

# **AGFA MEDICAL IMAGING DICOM Conformance Statement**

→ **TS5 Transmit/Preview Digitizer Station**

***DICOM 3.0: Storage SCU/SCP***

Document No. 000583, Revision 1.1



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## Revision Record

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Revision Number	Date	Author	Reason for Change
1.0	24/2/95	Andrew	Initial release.
1.1	16/3/95	Andrew	Major revisions to more accurately describe the Lumiscan system.
1.2	Jan 3, 1996	mike f	Added Query and N-Get sections
2.1	March 7, 1996	mike f	Removed N-Get, Added Modality Worklist
2.2	Apr. 15, 1996	mike f	Minor revisions
2.3	Apr. 19, 1996	mike f	Corrected N-Event-Report from scp to scu
2.4	Aug. 27, 1996	mike f	Added JPEG Transfer Syntaxes to C-Store; 12OD & 8Video Conformance
2.5	Dec. 16, 1996	mike f	Changed name to TS5, added SCP, added Print-SCU conformance
2.6	Dec. 19, 1996	mike f	Added N-Event-Report to AE Specifications, minor corrections
2.7	April 7, 1997	mike f	corrected 3.2.9 section.
2.8	May 12, 1997	mike f	corrected image attributes
2.8.1	May 23, 1997	mike f	corrected JPEG image attributes
2.8.2	July 17, 1997	mike f	updated DICOM concurrency
-	-	-	Checked into MIS
1.0		Amorris	Incorporated into Domino
1.1	16/4/01	Plang	Released

# 1 INTRODUCTION

## 1.1 Intended Audience

The user of this document is involved with system integration and/or software design. We assume that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 standard.

Readers not familiar with DICOM 3.0 terminology should first read the appropriate parts of the DICOM standard itself, prior to reading this conformance statement.

Although the use of this conformance statement in conjunction with the DICOM 3.0 standard is intended to facilitate communication with Agfa imaging equipment, it is not sufficient to guarantee, by itself, the inter-operation of the connection. The following issues need to be considered:

### 1.1.1 Integration

The integration of any device into a system of interconnected devices goes beyond the scope of the DICOM 3.0 standard and this conformance statement when *interoperability* is desired. The responsibility for analyzing the applications requirements and developing a solution that integrates the Agfa equipment with other vendors' systems is the user's responsibility and should not be underestimated.

### 1.1.2 Validation

Testing the complete range of possibilities between the Agfa equipment and non-Agfa devices, before the connection is declared operational, is deemed to be a necessity. The user should ensure that any non-Agfa provider accepts full responsibility for all validation required for their connection with the Agfa equipment. The accuracy of image data once it has crossed the interface between the Agfa equipment and the non-Agfa device as well as the stability of the image data for the intended applications is the responsibility of the non-Agfa provider.

### 1.1.3 Future Evolution

As the DICOM 3.0 standard evolves to meet the user's growing requirements and to incorporate new features and technologies, Agfa will follow the evolution of the standard. This evolution of the standard may require changes to devices that have implemented DICOM 3.0. The user should ensure that any non-Agfa provider, who connects with Agfa devices, also plans future evolution of the DICOM standard. A refusal to do so may reflect in the loss of functionality and/or connectivity between the different products.

## 1.2 Purpose of this Document

This document is a provisional DICOM Conformance Statement for the software product TS5. TS5 is a service class user for DIMSE-C services for the storage of images.

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### **Note:**

Refer to the Conformance Statements Overview document to get an overview of all Conformance Statements and their relationship to one another.

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### 1.3 Sources for this Document

- ▶ American College of Radiology-National Electrical Manufacturers Association (ACR-NEMA) Digital Imaging and Communications v2.0, 1988.
- ▶ ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) v3.0, Final Draft, Aug. 1993.

## 2 IMPLEMENTATION MODEL

TS5 is a PC Windows/NT scanning software package engineered to work with the full complement of Lumisys LSDT and SCSI scanners. The product is designed to allow technicians a simple mechanism to scan film into DICOM images and send them to remote stations using the DICOM protocol.

