

**Philips Medical Systems  
DICOM Conformance Statement  
CT Tomoscan M/EG/EG Compact  
Release 4.0**

Document Number 4522 220 59691  
30 March 2000

© Copyright Philips Medical Systems Nederland B.V. 2000

All rights reserved



**Issued by:**

Philips Medical Systems Nederland B.V.  
Integrated Clinical Solutions, Marketing & Communications  
Building QV-280  
P.O. Box 10.000  
5680 DA Best  
The Netherlands  
Tel.: +31 40 2764437  
Fax.: +31 40 2762673  
email: dicom@.philips.com

Internet (with the latest versions of Conformance Statements and other DICOM information):

<http://www.philips.com/ms/solution/connect>  
[ftp://ftp.philips.com/pub/ms/dicom/Conformance\\_Stmnts](ftp://ftp.philips.com/pub/ms/dicom/Conformance_Stmnts)

## Table of Contents

1	<b>Introduction</b> .....	5
1.1	Scope and field of application .....	5
1.2	Intended audience .....	5
1.3	Contents and structure .....	5
1.4	Used definitions, terms and abbreviations .....	5
1.5	References .....	5
1.6	Important note to the reader .....	6
1.7	General Acronyms and Abbreviations. ....	7
2	<b>Implementation model</b> .....	8
2.1	Application Data Flow Diagram .....	8
2.2	Functional definition of Application Entities .....	8
2.3	Sequencing of Real World Activities .....	9
3	<b>AE Specifications</b> .....	10
3.1	AE CT-Tomoscan DICOM Export Specification .....	10
3.1.1	Association Establishment Policies .....	10
3.1.2	Association Initiation Policy .....	10
3.1.3	Association Acceptance Policy .....	23
4	<b>Communication Profiles</b> .....	24
4.1	Supported Communication Stacks .....	24
4.2	TCP/IP Stack .....	24
4.2.1	Physical Media Support .....	24
5	<b>Extensions/Specializations/Privatizations</b> .....	24
6	<b>Configuration</b> .....	24
6.1	AE Title/Presentation Address mapping .....	24
6.1.1	Local AE Titles and Presentation Addresses .....	24
6.1.2	Remote AE Titles and Presentation Addresses .....	24
6.2	Configurable parameters .....	25
7	<b>Support of Extended Character Sets</b> .....	25
8	<b>Other Issues.</b> .....	26



## 1 Introduction

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

### 1.1 Scope and field of application

The scope of this DICOM Conformance Statement is to facilitate data exchange with equipment of Philips Medical Systems. This document specifies the compliance to the DICOM standard (formally called the NEMA PS 3.X-1996 standards). It contains a short description of the applications involved and provides technical information about the data exchange capabilities of the equipment. The main elements describing these capabilities are: the supported DICOM Service Object Pair (SOP) Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes.

The field of application is the integration of the Philips Medical Systems equipment into an environment of medical devices.

This Conformance Statement should be read in conjunction with the DICOM standard and its addenda [DICOM]. The conformance to the DICOM standard is a key element of the Inturis Program (see [INTURIS]).

### 1.2 Intended audience

This Conformance Statement is intended for:

- (potential) customers,
- system integrators of medical equipment,
- marketing staff interested in system functionality,
- software designers implementing DICOM interfaces.

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

### 1.3 Contents and structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2-1996.

### 1.4 Used definitions, terms and abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3-1996 and PS 3.4-1996.

The word Philips in this document refers to Philips Medical Systems.

### 1.5 References

- [DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard:  
NEMA PS 3.X 1996  
National Electrical Manufacturers Association (NEMA) Publication Sales  
1300 N. 17th Street, Suite 1847  
Rosslyn, Va. 22209, United States of America

[INTURIS] Inturis for Cardiology  
On-Line Image Access  
Doc. nr. 4522 982 69681  
Philips medical Systems Ned. BV

### 1.6 Important note to the reader

This Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyse thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**

Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.

Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment, also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

## Introduction

**1.7 General Acronyms and Abbreviations.**

The following acronyms and abbreviations are used in the document.

