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Digital Imaging and Communications in Medicine (DICOM)

Supplement 98: Retirement of Detached, Standalone and other Services

DICOM Standards Committee, Working Group 6 Base Standard

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Table of Contents

2	Table of Contents.....	2
	Foreword	5
4	Scope and Field of Application	6
	A.5.2.1 . “Application Entity <1>” - Specification.....	13
6	B.5.2 AE SPECIFICATIONS.....	14
	B.5.2.1 .. Offline-Media Application Entity Specification	14
8	B.5.2.1.2.1 Activity – Export to CD-R.....	14
	D.5.2 AE SPECIFICATIONS.....	14
10	D.5.2.1 .. MEDIA-FSR.....	14
	6.1.2 NORMALIZED IOD	14
12	7.2 ORGANIZATION OF ANNEXES A, B AND C.....	15
	A.1.2 IOD Entity-Relationship Model.....	16
14	A.1.2.2 STUDY IE	16
	A.1.2.3 SERIES IE	16
16	A.1.2.6 IMAGE IE.....	17
	A.1.2.7 OVERLAY IE	17
18	A.1.2.8 CURVE IE.....	17
	A.1.2.9 MODALITY LUT IE	18
20	A.1.2.10 VOI LUT IE	18
	A.6.4 US Image IOD Module Table	19
22	A.6.4.1 Mutually Exclusive IEs.....	20
	A.7.4 US Multi-Frame Image IOD Module Table.....	21
24	A.7.4.1 Mutually Exclusive IEs.....	22
	A.17.1 RT Image IOD Description	23
26	A.18.1 RT Dose IOD Description.....	24
	A.19.1 RT Structure Set IOD Description.....	24
28	A.20.1 RT Plan IOD Description.....	24
	A.32.1.2 VL Endoscopic Image IOD Entity-Relationship Model.....	25
30	A.32.5.3.2. Image Related Data Encoding.....	25
	A.33.2 Grayscale Softcopy Presentation State IOD Module Table	26
32	A.33.2.2 Color Softcopy Presentation State IOD Module Table.....	26
	A.33.3.2 Pseudo-Color Softcopy Presentation State IOD Module Table.....	26
34	C.7.6.15 Bitmap Display Shutter Module	26
	A.36.2.3.1 Enhanced MR Image IOD Content Constraints.....	27
36	B.17.2 IOD Modules	28
	C.4.15 Image Acquisition Results.....	30
38	C.4.19 General Purpose Scheduled Procedure Step Information Module.....	30
	C.7.3.1 General Series Module.....	31
40	C.8.8.1 RT Series Module	31
	C.8.11.1 DX Series Module.....	32
42	C.8.13.6 MR Series Module	32
	C.8.15.1 CT Series Module	33
44	C.8.4.9 NM Image Module	35
	C.8.5.6 US Image Module	36
46	C.8.7.1.1.9 Synchronization of Frame and <u>Curve Waveform</u> Times	36
	C.8.9.4 PET Image Module.....	37

	C.9.2	Overlay plane module	38
2		C.9.2.1 Overlay Attribute Descriptions	40
		C.9.2.1.1 Overlay type	40
4		C.9.2.1.2 ROI area, ROI mean, and ROI standard deviation	40
		C.9.2.1.3 Overlay Subtype	41
6		C.10.5 Graphic Annotation Module	42
		C.10.7 Graphic Layer Module	42
8		C.11.7 Overlay/Curve Activation Module	42
		C.13.2 Basic Film Session Relationship Module	44
10		C.13.5 Image Box Pixel Presentation Module	45
	F.2	BASIC DIRECTORY IOD OVERVIEW	47
12		F.2.1 Basic directory IOD organization	47
	F.3	BASIC DIRECTORY INFORMATION OBJECT DEFINITION	51
14		F.3.2.2 Directory Information Module	51
	F.4	BASIC DIRECTORY IOD INFORMATION MODEL	54
16	F.7	ICON IMAGE KEY DEFINITION	58
		6.1.2 Normalized IOD	59
18	B.5	STANDARD SOP CLASSES	59
		C.6.1.1.5 Composite object instance Level	62
20	Annex F	<u>STUDY MANAGEMENT SERVICE CLASS PROCEDURE STEP SOP CLASSES</u> (Normative) 64	
22		F.1 OVERVIEW	64
		F.2 CONFORMANCE OVERVIEW	64
24		F.2.1 Association Negotiation	65
		H.2.1.1 Global Data Flow Model	67
26		H.2.3 Print Management SOP Classes	68
		H.3.1 Scope	68
28		H.3.2 Print Management Meta SOP Classes	69
		H.3.2.1 Description	69
30		H.3.2.2.5 Pull Stored Print Management Meta SOP Class <u>(Retired)</u>	70
		H.3.3 Optional SOP Classes	70
32		H.3.3.1 Description	70
		H.3.3.2 List of Optional SOP Classes	70
34		H.3.4 Conformance statement	71
		H.4.1.2.1 N-CREATE	72
36		H.4.1.2.1.1 Attributes	72
		H.4.1.2.4.1 Attributes	73
38		H.4.2.2.4.1 Attributes	74
		H.4.3.1.2.1 N-SET	75
40		H.4.3.2.2.1 N-SET	77
		H.4.5.2.1.1 Attributes	78
42		H.4.10 Pull Print Request SOP Class <u>(Retired)</u>	80
		H.4.12 Basic Print Image Overlay Box SOP Class <u>(Retired)</u>	80
44		H.7 Example of the Pull Print Request Meta SOP Class (INFORMATIVE) <u>(Retired)</u>	80
		H.8 OVERLAY EXAMPLES (INFORMATIVE) <u>(Retired)</u>	80
46	I.1	OVERVIEW	81
		I.1.1 Scope	81
48		I.1.2 Service Definition	81
	I.2	BEHAVIOR	81
50		I.2.1 Behavior of an FSC	81

	I.2.2 Behavior of an FSR.....	82
2	I.2.3 Behavior of an FSU.....	82
	I.3 CONFORMANCE.....	83
4	I.3.1 Conformance as an FSC.....	83
	I.3.2 Conformance as an FSR.....	83
6	I.3.3 Conformance as an FSU.....	83
	I.3.4 Conformance Statement Requirements.....	84
8	I.4 MEDIA STORAGE STANDARD SOP CLASSES.....	85
	J.1.1 Scope.....	88
10	N.2 PIXEL TRANSFORMATION SEQUENCE.....	88
	8.1.2 Overlay data encoding of related data elements.....	89
12	A.1 DICOM IMPLICIT VR LITTLE ENDIAN TRANSFER SYNTAX.....	90
	A.2 DICOM LITTLE ENDIAN TRANSFER SYNTAX (EXPLICIT VR).....	90
14	A.3 DICOM BIG ENDIAN TRANSFER SYNTAX (EXPLICIT VR).....	90
	A.4 TRANSFER SYNTAXES FOR ENCAPSULATION OF ENCODED PIXEL DATA.....	91
16	D.2 VARIOUS ADDITIONAL EXAMPLES OF PIXEL AND OVERLAY DATA CELLS.....	91
	A.1 SIMPLE DIRECTORY CONTENT EXAMPLE.....	104
18	A.3 STD-XABC-CD BASIC CARDIAC PROFILE.....	107
	A.3.4.1.1 ATTRIBUTE VALUE PRECEDENCE.....	107
20	D.3 STD-GEN PROFILE CLASS.....	108
	D.3.3.2 Attribute value precedence.....	108
22	C.3.2 Physical Media And Media Formats.....	109
	E.3.2 Physical Medium And Medium Format.....	110

Foreword

2 This Supplement to the DICOM Standard retires various features that have not been used widely or in an interoperable manner, or have been superseded by more robust services.

4 In particular, the direction taken by IHE has been used as a guide to determine those services to retain.

6 Retirement does not imply that these features cannot be used. The reader is referred to earlier editions of the Standard. However, the DICOM Standards Committee will not maintain the
8 documentation of retired features. The use of the retired features is deprecated in new implementations, in favor of those alternatives remaining in the standard.

10 The DICOM Standard will not reuse Data Element tags and UIDs that would conflict with retired services.

12 This document is a Supplement to the DICOM Standard. It is an extension to the following parts of the published DICOM Standard:

14 PS 3.1 Introduction and Overview

PS 3.2 Conformance

16 PS 3.3 Information Object Definitions

PS 3.4 Service Class Specifications

18 PS 3.5 Data Structures and Encoding

PS 3.6 Data Dictionary

20 PS 3.10 Media Storage and File Format for Media Interchange

PS 3.11 Media Storage Application Profiles

22 PS 3.12 Media Formats and Physical Media for Media Interchange

Scope and Field of Application

2 This Supplement retires the following Services, SOP Classes, IODs and Modules:

1. Basic Study Content Notification
- 4 2. Detached Patient Management
3. Detached Study and Study Component Management
- 6 4. Detached Results and Interpretation Management
5. Print Queue Management
- 8 6. Stored Print
7. Standalone Overlays, Curves, VOI LUT and Modality LUT Storage
- 10 8. Multi-Referenced File Directory Record, and TOPIC
9. Floppy disk and obsolete MOD formats and profiles
- 12 10. Patient Study Only Query
11. Curves
- 14 12. Print Overlay
13. Overlays in images in high bits

16

2 Amend PS 3.1 to define retirement:

RETIREMENT

4 **Part of the maintenance process involves retirement of sections of the Standard,**
6 **including but not limited to, IODs, Attributes, Service Classes, SOP Classes, Transfer**
Syntaxes and Protocols.

8 **Retirement does not imply that these features cannot be used. However, the DICOM**
Standards Committee will not maintain the documentation of retired features. The reader
is referred to earlier editions of the Standard.

10 **The use of the retired features is deprecated in new implementations, in favor of those**
alternatives remaining in the standard.

12

Amend PS 3.2. Annex A.1 Conformance Statement Overview as follows:

14

**Table A.1-2
UID VALUES**

16

UID Value	UID NAME	Category
1.2.840.10008.1.9	Basic Study Content Notification SOP Class	Workflow Management
1.2.840.10008.1.20.1	Storage Commitment Push Model SOP Class	Workflow Management
1.2.840.10008.1.40	Procedural Event Logging SOP Class	Workflow Management
1.2.840.10008.3.1.2.1.1	Detached Patient Management SOP Class	Workflow Management
1.2.840.10008.3.1.2.1.4	Detached Patient Management Meta SOP Class	Workflow Management
1.2.840.10008.3.1.2.2.1	Detached Visit Management SOP Class	Workflow Management
1.2.840.10008.3.1.2.3.1	Detached Study Management SOP Class	Workflow Management
1.2.840.10008.3.1.2.3.2	Study Component Management SOP Class	Workflow Management
1.2.840.10008.3.1.2.3.3	Modality Performed Procedure Step SOP Class	Workflow Management
1.2.840.10008.3.1.2.3.4	Modality Performed Procedure Step Retrieve SOP Class	Workflow Management
1.2.840.10008.3.1.2.3.5	Modality Performed	Workflow Management

	Procedure Step Notification SOP Class	
1.2.840.10008.3.1.2.5.1	Detached Results Management SOP Class	Workflow Management
1.2.840.10008.3.1.2.5.4	Detached Results Management Meta SOP Class	Workflow Management
1.2.840.10008.3.1.2.5.5	Detached Study Management Meta SOP Class	Workflow Management
1.2.840.10008.3.1.2.6.1	Detached Interpretation Management SOP Class	Workflow Management
1.2.840.10008.4.2	Storage Service Class	Transfer
1.2.840.10008.5.1.1.1	Basic Film Session SOP Class	Print Management
1.2.840.10008.5.1.1.2	Basic Film Box SOP Class	Print Management
1.2.840.10008.5.1.1.4	Basic Grayscale Image Box SOP Class	Print Management
1.2.840.10008.5.1.1.4.1	Basic Color Image Box SOP Class	Print Management
1.2.840.10008.5.1.1.9	Basic Grayscale Print Management Meta SOP Class	Print Management
1.2.840.10008.5.1.1.14	Print Job SOP Class	Print Management
1.2.840.10008.5.1.1.15	Basic Annotation Box SOP Class	Print Management
1.2.840.10008.5.1.1.16	Printer SOP Class	Print Management
1.2.840.10008.5.1.1.16.376	Printer Configuration Retrieval SOP Class	Print Management
1.2.840.10008.5.1.1.18	Basic Color Print Management Meta SOP Class	Print Management
1.2.840.10008.5.1.1.22	VOI LUT Box SOP Class	Transfer
1.2.840.10008.5.1.1.23	Presentation LUT SOP Class	Print Management
1.2.840.10008.5.1.1.24.1	Basic Print Image Overlay Box SOP Class	Print Management
1.2.840.10008.5.1.1.26	Print Queue Management SOP Class	Print Management
1.2.840.10008.5.1.1.27	Stored Print Storage SOP Class	Print Management
1.2.840.10008.5.1.1.29	Hardcopy Grayscale Image Storage SOP	Transfer

	Class	
1.2.840.10008.5.1.1.30	Hardcopy Color Image Storage SOP Class	Transfer
1.2.840.10008.5.1.1.31	Pull Print Request SOP Class	Print Management
1.2.840.10008.5.1.1.32	Pull Stored Print Management Meta SOP Class	Print Management
1.2.840.10008.5.1.1.33	Media Creation Management SOP Class UID	Print Management
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.1.1	Digital X-Ray Image Storage – For Presentation	Transfer
1.2.840.10008.5.1.4.1.1.1.1.1	Digital X-Ray Image Storage – For Processing	Transfer
1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography X-Ray Image Storage – For Presentation	Transfer
1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography X-Ray Image Storage – For Processing	Transfer
1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-oral X-Ray Image Storage – For Presentation	Transfer
1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-oral X-Ray Image Storage – For Processing	Transfer
1.2.840.10008.5.1.4.1.1.2	CT Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.2.1	Enhanced CT Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.3.1	Ultrasound Multi-frame Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.4	MR Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.4.1	Enhanced MR Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.4.2	MR Spectroscopy Storage	Transfer
1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.7.1	Multi-frame Single Bit Secondary Capture Image Storage	Transfer

1.2.840.10008.5.1.4.1.1.7.2	Multi-frame Grayscale Byte Secondary Capture Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.7.3	Multi-frame Grayscale Word Secondary Capture Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.7.4	Multi-frame True Color Secondary Capture Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.8	Standalone Overlay Storage	Transfer
1.2.840.10008.5.1.4.1.1.9	Standalone Curve Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.1.1	12-lead ECG Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.1.2	General ECG Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.1.3	Ambulatory ECG Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.2.1	Hemodynamic Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.3.1	Cardiac Electrophysiology Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.9.4.1	Basic Voice Audio Waveform Storage	Transfer
1.2.840.10008.5.1.4.1.1.10	Standalone Modality LUT Storage	Transfer
1.2.840.10008.5.1.4.1.1.11	Standalone VOI LUT Storage	Transfer
1.2.840.10008.5.1.4.1.1.11.1	Grayscale Softcopy Presentation State Storage SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.11.2	Color Softcopy Presentation State Storage SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.11.3	Pseudo-Color Softcopy Presentation State Storage SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.11.4	Blending Softcopy Presentation State Storage SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.12.1	X-Ray Angiographic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.12.1.1	Enhanced XA Image Storage	Transfer

1.2.840.10008.5.1.4.1.1.12.2	X-Ray Radiofluoroscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.12.2.1	Enhanced XRF Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.20	Nuclear Medicine Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.66	Raw Data Storage	Transfer
1.2.840.10008.5.1.4.1.1.66.1	Spatial Registration Storage	Transfer
1.2.840.10008.5.1.4.1.1.66.2	Spatial Fiducials Storage	Transfer
1.2.840.10008.5.1.4.1.1.67	Real World Value Mapping Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.1.1	Video Endoscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.2.1	Video Microscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.4.1	Video Photographic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.4.1	Video Photographic Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.5.1	Ophthalmic Photography 8 Bit Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.5.2	Ophthalmic Photography 16 Bit Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.77.1.5.3	Stereometric Relationship Storage	Transfer
1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR	Transfer
1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR	Transfer
1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR	Transfer
1.2.840.10008.5.1.4.1.1.88.40	Procedure Log Storage	Transfer
1.2.840.10008.5.1.4.1.1.88.50	Mammography CAD SR	Transfer
1.2.840.10008.5.1.4.1.1.88.59	Key Object Selection Document	Transfer
1.2.840.10008.5.1.4.1.1.88.65	Chest CAD SR	Transfer

1.2.840.10008.5.1.4.1.1.88.67	X-Ray Radiation Dose SR	Transfer
1.2.840.10008.5.1.4.1.1.104.1	Encapsulated PDF Storage SOP Class	Transfer
1.2.840.10008.5.1.4.1.1.128	Positron Emission Tomography Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.129	Standalone PET Curve Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.1	RT Image Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.2	RT Dose Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.3	RT Structure Set Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.4	RT Beams Treatment Record Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.5	RT Plan Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.6	RT Brachy Treatment Record Storage	Transfer
1.2.840.10008.5.1.4.1.1.481.7	RT Treatment Summary Record Storage	Transfer
1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model – FIND	Query/Retrieve
1.2.840.10008.5.1.4.1.2.1.2	Patient Root Query/Retrieve Information Model – MOVE	Query/Retrieve
1.2.840.10008.5.1.4.1.2.1.3	Patient Root Query/Retrieve Information Model – GET	Query/Retrieve
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model – FIND	Query/Retrieve
1.2.840.10008.5.1.4.1.2.2.2	Study Root Query/Retrieve Information Model – MOVE	Query/Retrieve
1.2.840.10008.5.1.4.1.2.2.3	Study Root Query/Retrieve Information Model – GET	Query/Retrieve
1.2.840.10008.5.1.4.1.2.3.1	Patient/Study Only Query/Retrieve Information Model – FIND	Query/Retrieve
1.2.840.10008.5.1.4.1.2.3.2	Patient/Study Only Query/Retrieve Information Model – MOVE	Query/Retrieve

1.2.840.10008.5.1.4.1.2.3.3	Patient/Study Only Query/Retrieve Information Model – GET	Query/Retrieve
1.2.840.10008.5.1.4.31	Modality Worklist Information Model – FIND	Workflow Management
1.2.840.10008.5.1.4.32.1	General Purpose Worklist Information Model – FIND	Workflow Management
1.2.840.10008.5.1.4.32.2	General Purpose Scheduled Procedure Step SOP Class	Workflow Management
1.2.840.10008.5.1.4.32.3	General Purpose Performed Procedure Step SOP Class	Workflow Management
1.2.840.10008.5.1.4.32	General Purpose Worklist Management Meta SOP Class	Workflow Management
1.2.840.10008.5.1.4.33	Instance Availability Notification SOP Class	Workflow Management
1.2.840.10008.5.1.4.37.1	General Relevant Patient Information Query	Query/Retrieve
1.2.840.10008.5.1.4.37.2	Breast Imaging Relevant Patient Information Query	Query/Retrieve
1.2.840.10008.5.1.4.37.3	Cardiac Relevant Patient Information Query	Query/Retrieve
1.2.840.10008.5.1.4.38.1	Hanging Protocol Storage	Transfer
1.2.840.10008.5.1.4.38.2	Hanging Protocol Information Model – FIND	Query/Retrieve
1.2.840.10008.5.1.4.38.3	Hanging Protocol Information Model – MOVE	Query/Retrieve

2 **A.5.2.1 “Application Entity <1>” - Specification**

4 The following table, Table A.5.2-1, shows that for one or more Application Profiles in the first
column, there are a number of Real-World Activities in the second column, **and** the roles required
6 for each of these Real-World Activities in the third column, **and the Service Class Option
(Interchange or Print) is listed in the fourth column.**

8 **Table A.5.2-1
AE RELATED APPLICATION PROFILES, REAL-WORLD ACTIVITIES, AND ROLES**

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-AP1	RWA A	FSR	Interchange
	RWA B	FSR, FSC	Interchange
STD-AP1, AUG-AP2, etc.	RWA C	FSU	Print

	RWA D	FSC	Interchange
--	-------	-----	--------------------

2 **B.5.2 AE SPECIFICATIONS**

B.5.2.1 Offline-Media Application Entity Specification

4 The Offline-Media Application Entity provides standard conformance to the ~~DICOM Interchange Option of the~~ Media Storage Service Class. The Application Profiles and roles are listed below:

6 **Table B.5.2-1
APPLICATION PROFILES, ACTIVITIES AND ROLES FOR OFFLINE-MEDIA**

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Export to CD-R	FSC	Interchange

8

...

10 **B.5.2.1.2.1 Activity – Export to CD-R**

12 The Offline-Media Application Entity acts as an FSC ~~using the interchange option~~ when requested to export SOP Instances from the local database to a CD-R medium.

...

14 **D.5.2 AE SPECIFICATIONS**

D.5.2.1 MEDIA-FSR

16 MEDIA-FSR provides standard conformance to ~~DICOM Interchange Option of~~ the Media Storage Service Class.

18

**Table D.5.2-1
APPLICATION PROFILES, ACTIVITIES, AND ROLES FOR MEDIA-FSR**

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Load directory or file	FSR	Interchange
STD-GEN-DVD-RAM	Load directory or file	FSR	Interchange

20 *Amend PS 3.3 6.1.2 as follows:*

22 **6.1.2 NORMALIZED IOD**

24 A Normalized IOD is an Information Object Definition which generally represents a single entity in the DICOM Model of the Real-World.

26 ~~In this Standard, strict definition of Normalized Object Definitions has not been applied. Application of strict definitions would often result in unnecessary complexity and reduced performance of implementations for several applications.~~

28 ~~**Note:**—An example is the Print Queue IOD. Attributes from the Basic and Referenced Print Management IODs are combined in the Print Queue IOD. This allows an SCP to provide all relevant information in a single N-Get Service Element. Otherwise several Service Elements would be required to return the attributes from individual Normalized IODs. This requires less network traffic to convey the information, thus improving system performance.~~

30

32

~~The Print Queue IOD has been classified as a Normalized IOD to allow operations by DIMSE-N Services since most devices which support the Print Queue Management SOP Class also support the Basic Print Management Meta SOP Class in which the DIMSE-N Service Elements are used. This facilitates efficient implementations of the Print Queue Management SOP Class.~~

When an instance of a Normalized IOD is communicated, the context for that instance is not actually exchanged. Instead, the context is provided through the use of pointers to related Normalized IOD Instances.

The Normalized IODs are specified in Annex B.

Amend PS 3.3 7.2 as follows:

7.2 ORGANIZATION OF ANNEXES A, B AND C

Annex A defines Composite IOD's (e.g. Images, **Curves, Overlays**) acquired on a number of Modalities (e.g. CT, MR, NM, US, CR, Secondary Capture). These Composite IOD's reference Modules found in Annex C.

Annex B defines Normalized IODs (e.g. **Patient, Study, Results**, Film Session, Print Job) for a number of Service Classes specified in PS 3.4. These Normalized IODs reference Module definitions found in Annex C.

Amend PS 3.3 Section 7 Figures 7-1a, 7-1b, 7-2a, 7-2b as follows:

Figure 7-1a:

- remove Study Content Notification and relationship to Study
- remove Study Components and relationships to Study and Series
- remove Results and its children and relationship to Study, and corresponding note above figures
- remove Stored Print, LUT, Curve and Overlay and their relationships to Series

Figure 7-1b:

- remove Print Queue and its relationships to Printer and Print Job
- remove Overlay and its relationship to Image Box

Figure 7-2a:

- remove Basic Study Description IOD and relationship to Study IOD
- remove Study Component IOD and relationships to Study IOD and Series IOD
- remove Results IOD and its children and relationship to Study IOD
- remove Stored Print, Standalone Modality and VOI LUT, Standalone Curve and Standalone Overlay IODs and their relationships to Series IOD

Figure 7-2b:

- remove Print Queue IOD and its relationships to Printer and Print Job IODs
- remove Basic Print Image Overlay Box IOD and its relationship to Image Box IOD
- remove Stored Print, Image and Print Request IOD and relationship to Printer IOD

Remove PS 3.3 Annex A references to standalone objects:

Amend PS 3.3 Figure A.1-1:

- remove Stored Print, Curve, Modality LUT, VOI LUT and Overlay

A.1.2 IOD Entity-Relationship Model

2 ...