Support for DICOM Lossy JPEG compression for sending and receiving has been implemented, to provide an integrated teleradiology package for inter- and intra-hospital communication over low bandwidth lines.

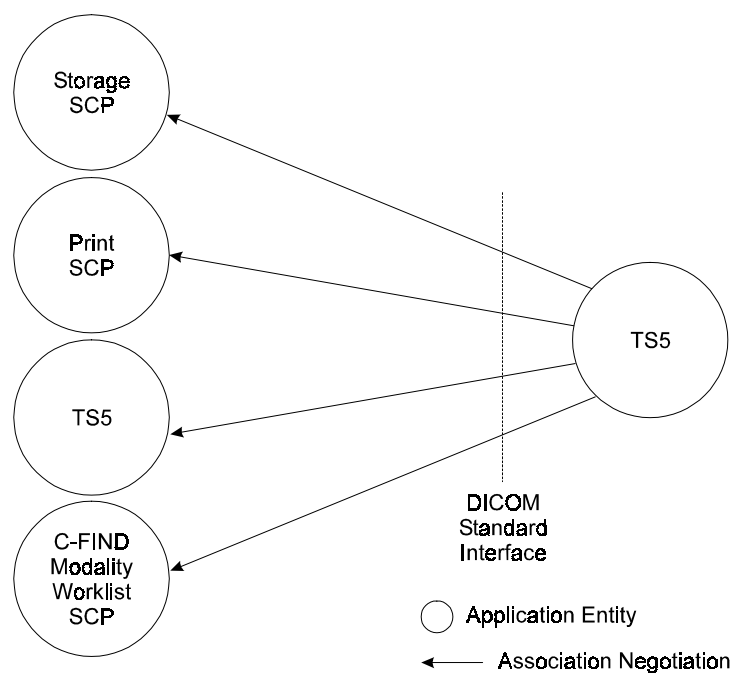
The product includes support for DICOM Basic Printing to provide an easy mechanism for film replication and for sending images to remote DICOM network printers.

TS5 is also able to receive Secondary Capture images. In this way, images can be pushed from one TS5 to another TS5, to provide a simple mechanism of exchanging information between institutions.

TS5 is able to request demographic information, to avoid unnecessary typing by technologists.

### 2.1 Application Data Flow Diagram

TS5 behaves as a single Application Entity according to DICOM. TS5 can initiate associations to send images for storage and to send images for printing to DICOM Service Class Providers. TS5 can also receive association requests to be able to store images to its local cache. TS5 is able to initiate an association with a Worklist SCP for the purposes of retrieving demographic information as well as being able to receive event notification of studies to be completed.



**Figure 2.1 Implementation model.**

## 2.2 Functional Definition of Application Entities

TS5 acts as a Service Class User for the purposes of storage, Printing and requesting demographic information. TS5 also acts as a Service Class Provider for the purposes of storage.

As an SCU, TS5 utilizes the DICOM C-Store to store images to a remote archive. The DICOM Basic Grayscale and Color Print Management is used to print images. The DICOM C-Find modality worklist service class is used to retrieve demographic information.

As an SCP, TS5 supports the DICOM C-Store service class for receiving images from a remote SCU, such as another TS5. TS5 is not an SCP for the Query/Retrieve Service Class.

## 3 AE SPECIFICATIONS

### 3.1 Services Used by TS5 as an SCU

#### 3.1.1 Verification as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Verification** SOP Class as an SCU.

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

*Table 3.1 Verification SOP class.*

#### 3.1.2 Storage as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Storage** SOP Class as an SCU.

SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

*Table 3.2 Storage SOP class.*

#### 3.1.3 Query/Retrieve as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Query/Retrieve** SOP Class as an SCU.

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.2.1
Patient/Study Only Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.3.1

*Table 3.3 Query/Retrieve SOP classes.*

### 3.1.4 Detached Study Component Management as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Detached Study Component Management** SOP Class as an SCU.

SOP Class Name	SOP Class UID
Detached Study Component Management	1.2.840.10008.3.1.2.3.1

*Table 3.4 Worklist SOP classes.*

### 3.1.5 Worklist Management as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Worklist Management** SOP Class as an SCU.