- ACC American College of Cardiology
- AE Application Entity
- ACR American College of Radiology
- ANSI American National Standard Institute
- BOT Basic Offset Table
- CD-R CD Recordable
- CD-M CD Medical
- DCI Digital Cardio Imaging
- DCR Dynamic Cardio Review
- DICOM Digital Imaging and Communication in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element-Composite
- DIMSE-N DICOM Message Service Element-Normalized
- ELE Explicit VR Little Endian
- EBE Explicit VR Big Endian
- FSC File Set Creator
- GUI Graphic User Interface
- HIS Hospital Information System
- HL7 Health Level Seven
- ILE Implicit VR Little Endian
- IOD Information Object Definition
- ISIS Information System - Imaging System
- NEMA National Electrical Manufacturers Association
- PDU Protocol Data Unit
- RIS Radiology Information System
- RWA Real World Activity
- SC Secondary Capture
- SCM Study Component Management
- SCP Service Class Provider
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet protocol
- UID Unique Identifier
- WLM Worklist Management

## 2 Implementation model

The CT Tomoscan M/EG R 4.0 (short CT-Tomoscan) system of Philips Medical Systems is a Computed Tomography (CT) image generating system. The system can be installed with an Export function based on the DICOM Image Storage to transfer images and image related data from the CT-Tomoscan to a remote system. This DICOM Export function implies the presence of the CT Tomoscan software release 2.6 or higher.

The DICOM Export function is described in this document.

### 2.1 Application Data Flow Diagram

The CT-Tomoscan system behaves as a single Application Entity. The related Implementation Model is shown in Figure 2-1 on page 8.

The DICOM Export function can be activated by the CT-Tomoscan operator. The images to be sent are selected from the images of several acquisition runs of the same patient (also called examination). Each image in these runs can be flagged for export or not. At export request the flagged images will be converted into DICOM format and sent out to a remote destination. This destination is previously selected by the operator from the user interface.

Image data transferred are DICOM Computed Tomography (CT) Class instances.

The images transferred are intended for viewing purposes. Postprocessing like MPR, 3D reconstruction and rendering may be possible, depending on the capabilities of the workstation receiving the CT images.

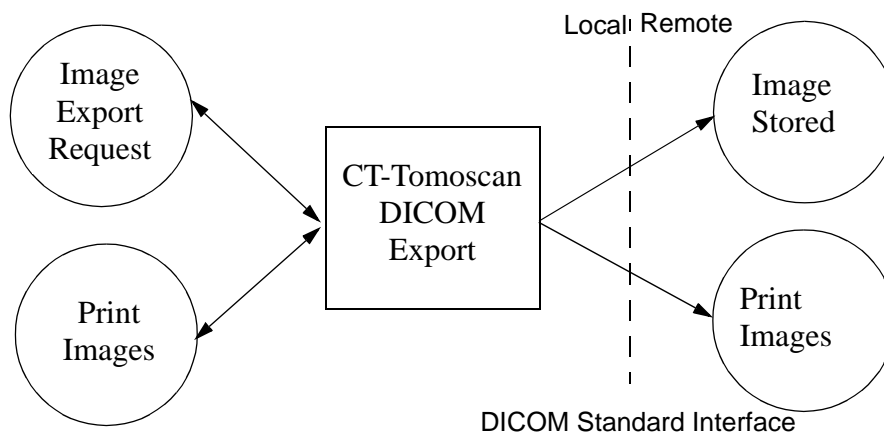


Figure 2-1: CT-Tomoscan DICOM Export and Print Implementation

### 2.2 Functional definition of Application Entities

The CT-Tomoscan AE acts as a Service Class User (SCU) of the Storage Service Class. The export function acts on the selected images of one examination. When the export is initiated, the AE will open an association to the remote system. The selected images and related image data are converted into a DICOM message to be sent to the remote system.

The application does not support Storage Service Classes as Service Class Provider (SCP).



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

Not applicable.

## 3 AE Specifications

### 3.1 AE CT-Tomoscan DICOM Export Specification

The CT-Tomoscan DICOM Export Application Entity provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

**Table 3-1: Supported SOP Classes by the CT-Tomoscan DICOM Export AE as SCU**

SOP Class Name	UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
> <sup>a</sup> Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
> Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
> Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
> Printer SOP Class	1.2.840.10008.5.1.1.16

a. The '>' sign indicates that the SOP Class is part of the above mentioned Meta SOP Class.

