Embedded server for C610 DM
DICOM Conformance Statement

Revision History:

Revision	Date	Reason for changes
1.0	June 26, 2012	Initial release(for software SA1-V3.40 and after)

DICOM 3.0 Conformance Statement

Summary:

This document is the DICOM Conformance Statement of the Print Service Class Provider (SCP) software installed on OKI printers. The software implements as a SCP the following DICOM 3.0 Meta Service Object Pair (SOP) Classes and SOP. This Print SCP can handle two simultaneous associations/threads. Therefore the maximum recommended number of connected modalities is 3 (three).

Classes:

- Basic Grayscale Print Management Meta SOP Class
- Basic Color Print Management Meta SOP Class
- Verification SOP Class
- Print Job SOP Class

1 Introduction

1.1 Scope and field of application

This document describes OKI Print SCP conformance to the DICOM 3.0 standard.

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 SOP Classes, Roles, Information Object Definitions (IOD) and Transfer Syntaxes. It should be read in conjunction with the DICOM standard and its addenda.

This statement is conformant with the recommended format as described in PS 3.2 of the DICOM standard. Print SCP acts as a SCP for the following SOP Classes:

- Basic Grayscale Print Management Meta SOP Class
- Basic Color Print Management Meta SOP Class
- Verification SOP Class
- Print Job SOP Class

1.2 Acronyms and abbreviations

The following acronyms and abbreviations are used in this document:

- ACR: American College of Radiology
- ANSI: American National Standards Institute
- 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

1.3 References

[DICOM]

Digital Imaging and Communications in Medicine

DICOM standard:

NEMA PS 3.1 to 3.14 and Supplements

National Electrical Manufacturers Association (NEMA) – Publication Sales - 1300 N. 17th Street, Suite 1847

Rosslyn, Va. 22209, United States of America

1.4 Intended audience

This Conformance Statement is intended for:

Potential users

System integrators of medical equipment

Software designers implementing DICOM interfaces

1.5 Note to the reader

This document is written with the assumption that the reader is familiar with the DICOM standard.

Comparison of this Conformance Statement and the Conformance Statement of another device may show that the other device conforms to this Conformance Statement. In that case, the other device may be interoperable with this product, but no guarantee is given. DICOM only deals with communications; it is not a standard that specifies what is needed for certain applications to run on a device.

2 Implementation model

2.1 Application data flow

Print SCP is a DICOM printing solution that can receive images from DICOM modalities and render the images on paper by using Print SCU capabilities.

2.2 Functional definitions of Application Entities

2.2.1 Verification Service as SCP

Print SCP waits for another application to connect at the presentation address configured in the network settings.

When another application connects, Print SCP expects it to be a DICOM application. Print SCP will accept associations with Presentation Contexts for SOP Classes of the Verification Service Class.

2.2.2 Print services as SCP

Once started, Print SCP waits for association requests. For each accepted request, it processes on the association the received print commands compatible with the SOP Classes it supports.

Associations are released either on Print SCU request or when an error condition occurs that leads to an association abort.

2.3 Sequencing of real-world activities

Not applicable.

3 Application Entity specifications

In its default configuration, Print SCP exists as a single Application Entity (AE) “OKI”. You can add several Application Entity Titles (AET), define each of those and add rules for color adjustment.

As far as the association acceptance is concerned, Print SCP does not check any matching between its AET and the called AET of the incoming DICOM association.

Print SCP provides standard conformance to the following DICOM V3.0 SOP Classes as an SCP:

SOP Class Name	UID
Verification SOP Class	1.2.840.10008.1.1
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
Printer SOP Class	1.2.840.10008.5.1.1.16

3.1 Association establishment policies

3.1.1 General

Before any SOP Classes can be exchanged between the SCU AE and the PMS (SCP), an association stage takes place to negotiate and exchange the capabilities of the SCU and SCP. The Print Management SCU and SCP establish an association by using the Association Services of the DICOM Upper Layer. During association establishment, the DICOM Print Management AE negotiates with the supported SOP classes.

Only the SCU AE shall release an association. The released association may be aborted by the SCU or the SCP. The SCU AE attempts to initiate a new association for each print session. This means that when no operation is done on the association, the SCU should release the association.

A DICOM entity can only send DIMSE messages to instances that are created on the same association.

3.1.2 Number of associations

In its standard configuration, Print SCP supports up to 2 (two) simultaneous associations.

3.1.3 Asynchronous nature

Print SCP does not support asynchronous operations.

3.2 Association initiation by real-world activity

Print SCP never initiates an association, since it acts as a SCP from a DICOM protocol point of view.

3.3 Association acceptance policy

Print SCP accepts DICOM associations according to the DICOM Meta SOP Classes and SOP Classes it supports. Print SCP does not perform any check on the called AET at association acceptance time.

3.3.1 Real-world activity: Print Management and Verification SCP

3.3.1.1 Associated real-world activity

The application entity waits for incoming associations. No operator action is required to receive DICOM print jobs or verification requests.

3.3.1.2 Presentation

Print SCP accepts the following Presentation Contexts:

Accepted Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None

3.3.1.3 SOP Specific Conformance for Basic Film Session SOP Class

The following DIMSE services are supported:

N-CREATE

N-ACTION

N-DELETE

N-CREATE is sent by the SCU AE to create a Basic Film Session SOP instance when an association has been established. If N-CREATE fails, an error message will be returned by the SCP AE. N-CREATE causes the Basic Film Session to be created and its attributes initialized.