SOP Class Name	SOP Class UID
Modality Worklist Info Model -FIND	1.2.840.10008.5.1.4.31

*Table 3.5 Worklist SOP classes.*

### 3.1.6 Print Management as an SCU

TS5 provides Standard Conformance to the following DICOM 3.0 **Print Management** SOP Classes as an SCU.

SOP Class Name	SOP Class UID
Basic Greyscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18

*Table 3.6 Presentation contexts.*

## 3.2 Services Provided by TS5 as an SCP

### 3.2.1 Verification as an SCP

TS5 provides Standard Conformance to the following DICOM 3.0 **Verification** SOP Class as an SCP.

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1

*Table 3.7 Verification SOP class.*

### 3.2.2 Query/Retrieve as an SCP

TS5 provides Standard Conformance to the following DICOM V3.0 **Query/Retrieve** SOP Class as an SCP.

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.1.1
Study Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.2.1
Patient/Study Only Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.3.1

**Table 3.8 Query/Retrieve SOP classes.**

### 3.2.3 Storage as an SCP

TS5 provides Standard Conformance to the following DICOM 3.0 **Storage** SOP Classes as an SCP.

SOP Class Name	SOP Class UID
Secondary Capture Image Storage (SC)	1.2.840.10008.5.1.4.1.1.7

**Table 3.9 Storage SOP class.**

## 3.3 Association Establishment Policies

### 3.3.1 General

TS5 contains a limitation of 100000 bytes for maximum PDU size.

### 3.3.2 Number of Associations

TS5 will issue only one association request at a time to a Remote AE. TS5 can issue up to 4 single associations at one time. TS5 can accept up to 4 single associations at one time.

### 3.3.3 Asynchronous Nature

TS5 allows a single outstanding operation on any association. Therefore, TS5 does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

### 3.3.4 Implementation Identifying Information

TS5 will respond with the following implementation identifying parameters:

- ▶ Implementation Class UID            **1.2.124.113532.5000**
- ▶ Implementation Version Name       **MITRAJUNE97**

The implementation version name policies are the following: company name "MITRA" followed by the month and year of the product "JUNE97".

### 3.3.5 Called/Calling Titles

The calling title is defined during the installation, by the operator.

### 3.3.6 Association Initiation by Real World Activity

TS5 will issue a new association with a remote device when images are to be transmitted.

#### 3.3.6.1 Real World Activity - Verification

##### 3.3.6.1.1 Associated Real World Activity - Verification

TS5 will issue a **Verification** request when a user of TS5 wishes to send a study of images to a remote DICOM SCP.

##### 3.3.6.1.2 Proposed Presentation Contexts - Verification

TS5 supports the transfer syntaxes listed in Table 3.10. For a **Verification** request, TS5 will propose the Presentation Contexts listed in Table 3.11.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

*Table 3.10 Transfer syntaxes.*

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Verification	1.2.840.10008.1.1	all from Table 3.10	SCU	None

*Table 3.11 Verification SOP classes.*

##### 3.3.6.1.3 SOP Specific Conformance - Verification

TS5 provides standard conformance to the DICOM **Verification** Service Class.

#### 3.3.6.2 Real World Activity - Query

##### 3.3.6.2.1 Associated Real World Activity - Query

TS5 will issue a **C-Find** request when a user of TS5 wishes to query a remote DICOM SCP to confirm that the images have been properly sent.

##### 3.3.6.2.2 Proposed Presentation Contexts - Query

TS5 supports the transfer syntaxes listed in Table 3.12. For a **C-Find** request, TS5 will propose the Presentation Contexts listed in Table 3.13.

Transfer Syntax	UID
DICOM Implicit VR Little Endian	1.2.840.10008.1.2

*Table 3.12 Transfer syntaxes.*

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Patient Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.1.1	all from Table 3.12	SCU	See Note
Study Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.2.1	all from Table 3.12	SCU	See Note
Patient/Study Only Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.3.1	all from Table 3.12	SCU	See Note

**Table 3.13 Query SOP classes.**

**Note:**

C-Find Extended Negotiation will be supported. TS5 will respond with the following information:

Field Name	Value	Description of Field
Relational-queries	1	Relational queries supported

**Table 3.14 Query Extended Negotiation.**

### 3.3.6.3 Real World Activity - Storage

#### 3.3.6.3.1 Associated Real World Activity - Storage

TS5 will issue a **Storage** request when a user of TS5 wishes to send a study of images to a remote DICOM SCP.