The CT-Tomoscan Application Entity does not support DICOM V3.0 SOP Classes as an SCP.

#### 3.1.1 Association Establishment Policies

##### 3.1.1.1 General

CT-Tomoscan has a default maximum PDU size in steps of 16K = 16384 bytes.

##### 3.1.1.2 Number of Associations

CT-Tomoscan will attempt to establish one association at a time.

##### 3.1.1.3 Asynchronous Nature

CT-Tomoscan does not support asynchronous operations and will not perform asynchronous window negotiation.

##### 3.1.1.4 Implementation Identifying Information

The Implementation Class UID is: "1.3.46.670589.10.13.800143.1"

The implementation version name is: "HMC/M\_TOMO\_20"

#### 3.1.2 Association Initiation Policy

CT-Tomoscan initiates associations as a result of the following local Real-World activities:

- The Image Export Request to send the selected images from the CT-Tomoscan to a remote system.

##### 3.1.2.1 Request to send images from CT-Tomoscan to a remote system

###### 3.1.2.1.1 Associated Real-World Activity

After selection of a peer station and after selection of one of more images of a number of scans, these images will be sent when initiating the Send command. CT-Tomoscan initiates one association to the selected peer entity and uses it to send the selected images via C-STORE requests (and receives the associated C-STORE Responses). The association is released by CT-Tomoscan after successful transfer of the images or when an error occurs. CT-Tomoscan handles each send request one after another.

### 3.1.2.1.2 Proposed Presentation Contexts

CT-Tomoscan will propose the following presentation contexts:

**Table 3-2: Proposed Presentation Contexts for Send Request**

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
see Table 3-1	see Table 3-1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1	SCU	None
		EBE	1.2.840.10008.1.2.2	SCU	None

### 3.1.2.1.3 C-STORE SCU Conformance

The Tomoscan does not show the result of responses on error messages in the user interface. While busy with transfer, the status Busy is shown on the CT-Tomoscan console.

Extended negotiation is not supported.

Table 3-3 lists the applied Conditional (DICOM Type 1C and 2C) and Optional (DICOM Type 3) attributes of the standard CT Image IOD. These attributes may be empty.

### 3.1.2.1.4 Overview applied CT Image IOD

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

The details of these applied modules are given in the tables below. The list of possible values are given (if applicable). The situation that an attribute is present conditionally/optionally or that an attribute may contain a zero length value, is indicated too. Conditions and Defined/Enumerated Values of DICOM are applicable but are not always shown.

**Table 3-3: Applied Conditional and Optional Attributes of the CT Image IOD**

Information Entity	Module	Conditional Attributes	Optional Attributes
Patient	Patient	-	-
Study	General Study	-	-
	Patient Study	-	Admitting Diagnosis Description
Series	General Series	Patient Position	Series Date, Series Time, Series Description, Performing Physician's Name, Operators' Name, Protocol Name
Frame of Reference	Frame of Reference	-	-
Equipment	General Equipment	-	Institution Name, Manufacturer's Model Name
Image	General Image	Image Date, Image Time	Derivation Description, Images Comments
	Image Plane	-	Slice Location
	Image Pixel	-	-
	Contrast/Bolus	-	-
	CT Image	-	Scan Options, Reconstruction Diameter, Gantry/Detector Tilt, Exposure Time, X-Ray Tube Current, Convolution Kernel
	Overlay Plane	-	-
	VOI LUT	-	Window Center, Window Width
	SOP Common	Specific Character Set	-

**Table 3-4: CT Image Storage SOP Class - Patient Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Patient's Name	0010,0010	Patient's full name.
Patient ID	0010,0020	Primary hospital identification number or code for the patient.
Patient's Birth Date	0010,0030	Birth date of the patient.
Patient's Sex	0010,0040	Sex of the named patient. Applied value(s): F, M, O

**Table 3-5: CT Image Storage SOP Class - General Study Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Study Date	0008,0020	Date the Study started.
Study Time	0008,0030	Time the Study started.
Accession Number	0008,0050	A RIS generated number which identifies the order for the Study.
Referring Physician's Name	0008,0090	Patient's referring physician
Study Description	0008,1030	Tag not send if not filled in.
Study Instance UID	0020,000D	Unique identifier for the Study.
Study ID	0020,0010	User or equipment generated Study identifier.

