0037).
(0020,0032) Image Position (Patient)	Important attribute for showing location of images in scanograms in IDS5. Needs to be present in both the stack and in the scanogram. See also (0020,0037) and (0028,0030).
(0020,0037) Image Orientation (Patient)	Important attribute for showing location of images in scanograms in IDS5. Needs to be present in both the stack and in the scanogram. See also (0020,0032) and (0028,0030).
(0020,0052) Frame of Reference UID	Is used for non-default method for identifying scanogram images if "-S A" option is used with w_store.
(0028,0002) Samples per Pixel	If not set, 1 is assumed in IDS5.
(0028,0004) Photometric Interpretation	MONOCHROME1, MONOCHROME2, PALETTE_COLOR, RGB and YBR_FULL_422 are supported by IDS5. If this attribute is not set, MONOCHROME2 is used by IDS5.
(0028,0006) Planar Configuration	If not set, 000 is assumed by IDS5.
(0028,0008) Number of Frames	If not set, 1 is assumed by IDS5.
(0028,0010) Rows	Must be set to be viewable in IDS5.
(0028,0011) Columns	Must be set to be viewable in IDS5
(0028,0030) Pixel Spacing	<ol style="list-style-type: none"> <li>Used for calibrating the image in IDS5. If empty (0018,1164) is used.</li> <li>Important attribute for showing location of images in scanograms in IDS5. Needs to be present in both the stack and in the scanogram. See also (0020,0032) and (0020,0037).</li> <li>An images with non-square pixels can be transformed to an image with square pixels during image import. IDS5 can only handle images with square pixels.</li> </ol>
(0028,0034) Pixel Aspect Ratio	Not used. 1/1 assumed by IDS5. There are possibilities to convert non-square pixels to square pixels in image import.
(0028,0100) Bits Allocated	Must be set to be viewable in IDS5
(0028,0101) Bits Stored	Must be set and less than (0028,0100) Bits Allocated to be viewable in IDS5.
(0028,0102) High Bit	<ol style="list-style-type: none"> <li>If not set, (Bits Stored)-1 is used by IDS5.</li> <li>If set, must be between greater than 0 and less than or equal to Bits Allocated. If not, (Bits Stored)-1 is used by IDS5.</li> </ol>
(0028,0103) Pixel Representation	If not set, 0000H (unsigned integer) is assumed by IDS5.
(0028,1050) Window Center	If not set, the default in IDS is half the bit depth.
(0028,1051) Window Width	If not set, the default in IDS5 is the bit depth.
(0028,1052) Rescale Intercept	Is used for calculating Hounsfield units of CT



	images in IDS5.
(0028,1053) Rescale Slope	Is used for calculating Hounsfield units of CT images in IDS5.
(0028,3000) Modality LUT Sequence	The first LUT in a sequence is used by IDS5, the rest is ignored.
(0028,3002) LUT Descriptor	Must be set if (0028,3000) Modality LUT Sequence is used.
(0028,3006) LUT Data	Must be set if (0028,3000) Modality LUT Sequence is used.
(0040,0244) Performed Procedure Step Start Date	Stored in WISE series data
(0040,0245) Performed Procedure Step Start Time	Stored in WISE series data
(0040,0254) Performed Procedure Step Description	Stored in WISE examination data, comments field (max 512 characters).
(0040, 0275) Request Attribute Sequence >(0040,0009) Scheduled Procedure Step Id >(0040,1001) Requested Procedure Id	Stored in WISE series data
(7FE0,0010) Pixel Data	Must be set.

## Appendix B. Key List for Q/R C-FIND-RQ

These tables contain the DICOM keys that are supported by the Q/R SCP AE in C-FIND requests. The three columns under Type correspond to the different Q/R information models: **Pat** = Patient Root, **Study** = Study Root and **P/S O** = Patient/Study Only. The contents of the Type columns specify the key type, where **M** = supported for matching and as return key, **R** = supported as return key only, not for matching. A minus sign indicates that the key is not supported for the specific level and information model. A "X" in the UNIX and Win columns indicate if the key is supported on WISE(Unix) and WISE(Win) respectively.