4 Each Series shall contain at least one ~~Curve IE, VOI Lookup Table IE, Overlay IE, Modality LUT IE, Stored Print IE~~, Presentation State IE, SR Document IE or Image IE.

...

6 A.1.2.2 STUDY IE

8 The Study IE defines the characteristics of a medical study performed on a patient. A study is a collection of one or more series of medical images, presentation states, and/or SR documents, ~~overlays and/or curves~~ that are logically related for the purpose of diagnosing a patient. Each study is associated with exactly one patient.

12 A study may include composite instances that are created by a single modality, multiple modalities or by multiple devices of the same modality.

The Study IE is modality independent.

14 A.1.2.3 SERIES IE

16 The Series IE defines the Attributes that are used to group composite instances into distinct logical sets. Each series is associated with exactly one Study.

The following criteria group composite instances into a specific series:

- 18 a. All composite instances within a series must be of the same modality
- 20 b. If a specific Composite Instance IOD specifies the support of a Frame of Reference IE, all composite instances within the series shall be spatially or temporally related to each other; therefore, each series is associated with exactly one Frame of Reference IE
- 22
- 24 c. If a specific Composite Instance IOD specifies the support of the Equipment IE, all composite instances within the series shall be created by the same equipment; therefore, each series is associated with exactly one Equipment IE
- 26 d. All composite instances within a series shall have the same series information

28 ~~Overlays and Curves may be grouped into a Series with or without Images. The Equipment IE and Frame of Reference IE are irrelevant to the Overlay IE and Curve IE.~~

30 Presentation States shall be grouped into Series without Images (i.e. in a different Series from the Series containing the Images to which they refer). The Frame of Reference IE is irrelevant to the Presentation State IE.

34 Note: The Series containing Presentation States and the Series containing the Images to which they refer are both contained within the same Study.

36 Waveforms shall be grouped into Series without Images. A Frame of Reference IE may apply to both Waveform Series and Image Series.

38 SR Documents shall be grouped into Series without Images. The Frame of Reference IE does not apply to SR Document Series.

40 ...

A.1.2.6 IMAGE IE

2 The Image IE defines the Attributes that describe the pixel data of an image. The pixel data may
4 be generated as a direct result of patient scanning (termed an Original Image) or the pixel data
6 may be derived from the pixel data of one or more other images (termed a Derived Image). An
image is defined by its image plane, pixel data characteristics, gray scale and/or color mapping
characteristics, overlay planes and modality specific characteristics (acquisition parameters and
image creation information).

8 An image is related to a single series within a single study.

10 The pixel data within an Image IE may be represented as a single frame of pixels or as multiple
frames of pixel data. The frames of a Multi-frame image (a cine run or the slices of a volume) are
12 sequentially ordered and share a number of common properties. A few Attributes may vary
between frames (eg.-Time, Angular Displacement, Slice Increment). All common Image IE
Attributes refer to the first frame of a multiple frame image.

14 Overlay, and Lookup Table and Curve data may be included within an Image IE only if this
information is directly associated with the image.

16 A.1.2.7 OVERLAY IE

The Overlay IE defines the Attributes that describe an independent set of Overlay Planes. The
18 Overlay IE may represent in a bit-map format, graphics or text and is used to indicate such items
as region of interest, reference marks and annotations. ~~These Overlay Planes may or may not
20 be coincident with an image. If the Overlay Plane is coincident with an image,~~ sufficient
information shall be available to allow an overlay to be presented at a display station
22 superimposed on a particular image with which it is associated. An Overlay IE shall be related to
only one Series IE.

24 An Overlay Plane may be represented as a single frame (when associated with a single frame
image) or as multiple frames of overlay planes (when associated with a Multi-frame image).

26 **Notes:** ~~1. Examples of independent overlay planes are:~~

28 ~~_____ a) line drawings which illustrate the equipment and patient setup prescribed~~

~~_____ b) line drawings which represent anatomy, pointers and text~~

~~_____ c) drawings showing the layout of images and text fields for filming formats~~

30 ~~_____ 2. The Overlay IE is similar in concept to the 'Graphics Data Set' defined by earlier
versions of this Standard.~~

A.1.2.8 CURVE IE

34 Retired. See PS 3.3 2004.

~~A Curve is used to represent graphical data that can be specified as a series of connected
36 points. Curve data may or may not be superimposed on a coincident image. An
independent Curve, like an independent Overlay, can exist as would an image without any
38 Pixel Data. Curves can be used to specify multi-dimensional graphs, regions of interest,
and annotation. Curve Data is not compressed in any of the DICOM Standard Transfer
40 Syntaxes specified in PS 3.5.~~

~~Each curve is specified as a series of connected points. One or more Curves shall be
42 described by using one or more even numbered Repeating Groups (5000-501E,eeee)
whose attributes are described in the Curve Module. The Type of Data (50xx,0020)
44 contained in the Curve shall be specified. For independent Curves, the Curve
Identification Module is used to identify the Curve.~~

A.1.2.9 MODALITY LUT IE

2 The Modality LUT IE defines the Attributes that describe the transformation of manufacturer
4 dependent pixel values into pixel values which are manufacturer independent (e.g. Hounsfield
units for CT, Optical Density for film digitizers, etc.). The Modality LUT may be contained within
6 an image, or a presentation state which references an image, ~~or as a Standalone Modality LUT
which references an image~~. When the transformation is linear, the Modality LUT is described by
8 Rescale Slope (0028,1053) and Rescale Intercept (0028,1052). When the transformation is non-
linear, the Modality LUT is described by Modality LUT Sequence (0028,3000).

A.1.2.10 VOI LUT IE

10 The VOI LUT IE defines the Attributes that describe the transformation of the modality pixel
12 values into pixel values that are meaningful for print, display, etc. This transformation is applied
after any Modality LUT. The VOI LUT may be contained within an image, or a presentation state
14 that references an image, ~~or as a Standalone VOI LUT which references an image~~. When the
transformation is linear, the VOI LUT is described by the Window Center (0028,1050) and
Window Width (0028,1051). When the transformation is non-linear, the VOI LUT is described by
16 VOI LUT Sequence (0028,3010).

18 *Remove Curve Identification and Curve and Audio Module Rows from PS 3.3 Table A.1-1*
COMPOSITE INFORMATION OBJECT MODULES OVERVIEW - IMAGES

22 *Remove Standalone Curve, PET Curve, Overlay, VOI LUT and Modality LUT Columns and*
Overlay Identification, Curve Identification, Curve Module, Patient Summary, PET Curve and
Audio Rows from PS 3.3 Table A.1-2, and rename Overlay/Curve Activation to Overlay Activation
24 *COMPOSITE INFORMATION OBJECT MODULES OVERVIEW - NON-IMAGES*

26 *Remove Study Content Module Row and Basic Study Description Column from PS 3.3 Table A.1-*
2
28 *COMPOSITE INFORMATION OBJECT MODULES OVERVIEW - NON-IMAGES*

30 *Remove the Curve Module and mention of the Curve IE from PS 3.3:*
Table A.2-1 CR Image IOD Modules
32 *Table A.5-1 NM Image IOD Modules*
and append the note after the tables:

34
36 **Note:** The Curve Module was previously included in the Image IE for this IOD but has been
retired. See PS 3.3 2004.

38 *Remove the Curve Module and mention of the Curve IE from PS 3.3 Table A.6-1 and amend the*
corresponding text accordingly:

40

A.6.4 US Image IOD Module Table

2

**Table A.6-1
US IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Frame of Reference	C.7.4.1	U
	Synchronization	C.7.4.2	U
Equipment	General Equipment	C.7.5.1	M
Image (See A.6.4.1)	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR
	US Region Calibration	C.8.5.5	U
	US Image	C.8.5.6	M
	Overlay Plane	C.9.2	U
	VOI LUT	C.11.2	U
Curve (See A.6.4.1)	Curve Identification	C.10.1	M
	Curve	C.10.2	M
	Audio	C.10.3	U
	SOP Common	C.12.1	M

4

Notes: 1. For the purpose of conveying ultrasound protocol data management information it is recommended that the Performed Protocol Code Sequence (0040,0260) be assigned the code value(s) of the performed ultrasound protocol, if any. The Baseline Context Group for these code values is Context ID 12001 (defined in PS 3.16).

6

8

2. The US Frame of Reference Module was previously included in this IOD, but has been retired. See PS 3.3 2003.

10

A.6.4.1 Mutually Exclusive IEs

2 ~~The Image and Curve IEs are mutually exclusive. Each SOP Instance using this IOD shall contain exactly one of these IEs.~~

4 Note: A Curve IE was previously included in this IOD that was mutually exclusive with the Image IE, but has been retired. See PS 3.3 2004.

6 ...

A.7.4 US Multi-Frame Image IOD Module Table

2

**Table A.7-1
US MULTI-FRAME IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Frame of Reference	C.7.4.1	U
	Synchronization	C.7.4.2	C – Required if Modality (0008,0060) = IVUS. May be present otherwise.
Equipment	General Equipment	C.7.5.1	M
Image (See A.7.4.1)	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image.
	Cine	C.7.6.5	M
	Multi-frame	C.7.6.6	M
	Frame Pointers	C.7.6.9	U
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR
	US Region Calibration	C.8.5.5	U
	US Image	C.8.5.6	M
	VOI LUT	C.11.2	U
	SOP Common	C.12.1	M
Curve (see A.7.4.1)	Curve Identification	C.10.1	M
	Curve	C.10.2	M
	Audio	C.10.3	U
	SOP Common	C.12.1	M

4

Notes: 1. For the purpose of conveying ultrasound protocol data management information it is recommended that the Performed Protocol Code Sequence (0040,0260) be assigned the code value(s) of the performed ultrasound protocol, if any. The Baseline Context Group for these code values is Context ID 12001 (defined in PS 3.16).

6

8

2 2. The US Frame of Reference Module was previously included in this IOD, but has been
retired. See PS 3.3 2003.

4 **A.7.4.1 Mutually Exclusive IEs**

6 ~~The Image and Curve IEs are mutually exclusive. Each SOP Instance using this IOD shall
contain exactly one of these IEs.~~

8 Note: A Curve IE was previously included in this IOD that was mutually exclusive with the
Image IE, but has been retired. See PS 3.3 2004.

10 *Replace the entire PS 3.3 A.9 Standalone Overlay information object definition with:*

12 **Retired. See PS 3.3 2004.**

14 *Replace the entire PS 3.3 A.10 Standalone Curve information object definition with:*

16 **Retired. See PS 3.3 2004.**

18 *Replace the entire PS 3.3 A.11 Basic study descriptor information object definition with:*

20 **Retired. See PS 3.3 2004.**

22 *Replace the entire PS 3.3 A.12 Standalone Modality LUT information object definition with:*

24 **Retired. See PS 3.3 2004.**

26 *Replace the entire PS 3.3 A.13 Standalone VOI LUT information object definition with:*

28 **Retired. See PS 3.3 2004.**

30 *Remove the Curve Module and mention of the Curve IE from PS 3.3:
Table A.14-1 XA IOD Modules
32 Table A.16-1 XRF IOD Modules
and append the note after the tables:*

34
36 Note: The Curve Module was previously included in the Image IE for this IOD but has been
retired. See PS 3.3 2004.

2 Remove the Curve and Audio Modules and mention of the Curve and Audio IE from PS 3.3:
3 Table A.17.3-1 RT Image IOD Modules
4 and replace note 3 after the table:

6 A.17.1 RT Image IOD Description

7 The focus for this Radiotherapy Image IOD (RT Image IOD) is to address the requirements for
8 image transfer found in general radiotherapy applications performed on conventional simulators,
9 virtual simulators, and portal imaging devices. Such images have a conical imaging geometry and
10 may either be acquired directly from the device, or digitized using a film digitizer. ~~They may or
11 may not have superimposed curves describing beam limiting device (collimator)
12 openings, beam modifying devices, patient structures and target volumes.~~ Numeric beam
13 data parameters may also be recorded with the image, indicating the parameter values at the
14 time the image was taken or created.

16 Note 3. ~~The Curve module has been included to allow the possibility of storing one or more
17 curves overlaid with a given image. Generally these curves would represent patient
18 structures, target volumes, or beam limiting device (collimator) openings, although they
19 could also be used to store other data such as axis information. Such curves would be
20 stored in pixel units (i.e. the coordinates would represent pixel indices in the image
21 data). For example, patient structures might have the following attribute assignments:~~

Curve Dimensions (50xx,0005)	=2
Number of Points (50xx,0010)	= Number of data points in curve
Type of Data (50xx,0020)	= ROI
Data Value Representation (50xx,0103)	= US (unsigned short)
Curve Data (50xx,3000)	=(x,y) pixel coordinates
Curve Description (50xx,0022)	= Structure/Target name

22 ~~————— Note that there is no facility for representing multi-frame curves (i.e. all curves are
23 interpreted as being related to the first image frame in a multi-frame image). Curves
24 other than patient structures might also be represented using the HIST, POLY or TABL
25 curve types (see C.10.2.1).~~

28 ~~————— The Curve and Audio Modules were previously included in the Image IE for this IOD but
29 has been retired. See PS 3.3 2004.~~

30

32 Remove the Audio Module and mention of the Audio IE from PS 3.3:
33 Table A.18.3-1 RT Dose IOD Modules
34 Table A.19.3-1 RT Structure Set IOD Modules
35 Table A.20.3-1 RT Plan IOD Modules
36 and append the note after the tables:

A.18.1 RT Dose IOD Description

2 The focus for this Radiotherapy Dose IOD (RT Dose IOD) is to address the requirements for
4 transfer of dose distributions calculated by radiotherapy treatment planning systems. These
6 distributions may be represented as 2D or 3D grids, as isodose curves, or as named or unnamed
8 dose points scattered throughout the volume. This IOD may also contain dose-volume histogram
data, single or multi-frame overlays, ~~audio annotations~~, and application-defined lookup tables.
This IOD does not provide for definition of doses in beam or other coordinate systems. The
application is responsible for transforming data in other, non-patient based coordinate systems to
the patient based coordinate system described in C.7.6.2.1.1.

10 A.19.1 RT Structure Set IOD Description

12 The focus for this Radiotherapy Structure Set IOD (RT Structure Set IOD) is to address the
14 requirements for transfer of patient structures and related data defined on CT scanners, virtual
simulation workstations, treatment planning systems and similar devices. ~~This IOD may also
contain audio curve annotations.~~

A.20.1 RT Plan IOD Description

16 The focus for this Radiotherapy Plan IOD (RT Plan IOD) is to address the requirements for
18 transfer of treatment plans generated by manual entry, a virtual simulation system, or a treatment
20 planning system before or during a course of treatment. Such plans may contain fractionation
information, and define external beams and/or brachytherapy application setups. ~~This IOD may
also contain audio curve annotations.~~

22 **Note:** The Audio Module was previously included in the Image IE for this IOD but has been
retired. See PS 3.3 2004.

24
26 *Replace the entire PS 3.3 A.22 Standalone PET Curve information object definition with:*

Retired. See PS 3.3 2004.

28
30 *Replace the entire PS 3.3 A.23 Stored Print information object definition with:*

Retired. See PS 3.3 2004.

32
34 *Replace the entire PS 3.3 A.24 Hardcopy Grayscale Image information object definition with:*

Retired. See PS 3.3 2004.

36
38 *Replace the entire PS 3.3 A.25 Hardcopy Color Image information object definition with:*

Retired. See PS 3.3 2004.

2 *Remove the Curve Module and mention of the Curve IE from PS 3.3:*
3 *Table A.26-1 DX IOD Modules*
4 *Table A.27-1 Digital Mammography IOD Modules*
5 *Table A.28-1 Digital Intra-oral X-ray IOD Modules*
6 *Table A.29.3-1 RT Beams Treatment Record IOD Modules*
7 *Table A.30.3-1 RT Brachy Treatment Record IOD Modules*
8 *Table A.31.3-1 RT Treatment Summary Record IOD Modules*
9 *and append the note after the tables:*

10
11 **Note:** The Curve Module was previously included in the Image IE for this IOD but has been
12 retired. See PS 3.3 2004.

13
14 *Remove mention of Curve entity from the model description of A.32.1.2, A.32.2.2, A.32.3.2,*
15 *A.32.4.2, A.32.5.2, A.32.6.2, A.32.7.2, A.41.2, A.42.2, as for example:*

16
17 **A.32.1.2 VL Endoscopic Image IOD Entity-Relationship Model**

18 The E-R Model in Section A.1.2 of this Part depicts those components of the DICOM Information
19 Model that directly reference the VL Endoscopic Image IOD, with exception of the **Curve**, VOI
20 LUT, Frame of Reference and Modality LUT entities, which are not used. Additionally, Image in
21 figure A.1.2 of PS3.3 represents a Single Frame image. A frame denotes a two-dimensional
22 organization of pixels recorded as a single exposure. Table A.32.1-1 specifies the Modules of the
23 VL Endoscopic Image IOD.

24 **Note:** The Curve entity was previously include in the list of entities that are not used, but has
25 been retired from DICOM. It is still not used in this IOD. See PS 3.3 2004.

26
27
28 *Remove mention of Curve Module from the description of A.32.5.3.2, A.32.6.3.2 A.32.7.3.2, as for*
29 *example:*

30 **A.32.5.3.2 Image Related Data Encoding**

31 The Modality LUT, VOI LUT, Graphic Annotation, and Overlay ~~and Curve~~ Modules shall not be
32 present.

33 **Note:** The Curve Module was previously include in the list of Modules that shall not be present,
34 but has been retired from DICOM. It is still not permitted to be present. See PS 3.3 2004.

35
36
37 *Rename the Overlay/Curve Activation Module to no longer mention curves:*
38

A.33.2 Grayscale Softcopy Presentation State IOD Module Table

2

**Table A.33-1
Grayscale Softcopy Presentation State IOD MODULES**

IE	Module	Reference	Usage

	Overlay/ Curve Activation	C.11.7	C- Required if referenced image contains curve or overlay data that is to be displayed

4

...
Notes: ...

6

4. This IOD does not support the storage of a multi-frame overlay in the IOD itself, but does support selective activation of multi-frame overlays within the referenced images via the Overlay/~~Curve~~ Activation Module.

8

10 ...

A.33.2.2 Color Softcopy Presentation State IOD Module Table

12

**Table A.33.2-1
Color Softcopy Presentation State IOD MODULES**

IE	Module	Reference	Usage

	Overlay/ Curve Activation	C.11.7	C- Required if referenced image contains curve or overlay data which is to be displayed

14

16

A.33.3.2 Pseudo-Color Softcopy Presentation State IOD Module Table

18

**Table A.33.3-1
Pseudo-Color Softcopy Presentation State IOD MODULES**

	Overlay/ Curve Activation	C.11.7	C- Required if referenced image contains curve or overlay data that is to be displayed

20

C.7.6.15 Bitmap Display Shutter Module

22

The Overlay specified in this Attribute shall not be activated (used as a conventional overlay) by the Overlay/~~Curve~~ Activation Module C.11.7.

24

...

2 *Remove mention of Curve Module from the content constraints of A.36.2.3.1, A.38.1.3.1, as for*
4 *example:*

A.36.2.3.1 Enhanced MR Image IOD Content Constraints

6 The General Image Module, Overlay Plane Module, ~~Curve Module~~ and VOI LUT Module shall
not be used in a Standard Extended SOP Class of the Enhanced MR Image.

8 **Note:** **The Curve Module was previously include in the list of Modules that shall not be present,**
10 **but has been retired from DICOM. It is still not permitted to be present. See PS 3.3 2004.**

12 *Replace the entire PS 3.3 B.1 Patient information object definition with:*

14 **Retired. See PS 3.3 2004.**

16 *Replace the entire PS 3.3 B.2 Visit information object definition with:*

18 **Retired. See PS 3.3 2004.**

20 *Replace the entire PS 3.3 B.3 Study information object definition with:*

22 **Retired. See PS 3.3 2004.**

24 *Replace the entire PS 3.3 B.4 Study Component information object definition with:*

26 **Retired. See PS 3.3 2004.**

28 *Replace the entire PS 3.3 B.5 Results information object definition with:*

30 **Retired. See PS 3.3 2004.**

32 *Replace the entire PS 3.3 B.6 Interpretation information object definition with:*

34 **Retired. See PS 3.3 2004.**

2 *Replace the entire PS 3.3 B.16 Print Queue information object definition with:*

4 **Retired. See PS 3.3 2004.**

6 *Amend PS 3.3 B.17 MODALITY PERFORMED PROCEDURE STEP IOD Modules:*

8 **B.17.2 IOD Modules**

Table B.17.2-1 lists the modules that make up the Modality Performed Procedure Step IOD.

10

**Table B.17.2-1
MODALITY PERFORMED PROCEDURE STEP IOD MODULES**

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP common information
Performed Procedure Step Relationship	C.4.13	References the related SOPs and IEs.
Performed Procedure Step Information	C.4.14	Includes identifying and status information as well as place and time
Image Acquisition Results	C.4.15	Identifies Series, and Images, Standalone LUTs, Overlays and Curves related to this PPS and specific image acquisition conditions.
Radiation Dose	C.4.16	Contains radiation dose information related to this Performed Procedure Step.
Billing and Material Management Codes	C.4.17	Contains codes for billing and material management.

12

14 *Replace the entire PS 3.3 B.19 Pull Print Request information object definition with:*

14

Retired. See PS 3.3 2004.

16 *Replace the entire PS 3.3 B.21 Basic Print Image Overlay Box information object definition with:*

18 **Retired. See PS 3.3 2004.**

20 *Replace the entire PS 3.3 C.3.5 Visit Discharge Module with:*

22 **Retired. See PS 3.3 2004.**

24 *Replace the entire PS 3.3 C.3.6 Visit Scheduling Module with:*

24

Retired. See PS 3.3 2004.

2

Replace the entire PS 3.3 C.4.1 Study Relationship Module with:

4

Retired. See PS 3.3 2004.

6

Replace the entire PS 3.3 C.4.2 Study Identification Module with:

8

Retired. See PS 3.3 2004.

10

Replace the entire PS 3.3 C.4.3 Study Classification Module with:

12

Retired. See PS 3.3 2004.

14

Replace the entire PS 3.3 C.4.4 Study Scheduling Module with:

16

Retired. See PS 3.3 2004.

18

Replace the entire PS 3.3 C.4.5 Study Acquisition Module with:

20

Retired. See PS 3.3 2004.

22

Replace the entire PS 3.3 C.4.6 Study Read Module with:

24

Retired. See PS 3.3 2004.

26

Replace the entire PS 3.3 C.4.7 Study Component Module with:

28

Retired. See PS 3.3 2004.

30

Replace the entire PS 3.3 C.4.8 Study Component Relationship Module with:

32

Retired. See PS 3.3 2004.

2

Replace the entire PS 3.3 C.4.9 Study Component Acquisition Module with:

4

Retired. See PS 3.3 2004.

6

Amend PS 3.3 C.4.15 IMAGE ACQUISITION RESULTS Module:

8

C.4.15 Image Acquisition Results

10 Table C.4-15 specifies attributes that describe the acquisition of images during the performance of
12 the Procedure Step and that provide references to the Series, Images and **Standalone other
Composite** SOP Instances associated with this Modality Performed Procedure Step.