#### 3.3.6.3.2 Proposed Presentation Contexts - Storage

TS5 supports the transfer syntaxes listed in Table 3.15. For a **Storage** request, TS5 will propose the Presentation Contexts listed in Table 3.16.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Baseline Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
DICOM Extended Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression	1.2.840.10008.1.2.4.51

**Table 3.15 Transfer syntaxes.**

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	all from Table 3.15	SCU	None

**Table 3.16 Storage SOP classes.**

### 3.3.6.3.3 SOP Specific Conformance - Storage

#### 3.3.6.3.3.1 Storage of Optical Density Image Data - Monochrome 1

TS5 will scan the film to create images of any modality as specified within the DICOM specification. The following values will be encoded for a non-compressed image:

Grp Elmt	Description	VR	Value
0008, 0008	image_type	CS	"DERIVED\SECONDARY"
0008, 0016	sop_class_uid	UI	1.2.840.10008.5.1.4.1.1.7
0008, 0018	sop_instance_uid	UI	
0008, 0020	study_date	DA	
0008, 0023	image_date	DA	
0008, 0030	study_time	TM	
0008, 0033	image_time	TM	
0008, 0050	accession_number	SH	
0008, 0060	modality	CS	
0008, 0064	conversion_type	CS	DF
0008, 0070	manufacturer	LO	LUMISYS
0008, 0080	institution_name	LO	
0008, 0081	institution_address	ST	
0008, 0090	referring_physician_name	PN	
0008, 1010	station_name	SH	
0008, 1030	study_description	LO	
0008, 103e	series_description	LO	
0008, 1040	institutional_department_name	LO	
0010, 0010	patient_name	PN	
0010, 0020	patient_id	LO	
0010, 0030	patient_birth_date	DA	
0010, 0040	patient_sex	CS	
0010, 1000	other_patient_ids	LO	
0010, 1010	patient_age	AS	
0010, 21B0	additional_patient_history	LT	
0018, 1010	secondary_capture_device_id	LO	
0018, 1012	date_of_secondary_capture	DA	
0018, 1014	time_of_secondary_capture	TM	
0018, 1016	secondary_capture_device_manufacturer	LO	LUMISYS
0018, 1018	secondary_capture_device_manufacturer_model_name	LO	"Scanner Model Number" eg: LS75
0018, 1019	secondary_capture_device_software_versions	LO	"Software Version Number" eg: Version: 4.2
0018, 1200	date_of_last_calibration	DA	
0018, 1201	time_of_last_calibration	TM	
0020, 000d	study_instance_uid	UI	
0020, 000e	series_instance_uid	UI	
0020, 0010	study_id	SH	
0020, 0011	series_number	IS	1
0020, 0013	image_number	IS	
0020, 0020	patient_orientation	CS	

Grp Elmt	Description	VR	Value
0028, 0002	samples_per_pixel	US	1
0028, 0004	photometric_interpretation	CS	MONOCHROME1
0028, 0010	rows	US	
0028, 0011	columns	US	
0028, 0100	bits_allocated	US	16
0028, 0101	bits_stored	US	12
0028, 0102	high_bit	US	11
0028, 0103	pixel_representation	US	0
0028, 1050	window_center	DS	
0028, 1051	window_width	DS	
0028, 1052	rescale_intercept	DS	0.0
0028, 1053	rescale_slope	DS	1.0
0028, 1054	rescale_type	LO	OD
0028, 2110	lossy_image_compression	CS	00
0032, 4000	study_comments	LT	

The "OD" stipulation for rescale type means that the pixel data is optical density x 1000. (i.e. the range for the TS5 images will be 0 (clear) to 4095 (black).)

### 3.3.6.3.3.2 Storage of Video Image Data - Monochrome 2

#### 3.3.6.3.3.2.1 Simplification to 12-bit Monochrome 2 Data

Twelve-bit Optical Density (OD) data can be simplified to 12-bit Video data during a C-Store. The newly created 12-bit Video images are then transmitted to the remote Application Entity.