**Table 16. PATIENT Level**

Key	Tag	Type			Unix	Win	Comment
		Pat	Study	P/S O			
Patient's Name	(0010,0010)	M	M	M	X	X	Case insensitive matching
Patient ID	(0010,0020)	M	M	M	X	X	
Patient's Birth Date	(0010,0030)	M	M	M	X	X	
Patient's Sex	(0010,0040)	M	M	M	X	X	

**Table 17. STUDY Level**

Key	Tag	Type			Unix	Win	Comment
		Pat	Study	P/S O			
Study Date	(0008,0020)	M	M	M	X	X	Range matching is supported
Study Time	(0008,0030)	M	M	M	X	X	Range matching is supported
Accession Number	(0008,0050)	M	M	M	X	X	
Modalities in Study	(0008,0061)	M	M	M	X	-	
Referring Physician's Name	(0008,0090)	M	M	M	X	-	Case sensitive matching
Study Description	(0008,1030)	M	M	M	X	X	

Patient's Name	(0010,0010)	-	M	-	X	X	Case insensitive matching
Patient ID	(0010,0020)	-	M	-	X	X	
Patient's Birth Date	(0010,0030)	-	M	-	X	X	
Patient's Sex	(0010,0040)	-	M	-	X	X	
Study ID	(0020,0010)	M	M	M	X	X	
Study Instance UID	(0020,000D)	M	M	M	X	X	
Number of Study Related Series	(0020,1206)	R	R	R	X	X	
Number of Study Related Instances	(0020,1208)	R	R	R	X	X	

**Table 18. SERIES Level**

Key	Tag	Type		Unix	Win	Comment
		Pat	Study			
Modality	(0008,0060)	M	M	X	X	
Body Part Examined	(0018,0015)	M	M	X	X	
Series Number	(0020,0011)	M	M	X	X	
Series Instance UID	(0020,000E)	M	M	X	X	
Number of Series Related Instances	(0020,1209)	R	R	X	X	
Request Attribute Sequence	(0040,0275)					
>Request Procedure ID	(0040,1001)	M	M	X	-	
>Scheduled Procedure ID	(0040,0009)	M	M	X	-	
Performed Procedure Step Start Date	(0040,0244)	M	M	X	-	
Performed Procedure Step Start Time	(0040,0245)	M	M	X	-	

**Table 19. INSTANCE Level**

Key	Tag	Type		Unix	Win	Comment
		Pat	Study			
SOP Class UID	(0008,0016)	M	M	X	X	
SOP Instance UID	(0008,0018)	M	M	X	X	
Content Date	(0008,0023)	R	R	X	-	
Content Time	(0008,0033)	R	R	X	-	
Instance Number	(0020,0013)	M	M	X	X	
Referenced Series Sequence	(0008,1115)					
>Series Instance UID	(0008,1115)	R	R	X	-	Presentation States only
>Referenced Image Sequence	(0008,1140)					
>>Referenced SOP Class UID	(0008,1150)	R	R	X	-	Presentation States only
>>Reference SOP Instance UID	(0008,1155)	R	R	X	-	Presentation States only
Number of Frames	(0028,0008)	R	R	X	-	Images only
Rows	(0028,0010)	R	R	X	-	Images only
Columns	(0028,0011)	R	R	X	-	Images only
Bits Allocated	(0028,0100)	R	R	X	-	Images only