14 **Table C.4-15**
IMAGE ACQUISITION RESULTS MODULE ATTRIBUTES

Attribute Name	Tag	Attribute Description
...
>Retrieve AE Title	(0008,0054)	Title of the DICOM Application Entity where the Images and Standalone other Composite SOP Instances in this Series may be retrieved on the network. Note: The duration for which this location remains valid is unspecified.
...
>Referenced Non-Image Composite SOP Instance Sequence	(0040,0220)	Uniquely identifies instances, other than images, of any SOP Class that conforms to the DICOM Composite IOD Information Model, such as Waveforms, Presentation States, <u>or</u> Structured Reports, LUTs, Curves or Overlays , created during the acquisition of the procedure step. The sequence may have zero or more Items.
...

16

Amend PS 3.3 C.4.19 General Purpose Scheduled Procedure Step Information Module:

18

C.4.19 General Purpose Scheduled Procedure Step Information Module

20

2

**Table C.4-19
GENERAL PURPOSE SCHEDULED PROCEDURE STEP INFORMATION MODULE
ATTRIBUTES**

Attribute Name	Tag	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	List of any Modality or General Purpose Performed Procedure Steps, or other Study Components , that may be used to perform the procedure step. This sequence may contain references to performed procedure steps resulting from previous contributions to the performance of the procedure step (e.g. an image processing procedure step interrupted, and completed later). Zero or more Items may be included in this sequence.
...

4

Amend PS 3.3 C.7.3.1 General Series Module:

6

C.7.3.1 General Series Module

8

...

10

**Table C.7-5a
GENERAL SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance or Study Component SOP Instance). The Sequence shall have zero or one Item.
...

12

Amend PS 3.3 C.8.8.1 RT Series Module:

14

C.8.8.1 RT Series Module

16

There exist significant differences in the manner in which RT objects as compared to diagnostic objects. An RT object can be one of several types, and a series of a given object type may be

18

created over a temporal span of several weeks. The RT Series Module has been created to satisfy the requirements of the standard DICOM Query/Retrieve model while including only those attributes relevant to the identification and selection of radiotherapy objects.

20

Table C.8-37 - RT SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
----------------	-----	------	-----------------------

...
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance or Study Component SOP Instance). One or more items may be included in this sequence.
...

2 Amend PS 3.3 C.8.11.1 DX Series Module:

4 **C.8.11.1 DX Series Module**

...

6 **Table C.8-68
DX SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	1C	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance or Study Component SOP Instance). The Sequence shall have one Item. Required if the Modality Performed Procedure Step SOP Class, General Purpose Performed Procedure Step SOP Class or Study Component SOP Class is supported.
...

8

Amend PS 3.3 C.8.13.6 MR Series Module:

10

C.8.13.6 MR Series Module

12 ...

14 **Table C.8-101
MR SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	1C	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or

			General-Purpose Performed Procedure Step SOP Instance or Study Component SOP Instance). The Sequence shall have one Item. Required if the Modality Performed Procedure Step SOP Class , General Purpose Performed Procedure Step SOP Class or Study Component SOP Class is supported.
...

2 Amend PS 3.3 C.8.15.1 CT Series Module:

4 **C.8.15.1 CT Series Module**

...

6 **Table C.8-113
CT SERIES MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Performed Procedure Step Sequence	(0008,1111)	1C	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance or Study Component SOP Instance). The Sequence shall have one Item. Required if the Modality Performed Procedure Step SOP Class , General Purpose Performed Procedure Step SOP Class or Study Component SOP Class is supported.
...

8

10 Replace the entire PS 3.3 C.5 Results Modules with:

12 **Retired. See PS 3.3 2004.**

14 Replace the entire PS 3.3 C.6 Interpretation Modules with:

16 **Retired. See PS 3.3 2004.**

2 *Replace the entire PS 3.3 C.7.7 Patient Summary Module with:*

4 **Retired. See PS 3.3 2004.**

6 *Replace the entire PS 3.3 C.7.8 Study Content Module with:*

8 **Retired. See PS 3.3 2004.**

10 *Remove references to curves and overlays from C.8.4.9 NM Image Module:*

C.8.4.9 NM Image Module

2 Table C.8-9 contains the Attributes that describe Nuclear Medicine Images.

4 **Table C.8-9
NM IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
...
Referenced Overlay Sequence	(0008,1130)	3	A sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Overlays. Uniquely identifies Overlays significantly related to this Image. Zero or more Items may be included in this sequence.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if a sequence Item is present.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if a sequence Item is present.
Referenced Curve Sequence	(0008,1145)	3	A sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Curves. Uniquely identifies Curves significantly related to this Image. Zero or more Items may be included in this sequence.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if a sequence Item is present.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if a sequence Item is present.
...

6 Notes: 1. Content Date (0008,0023) and Content Time (0008,0033) are included in the General Image
 8 Module, Table C.7-7, whenever the images are temporally related. For this purpose, all NM
 Images are considered temporally related, so that these elements are included in an NM Image.

10 2. Referenced Overlay Sequence (0008,1130) and Referenced Curve Sequence
 12 (0008,1145) were previously included in this Module as optional Attributes but have been
retired. See PS 3.3 2004.

14 Remove references to curves and overlays from C.8.5.6 US Image Module:

C.8.5.6 US Image Module

2 Table C.8-18 specifies the Attributes that describe ultrasound images.

4 **Table C.8-18**
US IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Referenced Overlay Sequence	(0008,1130)	3	A Sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Overlays. Uniquely identifies Overlays significantly related to this Image. Zero or more Items may be included in this Sequence.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Overlay Sequence (0008,1130) is sent.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Reference Overlay Sequence (0008,1130) is sent.
Referenced Curve Sequence	(0008,1145)	3	A sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Curves. Uniquely identifies Curves significantly related to this Image.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Curve Sequence (0008,1145) is sent.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Reference Curve Sequence (0008,1145) is sent.
...

6 **Note:** Referenced Overlay Sequence (0008,1130) and Referenced Curve Sequence (0008,1145)
 8 were previously included in this Module as optional Attributes but have been retired. See
 10 PS 3.3 2004.

12 *Remove references to curves from C.8.7.1 X-Ray Image Module:*

C.8.7.1.1.9 Synchronization of Frame and Curve Waveform Times

14 ~~If a Curve is present and of type ECG, pressure, physiological, respiration, time activity~~
 16 ~~curve, the origin of the coordinate start time (50xx, 0112) shall be the time of frame 1.~~

18 The synchronization of a multiframe X-ray image with a waveform (e.g., ECG, pressure, or
respiration) encoded in a different SOP Instance is managed through the attributes of the
Synchronization Module (see Section C.7.4.2) of the Frame of Reference IE.

Note: The use of a Curve IE within the X-Ray IODs was previously defined in DICOM (see PS3.3-2004). That use has been retired in favor of encoding waveform data in a separate IOD.

Remove references to curves and overlays from C.8.9.4 PET Image Module:

C.8.9.4 PET Image Module

Table C.8-63 contains IOD Attributes that describe PET images.

Table C.8-63 - PET IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
...
Referenced Overlay Sequence	(0008,1130)	3	A sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Overlays. Uniquely identifies Overlays significantly related to this Image. Zero or more Items may be included in this sequence.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Overlay Sequence (0008,1130) is sent.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Referenced Overlay Sequence (0008,1130) is sent.
Referenced Curve Sequence	(0008,1145)	3	A sequence which provides reference to a set of SOP Class/Instance pairs which are related independent Curves. Uniquely identifies Curves significantly related to this Image. Zero or more Items may be included in this sequence.
>Referenced SOP Class UID	(0008,1150)	1C	Uniquely identifies the referenced SOP Class. Required if Referenced Curve Sequence (0008,1145) is sent.
>Referenced SOP Instance UID	(0008,1155)	1C	Uniquely identifies the referenced SOP Instance. Required if Referenced Curve Sequence (0008,1145) is sent.
...

Note: Referenced Overlay Sequence (0008,1130) and Referenced Curve Sequence (0008,1145) were previously included in this Module as optional Attributes but have been retired. See PS 3.3 2004.

Replace the entire PS 3.3 C.8.9.5 PET Curve Module with:

Retired. See PS 3.3 2004.

2

Replace the entire PS 3.3 C.8.10 Hardcopy Modules with:

4

Retired. See PS 3.3 2004.

6

Replace the entire PS 3.3 C.9.1 Overlay Identification Module with:

8

Retired. See PS 3.3 2004.

10

Amend PS 3.3 C.9.2 Overlay Plane Module to retire use of overlays in image high bits:

12

C.9.2 Overlay plane module

14

Table C.9-2 contains Attributes that describe characteristics of an Overlay Plane.

16

An Overlay Plane describes graphics or bit-mapped text that is associated with an Image ~~or has its own existence within a Series~~. It may also describe a Region of Interest in an Image.

18

Each Overlay Plane is one bit deep. Sixteen separate Overlay Planes may be associated with an Image ~~or exist as Standalone Overlays in a Series~~.

20

Overlay ~~pixel data are is~~ stored ~~either~~ in Overlay Data (60xx,3000) ~~or embedded in the image pixel data in Image Pixel Data (7FE0,0010). See PS 3.5 for a description of overlay pixel data imbedded with image pixel data.~~ See the Section Repeating Groups in PS 3.5 for a

22

description of permitted values of 60xx. ~~Overlay Planes embedded in Image Pixel data (7FE0,0010) are only permitted when Samples per Pixel (0028,0002) has a value of 1.~~

24

Note: Overlay data stored in unused bit planes of the Pixel Data (7FE0,0010) with Samples Per Pixel (0028,0002) of 1 was previously described in DICOM. This usage has now been retired. See PS 3.3 and PS 3.5 2004.

26

28

Attributes describing display of grayscale and color overlays were defined in a previous version of the DICOM Standard. These have now been retired. How an Overlay Plane is rendered is undefined; specifically there is no mechanism to specify with what color or intensity an Overlay Plane is to be displayed, except when rendered under the control of a Grayscale Softcopy Presentation State SOP Instance.

30

32

**Table C.9-2
OVERLAY PLANE MODULE ATTRIBUTES**

34

Attribute Name	Tag	Type	Attribute Description
Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay.
Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay.
Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics.

			Enumerated Values: G = Graphics R = ROI.
Overlay Origin	(60xx,0050)	1	Location of first overlay point with respect to pixels in the image, given as row\column. The upper left pixel of the image has the coordinate 1\1. Column values greater than 1 indicate the overlay plane origin is to the right of the image origin. Row values greater than 1 indicate the overlay plane origin is below the image origin. Values less than 1 indicate the overlay plane origin is above or to the left of the image origin. Note: Values of 0\0 indicate that the overlay pixels start 1 row above and one column to the left of the image pixels.
Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay. If the overlay data are embedded in the Image Pixel Data (7FE0,0010), the value of this Attribute shall be the same as Bits Allocated (0028,0100). If the overlay data are stored in the Overlay Data (60xx,3000) Attribute, the <u>The</u> value of this Attribute shall be 1. <u>Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute was required to be the same as Bits Allocated (0028,0100). This usage has been retired. See PS 3.3 2004.</u>
Overlay Bit Position	(60xx,0102)	1	Bit in which Overlay is stored. See PS 3.5 for further explanation. If the overlay data are stored in the Overlay Data (60xx,3000) Attribute, ‡ <u>The</u> value of this Attribute shall be 0. <u>Note: Formerly the standard described embedding the overlay data in the Image Pixel Data (7FE0,0010), in which case the value of this Attribute specified the bit im which the overlay was stored. This usage has been retired. See PS 3.3 2004.</u>
Overlay Data	(60xx,3000)	1☺	Overlay pixel data.

			<p>The order of pixels sent for each overlay is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row, followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on.</p> <p>Overlay data shall be contained in this Attribute or imbedded with the image pixel data in Group 7FE0.</p> <p>Required if overlay data are in this Group.</p> <p>See C.9.2.1.1 for further explanation.</p>
Overlay Description	(60xx,0022)	3	User-defined comments about the overlay.
Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay Type. See C.9.2.1.3 for further explanation.
Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay.
ROI Area	(60xx,1301)	3	Number of pixels in ROI area. See C.9.2.1.2 for further explanation.
ROI Mean	(60xx,1302)	3	ROI Mean. See C.9.2.1.2 for further explanation.
ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation. See C.9.2.1.2 for further explanation.

2 C.9.2.1 Overlay Attribute Descriptions

C.9.2.1.1 Overlay type

4 There are two specific types of overlays. The type is specified in this Attribute.

6 A Region of Interest (ROI) is a specific use of an Overlay. The overlay bits corresponding to all the pixels included in the ROI shall be set to 1. All other bits are set to 0. This is used to specify an area of the image of particular interest.

8 A Graphics overlay may express reference marks, graphic annotation, or bit mapped text, etc. A Graphics overlay may be used to mark the boundary of a ROI. If this is the case and the ROI statistical parameters are used, they will only refer to the pixels under the boundaries, not those in the included regions.

12 The overlay bits corresponding to all the pixels included in the Graphics shall be set to 1. All other bits are set to 0.

14 C.9.2.1.2 ROI area, ROI mean, and ROI standard deviation

16 These Attributes contain the statistical parameters of the ROI. The values of these parameters are for the overlay pixel values set to 1.

C.9.2.1.3 Overlay Subtype

2 Two Defined Terms are specified:

USER - User created graphic annotation (e.g. operator)

4 AUTOMATED - Machine or algorithm generated graphic annotation, such as output of a
Computer Assisted Diagnosis algorithm.

6
8 Note: Additional or alternative Defined Terms may be specified in modality specific Modules, such as
in the Ultrasound Image Module, C.8.5.6.1.11.

10

Replace the entire PS 3.3 C.9.5 Basic Print Image Overlay Box Module with:

12

Retired. See PS 3.3 2004.

14

Replace the entire PS 3.3 C.10.1 Curve Identification Module with:

16

Retired. See PS 3.3 2004.

18

Replace the entire PS 3.3 C.10.2 Curve Module with:

20

Retired. See PS 3.3 2004.

22

Replace the entire PS 3.3 C.10.3 Audio Module with:

24

Retired. See PS 3.3 2004.

26

Amend PS 3.3 C.10.5 Graphic Annotation Module:

28

C.10.5 Graphic Annotation Module

2 This Module defines Attributes of vector graphics and text annotation that shall be made available
4 by a display device to be applied to an image. The graphics and text are defined in position and
size relative to the image pixel coordinates or the Specified Displayed Area space (defined in
C.10.4 Displayed Area Module). A Graphic Annotation shall be related to an Image.

6 Note: This Module uses a Sequence of Items rather than a Repeating Group (~~such as the Curve
8 Repeating Group~~) to avoid limiting the maximum number of annotation items that may be
present. The use of a Repeating Group would limit the number of items to 16. The use of
Repeating Groups is also noted in PS 3.5 to be deprecated.

10

Amend PS 3.3 C.10.7 Graphic Layer Module:

12

C.10.7 Graphic Layer Module

14 This Module defines the characteristics of the layers in which **curves**, overlays, graphic and text
may be rendered.

16 Layers group together graphics which are related. It is recommended that a layer be displayed
such that it may be distinguished from other layers that have a different value for Graphic Layer
18 Order (0070,0062).

20 Note: The transparency, opacity, and any other interaction (such as exclusive or) with underlying
layers or image data are not specified and are at the discretion of the implementation.

22

**Table C.10-7
GRAPHIC LAYER MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
Graphic Layer Sequence	(0070,0060)	1	A sequence of Items each of which represents a single layer in which overlays, curves, graphics or text may be rendered. An Item is required for each layer referenced from the Graphic Annotation Module or the Overlay/ Curve Activation Module.
...

24

Amend PS 3.3 C.11.7 Overlay/**Curve** Activation Module:

26

C.11.7 Overlay/**Curve** Activation Module

28 This Module defines a manner of controlling whether or not bit-mapped overlay and curve
information are displayed.

30 ~~In the case of Curves, these Curves are contained within the referenced image(s).~~

32 ~~Note: Curves may not be present within the Presentation State, since the same function is
served by the Graphic Annotation Module which provides additional features.~~

2 ~~In the case of Overlays, if~~ the corresponding Overlay Group activated is present within the
 4 Presentation State, then that Overlay shall be activated and any corresponding Overlay in the
 6 referenced image(s) ignored, otherwise the Overlay within the referenced image(s) shall be
 8 activated.

An Overlay Group referenced in the Bitmap Display Shutter Module described in C.7.6.15 shall
 6 not be activated using the Overlay/~~Curve~~ Activation Module.

Table C.11.7-1 specifies the Attributes that describe the Overlay/~~Curve~~ Activation Module.

8 **Table C.11.7-1**
OVERLAY/~~CURVE~~ ACTIVATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Overlay Activation Layer	(60xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module C.10.7) in which the Overlay described in group 60xx shall be displayed. If no layer is specified (zero length) then the overlay shall not be displayed. Required if Group 60xx is present in the referenced image(s) or the Presentation State instance containing this Module.
Curve Activation Layer	(50xx,1001)	2C	The layer (defined in Graphic Layer (0070,0002) of the Graphic Layer Module C.10.7) in which the Curve described in group 50xx shall be displayed. If no layer is specified (zero length) then the curve shall not be displayed. Required if Group 50xx is present in the referenced image(s) and Type of Data (50xx,0020) is POLY or ROI. Note: Curves with other types of data are not expected to be displayed.

10

Notes: **1. Previously ~~These~~** bits which are stored in Pixel data (7FE0,0010) above High
 12 Bit(0028,0102) ~~may could~~ be used as overlay bit planes if they ~~are were~~ referenced by an
 14 Overlay Bit Position (60xx,0102). ~~This usage has been retired. See PS 3.3 2004. If they are~~
 16 ~~not so referenced, Their their~~ contents are unspecified in DICOM and should not be
 18 displayed. Usually they will be zero, though if the pixel data is signed, i.e. Pixel Representation
 20 (0028,0103) is 0001H, then it is possible that the sign bit may be “extended” through these
 22 values. Alternatively, they may have been “masked off” even if the value is signed and negative.
2.Previously. Curve Activation Layer (50xx,1001) was defined in this Module. Its usage
has been retired. See PS 3.3 2004.

20

22

24

Amend PS 3.3 C.13.2 Basic Film Session Relationship Module to remove Stored Print related attributes:

C.13.2 Basic Film Session Relationship Module

2

Table C.13-2
BASIC FILM SESSION RELATIONSHIP MODULE ATTRIBUTES

Attribute Name	Tag	Attribute Description
Referenced Film Box Sequence	(2000,0500)	A Sequence which provides references to a set of Film Box SOP Class/Instance pairs. Zero or more Items may be included in this Sequence.
>Referenced SOP Class UID	(0008,1150)	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	Uniquely identifies the referenced SOP Instance.
Proposed Study Sequence	(2130,00A0)	Attributes that may be used to identify Stored Print Storage and Hardcopy Image SOP Instances created to store this Film Session.
>Patient's Name	(0010,0010)	See C.2.2 for description.
>Patient ID	(0010,0020)	See C.2.2 for description.
>Patient's Birth Date	(0010,0030)	See C.2.3 for description.
>Patient's Sex	(0010,0040)	See C.2.3 for description.
>Patient's Birth Time	(0010,0032)	See C.2.3 for description.
>Other Patient ID	(0010,1000)	See C.2.2 for description.
>Other Patient Names	(0010,1001)	See C.2.2 for description.
>Ethnic Group	(0010,2160)	See C.2.3 for description.
>Patient Comments	(0010,4000)	See C.2.3 for description.
>Study Instance UID	(0020,000D)	See C.4.1 for description.
>Study Date	(0008,0020)	See C.4.5 for description.
>Study Time	(0008,0030)	See C.4.5 for description.
>Referring Physician's Name	(0008,0090)	See C.3.4 for description.
>Study ID	(0020,0010)	See C.4.2 for description.
>Accession Number	(0008,0050)	See C.4.1 for description.
>Study Description	(0008,1030)	See C.4.9 for description.
>Name of Physician(s) Reading Study	(0008,1060)	See C.7.2.1 for description.
>Admitting Diagnoses Description	(0008,1080)	See C.7.2.2 for description.
>Patient's Age	(0010,1010)	See C.2.3 for description.
>Patient's Size	(0010,1020)	See C.2.3 for description.
>Patient's Weight	(0010,1030)	See C.2.3 for description.
>Occupation	(0010,2180)	See C.2.3 for description.
>Additional Patient's History	(0010,21B0)	See C.2.4 for description.
>Series Number	(0020,0011)	See C.7.3.1 for description

4

Note: ~~Proposed Study Sequence (2130,00A0) was previously included in this Module but has been retired. See PS 3.3 2004.~~

6

2 Amend PS 3.3 C.13.5 Image Box Pixel Presentation Module to remove Stored Print related
attributes:

4

C.13.5 Image Box Pixel Presentation Module

6

Table C.13-5
IMAGE BOX PIXEL PRESENTATION MODULE ATTRIBUTES

Attribute Name	Tag	Attribute Description
...
Referenced Image Overlay Box Sequence	{2020,0130}	A sequence which provides references to an Image Overlay Box SOP Class/Instance pair and a specific frame number in multi-frame instances. Zero or one Item may be included in this Sequence.
>Referenced SOP Class UID	{0008,1150}	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	{0008,1155}	Uniquely identifies the referenced SOP Instance.
Original Image Sequence	{2130,00C0}	Attributes of the original modality images to be printed in this Film Session.
>Study Instance UID	{0020,000D}	See C.7.2.1 for description.
>Series Instance UID	{0020,000E}	See C.7.3.1 for description.
>Patient ID	{0010,0020}	See C.7.1.1 for description.
>Referenced SOP Class UID	{0008,1150}	SOP Class UID of the original modality image used to create this Image Box.
>Referenced SOP Instance UID	{0008,1155}	SOP Instance UID of the original modality image used to create this Image Box.
>Referenced Frame Number	{0008,1160}	See C.7.6.1 for description.
>Instance Number	{0020,0013}	See C.7.6.1 for description.

8

10 Replace the entire PS 3.3 C.13.12 Print Request Module with:

10

Retired. See PS 3.3 2004.

12

14 Replace the entire PS 3.3 C.15 Queue Management Specific Modules with:

14

Retired. See PS 3.3 2004.

16

18 Replace the entire PS 3.3 C.16 Stored Print Modules with:

18

Retired. See PS 3.3 2004.

Amend PS 3.3 Annex F as follows:

2

F.2 BASIC DIRECTORY IOD OVERVIEW

4 ...

F.2.1 Basic directory IOD organization

6 ...

8 Each Directory Record, irrespective of the Directory Entity it is included in, contains four types of information:

- 10 a. A reference to a lower level Directory Entity or Referenced Directory Entity. This reference may be absent if such a lower level Directory Entity does not exist for an instance of a directory record;
- 12 b. A reference to a File of the File-set in which is stored a "Referenced Object" (formally called in DICOM a Referenced SOP Instance). This reference may be absent if no File is referenced. Files may be referenced **either** directly by their File ID **or indirectly**
14 **through a Multi-Referenced File Directory Record. The latter case allows the**
16 **same File to be referenced by several Directory Records;**
- 18 c. A set of "selection keys," specific to a Referenced Object, which will allow its selection among all the records included in a given Directory Entity;
- 20 d. A mechanism to chain the various Directory Records which belong to the same Directory Entity.

...