Simplification takes a 12-bit input image and changes it to 12-bit Video. The original 12-bit image can be either Video or OD. The rescale slope/intercept and the window center/width of the 12-bit input data are applied to produce the 12-bit Video values. The Window Width/Center values of 4095/2048 are defined to show the full range of 12-bit data. These values are then transformed from Optical Density data to Video data by converting the data from logarithmic to gamma-corrected luminance data.

Below is a list of the affected elements for 12-bit Video data.

Grp Elmt	Description	VR	Value
0008, 0018	sop_instance_uid	UI	newly generated unique identifier
0028, 0002	samples_per_pixel	US	1
0028, 0004	photometric_interpretation	CS	MONOCHROME2
0028, 0006	planar_configuration	US	1
0028, 0100	bits_allocated	US	16
0028, 0101	bits_stored	US	12
0028, 0102	high_bit	US	11
0028, 0103	pixel_representation	US	0
0028, 1050	window_center	DS	2048
0028, 1051	window_width	DS	4095
0028, 1052	rescale_intercept	DS	0.0
0028, 1053	rescale_slope	DS	1.0
0028, 1054	rescale_type	LO	US

### 3.3.6.3.3.2 Simplification to 8-bit Monochrome 2 Data

Twelve-bit Optical Density (OD) data can be simplified to 8-bit Video data during a C-Store. The newly created 8-bit Video images are then transmitted to the remote Application Entity.

Simplification takes a 12-bit input image and changes it to 8-bit Video. The original 12-bit image can be either Video or OD. The rescale slope/intercept and the window center/width of the 12-bit input data are applied to produce the 8-bit Video values. The Window Width/Center values of 255/127 are defined to show the full range of 8-bit data. These values are then transformed from Optical Density data to Video data by converting the data from logarithmic to gamma-corrected luminance data.

Below is a list of the affected elements for 8-bit Video data.

Grp Elmt	Description	VR	Value
0008, 0018	sop_instance_uid	UI	newly generated unique identifier
0028, 0002	samples_per_pixel	US	1
0028, 0004	photometric_interpretation	CS	MONOCHROME2
0028, 0006	planar_configuration	US	1
0028, 0100	bits_allocated	US	8
0028, 0101	bits_stored	US	8
0028, 0102	high_bit	US	7
0028, 0103	pixel_representation	US	0
0028, 1050	window_center	DS	127
0028, 1051	window_width	DS	255
0028, 1052	rescale_intercept	DS	0.0
0028, 1053	rescale_slope	DS	1.0
0028, 1054	rescale_type	LO	US

### 3.3.6.3.3.3 Storage of JPEG Compressed Image Data

Images (both 12-bit and 8-bit) are compressed during a C-Store to a remote Application Entity. The following elements are added/changed when the image has undergone DICOM-compliant JPEG compression. All elements not listed take on the same values whether compressed or non-compressed.

For JPEG Compressed Images:

Grp Elmt	Description	VR	Value
0008, 0008	image_type	CS	"DERIVED\SECONDARY"
0008, 0018	sop_instance_uid	UI	newly generated unique identifier
0008, 2111	derivation_description	ST	"{Compression Algorithm}, Q={q factor value}, Ratio={approximated compression ratios}" e.g. "LOSSY JPEG, Q=80, Ratio=8:1"
0028, 2110	lossy_image_compression	CS	01

### 3.3.6.4 Real World Activity - Detached Study Component Management

#### 3.3.6.4.1 Associated Real World Activity - Detached Study Component Management

TS5 will receive DIMSE N-EVENT-REPORT. The following message is supported:

- ▶ Study Scheduled - to signal that the study has been scheduled to occur.

#### 3.3.6.4.2 Presentation Context Table - Detached Study Component Management

TS5 supports the transfer syntaxes listed in Table 3.17.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

**Table 3.17 Transfer syntax.**

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Detached Study Management	1.2.840.10008.3.1.2.3.1	all from Table 3.17	SCU	None

**Table 3.18 Presentation contexts.**

#### 3.3.6.4.3 SOP Specific Conformance - Detached Study Component Management

TS5 provides standard conformance to the DICOM **Detached Study Component Management** Service Class.