Concept Name Code Sequence	(0040,A043)					
>Code Value	(0008,0100)	M	M	X	-	Key Object Selection Documents only
>Code Scheme Designator	(0008,0102)	M	M	X	-	Key Object Selection Documents only
>Coding Scheme Version	(0008,0103)	R	R	X	-	Key Object Selection Documents only
>Code Meaning	(0008,0104)	R	R	X	-	Key Object Selection Documents only
Referenced Request Sequence	(0040,A370)	R	R	X	-	
>Accession Number	(0008,0050)					Key Object Selection Documents only
>Study Instance UID	(0020,000D)					Key Object Selection Documents only
>Requested Procedure Code Sequence	(0032,1064)					
>>Code Value	(0008,0100)	R	R	X	-	Key Object Selection Documents only
>>Code Scheme Designator	(0008,0102)	R	R	X	-	Key Object Selection Documents only
>>Coding Scheme Version	(0008,0103)	R	R	X	-	Key Object Selection Documents only
>>Code Meaning	(0008,0104)	R	R	X	-	Key Object Selection Documents only
>Requested Procedure ID	(0040,1001)	R	R	X	-	Key Object Selection Documents only
Presentation Label	(0070,0080)	R	R	X	-	Presentation States only
Presentation Description	(0070,0081)	R	R	X	-	Presentation States only
Presentation Creation Date	(0070,0082)	R	R	X	-	Presentation States only
Presentation Creation Time	(0070,0083)	R	R	X	-	Presentation States only
Presentation Creator's Name	(0070,0084)	R	R	X	-	Presentation States only

## Appendix C. Sectra Private Attributes

If configured so, the Store SCU AE can include some Private Attributes in images exported from it. This table documents these attributes.

Tag	Name	VR	VM	Description
(0009,00xx)	Private creator code	LO	1	Value: SECTRA_Ident_01
(0009,xx01)	Request number	LO	1	Unique id of request for this image
(0009,xx02)	Examination number	LO	1	Unique id of examination for this image
(0009,xx04)	Series ID	LO	1	Series identifier
(0009,xx05)	Series Order	LO	1	Order within exam
(0009,xx06)	File Name	LO	1	File name
(0009,xx07)	Image Data ID	LO	1	Image identifier
(0029,00yy)	Private creator code	LO	1	Value: SECTRA_ImageInfo_01
(0029,yy01)	Image info	OB	1	Image settings made on an IDS workstation
(0029,yy02)	Marking	CS	1	Marking. Possible value: KEY.
(0029,yy03)	No decompression	LO	1	Indicates no decompression
(0029,yy04)	Image info new	OB	1	Image settings, new version
(6001,00zz)	Private creator code	LO	1	Value: SECTRA_OverlayInfo_01
(6001,zz01)	Sectra Overlay	LO	1	Indicates which overlay that is the Sectra Overlay

## Appendix D. Exported Presentation States

If the IDS5 user makes changes in the default image settings and/or annotations these settings and annotations can be exported as DICOM Standard Grayscale Presentation States if the Storage SCP supports this. The presentation states modules contain the following information generated from IDS5 settings and annotations.

If the IDS5 user changes an existing default setting the SOP Instance UID of the associated presentation state will be changed. The old setting will not be saved.

Please note that Presentation States that has been imported into WISE will be exported in a transparent way.

Module	IDS5 correspondence	Note
Presentation State	-	Label: "IDS5 DEFAULT" Description: "IDS5 Default Setting"
Mask	-	Not used.
Display Shutter	Cropping.	Always RECTANGULAR.
Bitmap Display Shutter	-	Not used.
Overlay Plane	-	Not used.
Overlay/Curve Activation	-	All 60xx overlays are rendered in graphic layer 0. 50xx curves are not displayed.
Displayed Area	A combination of view port, zoom factor, zoom	The presentation size mode can be one of "TRUE SIZE", "SCALE TO FIT"

	to fit, true size	or "MAGNIFY" depending on the IDS5 settings.
Graphic Annotation	All overlays graphics and measurements.	We always use annotation units "PIXEL", i.e. image relative coordinates.
Spatial Transformation	Rotation/flip.	
Graphic Layer	-	Only one single layer (0).
Modality LUT	-	Copied from original image.
Softcopy VOI LUT	Window width/center setting or currently selected LUT.	If the user has selected a true lookup table from the original image, this table is copied from the original image. Otherwise the current window width/center is used.
Softcopy Presentation LUT	-	Normally "IDENTITY", but in some cases it could also be "INVERSE":

## Appendix E. Presentation State Display in IDS5

Presentation states are translated to IDS5 parameters and displayed, with some limitations as described in the rest of this section. Any presentation state information that is not handled fully by IDS, causes a warning icon to be displayed over the image.