**Table 3-6: CT Image Storage SOP Class - Patient Study Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Admitting Diagnosis Description	0008,1080	May be empty.

**Table 3-7: CT Image Storage SOP Class - General Series Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Series Date	0008,0021	Date the Series started.
Series Time	0008,0031	Time the Series started.
Modality	0008,0060	Type of equipment that originally acquired the data used to create the images in this Series. Applied value(s): CT
Series Description	0008,103E	Tag not send if not filled in.
Performing Physician's Name	0008,1050	Name of the physicians administering the Series. Empty if not filled in.
Operator's name	0008,1070	
Protocol Name	0018,1030	Pre-defined description of the conditions under which the Series was performed.

**Table 3-7: CT Image Storage SOP Class - General Series Module (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Patient Position	0018,5100	Patient position descriptor relative to the equipment. Applied value(s): FFDL, FFDR, FFP, FFS, HF DL, HFDR, HFP, HFS
Series Instance UID	0020,000E	Unique identifier of the Series.
Series Number	0020,0011	A number that identifies this Series. Value 0 for Scannograms, value 1,2,3,... for Slices.

**Table 3-8: CT Image Storage SOP Class - Frame of Reference Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Frame of Reference UID	0020,0052	Uniquely identifies the frame of reference for a Series.
Position Reference Indicator	0020,1040	Part of the patient's anatomy used as a reference, such as the iliac crest, orbital-medial, sternal notch, symphysis pubis, xiphoid, lower costal margin, external auditory meatus.

**Table 3-9: CT Image Storage SOP Class - General Equipment Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Manufacturer	0008,0070	Manufacturer of the equipment that produced the digital images. Applied value(s): Philips Medical Systems
Institution Name	0008,0080	Institution where the equipment is located that produced the digital images. Empty if not filled in.
Manufacturer's Model Name	0008,1090	Manufacturers model number of the equipment that produced the digital images. Applied value(s): CT Tomoscan M-EG

**Table 3-10: CT Image Storage SOP Class - General Image Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Date	0008,0023	The date the image pixel data creation started.
Image Time	0008,0033	The time the image pixel data creation started.
Derivation Description	0008,2111	
Instance Number	0020,0013	A number that identifies this image.
Images in Acquisition	0020,1002	Tag not send if not filled in.
Image Comments	0020,4000	

**Table 3-11: CT Image Storage SOP Class - Image Plane Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Slice Thickness	0018,0050	Nominal slice thickness, in mm.
Image Position (Patient)	0020,0032	The x, y, and z coordinates of the upper left hand corner (center of the first pixel transmitted) of the image, in mm.
Image Orientation (Patient)	0020,0037	The direction cosines of the first row and the first column with respect to the patient.
Slice Location	0020,1041	Relative position of exposure expressed in mm.
Pixel Spacing	0028,0030	Physical distance in the patient between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm.

**Table 3-12: CT Image Storage SOP Class - Image Pixel Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Rows	0028,0010	Number of rows in the image.
Columns	0028,0011	Number of columns in the image

**Table 3-12: CT Image Storage SOP Class - Image Pixel Module (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Pixel Representation	0028,0103	Data representation of the pixel samples. Each sample shall have the same pixel representation. Applied value(s): 0000
Pixel Data	7FE0,0010	A data stream of the pixel samples which comprise the Image.

**Table 3-13: CT Image Storage SOP Class - Contrast/Bolus Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Contrast/Bolus Agent	0018,0010	Contrast or bolus agent.

**Table 3-14: CT Image Storage SOP Class - CT Image Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Type	0008,0008	For TOPO and TOMO: always ORIGINAL. If Image Number end with a 1 then PRIMARY, Otherwise SECONDARY. For VOLUME and DYNAMIC always ORIGINAL and SECONDARY. For every other including average and substract always DERIVED and SECONDARY  Applied value(s): ORIGINAL, DERIVED \ PRIMARY, SECONDARY \ AXIAL, LOCALIZER
Scan Options	0018,0022	
KVP	0018,0060	Peak kilo voltage output of the x-ray generator used
Reconstruction Diameter	0018,1100	
Gantry/Detector Tilt	0018,1120	Nominal angle of tilt in degrees of the scanning gantry.
Exposure Time	0018,1150	Time of x-ray exposure in ms.
X-ray Tube Current	0018,1151	X-ray Tube Current in mA.