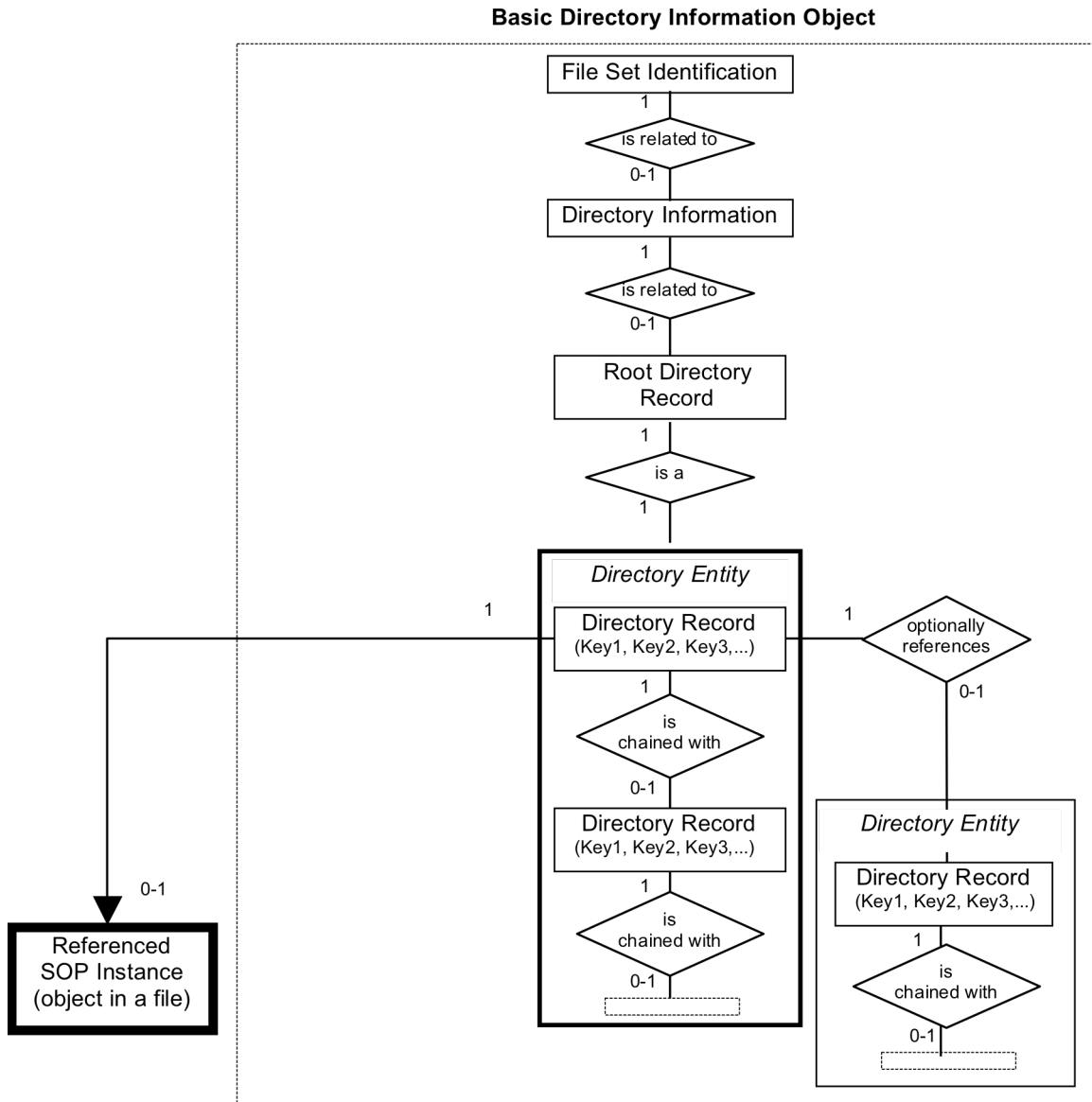
22 Notes: ...

24 2. Referenced Files may contain SOP Instances of SOP Classes which provide the means to
reference by UIDs other SOP Instances which may not be stored in files of the same File-set
26 **(e.g. an image referencing a study component).**

...

Replace the Figure F.2-1 with:

2



4

**Figure F.2-1
BASIC DIRECTORY INFORMATION OBJECT E-R MODEL**

6

To facilitate the management and update of the Directory Information a number of rules are defined:

8

- a. Any Lower-Level Directory Entity shall be referenced by at most one higher-level Directory Record. Not allowing multiple higher-level Directory Records to reference the same Lower-Level Directory Entity simplifies the management of the deletion (or inactivation) of Directory Records and Lower-Level Directory Entities and associated Directory Records

10

12

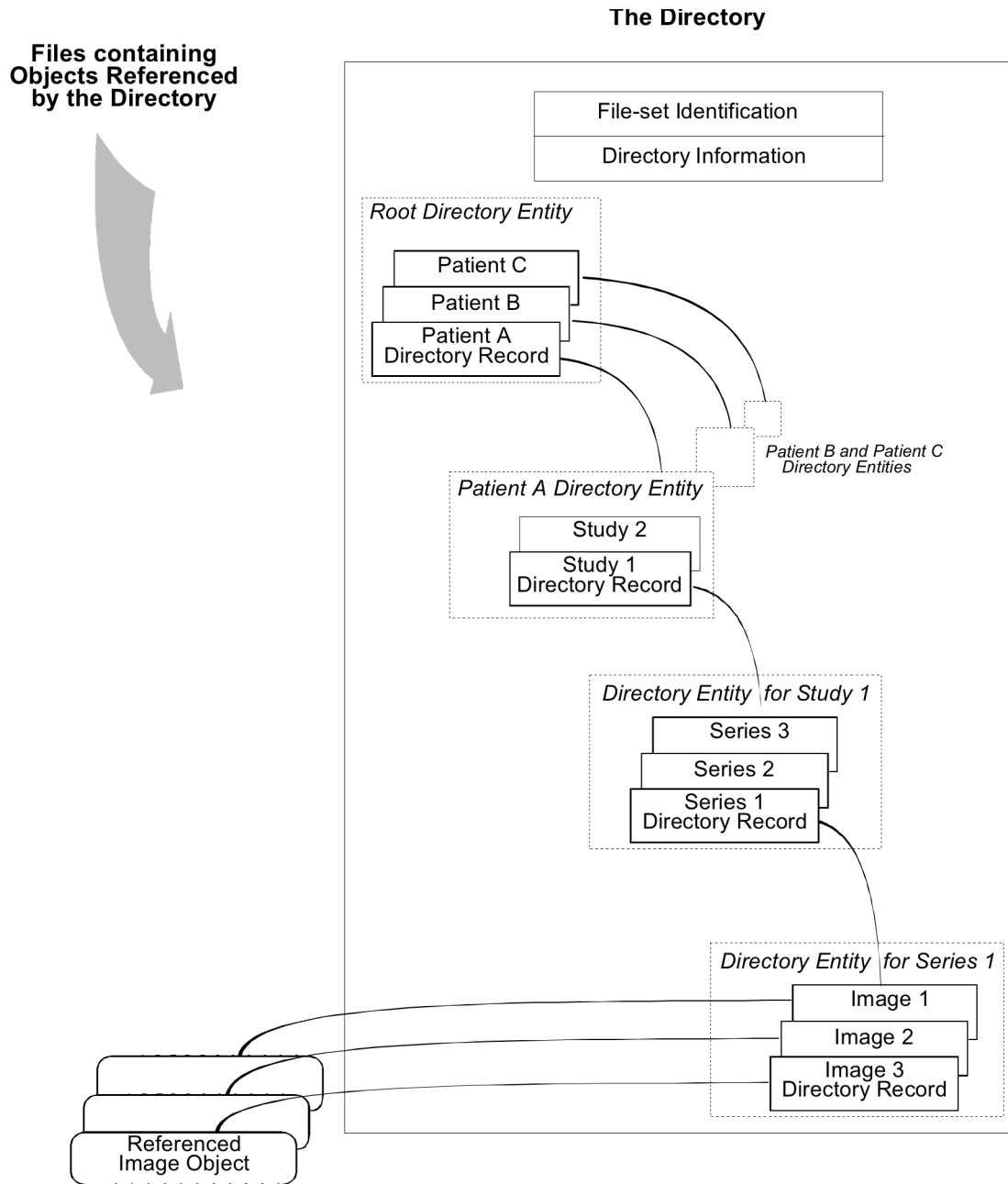
- 2 b. Any Directory Record (~~except for MRDR~~) shall belong to a single Directory Entity.
This rule and the above rule, makes the Basic Directory IOD itself strictly hierarchical
- 4 c. All files referenced by a Directory shall be present in the same File-Set to which the
directory belongs
- 6 d. Non-DICOM files which are not referenced by the Directory may be included in the
File-set space. The means of access to such Files and the semantics associated with
their absence from the Directory is beyond the scope of the DICOM Standard
- 8 e. If a DICOMDIR contains a Directory Information Module, all DICOM Files of the File-
set shall be referenced by a Directory Record
- 10 f. Any File of the File-set shall be directly referenced by at most one Directory Record of
the Directory. **Not allowing multiple Directory Records to directly reference the
12 same File simplifies the management of the deletion of Directory Records and
associated Files**
- 14 ~~g. A single File may be referenced indirectly by several Directory Records (which
16 may or may not belong to the same Directory Entity) through a special Directory
Record (called a Multi-Referenced File Directory Record). Such a Directory
Record facilitates the management of Directory Record deletion (or inactivation)
18 by keeping an explicit count of the multiple references to a single File.~~

20 Notes: 1. ~~Despite the fact that rules a and b make the DICOM Directory strictly hierarchical,
22 rules f and g make the referencing of Files fully relational. This relational flexibility
24 allows the sharing of the content of referenced Files by different Directory Records (e.g.
an image belonging to a study as well as a related film session). However, the full use of
26 this flexibility may require the "cloning" of Directory Records due to the strict hierarchy
of the Directory. An example of the use of a Multi-Referenced File Directory Record is
shown in PS 3.10.~~

28 ——— 2. Referenced Files may contain SOP Instances of SOP Classes which provide the means to
reference by UIDs other SOP Instances which may not be stored in files of the same File-set
30 (e.g. an image referencing a study component).

7..

Replace Figure F.2-2 with:



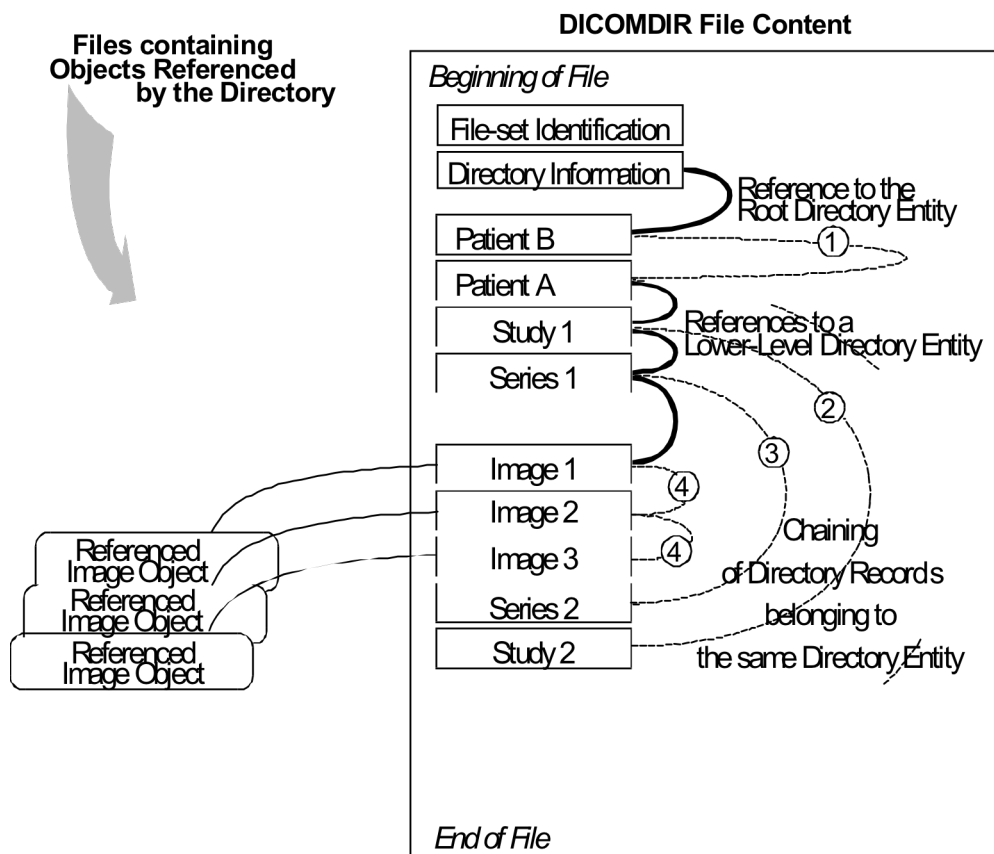
2

Figure F.2-2

EXAMPLE OF A DIRECTORY ORGANIZATION AND CONTENT

4

2 Replace Figure F.2-3 with:



4

Figure F.2-3

6 EXAMPLE OF DATA STRUCTURE FOR THE DICOM DIRECTORY INFORMATION

F.3 BASIC DIRECTORY INFORMATION OBJECT DEFINITION

8 ...

F.3.2.2 Directory Information Module

10 ...

Table F.3-3
DIRECTORY INFORMATION MODULE

Attribute Name	Tag	Type	Attribute Description
...
>Directory Record Type	(0004,1430)	1C	Defines a specialized type of Directory Record by reference to its position in the Media Storage Directory Information Model (see

12

			<p>Section F.4).</p> <p>Required if the Directory Record Sequence (0004,1220) is not zero length.</p> <p>Enumerated Values (see Section F.5):</p> <p>PATIENT STUDY SERIES</p> <p>IMAGE OVERLAY MODALITY LUT</p> <p>VOI LUT CURVE TOPIC</p> <p>VISIT RESULTS INTERPRETATION</p> <p>STUDY COMPONENT STORED PRINT</p> <p>RT DOSE RT STRUCTURE SET</p> <p>RT PLAN RT TREAT RECORD</p> <p>PRESENTATION WAVEFORM</p> <p>SR DOCUMENT KEY OBJECT DOC</p> <p>SPECTROSCOPY RAW DATA</p> <p>REGISTRATION FIDUCIAL</p> <p>PRIVATE = Privately defined record hierarchy position. Type shall be defined by Private Record UID (0004,1432).</p> <p>MRDR – Special Directory Record which allows indirect reference to a File by multiple Directory Records. Instead of directly referencing a File by its Referenced File ID (0004,1500), a Directory Record of any of the Types define above (except MRDR) may reference a Multi-Referenced File Directory Record which in turn will reference the File by its File ID.</p> <p>Note: Enumerated Values PRINT QUEUE, FILM SESSION, FILM BOX, and IMAGE BOX were previously defined in DICOM for this Attribute. They are now retired. See PS3.3-1998.</p> <p><u>Note: Enumerated Values OVERLAY, MODALITY LUT, VOI LUT, CURVE, TOPIC, VISIT, RESULTS, INTERPRETATION, STUDY COMPONENT and STORED PRINT were previously defined in DICOM for this Attribute. They are now retired. See PS3.3-2004.</u></p> <p><u>Note: Enumerated Value MRDR was previously defined in DICOM for this Attribute, to allow indirect reference to a File by multiple Directory Records. It is now retired. FSUs and FSRs are unlikely to be capable of supporting this mechanism. See PS3.3-2004.</u></p>
...
>Referenced File ID	(0004,1500)	1C	<p>A Multiple Value (See PS 3.5) which represents the ordered components of the File ID containing a "referenced object" or Referenced SOP Instance. A maximum of 8 components, each from 1 to 8 characters shall be used (see Section 8.2).</p> <p>Note: The Referenced File ID provides the means to "locate" the File through the DICOM File Service provided by the Media Format Layer.</p> <p>All referenced Files shall be with the File-set to which the Directory belongs. Any File within the File-set (to which the Directory belongs) shall be referenced by at most one Directory Record. When the Directory Record does not reference any SOP Instance this attribute shall not be present.To reference a</p>

			single File by more than one Directory Record, a special Directory Record of Directory Record Type (0004,1430) MRDR is used. The Referenced File ID (0004,1500) shall be absent and the MRDR Directory Record Offset (0004,1504) shall be used to reference the MRDR which indirectly references the File.
>MRDR Directory Record Offset	(0004,1504)	1C	<p>Offset of the first byte (of the Item Data Element) of the Multi-Referenced File Directory Record. This Offset is a number of bytes starting with the first byte of the File Meta Information. When the Directory Record does not reference any SOP Instance this attribute shall not be present.</p> <p>Required if the Directory Record indirectly references a SOP Instance by a MRDR. Shall not be present if the Referenced File ID (0004,1500) is used for direct reference.</p> <p>Shall not be present in a Multi-Referenced File Directory Record.</p> <p>Note: This offset includes the File Preamble and the DICM Prefix.</p>
>Referenced SOP Class UID in File	(0004,1510)	1C	<p>Unique ID for the SOP Class of the Instance stored in the referenced File. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset (0004,1504).</p> <p>Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.</p>
>Referenced SOP Instance UID in File	(0004,1511)	1C	<p>Unique Identifier for the SOP Instance stored in the referenced file. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset.</p> <p>Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.</p>
>Referenced Transfer Syntax UID in File	(0004,1512)	1C	<p>Unique Identifier for the Transfer Syntax used to encode the Instance stored in the referenced file. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset.</p> <p>Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.</p>
>Referenced Related General SOP Class UID in File	(0004,151A)	1C	<p>Unique ID for the Related General SOP Class(es) related to the SOP Class of the Instance stored in the referenced file.</p> <p>Required if the Directory Record references a SOP Instance that encodes the Related General SOP Class UID (0008,001A).</p> <p>Shall not be used in a Multi-Referenced File Directory Record.</p> <p>Note: This may be useful to an FSR that does not support the SOP Class of the referenced Instance, but which does support one of the Related General SOP Classes.</p>

>Record Selection Keys	See F.5	See F.5	A number of DICOM Data Elements which contain specific keys defined for each type of Directory Record (0004,1430) defined in Section F.5.
------------------------	---------	---------	---

2 **F.4 BASIC DIRECTORY IOD INFORMATION MODEL**

...

4

**Table F.4-1
RELATIONSHIP BETWEEN DIRECTORY RECORDS**

Directory Record Type	Section	Directory Record Types which may be included in the next lower-level directory Entity
(Root Directory Entity)	—	PATIENT, TOPIC , PRIVATE
PATIENT	F.5.1	STUDY, PRIVATE
STUDY	F.5.2	SERIES, VISIT, RESULTS, STUDY COMPONENT PRIVATE
SERIES	F.5.3	IMAGE, OVERLAY, MODALITY LUT, VOI LUT, CURVE, STORED PRINT , RT DOSE, RT STRUCTURE SET, RT PLAN, RT TREAT RECORD, PRESENTATION, WAVEFORM, SR DOCUMENT, KEY OBJECT DOC, SPECTROSCOPY, RAW DATA, REGISTRATION. FIDUCIAL, PRIVATE
IMAGE	F.5.4	PRIVATE
OVERLAY	F.5.5	PRIVATE
MODALITY LUT	F.5.6	PRIVATE
VOI LUT	F.5.7	PRIVATE
CURVE	F.5.8	PRIVATE
STORED PRINT	F.5.18	PRIVATE
RT DOSE	F.5.19	PRIVATE
RT STRUCTURE SET	F.5.20	PRIVATE
RT PLAN	F.5.21	PRIVATE
RT TREAT RECORD	F.5.22	PRIVATE
PRESENTATION	F.5.23	PRIVATE
WAVEFORM	F.5.24	PRIVATE
SR DOCUMENT	F.5.25	PRIVATE
KEY OBJECT DOC	F.5.26	PRIVATE
SPECTROSCOPY	F.5.27	PRIVATE
RAW DATA	F.5.28	PRIVATE
REGISTRATION	F.5.29	PRIVATE
FIDUCIAL	F.5.30	PRIVATE
TOPIC	F.5.9	STUDY, SERIES, IMAGE, OVERLAY, MODALITY LUT, VOI

		LUT, CURVE, STORED PRINT, RT DOSE, RT STRUCTURE SET, RT PLAN, RT TREAT RECORD, PRESENTATION, WAVEFORM, SR DOCUMENT, KEY OBJECT DOC, SPECTROSCOPY, RAW DATA, REGISTRATION, FIDUCIAL, PRIVATE
VISIT	F.5.10	PRIVATE
RESULTS	F.5.11	INTERPRETATION, PRIVATE
INTERPRETATION	F.5.12	PRIVATE
STUDY COMPONENT	F.5.13	PRIVATE
PRIVATE	F.6.1	PRIVATE, (any of the above as privately defined)
MRDR	F.6.2	(Not applicable)

2 Notes: **1.** Directory Record Types PRINT QUEUE, FILM SESSION, FILM BOX, and IMAGE BOX were previously defined in DICOM. They have been retired. See PS 3.3-1998.

4 **2.** Directory Record Types OVERLAY, MODALITY LUT, VOI LUT, CURVE, TOPIC, VISIT, RESULTS, INTERPRETATION, STUDY COMPONENT, STORED PRINT and MRDR were previously defined in DICOM. They have been retired. See PS 3.3-2004.

6

...

Replace Figure F.4-1 with:

2

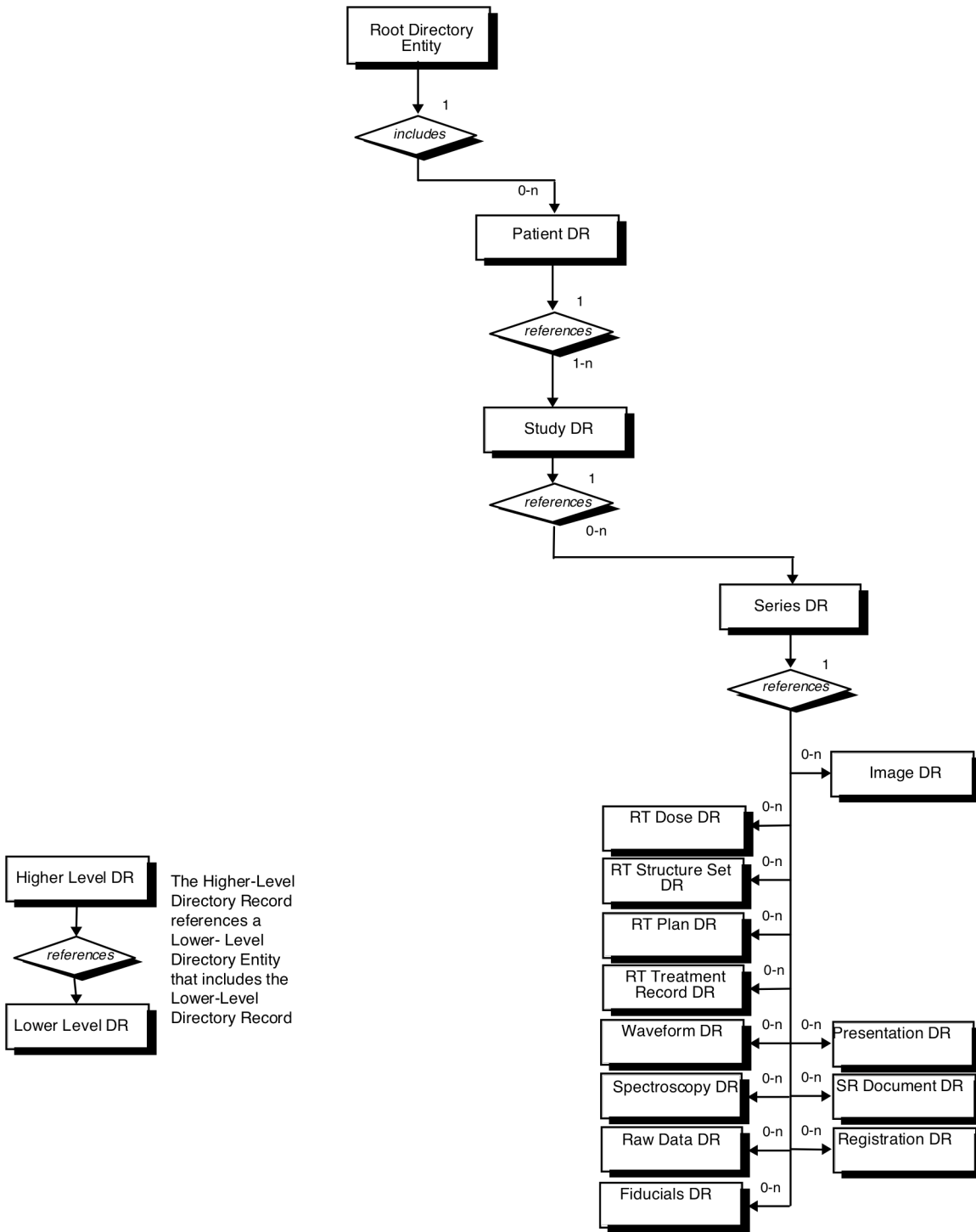


Figure F.4-1
BASIC DIRECTORY IOD INFORMATION MODEL

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Note: Normalized Print media storage was previously defined in DICOM. It is now retired. See PS3.3 - 1998.