TS5 supports the following elements for this SOP class:

Event Type Name	Attribute Name	Tag
Study Scheduled	Specific Character Set	(0008,0005)
	Referenced Patient Sequence	(0008,1120)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Referenced Visit Sequence	(0008,1125)
	>Referenced SOP Class UID	(0008,1150)
	>Referenced SOP Instance UID	(0008,1155)
	Scheduled Study Start Date	(0032,1000)
	Scheduled Study Start Time	(0032,1001)
	Scheduled Study Location	(0032,1020)
	Requested Procedure Description	(0032,1060)
	Requested Procedure Code Sequence	(0032,1064)
	>Code Value	(0008,0100)
	>Coding Scheme Designator	(0008,0102)
>Code Meaning	(0008,0104)	

**Table 3.19 Detached Study Management Object N-Event-Report attributes.**

TS5 returns one of the following status codes.

Service Status	Further Meaning	Protocol Codes	Related Fields	Description
Success	Success	0000		Operation performed properly.

**Table 3.20 Detached Study Management status codes.**

### 3.3.6.4.4 Presentation Context Acceptance Criterion - Detached Study Management

TS5 will always accept a Presentation Context for the Detached Study Management SOP Class.

### 3.3.6.4.5 Transfer Syntax Selection Policies - Detached Study Management

TS5 supports only the Little Endian Implicit Transfer Syntax.

### 3.3.6.5 Real World Activity - Modality Worklist Management

#### 3.3.6.5.1 Associated Real World Activity - Modality Worklist Management

TS5 will receive unsolicited Study-Scheduled N-Event-Reports. TS5 will then request DIMSE C-FINDs.

#### 3.3.6.5.2 Presentation Context Table - Modality Worklist Management

TS5 supports the transfer syntaxes listed in Table 3.21.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

**Table 3.21 Transfer syntaxes.**

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Info Model -FIND	1.2.840.10008.5.1.4.31	all from Table 3.21	SCU	None

**Table 3.22 Presentation contexts.**

### 3.3.6.5.3 SOP Specific Conformance - Modality Worklist Management

TS5 provides standard conformance to the DICOM Basic **Worklist Management** Service Class. TS5 supports all required matching key types:

**Matching Key Types**

- SV single valued match
- WC wild card match
- SQ sequence match
- DR date range match



TS5 uses the following elements for this SOP class:

Module	Attribute Name	Tag	Match	Return
SOP Common	Specific Character Set	(0008,0005)		1C
Scheduled Procedure Step	Scheduled Procedure Step Sequence	(0040,0100)	SQ	1
	>Scheduled Station AE Title	(0040,0001)	SV	1
	>Scheduled Procedure Step Start Date	(0040,0002)	DR	1
	>Scheduled Procedure Step Start Time	(0040,0003)	DR	1
	>Modality	(0008,0060)	SV	1
Requested Procedure	Requested Procedure ID	(0040,1001)		1
	Requested Procedure Description	(0032,1060)		1C
	Study Instance UID	(0020,000D)	SV	1
	Referenced Study Sequence	(0008,1110)		2
	>Referenced SOP Class UID	(0008,1150)		1C
	>Referenced SOP Instance UID	(0008,1155)		1C
Imaging Service Request	Accession Number	(0008,0050)	SV	2
	Referring Physician's Name	(0008,0090)		2
	Reason for Imaging Service Request	(0040,2001)		3
Patient Identification	Patient Name	(0010,0010)	WC	1
	Patient ID	(0010,0020)	SV	1
Patient Demographic	Patient Birth Date	(0010,0030)		2
	Patient Sex	(0010,0040)		2

**Table 3.23 Modality Worklist Information Model attributes.**

### 3.3.7 Real World Activity - Print Management

#### 3.3.7.1 Associated Real World Activity - Print Management

TS5 will issue a Print request when a user of the TS5 wishes to print a study of images to a DICOM SCP.