**Table 3-14: CT Image Storage SOP Class - CT Image Module (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Convolution Kernel	0018,1210	A label describing the convolution kernel or algorithm used to reconstruct the data
Acquisition Number	0020,0012	A number identifying the single continuous gathering of data over a period of time which resulted in this image
Samples per Pixel	0028,0002	Number of samples (planes) in this image. Applied value(s): 1
Photometric Interpretation	0028,0004	Specifies the intended interpretation of the pixel data. Applied value(s): MONOCHROME1, MONOCHROME2
Bits Allocated	0028,0100	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. Applied value(s): 16
Bits Stored	0028,0101	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. Applied value(s): 12
High Bit	0028,0102	Most significant bit for pixel sample data. Each sample shall have the same high bit. Applied value(s): 11
Rescale Intercept	0028,1052	The value b in relationship between stored values (SV) and Hounsfield (HU). $HU = m*SV+b$ Applied value(s): -1000
Rescale Slope	0028,1053	m in the equation specified in Rescale Intercept (0028,1052). Applied value(s): 1.0

**Table 3-15: CT Image Storage SOP Class - Overlay Plane Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Overlay Rows	6000,0010	Number of Rows in Overlay.
Overlay Columns	6000,0011	Number of Columns in Overlay.

**Table 3-15: CT Image Storage SOP Class - Overlay Plane Module (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Overlay Type	6000,0040	Indicates whether this overlay represents a region of interest or other graphics.
Overlay Origin	6000,0050	Location of first overlay point with respect to pixels in the image, given as row\column.
Overlay Bits Allocated	6000,0100	Number of Bits Allocated in the Overlay. Applied value(s): 16
Overlay Bit Position	6000,0102	Bit in which Overlay is stored. Applied value(s): 12

**Table 3-16: CT Image Storage SOP Class - VOI LUT Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Window Center	0028,1050	Window Center for display.
Window Width	0028,1051	Window Width for display.

**Table 3-17: CT Image Storage SOP Class - SOP Common Module**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Specific Character Set	0008,0005	Character Set that expands or replaces the Basic Graphic Set. Applied value(s): ISO_IR 100
SOP Class UID	0008,0016	Uniquely identifies the SOP Class. Applied value(s): 1.2.840.10008.5.1.4.1.1.2
SOP Instance UID	0008,0018	Uniquely identifies the SOP Instance.

### 3.1.2.2 Print Images

#### 3.1.2.2.1 Associated Real-World Activity

There are two ways to request for image printing:

- Print Compose

The operator is able to select one or more images from the internal database (via the Data Handling facility) and perform the Print operation on them.

- Print Protocol

The operator is also able to print images via the various clinical applications of CT-Tomo-

scan.

The operator will select the print destination (out of choice list of configured printers) and some print parameters (depending on the configuration and the selected printer).

As a result, CT-Tomoscan will initiate an association to the selected printer and uses it to send the Print Service Elements of the Print SOP Classes.

CT-Tomoscan allows to have a print preview first.

### 3.1.2.2.2 Proposed Presentation Context

CT-Tomoscan will propose the presentation contexts as given in: Table 3-2, for the Basic Greyscale Print Management Meta SOP Class (UID 1.2.840.100008.5.1.1.9).

### 3.1.2.2.3 Conformance to the Print SOP Classes

CT-Tomoscan provides standard conformance to the Basic Grayscale Print Management Meta SOP Class.

The applied order of Print Service Elements (DIMSE's) is specified in Table 3-18. A description and the applied optional (i.e. non-mandatory attributes as Print SCU) attributes in these Service Elements are specified too. Note that the Service Elements order is not specified by the DICOM standard.

An explicit N-DELETE Request on the created instances is not done by CT-Tomoscan; these are deleted implicitly when releasing the association.

The **full list of (Mandatory and Optional) attributes** applied in these Service Elements are given in chapter 3.1.2.2.4 on page 20.