...
Replace the entire PS 3.3 F.5.5 Standalone overlay directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.6 Standalone modality LUT directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.7 Standalone VOI LUT directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.8 Standalone Curve directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.9 Topic directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.10 Visit directory record definition with:

Retired. See PS 3.3-2004.

Replace the entire PS 3.3 F.5.11 Results directory record definition with:

Retired. See PS 3.3-2004.

2 *Replace the entire PS 3.3 F.5.12 Interpretation directory record definition with:*

4 **Retired. See PS 3.3-2004.**

6 *Replace the entire PS 3.3 F.5.13 Study Component directory record definition with:*

8 **Retired. See PS 3.3-2004.**

10 *Replace the entire PS 3.3 F.5.18 Stored Print directory record definition with:*

12 **Retired. See PS 3.3-2004.**

14 *Replace the entire PS 3.3 F.6.2 Multi-referenced file directory record definition with:*

16 **Retired. See PS 3.3-2004.**

18 *Amend PS 3.3 F.7:*

18 **F.7 ICON IMAGE KEY DEFINITION**

20 An Icon Image may be used as a key representative of an Image, RT Dose, **Stored Print, or**
22 Series ~~or Overlay~~ in a corresponding Directory Record to allow an application to display icons
which enable a user to select one or more from amongst several of them. It is based on the general
purpose Image Pixel Macro (See Annex C).

24

PS 3.4 Changes:

Amend PS 3.4 6.1.2:

6.1.2 Normalized IOD

A Normalized IOD is an Information Object Definition which generally represents a single entity in the DICOM Model of the Real-World.

In this Standard, strict definition of Normalized Object Definitions has not been applied. Application of strict definitions would often result in unnecessary complexity and reduced performance of implementations for several applications.

When an instance of a Normalized IOD is communicated, the context for that instance is not actually exchanged. Instead, the context is provided through the use of pointers to related Normalized IOD Instances.

The Normalized IODs are specified in PS 3.3.

Retire unused storage SOP classes in PS 3.4 Annex B:

B.5 STANDARD SOP CLASSES

...

Table B.5-1
STANDARD SOP CLASSES

SOP Class Name	SOP Class UID	IOD Specification (defined in PS 3.3)
Stored Print Storage	1.2.840.10008.5.1.1.27	
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DX IOD (see B.5.1.1)
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	DX IOD (see B.5.1.1)
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography IOD (see B.5.1.2)
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography IOD (see B.5.1.2)
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-oral X-Ray IOD (see B.5.1.3)
Digital Intra-oral X-Ray Image	1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-oral X-Ray

Storage - For Processing		IOD (see B.5.1.3)
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Enhanced CT Image (see B.5.1.7)
Ultrasound 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	Enhanced MR Image (see B.5.1.6)
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	MR Spectroscopy
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Multi-frame Single Bit Secondary Capture Image
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Multi-frame Grayscale Byte Secondary Capture Image
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Multi-frame Grayscale Word Secondary Capture Image
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Multi-frame True Color Secondary Capture Image
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	12-lead ECG Waveform
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	General ECG Waveform
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Ambulatory ECG Waveform
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Hemodynamic Waveform
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Cardiac Electrophysiology Waveform
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Basic Voice Audio Waveform
Stand-alone Modality LUT Storage	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 Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Grayscale Softcopy Presentation State Storage
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	
Nuclear Medicine 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	Raw Data
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Spatial Registration IOD
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Spatial Fiducials IOD
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic Image
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Procedure Log
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Mammography CAD SR IOD
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	Key Object Selection Document
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Chest CAD SR IOD
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	
Standalone 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	

2 *Replace the entire Annex C Section C.3.3 Patient/Study Only Query/Retrieve Information Model*
4 *with:*

Retired. See PS 3.4 2004.

6
8 *Replace the entire Annex C Section C.6.3 Patient/Study Only SOP Class Group with:*

Retired. See PS 3.4 2004.

10
12 *Amend PS 3.4 Annex C Section C.6.1.1.5 as follows:*

C.6.1.1.5 Composite object instance Level

14 Table C.6-4 defines the keys at the Composite object instance Information level of the Patient
16 Root Query/Retrieve Information Model.

18 **Table C.6-4
COMPOSITE OBJECT INSTANCE LEVEL KEYS FOR THE PATIENT
ROOT QUERY/RETRIEVE INFORMATION MODEL**

Description	Tag	Type
Instance Number	(0020,0013)	R
Overlay Number	(0020,0022)	O
Curve Number	(0020,0024)	O
LUT Number	(0020,0026)	O
...

20 Notes: 1. ~~Ideally, Overlay Number (0020,0022), Curve Number (0020,0024), LUT Number~~
22 ~~(0020,0026) and Report Number (0020,00AA) would be of Type R rather than Type O to~~
24 ~~require an SCP to match on these keys. However for backward compatibility with SCPs~~
26 ~~that are not aware of the revised model, they remain Type O. An SCP that is aware of the~~
revised model can state in its Conformance Statement that matching on these keys IS performed. Instance Number (0020,0013), if present in non-image objects is the preferred key if present in revised objects.

28 2. SOP Class UID (0008,0016) is an optional key, but it is strongly recommended that it always
be returned by all SCPs, if matching is requested.

30 3. The Concept Name Code Sequence (0040,A043) and Content Template Sequence
32 (0040,A504) are optional keys that are useful for identifying instances of various Structured
Reporting Storage SOP Classes. It is strongly recommended that these keys be supported by
the SCP for query against such instances.

34 *Replace the entire PS 3.4 Annex D STUDY CONTENT NOTIFICATION SERVICE CLASS with:*

Retired. See PS 3.4 2004.

2

Replace the entire PS 3.4 Annex E PATIENT MANAGEMENT SERVICE CLASS with:

4

Retired. See PS 3.4 2004.

6

- Modality Performed Procedure Step SOP Class
- 2 — Modality Performed Procedure Step Notification SOP Class
- Modality Performed Procedure Step Retrieve SOP Class
- 4 — General Purpose Scheduled Procedure Step SOP Class
- General Purpose Performed Procedure Step SOP Class

6

8 Each SOP Class operates on a subset of the **Study IOD**, Modality Performed Procedure Step IOD, **Study Component IOD**, General Purpose Scheduled Procedure Step IOD, or General Purpose Performed Procedure Step IOD and specifies the Attributes, operations, notifications, and behavior applicable to the SOP Class. Conformance of Application Entities shall be defined by selecting one or more of the Study and Study Component Management SOP and Meta SOP Classes. For each SOP Class conformance requirements shall be specified in terms of the Service Class Provider (SCP) and the Service Class User (SCU).

14 **Note:** ~~The example shown in Figure F.2-1 is of usage of the Study Management and Study Component SOP Classes. It illustrates one simple data flow based on these two SOP Classes but is not intended to cover related flows (e.g., Storage of Images, Patient Management, Result Management, etc.). This example (see Figure F.2-1) involves three nodes. Node A (e.g., an image acquisition) system and Node C (e.g., a review system) support the Study SOP and the Study Component SOP Classes as SCUs and Node B (e.g., an information management system) as an SCP.~~

22 ~~Node B, notifies Node A that a Study has been scheduled (SOP Instance created internally on Node B as SCP) by issuing an N-EVENT-REPORT Study Notification (1). Using the SOP Instance UID which was communicated in the N-EVENT-REPORT Study Notification (1), Node A may obtain further information by an N-GET Study (2). As a number of images are created on Node A, this node issues an N-CREATE Study Component (3) and relates the created instance to the Study SOP Instance using the Study SOP instance UID which was known from the N-EVENT-REPORT Study Notification (1) received earlier. Node A may later update the status of the Study Component when all necessary images have been created, by using an N-SET Study Component (4).~~

30 ~~Based on a change of Study Component Status (internal policies and configuration), Node B decides to issue to Node C an N-EVENT-REPORT Study Notification (5). By using the Study SOP Instance UID, an N-GET Study (6) may be issued to obtain Study information and in particular the current list of Study Component SOP Instance UIDs. By using the SOP Instance UIDs of the Study Components communicated in the N-EVENT-REPORT Study Notification (5), an N-GET Study Component (7) may also be issued to obtain information about a specific Study Component (e.g., the Series UIDs/Image UIDs related to the Study Component).~~

38

40

42 **Figure F.2-1 EXAMPLE OF USAGE THE STUDY MANAGEMENT AND STUDY COMPONENT SOP CLASSES**

44 **F.2.1 Association Negotiation**

44 Association establishment is the first phase of any instance of communication between peer DICOM Aes. The Association negotiation procedure specified in PS 3.7 shall be used to negotiate the supported SOP Classes **or Meta SOP Classes**.

48 Support for the SCP/SCU role selection negotiation is mandatory. The SOP Class Extended Negotiation shall not be supported.

2 Note: Event notification is a process that logically extends across multiple Associations. SCP
implementations should support a local table of SCUs to which event notifications are to be sent.

4

6 *Replace the entire Annex F Section F.3 Detached Study Management SOP Class with:*

6

Retired. See PS 3.4-2004.

8

10 *Replace the entire Annex F Section F.4 Study Component Management SOP Class with:*

10

Retired. See PS 3.4-2004.

12

14 *Replace the entire Annex F Section F.5 Study Management Meta SOP Class with:*

14

Retired. See PS 3.4-2004.

16

18 *Replace the entire Annex F Section F.6 Specialized SOP Class Conformance with:*

18

Retired. See PS 3.4-2004.

20

22 *Replace the entire PS 3.4 Annex G RESULTS MANAGEMENT SERVICE CLASS with:*

22

Retired. See PS 3.4 2004.

24

2 *Retire Stored Print and Overlay and Print Queue Management related SOP Classes in Annex H Print Management:*

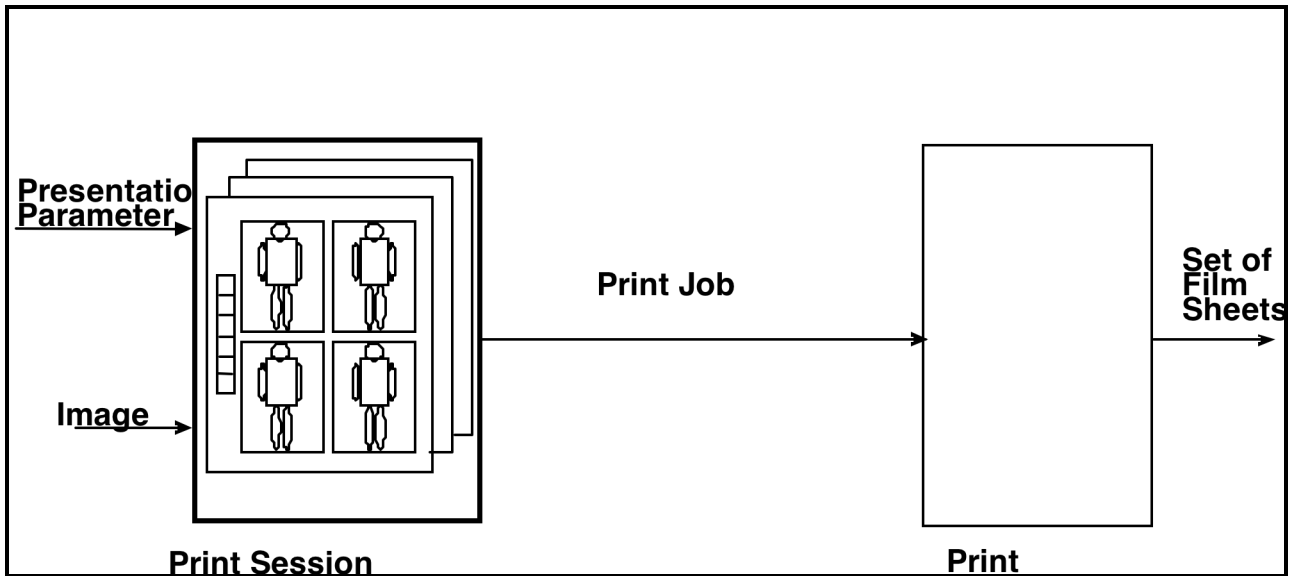
4 *Amend PS 3.4 H.2.1.1 as follows, including replacement of figure H.2-1 with that supplied:*

6 **H.2.1.1 Global Data Flow Model**

The Print Management Data Flow Model (Figure H.2-1) consists of three main processes:

- 8 — Film Session Management process
- 9 — ~~Queue Management process~~
- 10 — Print process

12 Note: The Standard uses the word film as a general name for different types of hard copy media (e.g. photographic film, paper).



14
16 **Figure H.2-1**
PRINT MANAGEMENT DATA FLOW MODEL

18 The Film Session Management process is responsible for acquiring all the information which is
20 required to print the film session. The film session is the atomic work package of the Print
22 Management Application and contains one or more films related in a user defined way (e.g.,
belonging to the same exam, patient) that are originated from one host (e.g., workstation,
diagnostic modality) and that are printed on one hard copy printer.

24 Each film consists of one or more images and zero or more film related annotations. An
annotation consists of one or more lines of text.

26 Each image consists of pixel data and zero or more overlay planes. The user controls the look of
the film by assigning values to print parameters.

Print parameters are defined at film session, film, image and annotation levels. The parameter level determines the scope of operation of the print parameters (e.g., print parameters of the image level are valid for the corresponding image).

The inputs of the Film Session Management process are:

- set of images and image related data
- presentation data that describes the visual look of the films

The output of the Film Session Management process is the Print Job, which contains all the information to print the film session.

~~The Queue Management process manages the various Print Jobs. The user can manipulate the queue content : e.g. delete Print Jobs, prioritize Print Jobs.~~

The Print process prints a set of films, based on the information in the Print Job. The Print process is implementation specific and its management is beyond the scope of the DICOM standard.

Amend PS 3.4 H.2.3 as follows:

H.2.3 Print Management SOP Classes

The Print Management SCU controls the Print Process by manipulating the Print Management SOP Classes by means of the DIMSE Services. The Print Management SOP Classes are managed by the Print Management SCP.

The Print Management SOP Classes are classified as follows:

- Content related SOP Classes: these SOP Classes are an abstraction of the contents of a film (e.g., pixel data, text string). The content related SOP Classes correspond with the Image related SOP Classes, which are described in Section H.4 of this Part.
- Presentation related SOP Classes: these SOP Classes are an abstraction of the presentation of a film (e.g., layout information) and are defined by Normalized IODs and Normalized DIMSE-N Services. The presentation related SOP Classes are defined in Section H.4 of this Part.
- ~~— Queue related SOP Classes: these SOP Classes are an abstraction of the print queue and are defined by Normalized IODs and Normalized DIMSE-N Services. The Queue related SOP Classes are defined in Section H.4 of this Part.~~
- Printer related SOP Classes: these SOP Classes are an abstraction of the printer configuration and status and are defined by Normalized IODs. The Printer SOP Class is defined in Section H.4 of this Part.

Amend PS 3.4 H.3.1 and 3.2.1 as follows:

H.3.1 Scope

...

A Meta SOP Class corresponds with a pre-defined group of SOP Classes. The following Print Management Meta SOP Classes are defined:

- Basic Grayscale Print Management Meta SOP Class
- Basic Color Print Management Meta SOP Class
- ~~— Pull Stored Print Management Meta SOP Class~~

...

H.3.2 Print Management Meta SOP Classes

H.3.2.1 Description

The Basic Print Management Meta SOP Classes correspond with the minimum functionality that an implementation of the Print Management Service Class shall support. The Basic Print Management Meta SOP Classes support the following mandatory features:

- preformatted grayscale images or preformatted color images; preformatted images are images where annotation, graphics, overlays are burned in
- pre-defined film layouts (image display formats)
- basic presentation parameters on film session, film box and image box level
- basic device management

The optional SOP Classes described in Section H.3.3 may be used with the Basic Print Management Meta SOP Classes.

~~The Pull Stored Print Management Meta SOP Class is an extension of the Basic Print Management Meta SOP Class. It supports the following mandatory features:~~

- ~~— Film box (page) level printing~~
- ~~— Printing of Hardcopy Grayscale/Color and other Preformatted Images~~
- ~~— Images are send separately from the print parameters~~
- ~~— Print parameters are stored in the Stored Print Storage SOP Instance~~
- ~~— Stored Print Storage SOP Instances and the Image SOP Instances are sent to the printer by the various Storage SOP Classes~~

The following features are optional for SCUs and SCPs:

- Film box annotation
- ~~— Separate image overlays~~
- Presentation LUT

~~One use of the Pull Stored Print Management Meta SOP Classes is to make an additional print of images originally printed with one of the Print Management Meta SOP Classes. It allows all the information originally sent to a printer to be sent to the same or another printer. The specific results on the second printer will depend on a number of factors including:~~

- ~~— Printer defaults used for Attributes not specified in the original print process~~
- ~~— Differences in capabilities of the original and subsequent printers~~

~~Especially when the subsequent print is made on a different model printer, there probably will be differences in the subsequent prints compared with the original prints.~~

2 ~~The magnitude of these differences and their acceptability in specific clinical~~
circumstances is beyond the scope of the DICOM Standard.

4 *Replace the entire Annex H Section H.3.2.2.5 Pull Stored Print Management Meta SOP Class*
with:

6 **H.3.2.2.5 Pull Stored Print Management Meta SOP Class (Retired)**

8 **This section was previously defined in DICOM. It is now retired. See PS 3.4-2004.**

10 *Amend Annex H Section H.3.3 Optional SOP Classes:*

12 **H.3.3 Optional SOP Classes**

12 **H.3.3.1 Description**

14 The optional SOP Classes address functionality beyond that of the Print Management Meta SOP
Classes. One or more optional SOP Classes may be used in addition to the Print Management
Meta SOP Classes.

16 The following functionality is supported by the optional SOP Classes:

- annotation (text associated with a sheet of film)
- tracking the printing of the print session
- ~~— overlays (text or graphics associated with an image)~~
- retrieval of printer configuration information
- Presentation LUTs

24 Use of these optional SOP Classes allows an SCU to provide information to be printed with or on
an image without burning the information into the image pixels. If these optional SOP Classes
are not supported by both the SCU and SCP, then only the information burnt in to the image
pixels before they are sent to the SCP will be printed. If the optional SOP Classes are not
supported, the SCU is responsible for burning all expected text or graphics into the image pixels.

28 **H.3.3.2 List of Optional SOP Classes**

30 The following optional SOP Classes may be used in conjunction with the Basic Print Management
Meta SOP Classes specified in Section H.3.2.2.

SOP Class Name	Reference	Usage SCU/SCP
Basic Annotation Box SOP Class	H.4.4	U/U
Print Job SOP Class	H.4.5	U/U
Basic Print Image Overlay Box SOP Class	H.4.12	U/U
Presentation LUT SOP Class	H.4.9	U/U
Printer Configuration Retrieval SOP	H.4.11	U/U

Class		
-------	--	--

2 Note: Negotiation of the Presentation LUT SOP Class does not imply any behavior in the SCP.
 4 Behavior is explicit when the Presentation LUT SOP Class is created and referenced at either
 the Film Session, Film Box, or Image Box levels.

6 ~~The following optional SOP Class may be used in conjunction with the Pull Stored Print
 Management Meta SOP Class specified in Section H.3.2.2.~~

SOP Class Name	Reference	Usage SCU/SCP
Print Job SOP Class	H.4.5	U/U
Presentation LUT SOP Class	H.4.9	U/U
Printer Configuration Retrieval SOP Class	H.4.11	U/U

8 ~~Note: Negotiation of the Presentation LUT SOP Class does not imply any behavior in the SCP.
 10 Behavior is explicit when the Presentation LUT SOP Class is created and referenced at
 12 either the Film Session, Film Box, or Image Box levels.~~

H.3.4 Conformance statement

14 The implementation Conformance Statement of these SOP Classes shall follow PS 3.2.

The SCU Conformance Statement shall specify the following items:

- 16 — maximum number of supported Associations at the same time
- list of supported SOP Classes and Meta SOP Classes
- 18 — for each of the supported SOP and Meta SOP Classes:
 - list of supported optional SOP Class Attributes and DIMSE Service Elements
 - 20 — for each supported Attribute (mandatory and optional Attribute), the valid
 range of values

22 The SCP Conformance Statement shall specify the following items:

- 24 — maximum number of supported Associations at the same time
- list of supported SOP Classes and Meta SOP Classes
- 26 — minimum and maximum number of printable pixel matrix per supported film
 size
- 28 — for each of the supported SOP Classes:
 - list of supported optional SOP Class Attributes and DIMSE Service Elements
 - 30 — for each supported Attribute (mandatory and optional Attribute):
 - valid range of values
 - 32 — default value if no value is supplied by the SCU
 - status code (Failure or Warning) if SCU supplies a value which is out of
 34 range

- 2 — for each supported DIMSE Service, the SCP behavior for all specific status codes
- 4 — description of each supported custom Image Display Format (2010,0010) e.g., position and dimensions of each composing image box, numbering scheme of the image positions
- 6 — description of each supported Annotation Display Format ID (2010,0030) e.g., position and dimensions of annotation box, font, number of characters
- 8 — description of each supported configuration table (e.g. identification, content)
- 10 — if the SCP supports N-ACTION for the Film Session SOP Class then the SCP shall specify the maximum number of collated films
- 12 — in the case of grayscale printers that print color images, the behavior of printing color images
- 14 ~~— for Pull Print Request Meta SOP Class SCPs, behavior when Image Overlay, Annotation, and Presentation LUT options are contained in the Stored Print Storage SOP Class~~
- 16 — if cropping of images is supported, the algorithm for removing rows and columns from the image
- 18

20 Amend H.4.1.2.1.1 as follows:

22 **H.4.1.2.1 N-CREATE**

The N-CREATE is used to create an instance of the Basic Film Session SOP Class.

24 **H.4.1.2.1.1 Attributes**

The Attribute list of the N-CREATE is defined as shown in Table H.4-2.