### E.1 Presentation State Module (C.11.10)

Presentation Label	(0070,0080)	Used to select PR and presented to user to aid in selection
Referenced Series Sequence	(0008,1115)	Used to link PR with image
>Series Instance UID	(0020,000E)	Used to link PR with image
>Referenced Image Sequence	(0008,1140)	Used to link PR with image
>>Referenced Frame Number	(0008,1160)	Used to link PR with image
Presentation Creation Date	(0070,0082)	Presented to user to aid in selection
Presentation Creation Time	(0070,0083)	Presented to user to aid in selection

### E.2 Mask Module (C.7.6.10)

(Not supported)

Mask Subtraction Sequence	0028, 6100	Warning displayed if element present
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### E.3 Display Shutter Module (C.7.6.11), Bitmap Display Shutter (C.7.6.15)

Bitmap shutters are not supported. Rectangular shutters are implemented as cropping in IDS5.

Shutter Shape	(0018,1600)	Only RECTANGULAR is supported
Shutter Left Vertical Edge	(0018,1602)	Used to define shutter shape
Shutter Right Vertical Edge	(0018,1604)	

Shutter Upper Horizontal Edge	(0018,1606)	
Shutter Lower Horizontal Edge	(0018,1608)	

## E.4 Overlay Plane (C.9.2)

Only bitmap overlays (no curves) are supported.

Overlay Rows	(60xx,0010)	Defines overlay size
Overlay Columns	(60xx,0011)	
Overlay Type	(60xx,0040)	Only type "G" overlays supported
Overlay Origin	(60xx,0050)	
Overlay Bits Allocated	(60xx,0100)	
Overlay Bit Position	(60xx,0102)	
Overlay data	(60xx,3000)	

## E.5 Overlay/Curve Activation (C.11.7)

Not supported; overlay display is controlled by user (normally "on").

Overlay Activation Layer	60xx,1001	Warning displayed if present
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## E.6 Displayed Area (C.10.4)

Fully supported; implemented as combination of viewport, zoom factor, zoom to fit and zoom to true size in IDS5.

Displayed Area Selection Sequence	0070,005A	Used to select displayed area item
>Referenced Image Sequence	(0008,1140)	
>>Referenced SOP Instance Sequence	(0008,1155)	
>>Referenced Frame Number	(0008,1160)	
>Presentation Pixel Spacing	(0070,0101)	
>Presentation Pixel Aspect Ratio	(0070,0102)	Only 1:1-aspect pixels are supported
>Displayed Area Top Left Hand Cordner	(0070,0052)	
>Displayed Area Bottom Right Hand Corner	(0070,0053)	
>Presentation Size Mode	(0070,0100)	
>Presentation Pixel Magnification Ratio	(0070,0103)	

## E.7 Graphic Annotation (C.10.5)

Only image relative coordinates are supported (unit type "PIXEL"). Filled graphics are not supported. ELLIPSE graphics must have their axes aligned with the coordinate system. INTERPOLATED graphics are not supported.

Graphic Annotation Sequence	(0070,0001)	
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>Referenced Image Sequence	(0008,1140)	
>>Referenced SOP Class UID	(0008,1155)	
>>Referenced Frame Number	(0008,1160)	
>Graphic Layer	(0070,0002)	Warning displayed if present.
>Text Object Sequence	(0070,0008)	
>>Bounding Box Annotation Units	(0080,0003)	Only PIXEL units supported
>>Anchor Point Annotation Units	(0070,0004)	Only PIXEL units supported
>>Unformatted Text Value	(0070,0006)	
>>Bounding Box Top Left Hand Corner	(0070,0010)	
>>Bounding Box Bottom Right Hand Corner	(0070,0011)	
>>Bounding Box Text Horizontal Justification	(0070,0012)	
>>Anchor Point	(0070,0014)	
>>Anchor Point Visibility	(0070,0015)	
>Graphic Object Sequence	(0070,0009)	
>>Graphic Annotation Units	(0070,0005)	Only PIXEL units supported
>>Number of Graphic Points	(0070,0021)	
>>Graphic Data	(0070,0022)	
>>Graphic Type	(0070,0023)	Type INTERPOLATED is not supported. ELLIPSE objects must have axes aligned with pixel grid.
>>Graphic Filled	(0070,0024)	Value "Y" (filled graphics) not supported