**Table 3-18: The applied order of Print Service Elements and its optional attributes**

Service Element of SOP Class	Description and applied optional attributes
N-GET of the Printer SOP Class	Purpose is to retrieve printer information.
N-CREATE of the Basic Film Session SOP Class	CT-Tomoscan specifies the DICOM Printer about some general presentation parameters, applicable for all films in the Film Session. Applied optional attributes are: Number of Copies, Medium Type
N-CREATE of the Basic Film Box SOP Class	CT-Tomoscan specifies the DICOM Printer about some general presentation parameters, applicable for all images in the Film Box. Applied optional attributes are: Film Orientation, Film Size ID, Magnification Type, Max. Density, Configuration Information, Trim.
N-SET of the Basic Grayscale Image Box SOP Class	CT-Tomoscan will send the images to be printed. Applied optional attributes are: Polarity

**Table 3-18: The applied order of Print Service Elements and its optional attributes**

Service Element of SOP Class	Description and applied optional attributes
N-ACTION of the Basic Film Box SOP Class	CT-Tomoscan triggers the DICOM Printer to print, this actual print action is done at film box level. No (optional) attributes are present.

The table below specifies the supported Service Elements which may be generated by the Printer at any time during the association.

**Table 3-19: The applied sequence of Print Service Elements and its optional attributes**

Service Element of SOP Class	Note
N-EVENT-REPORT of the Printer SOP Class	May be sent at any moment by the Printer SCP (i.e. the DICOM Printer). CT-Tomoscan will respond.

The Status Codes of DIMSE Responses (Success, Warning, Failure) as returned by the printer will also be logged (for service purposes).

The following implementation remarks are important to achieve successful printing:

- CT-Tomoscan will release the association when the print command is given (i.e. the N-ACTION Request); the association is not kept open for receiving N-EVENT-REPORTs of the Printer SOP Class.

#### 3.1.2.2.4 Basic Film Session SOP Class

**Table 3-20: Basic Film Session SOP Class - N-CREATE**

Attribute Name	Tag	Note
Number of Copies	2000,0010	Between 1 and 99.
Medium Type	2000,0030	Applied value(s): BLUE FILM, CLEAR FILM, PAPER

#### 3.1.2.2.5 Description of the Basic Film Box SOP Class

**Table 3-21: Basic Film Box SOP Class - N-CREATE**

Attribute Name	Tag	Note
Image Display Format *	2010,0010	The applied value below is an CT-Tomoscan specific value indicating that one (large) image is contained in a Film Box. Applied value(s): STANDARD\1,1 (Rows, Columns)
Film Orientation *	2010,0040	Applied value(s): LANDSCAPE, PORTRAIT
Film Size ID *	2010,0050	DICOM specifies a number of Defined Terms; more values are possible and is print configuration dependent.

**Table 3-21: Basic Film Box SOP Class - N-CREATE (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Magnification Type	2010,0060	Normally sent out, however some DICOM printers are not able to handle (value NONE for) this attribute. Applied value(s): CUBIC
Trim	2010,0140	Applied value(s): NO
Max Density	2010,0130	Applied value(s): 300
Configuration Information	2010,0150	Used to refer to a vendor specific Lookup-table (LUT); should be applied by the DICOM printer if LUT data is present.
Referenced Film Session Sequence	2010,0500	Parent Film Session.
> Referenced SOP Class UID	0008,1150	
> Referenced SOP Instance UID	0008,1155	

*Note:* \* that Image Display, Film Orientation and Film Size ID are selectable. Which combination can be selected is dependable on the specific Printer Type.

**Table 3-22: Basic Film Box SOP Class - N-ACTION**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
No attributes present		

### 3.1.2.2.6 Basic Grayscale Image Box SOP Class

**Table 3-23: Basic Grayscale Image Box SOP Class - N-SET**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Image Position	2020,0010	Applied value(s): 1
Polarity	2020,0020	Applied value(s): NORMAL
Preformatted Grayscale Image Sequence	2020,0110	
Pixel Aspect Ratio	0028,0034	
> Samples per Pixel	0028,0002	Applied value(s): 1
> Photometric Interpretation	0028,0004	Applied value(s): MONOCHROME2
> Rows	0028,0010	Depending on the selected printer type and film size
> Columns	0028,0011	Depending on the selected printer type and film size