26 **Table H.4-2
N-CREATE ATTRIBUTE LIST**

Attribute Name	Tag	Usage SCU/SCP
Specific Character Set	{0008,0005}	U/U
Number of Copies	{2000,0010}	U/M
Print Priority	{2000,0020}	U/M
Medium Type	{2000,0030}	U/M
Film Destination	{2000,0040}	U/M
Film Session Label	{2000,0050}	U/U
Memory Allocation	{2000,0060}	U/U
Owner ID	{2100,0160}	U/U
Proposed Study Sequence	{2130,00A0}	U/U
>Patient's Name	{0010,0010}	U/U
>Patient ID	{0010,0020}	U/U
>Patient's Birth Date	{0010,0030}	U/U

>Patient's Sex	(0010,0040)	U/U
>Patient's Birth Time	(0010,0032)	U/U
>Other Patient ID	(0010,1000)	U/U
>Other Patient Names	(0010,1001)	U/U
>Ethnic Group	(0010,2160)	U/U
>Patient Comments	(0010,4000)	U/U
>Study Instance UID	(0020,000D)	U/U
>Study Date	(0008,0020)	U/U
>Study Time	(0008,0030)	U/U
>Referring Physician's Name	(0008,0090)	U/U
>Study ID	(0020,0010)	U/U
>Accession Number	(0008,0050)	U/U
>Study Description	(0008,1030)	U/U
>Name of Physician(s) Reading Study	(0008,1060)	U/U
>Admitting Diagnoses Description	(0008,1080)	U/U
>Patient's Age	(0010,1010)	U/U
>Patient's Size	(0010,1020)	U/U
>Patient's Weight	(0010,1030)	U/U
>Occupation	(0010,2180)	U/U
>Additional Patient's History	(0010,21B0)	U/U
>Series Number	(0020,0011)	U/U

- 2 Notes: 1. The memory allocation Attribute allows the SCU to reserve sufficient memory to store the
4 "working" film session hierarchy as well the "copied" film session hierarchy in the Print Job in
order to prevent deadlock situations.
- 6 2. Owner ID (2100,0160) is a user option for the Basic Film Session. **However, SCUs that also
implement the Print Queue Management Service Class are required to supply Owner ID
8 to successfully delete or re-prioritize Print Jobs in the printer queue (see section
L.4.2.3.1).**
- 10 **3. Proposed Study Sequence (2130,0040) may be used to identify Stored Print Storage
and Hardcopy Image SOP Instances created to store this Film Session**
- 12 **4. To meet requirements specified in PS 3.3, the Study Instance UID of the Stored Print
Storage SOP Instance should be the same as the Study Instance UID in Proposed Study
14 Sequence (2130,0040). New Series Instance and Image Instance UIDs will be supplied
by the device that creates the Stored Print Storage SOP Instance.**

16

18 *Amend H.4.1.2.4.1 as follows:*

18

H.4.1.2.4.1 Attributes

20 The arguments of the N-ACTION are defined in Table H.4-3.

- 2 The Action Reply argument is encoded as a DICOM Data Set. The Data Set only contains the Attribute Referenced Print Job Sequence (2100,0500) which includes the Referenced SOP Class UID (0008,1150) and the Referenced SOP Instance UID (0008,1155).
- 4 If the SCP supports the Print Job SOP Class ~~or Print Queue Management~~, the Action Reply argument is contained in the N-ACTION response. Otherwise, the Action Reply is not contained
- 6 in the N-ACTION response.

8 **Table H.4-3
N-ACTION ARGUMENTS**

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU/SCP
Print	1	Referenced Print Job Sequence	(2100,0500)	-/MC Required if Print Job SOP is supported
		>Referenced SOP Class UID	(0008,1150)	-/MC Required if Referenced Print Job Sequence (2100,0500) is present
		>Referenced SOP Instance UID	(0008,1155)	-/MC Required if Referenced Print Job Sequence (2100,0500) is present
		>Print Job ID	(2100,0010)	-/MC (Required if Print Queue Management SOP Class is supported)

10 Amend H.4.2.2.4.1 as follows:

12 **H.4.2.2.4.1 Attributes**

The arguments of the N-ACTION are defined as shown in Table H.4-8.

- 14 The Action Reply argument is encoded as a DICOM Data Set. The Data Set only contains the Attribute Referenced Print Job Sequence (2100,0500) which includes the Referenced SOP Class UID (0008,1150) and the Referenced SOP Instance UID (0008,1155).
- 16

- 18 If the SCP supports the Print Job SOP Class ~~or Print Queue Management~~, the Action Reply argument is contained in the N-ACTION response. Otherwise, the Action Reply is not contained in the N-ACTION response.

20 **Table H.4-8
N-ACTION ARGUMENTS**

Action Type Name	Action Type ID	Attribute	Tag	Usage SCU/SCP
Print	1	Referenced Print Job Sequence	(2100,0500)	-/MC Required if Print Job

			SOP is supported
	>Referenced SOP Class UID	(0008,1150)	-/MC Required if Referenced Print Job Sequence (2100,0500) is present
	>Referenced SOP Instance UID	(0008,1155)	-/MC Required if Referenced Print Job Sequence (2100,0500) is present
	>Print Job ID	(2100,0010)	-/MC (Required if Print Queue Management SOP Class is supported)

2 Amend H.4.3.1.2.1 as follows:

4 **H.4.3.1.2.1 N-SET**

The N-SET may be used to update an instance of the Basic Grayscale Image Box SOP Class.

6 **H.4.3.1.2.1.1 Attributes**

The Attributes which may be updated are shown in Table H.4-10.

8

**Table H.4-10
N-SET ATTRIBUTES**

Attribute Name	Tag	Usage SCU/SCP
Image Position	(2020,0010)	M/M
Basic Grayscale Image Sequence	(2020,0110)	M/M
>Samples Per Pixel	(0028,0002)	M/M
>Photometric Interpretation	(0028,0004)	M/M
>Rows	(0028,0010)	M/M
>Columns	(0028,0011)	M/M
>Pixel Aspect Ratio	(0028,0034)	MC/M (Required if the aspect ration is not 1\1)
>Bits Allocated	(0028,0100)	M/M
>Bits Stored	(0028,0101)	M/M
>High Bit	(0028,0102)	M/M
>Pixel Representation	(0028,0103)	M/M
>Pixel Data	(7FE0,0010)	M/M
Polarity	(2020,0020)	U/M
Referenced Image Overlay Box Sequence	(2020,0130)	U/MC (Required if optional Overlay

		SOP was negotiated)
>Referenced SOP Class UID	(0008,1150)	MC/M (Required if sequence is present)
>Referenced SOP Instance UID	(0008,1155)	MC/M (Required if sequence is present)
Magnification Type	(2010,0060)	U/U
Smoothing Type	(2010,0080)	U/U
Min Density	(2010,0120)	U/U
Max Density	(2010,0130)	U/U
Configuration Information	(2010,0150)	U/U
Requested Image Size	(2020,0030)	U/U
Requested Decimate/Crop Behavior	(2020,0040)	U/U
Referenced Presentation LUT Sequence	(2050,0500)	U/U
> Referenced SOP Class UID	(0008,1150)	U/U
> Referenced SOP Instance UID	(0008,1155)	U/U
Original Image Sequence	(2130,00C0)	U/U
>Study Instance UID	(0020,000D)	MC/M (Required if Sequence is present)
>Series Instance UID	(0020,000E)	MC/M (Required if Sequence is present)
>Patient ID	(0010,0020)	MC/M (Required if Sequence is present and value is known)
>Referenced SOP Class UID	(0008,1150)	MC/M (Required if Sequence is present)
>Referenced SOP Instance UID	(0008,1155)	MC/M (Required if Sequence is present)
>Referenced Frame Number	(0008,1160)	MC/M (Required if Sequence is present and Original Image is a Multi-frame Image)
>Instance Number	(0020,0013)	MC/M (Required if Sequence is present and value is known)

2

Amend H.4.3.2.2.1 as follows:

H.4.3.2.2.1 N-SET

2 The N-SET may be used to update an instance of the Basic Color Image Box SOP Class.

H.4.3.2.2.1.1 Attributes

4 The Attributes which may be updated are shown in Table H.4-11.

The meaning of the Usage SCU/SCP is described in Section H.2.4.

6 The values of Magnification Type (2010,0060) and Smoothing Type (2010,0080) of a particular image box override the values of Magnification Type and Smoothing Type of the film box.

8

**Table H.4-11
N-SET ATTRIBUTES**

Attribute Name	Tag	Usage SCU/SCP
Image Position	(2020,0010)	M/M
Basic Color Image Sequence	(2020,0111)	M/M
>Samples Per Pixel	(0028,0002)	M/M
>Photometric Interpretation	(0028,0004)	M/M
>Planar Configuration	(0028,0006)	M/M
>Rows	(0028,0010)	M/M
>Columns	(0028,0011)	M/M
>Pixel Aspect Ratio	(0028,0034)	MC/M (Required if the aspect ration is not 1\1))
>Bits Allocated	(0028,0100)	M/M
>Bits Stored	(0028,0101)	M/M
>High Bit	(0028,0102)	M/M
>Pixel Representation	(0028,0103)	M/M
>Pixel Data	(7FE0,0010)	M/M
Polarity	(2020,0020)	U/M
Referenced Image Overlay Box Sequence	(2020,0130)	U/MC (Required if optional Overlay SOP was negotiated).
>Referenced SOP Class UID	(0008,1150)	MC/M (Required if sequence is present)
>Referenced SOP Instance UID	(0008,1155)	MC/M (Required if sequence is present)
Magnification Type	(2010,0060)	U/U
Smoothing Type	(2010,0080)	U/U
Requested Image Size	(2020,0030)	U/U
Requested Decimate/Crop Behavior	(2020,0040)	U/U

Original Image Sequence	(2130,00C0)	U/U
>Study Instance UID	(0020,000D)	MC/M (Required if Sequence is present)
>Series Instance UID	(0020,000E)	MC/M (Required if Sequence is present)
>Patient ID	(0010,0020)	MC/M (Required if Sequence is present and value is known)
>Referenced SOP Class UID	(0008,1150)	MC/M (Required if Sequence is present)
>Referenced SOP Instance UID	(0008,1155)	MC/M (Required if Sequence is present)
>Referenced Frame Number	(0008,1160)	MC/M (Required if Sequence is present and Original Image is a Multi-frame Image)
>Instance Number	(0020,0013)	MC/M (Required if Sequence is present and value is known)

2

Amend H.4.5.2.1.1 as follows:

4

H.4.5.2.1.1 Attributes

6 The arguments of the N-EVENT-REPORT are defined as shown in Table H.4-14.

Note: The encoding of Notification Event Information is defined in PS 3.7.

8

Table H.4-14
NOTIFICATION EVENT INFORMATION

10

Event Type Name	Event Type ID	Attribute	Tag	Usage SCU/SCP
Pending	1	Execution Status Info	(2100,0030)	U/M
		Print Job ID	(2100,0010)	U/MC (Required if Print Queue Management SOP Class is supported)
		Film Session Label	(2000,0050)	U/U
		Printer Name	(2110,0030)	U/U
Printing	2	Execution Status Info	(2100,0030)	U/M
		Print Job ID	(2100,0010)	U/MC (Required if Print Queue Management SOP Class is supported)
		Film Session Label	(2000,0050)	U/U
		Printer Name	(2110,0030)	U/U
Done	3	Execution Status Info	(2100,0030)	U/M
		Print Job ID	(2100,0010)	U/MC (Required if Print Queue Management SOP Class is supported)
		Film Session Label	(2000,0050)	U/U
		Printer Name	(2110,0030)	U/U
Failure	4	Execution Status Info	(2100,0030)	U/M
		Print Job ID	(2100,0010)	U/MC (Required if Print Queue Management SOP Class is supported)
		Film Session Label	(2000,0050)	U/U
		Printer Name	(2110,0030)	U/U

2

4

Replace the entire Annex H Section H.4.10 Pull Print Request SOP Class with:

6

H.4.10 Pull Print Request SOP Class (Retired)

2 **This section was previously defined in DICOM. It is now retired. See PS 3.4-2004.**

4 *Replace the entire Annex H Section H.4.12 Basic Print Image Overlay Box SOP Class with:*

H.4.12 Basic Print Image Overlay Box SOP Class (Retired)

6 **This section was previously defined in DICOM. It is now retired. See PS 3.4-2004.**

8 *Replace the entire Annex H Section H.7 Example of the Pull Print Request Meta SOP Class with:*

H.7 Example of the Pull Print Request Meta SOP Class (INFORMATIVE) (Retired)

10 **This section was previously defined in DICOM. It is now retired. See PS 3.4-2004.**

12 *Replace the entire Annex H Section H.8 Overlay Examples with:*

H.8 OVERLAY EXAMPLES (INFORMATIVE) (Retired)

14 **This section was previously defined in DICOM. It is now retired. See PS 3.4-2004.**

16

2 Amend PS 3.4 Annex I as follows:

4 I.1 OVERVIEW

4 I.1.1 Scope

6 The Media Storage Service Class defines an application-level class-of-service which facilitates the simple transfer of images and associated information between DICOM AEs by means of Storage Media. It supports:

- 8 a. The Interchange of images and a wide range of associated information. ~~This is called the Interchange Option of the Media Storage Service Class;~~
- 10 ~~b. The Storage of Images organized in Filming Sessions to ensure in an off-line manner their transfer for hardcopy printing. This is called the Print Option of the Media Storage Service Class;~~
- 12 c. ~~The combined use of the Interchange Option and of the Print Option as introduced in a and b above.~~

16 I.1.2 Service Definition

18 DICOM AEs implement a SOP Class ~~of the Interchange Option~~ of the Media Storage Service Class by supporting one or more roles among the three roles FSC, FSR or FSU. ~~DICOM AEs implement a SOP Class of the Print Option of the Media Storage Service Class by supporting one or more roles among the two roles FSC or FSU.~~ SOP Classes of the Media Storage Service Class (either Options) are implemented using the Media Storage Operations (M-WRITE, M-READ, M-DELETE, M-INQUIRE FILE-SET and M-INQUIRE FILE). The services provided by these Operations are defined in PS 3.10.

24 I.2 BEHAVIOR

26 This Section discusses the FSC, FSR and FSU behavior for SOP Classes of the Media Storage Service Class.

I.2.1 Behavior of an FSC

28 The FSC shall be able to create a DICOMDIR File containing the Media Storage Directory SOP Class for the created File-set and create zero or more Files belonging to the File-set by invoking M-WRITE Operations with SOP Instances which meet the requirements of the corresponding IOD. It is the responsibility of the FSC to ensure that the M-WRITE results in the creation of a correctly formatted DICOM File. The manner in which this is achieved is beyond the scope of the DICOM Standard.

34 The FSC shall support the Media Storage Operation M-INQUIRE FILE-SET and may optionally support the M-INQUIRE FILE.

36 **For the Print Option the following specifically applies:**

- 38 ~~— An FSC requests that a Film Session be printed by an FSU by placing a Film Session Directory Record in a Print Queue Directory Entity and setting the Execution Status (2100,0020) of the Film Session Directory Record to Pending;~~
- 40 ~~— For a Film Session which is requested to be printed, only Film Boxes with an Execution Status (2100,0020) of Pending are requested to be printed.~~

42

1.2.2 Behavior of an FSR

2 ~~This behavior applies only to the Interchange Option of the Media Storage Service Class.~~
The FSR shall be able to recognize a File-set and the corresponding DICOMDIR containing the
4 Media Storage Directory SOP Class. A valid File-set may contain only a DICOMDIR and no other
files. If a File-set contains other files with stored SOP Instance, the FSR shall be capable of
6 invoking M-READ Operations to access the content of the Files of the File-set. The manner in
which this is achieved is beyond the scope of the DICOM Standard.

8 The FSR shall support the Media Storage Operation M-INQUIRE FILE and may optionally support
the M-INQUIRE FILE-SET.

1.2.3 Behavior of an FSU

10 The FSU shall be able to recognize a File-set and the corresponding DICOMDIR containing the
Media Storage Directory SOP Class. A valid File-set may contain only a DICOMDIR and no other
12 files. If a File-set contains other files with stored SOP Instances, the FSU shall be capable of
invoking M-READ Operations to access the content of the Files of the File-set. The manner in
14 which this is achieved is beyond the scope of the DICOM Standard.

16 The FSU shall support the Media Storage Operation M-INQUIRE FILE and the M-INQUIRE FILE-
SET.

18 The FSU shall be able to create one or more new Files belonging to the File-set by invoking M-
WRITE Operations with SOP Instances which meet the requirements of the corresponding IOD.
20 It is the responsibility of the FSU to ensure that the M-WRITE results in the creation of a correctly
formatted DICOM File. The manner in which this is achieved is beyond the scope of the DICOM
22 Standard. The FSU shall be able to update the contents of the DICOMDIR File by using M-
DELETE and or M-WRITE Operations.

24 **For the Print Option the following specifically apply:**

26 ~~a) Only Film Sessions with a Film Session Directory Record present in a Print
Queue Directory Entity with an Execution Status (2100,0020) of Pending are
candidates to be printed;~~

28 ~~b) For a Film Session which is candidate for printing, Film Boxes with an
Execution Status (2100,0020) of Pending are candidates for being printed;~~

30 ~~Note: The behavior of an FSU with respect to Film Sessions and Film Boxes with an Execution
Status (2100,0020) of Done, is beyond the scope of the DICOM Standard. They may or
32 may not be printed by the FSU.~~

34 ~~c) Following the successful printing of a Film Box, the FSU supporting the Print
Option shall change the Execution Status (2100,0020) of the corresponding
Film Box Directory Record to Done. Once all the Film Boxes of a Film Session
36 have been successfully printed by the FSU, the Film Session Directory Record
Execution Status shall updated to Done. It is beyond the scope of the Print
38 Option of this Service Class to decide whether or not the Film Session, related
Film Boxes Directory Records, referenced Film Session, Film Box and Image
40 Box SOP Instances may be deleted from the File-set by the FSU;~~

42 ~~d) Following a failure to print one or more Film Boxes from a Film Session, the
FSU shall leave the status of the corresponding Film Box Directory Record as
Pending. While there are Pending Film Boxes in a Film Session, the Execution
44 Status of the Film session shall remain Pending. It is beyond the scope of the
Print Option of this Service Class to decide what recovery action may be taken
46 following the failure of printing a Film Box.~~

~~Note: In the case of such failure it is recommended that the Film Session and related Film Box Directory Records as well as referenced Film Session, Film Box and Image Box SOP Instances not be deleted from the File set by the FSU. The Print Option of this Service Class does not include the use of the M-DELETE Operation for Files except for updating the DICOMDIR File. The Interchange Option of the Media Storage Service Class with an FSU Role is intended to be used for such a function.~~

I.3 CONFORMANCE

I.3.1 Conformance as an FSC

An implementation which conforms to one of the SOP Classes of the Media Storage Service Class:

- a) shall meet the requirements specified in Section I.2.1;
- b) shall meet the requirements specified in PS 3.10;
- c) shall perform M-WRITE Operations according to the SOP Class specification identified by the SOP Class UID in the Meta File Information;
- d) shall support the Media Storage Directory SOP Class (stored in the DICOMDIR File). ~~If it supports only the Interchange Option,~~ the directory may contain no Directory Information Module. ~~If it supports the Print Option the directory shall contain a Directory Information Module with appropriate Directory Records (Print Queue, Film Session, Film Box, and Image Box.);~~
- ~~e) may create DICOMDIR Files containing the Media Storage Directory SOP Class with Directory Records making multiple references to a File through an MRDR Directory Records.~~

I.3.2 Conformance as an FSR

An implementation which conforms to one of the SOP Classes of the Media Storage Service Class ~~with the Interchange Option:~~

- a) shall meet the requirements specified in Section I.2.2;
- b) shall meet the requirements specified in PS 3.10;
- c) shall perform M-READ Operations according to the SOP Class specification identified by the SOP Class UID in the Meta File Information. M-READ of non-supported SOP Classes shall simply result in ignoring such stored Data Sets;
- ~~d) shall read DICOMDIR Files containing the Media Storage Directory SOP Class with Directory Records making multiple references to Files through an MRDR Directory Record.~~
- e) shall read DICOMDIR Files without a Directory Information Module or with a Directory Information Module including Directory Records of a Type not supported by the implementation.

I.3.3 Conformance as an FSU

An implementation which conforms to one of the SOP Classes of the Media Storage Service Class:

- a) shall meet the requirements specified in Section I.2.3;
- b) shall meet the requirements specified in PS 3.10;
- c) shall perform M-READ Operations according to the SOP Class specification identified by the SOP Class UID in the Meta File Information. M-READ of unsupported SOP Classes shall simply result in ignoring such stored Data Sets;

- 2 d) shall perform M-WRITE Operations according to the SOP Class specification identified by the SOP Class UID in the Meta File Information;
- 4 e) shall support the Media Storage Directory SOP Class (stored in the DICOMDIR File). Directories containing a Directory Information Module shall be updated by an FSU. Directories containing no Directory Information Module shall not be updated by an FSU;
- 6
- 8 f) ~~shall read DICOMDIR Files containing the Media Storage Directory SOP Class with Directory Records making multiple references to Files through an MRDR Directory Record;~~
- 10 g) ~~may optionally update DICOMDIR Files containing the Media Storage Directory SOP Class by creating Directory Records, utilizing MRDR Directory Records where multiple references to Files are needed.~~
- 12
- 14 h) shall read DICOMDIR Files without a Directory Information Module or with a Directory Information Module including Directory Records of a Type not supported by the implementation.
- 16

I.3.4 Conformance Statement Requirements

18 An implementation of the Media Storage Service Class may support one or more Roles and related Options as specified in Table I.3-1. In addition, the implementation may conform to one or more of the SOP Classes of the Media Storage Service Class defined in Section I.4. The

20 Conformance Statement shall be in the format defined by PS 3.2.

22 **Table I.3-1
Allowed Combinations of Roles and Options**

Options	Roles	FSR	FSC	FSU
Interchange Option	With a Directory Information Module	Allowed	Allowed	Allowed Directory shall be updated
	With no Directory Information Module	Allowed	Allowed	Allowed Directory shall not be updated
Print Option	With a Directory Information Module	Not Allowed	Allowed	Allowed Directory shall be updated
	With no Directory Information Module	Not Allowed	Not Allowed	Not Allowed

24

26 The following aspects shall be documented in the Conformance Statement of any implementation claiming conformance to one of the Media Storage SOP Classes:

- 28 — the subset of the Basic Directory Information Object Model supported;
- 30 — ~~which of the Service Class Options are supported: Interchange Option or Print Option or both;~~
- 32 — ~~for the Interchange Option,~~ whether the Directory Information Module is present or absent.
- When the Directory Information Module is created or updated (Directory Information Module supported), the optional standard keys which may be included in Directory

Records shall be documented. Private Keys and Private Records may also be documented;

Retire unused storage SOP classes in PS 3.4 Annex I:

I.4 MEDIA STORAGE STANDARD SOP CLASSES

Table I.4-1
Media Storage Standard SOP Classes

SOP Class Name	SOP Class UID	IOD Specification
Media Storage Directory Storage	1.2.840.10008.1.3.10	IOD defined in PS 3.3
Detached Patient Management Storage	1.2.840.10008.3.1.2.1.1	See N-GET Attributes Section E.3.2.1
Detached Visit Management Storage	1.2.840.10008.3.1.2.2.1	See N-GET Attributes Section E.4.2.1
Detached Study Management Storage	1.2.840.10008.3.1.2.3.1	See N-GET Attributes Section F.3.2.1
Detached Study Component Management Storage	1.2.840.10008.3.1.2.3.2	See N-GET Attributes Section F.4.2.1
Detached Results Management Storage	1.2.840.10008.3.1.2.5.1	See N-GET Attributes Section G.3.2.1
Detached Interpretation Management Storage	1.2.840.10008.3.1.2.6.1	See N-GET Attributes Section G.4.2.1
Stored Print Storage	1.2.840.10008.5.1.1.27	IOD defined in PS3.3
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	IOD defined in PS3.3
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	IOD defined in PS3.3
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	IOD defined in PS 3.3
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DX IOD
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	DX IOD
Digital Mammography Image	1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography

Storage – For Presentation		IOD
Digital Mammography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography IOD
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-oral X-Ray IOD
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-oral X-Ray IOD
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	IOD defined in PS 3.3
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	IOD defined in PS 3.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	IOD defined in PS 3.3
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	IOD defined in PS 3.3
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	IOD defined in PS 3.3
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	IOD defined in PS 3.3
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	IOD defined in PS 3.3
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	IOD defined in PS 3.3
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Multi-frame Single Bit Secondary Capture Image
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Multi-frame Grayscale Byte Secondary Capture Image
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Multi-frame Grayscale Word Secondary Capture Image
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Multi-frame True Color Secondary Capture Image
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	IOD defined in PS 3.3
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	IOD defined in PS 3.3
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	12-lead ECG Waveform
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	General ECG Waveform
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Ambulatory ECG Waveform
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Hemodynamic Waveform
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Cardiac Electrophysiology Waveform

Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Basic Voice Audio Waveform
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	IOD defined in PS 3.3
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	IOD defined in PS 3.3
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Grayscale Softcopy Presentation State Storage
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	IOD defined in PS 3.3
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	IOD defined in PS 3.3
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	IOD defined in PS 3.3
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	IOD defined in PS 3.3
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Spatial Registration IOD
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Spatial Fiducials IOD
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic Image
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Procedure Log
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Mammography CAD SR IOD
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Key Object Selection Document
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Chest CAD SR IOD
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	IOD defined in PS 3.3
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	IOD defined in PS 3.3
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	IOD defined in PS 3.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	IOD defined in PS 3.3
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	IOD defined in PS 3.3
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	IOD defined in PS 3.3

RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	IOD defined in PS 3.3
-------------------------------------	-------------------------------	-----------------------

- 2 Notes: 1. Except for the Media Storage Directory SOP Classes, the above listed Media Storage
4 Standard SOP Classes are assigned the same UID Value as the corresponding network
6 communication SOP Classes. This was done to simplify UID assignment. Although these SOP
8 Classes are based on different Operations, the context of their usage should unambiguously
distinguish a Media Storage SOP Class from a Network communication SOP Class.
2. The storage of Normalized Print SOP Instances on media was previously defined in DICOM.
They have been retired. See PS 3.4-1998.
**3. The storage of Detached and Standalone SOP Instances on media was previously
defined in DICOM. They have been retired. See PS 3.4-2004.**

12 *Amend PS 3.4 Annex J as follows:*

14 **J.1.1 Scope**

The mechanism currently defined in DICOM for network based storage of SOP Instances, the
Storage Service Class, allows a Service Class User (SCU) to transmit images and other
Composite SOP Instances information (such as overlays and curves) to a Service Class
Provider (SCP). However, the Storage Service Class does not specify that the SCP explicitly take
responsibility for the safekeeping of data into account. That is, there is no commitment that the
SCP will do more than accept the transmitted SOP Instances. In order to have medical image
management in addition to medical image communication, there is a need for a Service Class
within DICOM that ensures that there is an explicitly defined commitment to store the SOP
Instances.