#### 3.3.7.2 Presentation Context Table - Print Management

TS5 will propose the transfer syntax listed in Table 3.24.

TS5 will propose the Presentation Contexts listed in Table 3.25.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

**Table 3.24 Transfer syntaxes.**

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Greyscale Print Management Meta	1.2.840.10008.5.1.1.9	all from Table 3.24	SCU	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	all from Table 3.24	SCU	None

**Table 3.25 Presentation contexts.**

### 3.3.7.3 SOP Specific Conformance - Print Management

These are the SOP-specific values sent by the TS5 to a DICOM SCP supporting Print Management Services.

#### 3.3.7.3.1 Basic Film Session SOP Class

DICOM Tag	Element name	Values
(2000, 0010)	Number of copies	1-9
(2000, 0020)	Print Priority	LOW, MED, HIGH
(2000, 0030)	Medium Type	CLEAR FILM, BLUE FILM, PAPER, BLUE, CLEAR
(2000, 0040)	Film Destination	MAGAZINE, PROCESSOR

#### 3.3.7.3.2 Basic Film Box SOP Class

DICOM Tag	Element name	Values
(2010,0010)	Image Display Format	STANDARD\1,1 LANDSCAPE STANDARD\2,1 LANDSCAPE STANDARD\2,2 LANDSCAPE STANDARD\3,3 LANDSCAPE STANDARD\1,1 PORTRAIT STANDARD\1,2 PORTRAIT STANDARD\2,2 PORTRAIT STANDARD\2,3 PORTRAIT STANDARD\3,3 PORTRAIT
(2010, 0040)	Film Orientation	PORTRAIT, LANDSCAPE
(2010, 0050)	Film Size ID	8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A5, LETTER, A4
(2010, 0060)	Magnification Type	REPLICATE, BILINEAR, CUBIC
(2010,0080)	Smoothing Type	SMOOTH, SHARP
(2010, 0100)	Border Density	BLACK, WHITE
(2010, 0110)	Empty Image Density	BLACK, WHITE
(2010,0120)	Minimum Density	10-50
(2010,0130)	Maximum Density	100-350
(2010,0140)	Trim	YES,NO
(2020,0020)	Polarity	NORMAL, REVERSE

#### 3.3.7.3.3 Basic Image Box SOP Classes

Options set according to characteristics of images received from other devices. Mandatory elements only.

#### 3.3.7.4 Real World Activity - Query

##### 3.3.7.4.1 Associated Real World Activity - Query

TS5 will issue a **C-Find** request when a user of TS5 wishes to query a remote DICOM SCP to confirm that the images have been properly sent.

### 3.3.7.4.2 Proposed Presentation Contexts - Query

TS5 supports the transfer syntaxes listed in Table 3.29. For a **C-Find** request, TS5 will propose the Presentation Contexts listed in Table 3.30.

Transfer Syntax	UID
DICOM Implicit VR Little Endian	1.2.840.10008.1.2

*Table 3.26 Transfer syntaxes.*

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Patient Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.1.1	all from Table 3.12	SCU	See Note
Study Root Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.2.1	all from Table 3.12	SCU	See Note
Patient/Study Only Query/Retrieve - Find	1.2.840.10008.5.1.4.1.2.3.1	all from Table 3.12	SCU	See Note

*Table 3.27 Query SOP classes.*

#### Note:

C-Find Extended Negotiation will be supported. TS5 will respond with the following information:

Field Name	Value	Description of Field
Relational-queries	1	Relational queries supported

*Table 3.28 Query Extended Negotiation.*

### 3.3.7.5 Real World Activity - Storage

#### 3.3.7.5.1 Associated Real World Activity - Storage

TS5 will accept a **C-Store** request when a remote station wishes to store images to this scanning station.

#### 3.3.7.5.2 Presentation Context Table - Storage

TS5 supports the transfer syntaxes listed in Table 3.7. For a **Storage** request, TS5 will propose the Presentation Contexts listed in Table 3.30.