**Table 3-23: Basic Grayscale Image Box SOP Class - N-SET (Continued)**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
> Bits Allocated	0028,0100	Applied value(s): 16, 8
> Bits Stored	0028,0101	Applied value(s): 12, 8
> High Bit	0028,0102	Applied value(s): 11, 7
> Pixel Representation	0028,0103	Applied value(s): 0x0000 (i.e. unsigned integer)
> Pixel Data	7FE0,0010	

**3.1.2.2.7 Printer SOP Class.****Table 3-24: Printer SOP Class - N-GET**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Printer Status	2110,0010	
Printer Status Info	2110,0020	

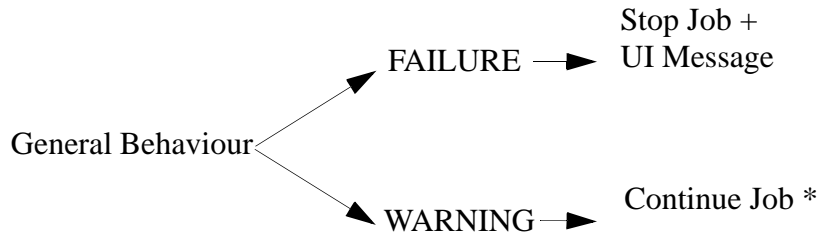
**Table 3-25: Printer SOP Class - N-EVENT-REPORT<sup>a</sup>**

<i>Attribute Name</i>	<i>Tag</i>	<i>Note</i>
Printer Status Info	2110,0020	Conditionally sent by the Printer. CT-Tomoscan will react on notification, and will show corresponding messages on the UI for the events WARNING and FAILURE.

- a. This Service Element is sent by the printer and interpreted by CT-Tomoscan.

The CT-Tomoscan does not send an attribute list to the printer, therefore the only attributes which are needed to be supported by the printer, are the mandatory attributes listed in Table 3-

24, "Printer SOP Class - N-GET," on page 22.



**Figure 3-1: CT-Tomoscan general behaviour for N\_GET and N\_EVENT\_REPORT**

\* Except for warning 116, after value out of range.

### 3.1.3 Association Acceptance Policy

The CT-Tomoscan Application Entity does not accept associations.

## 4 Communication Profiles

### 4.1 Supported Communication Stacks

CT-Tomoscan provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

### 4.2 TCP/IP Stack

CT-Tomoscan uses the TCP/IP program installed on the PC where CT-Tomoscan DICOM Export is running on. This is a subroutine library that is based on a Berkeley socket interface.

#### 4.2.1 Physical Media Support

CT-Tomoscan supports ISO 8802-3 10BASE5 (Thick-wire), 10BASE2 (Thin-wire) and 10BASE-T (Twisted-pair) Ethernet.

## 5 Extensions/Specializations/Privatizations

Tag (7001,0010) private creator code

Tag (7001,1010) private attribute - "Every graphic element is defined by a certain structure and a set of functions which provide such manipulations as drawing, missing, selection and etc. These structure are stored in database.

When the image with graphic is exported (DICOM format) graphic element structures are read from database and are embedded in Pixel Data as overlay.

Retrival of graphic structures from Overlay when the image is imported is impossible. Thereby the private attribute is used to hold the graphic structures in DICOM messages."

## 6 Configuration

The CT-Tomoscan system is configured by means of editing the DICOM configuration files on the system running the DICOM Export. This configuration is intended to be used by Philips service engineers only.

### 6.1 AE Title/Presentation Address mapping

#### 6.1.1 Local AE Titles and Presentation Addresses

The CT-Tomoscan AE title is not configurable; the system chooses an AE title which is unique within a network. This AE title can be seen via the System Administration function.

#### 6.1.2 Remote AE Titles and Presentation Addresses

For remote applications that act as Service Class Provider the following additional information must be provided:

- The AE title.
- The host name and IP address on which the application resides.
- The port number at which the application accepts association requests.



## **6.2 Configurable parameters**

# **7 Support of Extended Character Sets**

CT-Tomoscan supports the Extended Character Set “ISO\_IR 100” which is the Latin alphabet No 1, supplementary set.

## **8 Other Issues**

- By print failure the association between the printer and the CT Tomoscan will not be automatically cancelled.