26 *Replace the entire PS 3.4 Annex L QUEUE MANAGEMENT SERVICE CLASS with:*

28 **Retired. See PS 3.4 2004.**

30 *Amend PS 3.4 Annex N.2 as follows:*

32 **N.2 PIXEL TRANSFORMATION SEQUENCE**

34 ...

The Referenced Image Storage SOP Instance may also contain bit-mapped overlays **and
curves**. The Softcopy Presentation State Storage SOP Classes specify a mechanism for turning
these on or off (i.e. displaying them or not).

38

PS 3.5 Changes:

2

4 *Retire Overlay Data embedded in Pixel Data from PS 3.5 Section 8.1.2:*

4

6 **8.1.2 Overlay data encoding of related data elements**

6

8 Encoded Overlay Planes always have a bit depth of 1, **but may be and are** encoded **in bits not**
10 **used for Pixel Sample Values in the Pixel Data (7FE0,0010), or** separate from the Pixel Data
in Overlay Data (60xx,3000). The following two Data Elements shall define the Overlay Plane
structure:

10

— Overlay Bits Allocated (60xx,0100)

12

— Overlay Bit Position (60xx,0102)

14

Notes: 1. There is no Data Element analogous to Bits Stored (0028,0101) since Overlay Planes always
have a bit depth of 1.

16

2. Restrictions on the allowed values for these Data Elements are defined in PS 3.3. **Formerly**
overlay data stored in unused bits of Pixel Data (7FE0,0010) was described, and these
attributes had meaningful values but this usage has been retired. See PS 3.5 2004. For
overlays encoded in Overlay Data Element (60xx,3000), Overlay Bits Allocated
(60xx,0100) is always 1 and Overlay Bit Position (60xx,0102) is always 0.

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3. **For example, in Pixel Data with 16 bits (2 bytes) allocated, 12 bits stored, and bit 11**
specified as the high bit, one pixel sample is encoded in each 16-bit word, with the 4
most significant bits of each word not containing Pixel Data. These 4 most significant
bits can be used to store Overlay Planes. For example, a single plane can be stored in bit
15 by specifying 15 for Overlay Bit Position. Overlay Bits Allocated would be 16, since it
is always equal to Bits Allocated for the case of overlays embedded in the Pixel Data, as
defined in PS 3.3. See Annex D for other examples of the basic encoding schemes.

28

~~If Overlay Planes are sent in the For~~ Overlay Data Element (60xx,3000), the Value
Representation OW is most often required. The Value Representation OB may also be used for
Overlay Data in cases where the Value Representation is explicitly conveyed (see Annex A).

30

32

Note: The DICOM default Transfer Syntax (Implicit VR Little Endian) does not explicitly convey Value
Representation and therefore the VR of OB may not be used for Pixel Data when using the
default Transfer Syntax.

34

36

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Overlay Data is encoded as the direct concatenation of the bits of a single Overlay Plane, where
the first bit of an Overlay Plane is encoded in the least significant bit, immediately followed by the
next bit of the Overlay Plane in the next most significant bit. When the Overlay Data crosses a
word boundary in the OW case, or a byte boundary in the OB case, it shall continue to be
encoded, least significant bit to most significant bit, in the next word, or byte, respectively (see
Annex D). ~~For Pixel Data encoded with the Value Representation OW, t~~The byte ordering of
the resulting 2-byte words is defined by the Little Endian or Big Endian Transfer Syntaxes
negotiated at the Association Establishment (see Annex A).

44

Note: For Overlay Data encoded with the Value Representation OB, the Overlay Data encoding is
unaffected by Little Endian or Big Endian byte ordering.

46

2 Retire Curve and Audio Data from all Transfer Syntaxes in PS 3.5:

4 **A.1 DICOM IMPLICIT VR LITTLE ENDIAN TRANSFER SYNTAX**

....

6 — ~~Data Element (50xx,3000) Curve Data has the Value Representation OB with its component points (n-tuples) having the Value Representation specified in Data Value Representation (50xx,0103). The component points shall be encoded in Little Endian.~~

8 — Data Element (5400,1010) Waveform Data shall have Value Representation OW and shall be encoded in Little Endian.

10 — ~~Data Element (50xx,200C) Audio Sample Data has the Value Representation OB when Audio Sample Format (50xx,2002) specifies 8-bit values, and OW encoded in Little Endian when 16 bit values are specified. See the specification of the Audio Module in PS 3.3.~~

12 —

14 **Note:** Encoding of Curve Data and Audio Sample Data was previously defined but has been retired. See PS 3.5 2004.

16

...

18 **A.2 DICOM LITTLE ENDIAN TRANSFER SYNTAX (EXPLICIT VR)**

....

20

22 — ~~Data Element (50xx,3000) Curve Data has the Value Representation specified in its Explicit VR Field. See the specification of the Curve Data Module in PS 3.3 for the enumerated list of allowable VRs. The component points shall be encoded in Little Endian.~~

24 — Data Element (5400,1010) Waveform Data has the Value Representation specified in its Explicit VR Field. The component points shall be encoded in Little Endian.

26 — ~~Data Element (50xx,200C) Audio Sample Data has the Value Representation OB when Audio Sample Format (50xx,2002) specifies 8-bit values, and OW encoded in Little Endian when 16 bit values are specified. See the specification of the Audio Module in PS 3.3.~~

28 —

30 **Notes:** 1. For Data encoded with the Value Representation OB, the Data encoding is unaffected by Little Endian or Big Endian byte ordering.

32 2. Encoding of Curve Data and Audio Sample Data was previously defined but has been retired. See PS 3.5 2004.

34

36 **A.3 DICOM BIG ENDIAN TRANSFER SYNTAX (EXPLICIT VR)**

38

40

- 2 — ~~Data Element (50xx,3000) Curve Data has the Value Representation specified in its Explicit VR Field. See the specification of the Curve Data Module in PS 3.3 for the enumerated list of allowable VRs. The component points shall be encoded in Big Endian.~~
- 4
- 6 — Data Element (5400,1010) Waveform Data has the Value Representation specified in its Explicit VR Field. The component points shall be encoded in Big Endian.
- 8 — ~~Data Element (50xx,200C) Audio Sample Data has the Value Representation OB when Audio Sample Format (50xx,2002) specifies 8-bit values, and OW encoded in Big Endian when 16 bit values are specified. See the specification of the Audio Module in PS 3.3.~~
- 10
- 12 — ...

14 Notes: 1. For Data encoded with the Value Representation OB, the Data encoding is unaffected by Little Endian or Big Endian byte ordering.

16 2. Encoding of Curve Data and Audio Sample Data was previously defined but has been retired. See PS 3.5 2004.

18 **A.4 TRANSFER SYNTAXES FOR ENCAPSULATION OF ENCODED PIXEL DATA**

- 20 ...
- 22 — ~~Data Element (50xx,3000) for Curve Data has the Value Representation specified in its Explicit VR Field. See the specification of the Curve Data Module in PS 3.3 for the enumerated list of allowable VRs. The component points shall be encoded in Little Endian.~~
- 24
- 26 — Data Element (5400,1010) Waveform Data has the Value Representation specified in its Explicit VR Field. The component points shall be encoded in Little Endian.
- 28 — ~~Data Element (50xx,200C) Audio Sample Data has the Value Representation OB when Audio Sample Format (50xx,2002) specifies 8-bit values, and OW encoded in Little Endian when 16 bit values are specified. See the specification of the Audio Module in PS 3.3.~~
- 30
- 32 — ...

34 Notes: 1. For Data encoded with the Value Representation OB, the Data encoding is unaffected by Little Endian or Big Endian byte ordering.

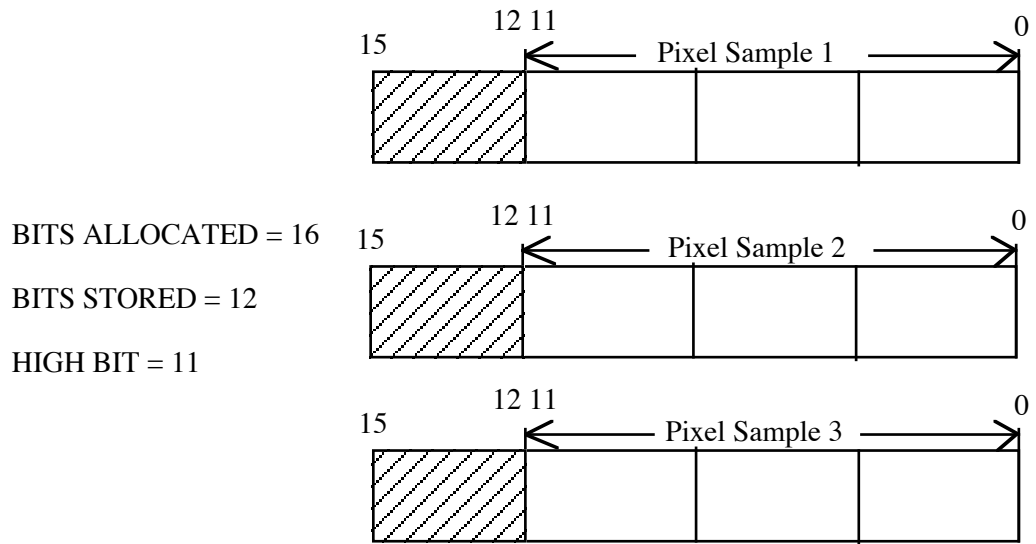
36 2. Encoding of Curve Data and Audio Sample Data was previously defined but has been retired. See PS 3.5 2004.

40 *Retire Overlay Data embedded in Pixel Data from PS 3.5 Annex D Section D.2:*

42 **D.2 VARIOUS ADDITIONAL EXAMPLES OF PIXEL AND OVERLAY DATA CELLS**

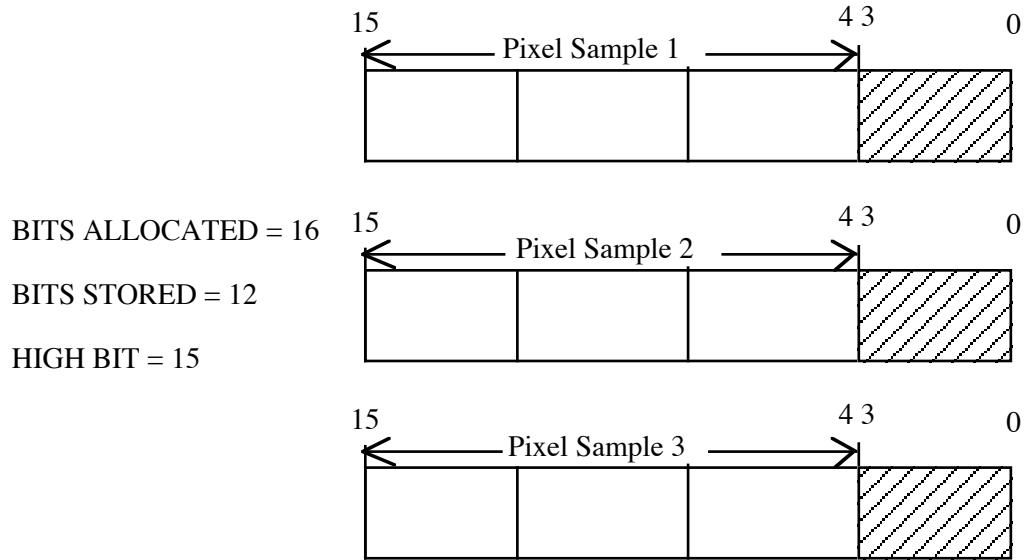
44 The following examples further illustrate the use of the data elements for Bits Allocated (0028,0100), Bits Stored (0028,0101) and High Bit (0028,0102) in the encoding of Pixel and Overlay Data. All examples show sample Pixel Cells before being encoded in byte streams (and before being affected by a particular Transfer Syntax).

46



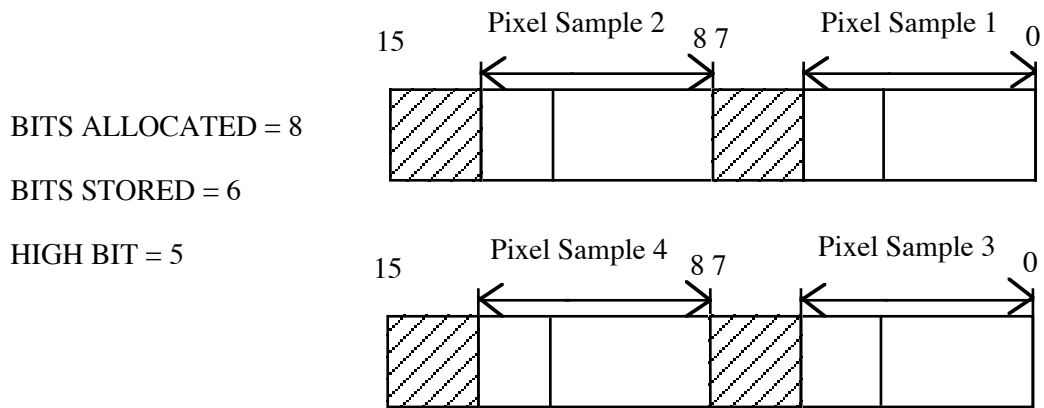
2

Figure D.2-1: Example 1 of Pixel and Overlay Data Cells



4

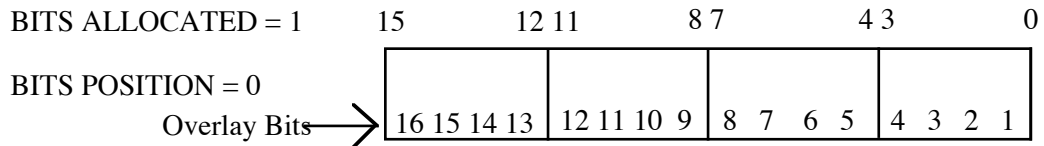
Figure D.2-2: Example 2 of Pixel and Overlay Data Cells



2

Figure D.2-3: Example 3 of Pixel and Overlay Data Cells

An Example of an encoded Overlay



4

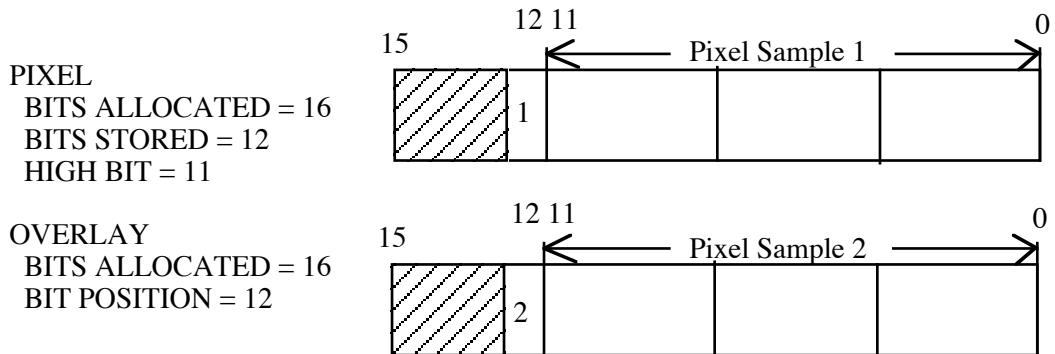
Figure D.2-4: Example 4 of Overlay Data Cells

Note: In this example, the Overlay Bits are numbered in the same manner that Pixel Cells are numbered in the other examples in this Annex. That is Overlay Bit 1 is the first bit of the Overlay Plane, encoded from left to right and top to bottom, a row at a time.

8

Delete Figure D.2.5:

An example of encoded Pixel Data with an embedded Overlay



10

Figure D.2-5: Example 5 of Pixel and Overlay Data Cells

2

4

PS 3.6 Changes:

2

For final text, PS 3.6 data elements that are used only in retired modules shall be flagged as retired.

4

Retire the following UIDs in PS 3.6 Table A-1

6

8

**Table A-1
UID VALUES**

UID Value	UID NAME	UID TYPE	Part
1.2.840.10008.1.1	Verification SOP Class	SOP Class	PS 3.4
1.2.840.10008.1.2	Implicit VR Little Endian: Default Transfer Syntax for DICOM	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.1	Explicit VR Little Endian	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.1.99	Deflated Explicit VR Little Endian	Transfer Syntax	PS 3.5
<i>1.2.840.10008.1.2.2</i>	<i>Explicit VR Big Endian (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
1.2.840.10008.1.2.4.50	JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.51	JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	Transfer Syntax	PS 3.5
<i>1.2.840.10008.1.2.4.52</i>	<i>JPEG Extended (Process 3 & 5) (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
<i>1.2.840.10008.1.2.4.53</i>	<i>JPEG Spectral Selection, Non-Hierarchical (Process 6 & 8) (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
<i>1.2.840.10008.1.2.4.54</i>	<i>JPEG Spectral Selection, Non-Hierarchical (Process 7 & 9) (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
<i>1.2.840.10008.1.2.4.55</i>	<i>JPEG Full Progression, Non-Hierarchical (Process 10 & 12) (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
<i>1.2.840.10008.1.2.4.56</i>	<i>JPEG Full Progression, Non-Hierarchical (Process 11 & 13) (Retired)</i>	<i>Transfer Syntax</i>	<i>PS 3.5</i>
1.2.840.10008.1.2.4.57	JPEG Lossless, Non-Hierarchical (Process 14)	Transfer Syntax	PS 3.5

1.2.840.10008.1.2.4.58	JPEG Lossless, Non-Hierarchical (Process 15) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.59	JPEG Extended, Hierarchical (Process 16 & 18) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.60	JPEG Extended, Hierarchical (Process 17 & 19) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.61	JPEG Spectral Selection, Hierarchical (Process 20 & 22) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.62	JPEG Spectral Selection, Hierarchical (Process 21 & 23) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.63	JPEG Full Progression, Hierarchical (Process 24 & 26) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.64	JPEG Full Progression, Hierarchical (Process 25 & 27) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.65	JPEG Lossless, Hierarchical (Process 28) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.66	JPEG Lossless, Hierarchical (Process 29) (Retired)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.70	JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.80	JPEG-LS Lossless Image Compression	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.81	JPEG-LS Lossy (Near-Lossless) Image Compression	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.90	JPEG 2000 Image Compression (Lossless Only)	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.4.91	JPEG 2000 Image Compression	Transfer Syntax	PS 3.5
1.2.840.10008.1.2.5	RLE Lossless	Transfer Syntax	PS 3.5
1.2.840.10008.1.3.10	Media Storage Directory Storage	SOP Class	PS 3.4
1.2.840.10008.1.4.1.1	Talairach Brain Atlas Frame of Reference	Well-known frame of reference	

1.2.840.10008.1.4.1.2	SPM2 T1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.3	SPM2 T2 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.4	SPM2 PD Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.5	SPM2 EPI Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.6	SPM2 FIL T1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.7	SPM2 PET Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.8	SPM2 TRANSM Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.9	SPM2 SPECT Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.10	SPM2 GRAY Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.11	SPM2 WHITE Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.12	SPM2 CSF Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.13	SPM2 BRAINMASK Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.14	SPM2 AVG305T1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.15	SPM2 AVG152T1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.16	SPM2 AVG152T2 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.17	SPM2 AVG152PD Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.1.18	SPM2 SINGLESUBJT1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.2.1	ICBM 452 T1 Frame of Reference	Well-known frame of reference	
1.2.840.10008.1.4.2.2	ICBM Single Subject MRI Frame of Reference	Well-known frame of reference	