## E.8 Spatial Transformation (C.10.6)

Image Rotation	(0070,0042)	
Image Horizontal Flip	(0070,0041)	

## E.9 Graphic Layer (C.10.7)

Not supported; overlays from all layers are displayed in the same manner.

Graphic Layer Sequence	0070,0060	Warning displayed if element present
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## E.10 Modality LUT (C.11.1)

Modality LUT Sequence	(0028,3000)	
>LUT Descriptor	(0028,3002)	
>LUT Data	(0028,3006)	

Modality LUT Rescale Intercept	(0028,1052)	
Modality LUT Rescale Slope	(0028,1053)	

### E.11 Softcopy VOI LUT (C.11.8)

Softcopy VOI Lut Sequence	(0028,3110)	
>Referenced Image Sequence	(0008,1140)	
>Referenced SOP Instance UID	(0008,1155)	
>Referenced Frame Number	(0008,1160)	
>VOI LUT Sequence	(0028,3010)	
>>LUT Descriptor	(0028,3002)	
>>LUT Data	(0028,3006)	
>Window Center	(0028,1050)	
>Window Width	(0028,1051)	

### E.12 Softcopy Presentation LUT (C.11.6)

Presentation LUT Sequence	(2050,0010)	
>LUT Descriptor	(0028,3002)	
>LUT Data	(0028,3006)	
Presentation LUT Shape	(2050,0020)	

## Appendix F. Key List for MWL C-FIND-RQ

This table contains the DICOM keys that are supported by the Modality Worklist SCP AE in C-FIND requests. The contents of the Type columns specify the key type, where **M** = supported for matching and as return key, **R** = supported as return key only, not for matching.

**Table 20. Modality Worklist Information Model Attributes**

Key	Tag	Type	Comment
Specific Character Set	(0008,0005)	R	
Scheduled Procedure Step Sequence	(0040,0100)	M	
>Scheduled Station AE Title	(0040,0001)	M	
>Scheduled Procedure Step Start Date	(0040,0002)	M	Range matching is supported
>Scheduled Procedure Step Start Time	(0040,0003)	M	Range matching is supported
>Modality	(0008,0060)	M	



Key	Tag	Type	Comment
>Scheduled Performing Physician's name	(0040,0006)	M	
>Scheduled Procedure Step Description	(0040,0007)	M	
>Scheduled Station Name	(0040,0010)	M	
>Scheduled Procedure Step ID	(0040,0009)	M	
Requested Procedure ID	(0040,1001)	M	
Requested Procedure Description	(0032,1060)	R	
Study Instance UID	(0020,000D)	M	
Accession Number	(0008,0050)	M	
Referring Physician's Name	(0008,0090)	M	Case sensitive matching
Patient ID	(0010,0020)	M	
Patient's Name	(0010,0010)	M	Case insensitive matching
Patient's Birth Date	(0010,0030)	M	
Patient's Sex	(0010,0040)	M	

**World Headquarters:**

Sectra Imtec AB, Teknikringen 20  
SE-583 30 Linköping, Sweden  
Phone: +46 13 23 52 00 Fax: +46 13 21 21 85

**Sectra North America Headquarters:**

2 Enterprise Drive, Suite 507  
Shelton, CT 06484, USA  
Phone: +1 203 925 0899 Fax: +1 203 925 0906

[info.imtec@sectra.se](mailto:info.imtec@sectra.se)

[www.sectra.se](http://www.sectra.se)

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