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2
DICOM Baseline Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
DICOM Extended Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression	1.2.840.10008.1.2.4.51

*Table 3.29 Transfer syntaxes.*

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Secondary Capture Image Storage (SC)	1.2.840.10008.5.1.4.1.1.7	all from Table 3.29	SCP	None

**Table 3.30 Storage SOP classes.**

**Note:**

Storage Extended Negotiation will be supported. TS5 will respond with the following information:

Field Name	Value	Description of Field
Level of Support	2	Level 2 (FULL) SCP
Element Coercion	0	Does not coerce any element

**Table 3.31 Storage Extended Negotiation.**

### 3.3.7.6 SOP Specific Conformance - Storage

TS5 conforms to the DICOM **Storage** Service Class as an SCP at level 2 (Full). No elements are discarded or coerced by TS5. In the event of a successful **C-STORE** operation, the image has been written to internal storage.

Required DICOM elements:

DICOM Tag	Element Name
(0010, 0020)	Patient ID
(0020, 000d)	Study instance UID
(0020, 000e)	Series instance UID
(0008, 0018)	SOP instance UID
(0008, 0016)	SOP class UID

TS5 returns one of the following status codes:

Service Status	Further Meaning	Protocol Codes	Related Fields	Description
Refused	Out of resources	A700		Indicates that there was not enough storage space to store the image. Recovery from this condition is left to the administrative functions available in TS5.
	SOP Class not supported	A800		Indicates that the SOP Class of the Image in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context.
Error	Data set does not match SOP Class	A900		Indicates that the Data Set does not encode an instance of the SOP Class specified.
	Failed	C000		The operation was not successful.
	Cannot understand	C005		Indicates that the Data Set cannot be parsed into elements by TS5.
Warning	Coercion of data elements	B000		Data elements were modified before being stored.
	Data set does not match SOP Class	B007		Indicates that the Data Set does not match the SOP Class, but that the image was stored anyway.
	Elements Discarded	B006		Indicates that some of the elements of the Data Set were discarded.
	Duplicate SOP Instance UID	D000		Indicates that the SOP Instance UID of the specified image is already stored in the database.
Success	Success	0000		Operation performed properly.

### 3.3.7.7 Presentation Context Acceptance Criterion - Storage

TS5 will accept any number of **Storage** Presentation Contexts per association request.

### 3.3.7.8 Transfer Syntax Selection Policies - Storage

TS5 only receives images encoded using the DICOM default implicit VR Little Endian, Baseline Default Transfer Syntax for Lossy JPEG 8, and Baseline Default Transfer Syntax for Lossy JPEG 12.

### 3.3.8 Association Acceptance Policy

TS5 will accept association requests for C-Store.

## 4 COMMUNICATIONS PROFILES

TS5 provides DICOM 3.0 TCP/IP Network Communication Support, as defined in Part 8 of the DICOM Standard.

### 4.1 TCP/IP Stack

TS5 inherits its TCP/IP stack from the computer system upon which it executes.

### 4.1.1 Physical Media Support

TS5 is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes.

## 5 EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

TS5 uses the DICOM study\_comments field (0032, 4000) to encode anecdotal study information by technologist/physicians.

## 6 CONFIGURATION

TS5 obtains configuration information from the following sources:

- ▶ Mapping from Application Entity Title to Presentation Address is provided by the database.
- ▶ Configuration table stores Application Entity Title, default PDU size, and preferred byte orders for the SOP classes that TS5 supports.

## 7 SUPPORT FOR EXTENDED CHARACTER SETS

TS5 is known to support the following character sets:

- ISO-IR 6 (default)      Basic G0 Set
- ISO-IR 100            Latin Alphabet No. 1

## 8 ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this document.

- ▶ ACR      American College of Radiology
- ▶ DICOM    Digital Imaging and Communications in Medicine
- ▶ DIMSE    DICOM Message Service Element
- ▶ DIMSE-C    DICOM Message Service Element-Composite
- ▶ DIMSE-N    DICOM Message Service Element-Normalized
- ▶ NEMA      National Electrical Manufacturers Association
- ▶ PDU      Protocol Data Unit
- ▶ SCP      Service Class Provider
- ▶ SCU      Service Class User
- ▶ SOP      Service Object Pair
- ▶ TCP/IP    Transmission Control Protocol/Internet Protocol
- ▶ UID      Unique Identifier