1.2.840.10008.1.9	Basic Study Content Notification SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.1.20.1	Storage Commitment Push Model SOP Class	SOP Class	PS 3.4
1.2.840.10008.1.20.1.1	Storage Commitment Push Model SOP Instance	Well-known SOP Instance	PS 3.4
1.2.840.10008.1.20.2	Storage Commitment Pull Model SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.1.20.2.1	Storage Commitment Pull Model SOP Instance <u>(Retired)</u>	Well-known SOP Instance	PS 3.4
1.2.840.10008.1.40	Procedural Event Logging SOP Class	SOP Class	PS 3.4
1.2.840.10008.1.40.1	Procedural Event Logging SOP Instance	Well-known SOP Instance	PS 3.4
1.2.840.10008.2.16.4	DICOM Controlled Terminology	Coding Scheme	PS 3.16
1.2.840.10008.3.1.1.1	DICOM Application Context Name	Application Context Name	PS 3.7
1.2.840.10008.3.1.2.1.1	Detached Patient Management SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.3.1.2.1.4	Detached Patient Management Meta SOP Class <u>(Retired)</u>	Meta SOP Class	PS 3.4
1.2.840.10008.3.1.2.2.1	Detached Visit Management SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.3.1.2.3.1	Detached Study Management SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.3.1.2.3.2	Study Component Management SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.3.1.2.3.3	Modality Performed Procedure Step SOP Class	SOP Class	PS 3.4
1.2.840.10008.3.1.2.3.4	Modality Performed Procedure Step Retrieve SOP Class	SOP Class	PS 3.4
1.2.840.10008.3.1.2.3.5	Modality Performed Procedure Step Notification SOP Class	SOP Class	PS 3.4
1.2.840.10008.3.1.2.5.1	Detached Results Management SOP Class <u>(Retired)</u>	SOP Class	PS 3.4
1.2.840.10008.3.1.2.5.4	Detached Results Management Meta SOP Class <u>(Retired)</u>	Meta SOP Class	PS 3.4
1.2.840.10008.3.1.2.5.5	Detached Study Management Meta SOP Class <u>(Retired)</u>	Meta SOP Class	PS 3.4

<i>1.2.840.10008.3.1.2.6.1</i>	<i>Detached Interpretation Management SOP Class (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.1.1	Basic Film Session SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.2	Basic Film Box SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.4	Basic Grayscale Image Box SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.4.1	Basic Color Image Box SOP Class	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.1.4.2</i>	<i>Referenced Image Box SOP Class (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.1.9	Basic Grayscale Print Management Meta SOP Class	Meta SOP Class	PS 3.4
<i>1.2.840.10008.5.1.1.9.1</i>	<i>Referenced Grayscale Print Management Meta SOP Class (Retired)</i>	<i>Meta SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.1.14	Print Job SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.15	Basic Annotation Box SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.16	Printer SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.16.376	Printer Configuration Retrieval SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.1.17	Printer SOP Instance	Well-known Printer SOP Instance	PS 3.4
1.2.840.10008.5.1.1.17.376	Printer Configuration Retrieval SOP Instance	Well-known Printer SOP Instance	PS 3.4
1.2.840.10008.5.1.1.18	Basic Color Print Management Meta SOP Class	Meta SOP Class	PS 3.4
<i>1.2.840.10008.5.1.1.18.1</i>	<i>Referenced Color Print Management Meta SOP Class (Retired)</i>	<i>Meta SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.1.22</i>	<i>VOI LUT Box SOP Class (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.1.23	Presentation LUT SOP Class	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.1.24</i>	<i>Image Overlay Box SOP Class (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.1.24.1</i>	<i>Basic Print Image Overlay Box SOP Class (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.1.25</i>	<i>Print Queue SOP Instance (Retired)</i>	<i>Well-known Print Queue SOP Instance</i>	<i>PS 3.4</i>

1.2.840.10008.5.1.1.26	Print Queue Management SOP Class (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.1.27	Stored Print Storage SOP Class (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.1.29	Hardcopy Grayscale Image Storage SOP Class (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.1.30	Hardcopy Color Image Storage SOP Class (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.1.31	Pull Print Request SOP Class (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.1.32	Pull Stored Print Management Meta SOP Class (Retired)	Meta SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1	Computed Radiography Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.1	Digital X-Ray Image Storage – For Presentation	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.1.1	Digital X-Ray Image Storage – For Processing	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.2	Digital Mammography X-Ray Image Storage – For Presentation	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.2.1	Digital Mammography X-Ray Image Storage – For Processing	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.3	Digital Intra-oral X-Ray Image Storage – For Presentation	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.1.3.1	Digital Intra-oral X-Ray Image Storage – For Processing	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.2	CT Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.2.1	Enhanced CT Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.3	Ultrasound Multi-frame Image Storage (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.3.1	Ultrasound Multi-frame Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.4	MR Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.4.1	Enhanced MR Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.4.2	MR Spectroscopy Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.5	Nuclear Medicine Image Storage (Retired)	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.6	Ultrasound Image Storage (Retired)	SOP Class	PS 3.4

1.2.840.10008.5.1.4.1.1.6.1	Ultrasound Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.7.1	Multi-frame Single Bit Secondary Capture Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.7.2	Multi-frame Grayscale Byte Secondary Capture Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.7.3	Multi-frame Grayscale Word Secondary Capture Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.7.4	Multi-frame True Color Secondary Capture Image Storage	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.1.8</i>	<i>Standalone Overlay Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.4.1.1.9</i>	<i>Standalone Curve Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.4.1.1.9.1.1	12-lead ECG Waveform Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.9.1.2	General ECG Waveform Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.9.1.3	Ambulatory ECG Waveform Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.9.2.1	Hemodynamic Waveform Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.9.3.1	Cardiac Electrophysiology Waveform Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.9.4.1	Basic Voice Audio Waveform Storage	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.1.10</i>	<i>Standalone Modality LUT Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.4.1.1.11</i>	<i>Standalone VOI LUT Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.4.1.1.11.1	Grayscale Softcopy Presentation State Storage SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.12.1	X-Ray Angiographic Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.12.2	X-Ray Radiofluoroscopic Image Storage	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.1.12.3</i>	<i>X-Ray Angiographic Bi-Plane Image Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>

1.2.840.10008.5.1.4.1.1.20	Nuclear Medicine Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.66	Raw Data Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.66.1	Spatial Registration Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.66.2	Spatial Fiducials Storage	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.1.77.1</i>	<i>VL Image Storage (Retired)</i>		
<i>1.2.840.10008.5.1.4.1.1.77.2</i>	<i>VL Multi-frame Image Storage (Retired)</i>		
1.2.840.10008.5.1.4.1.1.77.1.1	VL Endoscopic Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.77.1.2	VL Microscopic Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.77.1.3	VL Slide-Coordinates Microscopic Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.77.1.4	VL Photographic Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.11	Basic Text SR	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.22	Enhanced SR	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.33	Comprehensive SR	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.40	Procedure Log Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.50	Mammography CAD SR	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.59	Key Object Selection Document	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.88.65	Chest CAD SR	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.128	Positron Emission Tomography Image Storage	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.1.129</i>	<i>Standalone PET Curve Storage (Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.4.1.1.481.1	RT Image Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.2	RT Dose Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.3	RT Structure Set Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.4	RT Beams Treatment Record Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.5	RT Plan Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.6	RT Brachy Treatment Record Storage	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.1.481.7	RT Treatment Summary Record Storage	SOP Class	PS 3.4

1.2.840.10008.5.1.4.1.2.1.1	Patient Root Query/Retrieve Information Model – FIND	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.2.1.2	Patient Root Query/Retrieve Information Model – MOVE	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.2.1.3	Patient Root Query/Retrieve Information Model – GET	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.2.2.1	Study Root Query/Retrieve Information Model – FIND	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.2.2.2	Study Root Query/Retrieve Information Model – MOVE	SOP Class	PS 3.4
1.2.840.10008.5.1.4.1.2.2.3	Study Root Query/Retrieve Information Model – GET	SOP Class	PS 3.4
<i>1.2.840.10008.5.1.4.1.2.3.1</i>	<i>Patient/Study Only Query/Retrieve Information Model - FIND</i> <i>(Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.4.1.2.3.2</i>	<i>Patient/Study Only Query/Retrieve Information Model - MOVE</i> <i>(Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
<i>1.2.840.10008.5.1.4.1.2.3.3</i>	<i>Patient/Study Only Query/Retrieve Information Model - GET</i> <i>(Retired)</i>	<i>SOP Class</i>	<i>PS 3.4</i>
1.2.840.10008.5.1.4.31	Modality Worklist Information Model – FIND	SOP Class	PS 3.4
1.2.840.10008.5.1.4.32.1	General Purpose Worklist Information Model – FIND	SOP Class	PS 3.4
1.2.840.10008.5.1.4.32.2	General Purpose Scheduled Procedure Step SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.4.32.3	General Purpose Performed Procedure Step SOP Class	SOP Class	PS 3.4
1.2.840.10008.5.1.4.32	General Purpose Worklist Management Meta SOP Class	Meta SOP Class	PS 3.4

PS 3.10 Changes:

Remove directory records referencing the Detached Patient Management SOP Class in PS 3.10 Annex A.1, and recompute offsets accordingly.

A.1 SIMPLE DIRECTORY CONTENT EXAMPLE

Table A.1-1 shows in a simplified manner, the content of a simple (i.e. without Multiple Referenced Files) DICOMDIR File. Values of elements are noted between square brackets (e.g. [1.840.10008.34.7.6]). Byte Offsets are shown by symbolic Values noted between brackets (e.g. {1493}).

**Table A.1-1
Directory Content Example**

Meta-Info	128 bytes 4 bytes 0002,0000 0002,0001 0002,0002 0002,0003 0002,0010 0002,0012 ...	File Preamble [all bytes set to 00H] DICOM Prefix [DICM] Group Length File Meta-Information Version [0001] SOP Class UID [1.2.840.10008.1.3.10] SOP Instance UID [1.840.23856.36.45.3] Transfer Syntax UID [1.840.10008.1.1] Implementation Class UID [1.840.23856.34.90.3] ...
File-set Identification	0004,1130 ...	File-set ID [EXAMPLE] ...
General Directory Information	0004,1200 0004,1202 0004,1212 ... 0004,1220	Offset of First Record of Root Directory Entity {12361829} Offset of Last Record of Root Directory Entity {6F18} File-set Consistency Flag [0000H] ... Directory Record Sequence. This Data Element Value includes the following Sequence of Items.

{1236}	Item-Tag	FFFFE,0000	Item-Data Element (includes the following Data Elements)
	Patient B Directory Record	0004,1400	Offset of the next Directory Record in Dir. Entity {1493}
		0004,1410	Record In-Use Flag [FFFFH]
		0004,1420	Offset of Referenced Lower Level Dir. Entity (not shown in example)
		...	
	0004,1430	Directory Record Type [PATIENT]	
Selection Keys	0004,1500	Referenced File ID [DIRATHREK48]	
	0004,1510	Referenced SOP Class UID in File [1.840.10008.3.1.2.1.1]	
	0004,1511	Referenced SOP Instance UID in File [1.840.23856.3.9879]	
	0004,1512	Referenced Transfer Syntax UID in File [1.2.840.10008.1.2.2]	
	0010,0010	Patient Name [Patient-B]	
	0010,0020	Patient ID [550-31-8623]	
	
Item-Del. Tag	FFFFE,0000	Item-Delimitation Tag is present only if Item is of undefined Length	

{1493}	Item-Tag	FFFFE,0000	Item-Data Element (includes the following Data Elements)
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2

Patient A Directory Record	0004,1400 0004,1410 0004,1420 ...	Offset of the next Dir. Record in Dir. Entity {6F18} Record In-use Flag [FFFFH] Offset of Referenced Lower Level Directory Entity {1829} ...
	0004,1430	Directory Record Type [PATIENT]
Selection Keys	0004,1500 0004,1510 0004,1511 0004,1512	Referenced File ID [DIRTDRE\GC48] Referenced SOP Class UID in File [1.840.10008.3.1.2.1.1] Referenced SOP Instance UID in File [1.840.23856.3.9789] Referenced Transfer Syntax UID in File [1.2.840.10008.1.2.2]
	0010,0010 0010,0020 ...	Patient Name [Patient A] Patient ID [535-71-7321] ...
Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

4

{1829}	Item Tag	FFFE,E000	Item Data Element (includes the following Data Elements)
	Study 1 Directory Record	0004,1400 0004,1410 0004,1420 ...	Offset of the next Dir. Record in Dir. Entity (not shown in example) Record In-use Flag [FFFFH] Offset of Referenced Lower Level Directory Entity {2299} ...
		0004,1430	Directory Record Type [STUDY]
	Selection Keys	0020,000D 0020,0010 ...	Study Instance UID [1.840.4656.23.4568745] Study ID [srt78UJ]
	Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

6

{2299}	Item Tag	FFFE,E000	Item Data Element (includes the following Data Elements)
	Series 1 Directory Record	0004,1400 0004,1410 0004,1420 ...	Offset of the next Dir. Record in Dir. Entity (not shown in example) Record In-use Flag [OFFFFH] Offset of Referenced Lower Level Directory Entity {2681} ...
		0004,1430	Directory Record Type [SERIES]
	Selection Keys	0008,0060 0020,0011 ...	Modality [NM] Series Number [2] ...
	Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

{2681}	Item Tag	FFFE,E000	Item Data Element (includes the following Data Elements)
	Image 1 Directory Record	0004,1400 0004,1410 0004,1420 ...	Offset of the next Dir. Record in Dir. Entity {3419} Record In-use Flag [FFFFH] Offset of Referenced Lower Level Directory Entity [00000000H] ...
		0004,1430	Directory Record Type [IMAGE]

2

	0004,1500 0004,1510 0004,1511 0004,1512	Referenced File ID [DIR\TDRI\3856G3] Referenced SOP Class UID in File [1.840.10008.5.1.4.1.1.5] Referenced SOP Instance UID in File [1.840.34.56.78999654.234] Referenced Transfer Syntax UID in File [1.2.840.10008.1.2.1]
<i>Selection Keys</i>	0008,0018 0020,0013 ...	Image SOP Instance UID [1.840.34.56.78999654.234] Image Number [1] ...
Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

{3419}	Item Tag	FFFE,E000	Item Data Element (includes the following Data Elements)
	Image 2 Directory Record	0004,1400 0004,1410 0004,1420 ... 0004,1430	Offset of the next Dir. Record in Dir. Entity (not shown in example) Record In-use Flag [FFFFH] Offset of Referenced Lower Level Directory Entity [00000000H] ... Directory Record Type [IMAGE]
	<i>Selection Keys</i>	0004,1500 0004,1510 0004,1511 0004,1512	Referenced File ID [DIR\TDRI\3856G7] Referenced SOP Class UID in File [1.840.10008.5.1.4.1.1.5] Referenced SOP Instance UID in File [1.840.34.56.78999654.235] Referenced Transfer Syntax UID in File [1.2.840.10008.1.2.2]
		0008,0018 0020,0013 ...	Image SOP Instance UID [1.840.34.56.78999654.235] Image Number [2] ...
	Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

4

{6F18}	Item Tag	FFFE,E000	Item Data Element (includes the following Data Elements)
	Patient C Directory Record	0004,1400 0004,1410 0004,1430 ...	Offset of the next Dir. Record in Dir. Entity { 00000000H } Record In-use Flag [FFFFH] Directory Record Type [PATIENT] ...
	<i>Selection Keys</i>	0010,0010 0010,0020	Patient Name [Patient C] Patient ID [523-61-8765]
	Item Del. Tag	FFFE,E00D	Item Delimitation Tag is present only if Item is of undefined length

6

Sequence Delimitation Tag FFFE,E0DD	Used only if the Directory Record Sequence (0004,1220) is of undefined length to delimit the end of the Value of the Directory Record Sequence Data Element.
--	--

PS 3.11 changes:

Retire the use of the Detached Patient Management SOP Class in PS 3.11 in those profiles that suggested it for overriding patient attribute values in referenced files:

A.3 STD-XABC-CD BASIC CARDIAC PROFILE

...

Table A.3-1
STD-XABC-CD SOP CLASSES AND TRANSFER SYNTAXES

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Requirement	FSR Requirement	FSU Requirement
...
Detached Patient Management	1.2.840.10008.3.1.2.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Optional	Optional

Notes: 1. This application profile does not allow the use of the X-Ray Angiographic Bi-Plane Image Object. Biplane acquisitions must therefore be transferred as two single plane SOP instances. A future Application Profile that permits X-Ray Angiographic Bi-Plane Image Object transfer is under development.
2. This Application Profile includes only the XA Image ~~and Detached Patient Management~~ SOP Instances. It does not include Standalone Curve, Modality LUT, VOI LUT, or Overlay SOP Instances.

...

A.3.4.1.1 ATTRIBUTE VALUE PRECEDENCE

Retired. See PS 3.11 2004.

~~The values of attributes contained in a Detached Patient Management SOP Instance referenced by a Directory Record of type PATIENT shall take precedence over the values of those attributes contained in a SOP Instance referenced by a subsidiary Directory Record. The DICOMDIR Directory Records of type PATIENT shall have key attribute values in accordance with this precedence.~~

~~Note: This allows patient identification and demographic information to be updated without changing the composite Image IOD files. The DICOMDIR file is critical in establishing the link between the updated information and the image. As an example, at the time an image file was written, the patient's name was incorrect, or inconsistent with the Hospital Information System records. Subsequently, a Detached Patient Management file with the corrected name is added to the File-set. If the FSR supports the Detached Patient Management SOP Class, then the FSR should use the information from this SOP Class rather than the information in the Image file.~~

Note: The retired Detached Patient Management SOP Class was previously suggested to allow patient identification and demographic information to be updated without changing the composite Image IOD files. This usage is now retired.

D.3 STD-GEN PROFILE CLASS

Table D.3-1
STD-GEN-CD SOP Classes and Transfer Syntaxes

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Requirement	FSR Requirement	FSU Requirement
...
Detached Patient Management	1.2.840.10008.3.1.2.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Defined in Conformance Statement (See D.3.3.2)	Optional

D.3.3.2 Attribute value precedence

Retired. See PS 3.11 2004.

~~If an FSR supports the Detached Patient Management SOP Class, the values of attributes contained in a Detached Patient Management SOP Instance referenced by a Directory Record of type PATIENT, shall take precedence over the values of those attributes contained in the SOP Instance referenced by a subsidiary Directory Record. The DICOMDIR Directory Records of type PATIENT shall have key attributes values in accordance with this precedence.~~

~~**Note:** 1. This allows patient identification and demographic information to be updated without changing the composite Image IOD files. The DICOMDIR file thus is critical in establishing the link between the updated information and the image. As an example, at the time an Image file was written, the patient's name therein was incorrect, or inconsistent with the Hospital Informations System records. Subsequently, a Detached Patient Management file with the corrected name is added to the File Set. The FSR should use the information from the Detached Patient Management SOP Class, rather than the information in the Image file.~~

~~2. The support for the Detached Patient Management SOP Class as indicated in Table D.3-1, is to be defined in the Conformance Statement, and is not mandatory for all FSRs of this profile. Applications which require the ability to read updated patient identifying information, such as an FSR that may forward an updated SOP Instance elsewhere, may need to support this mechanism. Applications such as standalone viewers may choose not to support this mechanism, in which case the user should be made aware, for example by a screen message or in the documentation, that updated identifying information may exist on the media that is not visible.~~

Note: The retired Detached Patient Management SOP Class was previously suggested to allow patient identification and demographic information to be updated without changing the composite Image IOD files. This usage is now retired.

2

Retire obsolete Media Formats used in PS 3.11:

4

Retire obsolete Media Formats used in PS 3.11 Annex C Ultrasound Application Profile:

6

C.3.2 Physical Media And Media Formats

8 An ultrasound application profile class may be supported by any one of the media described in Table C.3-3.

10

**Table C.3-3
MEDIA CLASSES**

Media	Media Classes	Media Format	PS 3.12
1.44MB Floppy Disc	FLOP	DOS	Annex B
128MB 90mm MOD	MOD128	DOS, unpartitioned (removable media)	Annex C
230MB 90mm MOD	MOD230	DOS, unpartitioned (removable media)	Annex G
540MB 90mm MOD	MOD540	DOS, unpartitioned (removable media)	Annex H
640MB 90mm MOD	MOD640	DOS, unpartitioned (removable media)	Annex N
1.3GB 90mm MOD	MOD13	DOS, unpartitioned (removable media)	Annex O
2.3GB 90mm MOD	MOD23-90	DOS, unpartitioned (removable media)	Annex Q
650MB 130mm MOD	MOD650	DOS, unpartitioned (removable media)	Annex D
1.2GB 130mm MOD	MOD12	DOS, unpartitioned (removable media)	Annex E
2.3GB 130mm MOD	MOD23	DOS, unpartitioned (removable media)	Annex I

12

Note: Media Classes FLOP, MOD128, MOD230, MOD540, MOD640, MOD650, MOD12 AND MOD23 were previously defined but have been retired. See PS 3.11 2004.

14

Retire obsolete Media Formats used in PS 3.11 Annex E CT and MR Image Application Profiles:

16

18

Table E.1-1 - STD-CTMR Profiles

Application Profile	Identifier	Description
CT/MR Studies on 650MB MOD	STD-CTMR-MOD650	Handles single frame 8, 12 or 16 bit

		grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on 1.2GB MOD	STD-CTMR-MOD12	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on 2.3GB MOD	STD-CTMR-MOD23	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on 4.1GB MOD	STD-CTMR-MOD41	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on CD-R	STD-CTMR-CD	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on DVD-RAM Media	STD-CTMR-DVD-RAM	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.
CT/MR Studies on DVD Media	STD-CTMR-DVD	Handles single frame 8, 12 or 16 bit grayscale and 8 bit palette color, uncompressed and lossless compressed images.

2 **Note:** Media Profiles STD-CTMR-MOD650, STD-CTMR-MOD12 and STD-CTMR-MOD23 were
4 previously defined but have been retired. See PS 3.11 2004.

4

...

6 **E.3.2 Physical Medium And Medium Format**

8 ~~The STD-CTMR-MOD650 application profile requires the 130 mm 650MB R/W MOD physical medium with the PC DOS Media Format, as defined in PS 3.12.~~

10 ~~The STD-CTMR-MOD12 application profile requires the 130 mm 1.2GB R/W MOD physical medium with the PC DOS Media Format, as defined in PS 3.12.~~

12 ~~The STD-CTMR-MOD23 application profile requires the 130 mm 2.3GB R/W MOD physical medium with the PC DOS Media Format, as defined in PS 3.12.~~

14 The STD-CTMR-MOD41 application profile requires the 130 mm 4.1GB R/W MOD physical medium with the PC DOS Media Format, as defined in PS 3.12.

16 The STD-CTMR-CD application profile requires the 120 mm CD-R physical medium with the ISO 9660 Media Format, as defined in PS 3.12.

2 The STD-CTMR-DVD-RAM application profile requires the 120 mm DVD-RAM medium, as
defined in PS 3.12.

4 The STD-CTMR-DVD application profile requires any of the 120 mm DVD media other than DVD-
RAM, as defined in PS 3.12.

6 *Retire obsolete Media Formats used in PS 3.11 by removing Annex F Waveform Diskette
Interchange Profile entirely. Replace Entire Annex F with:*

8

Retired. See PS 3.11 2004.

10

PS 3.12 changes:

2

Retire obsolete physical media formats from PS 3.12:

4

Replace entire PS 3.12 Annex B 1.44 MB Diskette with::

6

Retired. See PS 3.12 2004.

8

Replace entire PS 3.12 Annex C 90 mm 128mb magneto-optical disk with::

10

Retired. See PS 3.12 2004.

12

Replace entire PS 3.12 Annex D 130 mm 650MB magneto-optical disk with::

14

Retired. See PS 3.12 2004.

16

Replace entire PS 3.12 Annex E 130 mm 1.2GB magneto-optical disk with::

18

Retired. See PS 3.12 2004.

20

Replace entire PS 3.12 Annex G 90 mm 230MB magneto-optical disk with::

22

Retired. See PS 3.12 2004.

24

Replace entire PS 3.12 Annex H 90 mm 540MB magneto-optical disk with::

26

Retired. See PS 3.12 2004.

28

Replace entire PS 3.12 Annex I 130 mm 2.3GB magneto-optical disk with::

30

Retired. See PS 3.12 2004.

32

2

Replace entire PS 3.12 Annex N 90 mm 640MB magneto-optical disk with::

Retired. See PS 3.12 2004.

4

Replace entire PS 3.12 Annex O 90 mm 1.3GB magneto-optical disk with::

6

Retired. See PS 3.12 2004.

8