The Basic Film Session SOP instances shall be created before the Film Box SOP Instances are created. Print SCP provides the following support for the attributes contained in the N-CREATE DIMSE Service of the Basic Film Session SOP Class:

Tag	Name	Value
(2000, 0010)	Number of Copies	Default 1
(2000, 0030)	Medium Type	Ignored
(2000, 0040)	Film Destination	Ignored

The SCP will return one of the following status codes for N-CREATE:

Code	Status	Comment
0x0000	Success	Film Session was successfully created
0x0112	Failure	No such SOP instance
0x0213	Failure	Resource limit

Tag	Name	Value
(2010, 0010)	Image Display Format	STANDARD\1,1 STANDARD\1,2 STANDARD\2,1 STANDARD\2,2 STANDARD\2,3 STANDARD\2,4 STANDARD\3,2 STANDARD\3,3 STANDARD\3,4 STANDARD\3,5 STANDARD\4,3 STANDARD\4,4 STANDARD\4,5 STANDARD\4,6 STANDARD\5,3 STANDARD\5,4 STANDARD\5,5 STANDARD\5,6 STANDARD\5,7
(2010, 0040)	Film Orientation	PORTRAIT LANDSCAPE
(2010, 0050)	Film Size ID	8 in X 10 in 8.5 in X 11 in 10 in X 14 in 11 in X 17 in 14 in X 14 in 14 in X 17 in Letter Tabloid 24 cm X 24 cm 24 cm X 30 cm A4 A3 Are translated to A4/Letter
(2010, 0060)	Magnification Type	BILINEAR
(2010, 0100)	Border Density	BLACK WHITE
(2010, 0110)	Empty Image Density	BLACK WHITE
(2010, 0120)	Min Density	0 – 99 %
(2010, 0130)	Max Density	1 – 100 %

SCP Pixel Matrix for a Pixel Size of 0.117 mm (216dpi)

Film Size	Rows	Columns
A4 (Portrait)	1707	2448
A4 (Landscape)	2448	1707
Letter (Portrait)	1758	2298
Letter (Landscape)	2298	1758

The SCP will return one of the following status codes for N-ACTION:

Code	Status	Comment
0x0000	Success	Film Box was successfully printed
0x0112	Failure	No such SOP instance
0x0213	Failure	Resource limit

The SCP will return one of the following status codes for N-DELETE:

Code	Status	Comment
0x0000	Success	Film Box was successfully deleted
0x0112	Failure	No such SOP instance

4 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

The following DIMSE services are supported:

N-SET

Tag	Name	Value
(2020,0010)	Image Position	
(2020,0020)	Polarity	NORMAL or REVERSE
(2010,0060)	Magnification Type	Ignored. Always BILINEAR
(2010,0080)	Smoothing Type	NORMAL or SHARPEN
(2020,0110)	Basic Grayscale Image Sequence	
(0028,0002)	>Samples Per Pixel	1
(0028,0004)	>Photometric Interpretation	MONOCHROME2
(0028,0010)	>Rows	
(0028,0011)	>Columns	
(0028,0100)	>Bits Allocated	8
(0028,0101)	>Bits Stored	8
(0028,0102)	>High Bit	7
(0028,0103)	>Pixel Representation	
(0028,0034)	>Pixel Aspect Ratio	
(7FE0,0010)	>Pixel Data Mandatory	

The SCP will return one of the following status codes for N-SET:

Code	Status	Comment
0x0000	Success	Image Box was successfully set
0x0110	Failure	Processing failure

5 SOP Specific Conformance for Basic Color Image Box SOP Class

The following DIMSE services are supported:

N-SET

Tag	Name	Value
(2020,0010)	Image Position	
(2020,0020)	Polarity	NORMAL or REVERSE
(2010,0060)	Magnification Type	Ignored. Always BILINEAR
(2010,0080)	Smoothing Type	Ignored
(2020,0110)	Basic Grayscale Image Sequence	
(0028,0002)	>Samples Per Pixel	1
(0028,0004)	>Photometric Interpretation	RGB
(0028,0006)	>Planar Configuration	0 or 1
(0028,0010)	>Rows	
(0028,0011)	>Columns	
(0028,0100)	>Bits Allocated	8
(0028,0101)	>Bits Stored	8
(0028,0102)	>High Bit	7
(0028,0103)	>Pixel Representation	
(0028,0034)	>Pixel Aspect Ratio	
(7FE0,0010)	>Pixel Data Mandatory	

The SCP will return one of the following status codes for N-SET:

Code	Status	Comment
0x0000	Success	Image Box was successfully set
0x0110	Failure	Processing failure

6 Communication Profiles

6.1 Supported Communications Stacks

Print SCP provides DICOM V3.0 TCP/IP network communication support as defined in PS 3-8 of the DICOM standard.

6.2 TCP/IP Stack

Print SCP inherits its TCP/IP stack from the OKI printer system upon which it is executed.

6.3 Physical Media Support

Print SCP is irrelevant of the physical medium over which TCP/IP executes; it inherits this from the system upon which it is executed.

7 Extensions/Specialization/Privatization

No extensions defined.

8 Configuration

Print SCP configuration is included in the application user interface through the setup dialog.

Print SCP parameters may be defined in the user interface.

They main configuration parameters related to the DICOM communication are:

- Default AET: OKI
- Border Density: Client (default)
- Empty Image Density: Client (default)
- Dmin (low-pass filter)/Dmax (high-pass filter)
- Gamma: You can adjust gamma for each separate color toner (Cyan, Magenta and Yellow) from 0.01 to 2.90 in steps of 0.01.
- Smoothing: Default is Client, and you can choose between Normal and Sharpen.
- Polarity: Default is Client, and you can choose between Normal and Inverse.