CODONICS

DICOM Conformance Statement for

Print-SCP on Codonics Network Printers

NP1600/1660 MD

Mitra

Imaging Incorporated

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This document applies to Codonics NP-DICOM
Versions 2.5.0 and later.

Revision	Date	Author	Reason for Change
1.2	31/3/95	Andrew	Minor style changes.
1.3	19/5/95	Andrew	Removed unsupported transfer syntaxes.
1.4	29/5/95	Andrew	Removed unsupported Annotation boxes.
1.5	Feb 19, 1996	mike f	Removed Referenced printing.
1.6	Apr. 19, 1996	mike f	Removed Image/LUT storage
1.7	Apr. 25, 1996	mike f	clarified implementation of Basic Film box empty image density
1.8	May 29, 1997	larry w	Corrected inconsistancies between code and CS with respect to error reporting of illegal values in Film Session, Film Box and Image Box.
1.9	June 18, 1997	larry w	Some minor corrections noted by Codonics
1.10	Oct 15, 1997	larry w	Group/element numbers wrong in table 10

Paper Out error message too long |
1.11	Oct. 16, 1997	larry w	Add replicate to magnification type
1.12	Sep 9, 1998	rich edwards	clean up valid attributes and ranges of same; add called title and configuration info; updates for v2.4.0 software
1.13	Oct 15, 1998	rich edwards	add Printer Status Info and Available Media Size tables; change all density ranges to 0..300; other minor cleanups
1.14	Nov 19, 1998	rich edwards	add Configuration Information support; add SHARP* values to Magnification Types; updates for v2.4.1 software
1.15	Sept 27, 2000	rich edwards	add footnote for Min Density values; minor editing and cleanup

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1. Introduction

1.1 Purpose of this Document

This document is a DICOM Conformance Statement for the software product *Print-SCP* for the Codonics Network Printer. It is drafted for two purposes:

- To convey essential information about the product's requirements and abilities.
- To elicit comments on the format and content of the conformance claim itself, to ensure that it fulfills the DICOM requirements in this regard.

Print-SCP is a service class provider for DIMSE-C and DIMSE-N services relating to the printing of medical images. Each printer has one and only one *Print-SCP*.

Unless otherwise stated, all features conform with the DICOM V3.0 specification; all mandatory elements are supported.

1.2 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.

1.3 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

1.4 Typographical Conventions

This section is designed to assist the reader in understanding the terms and typographical conventions used in this document.

Formatting convention	Type of information
Bold type	DICOM SOP Class, or DIMSE Service
Italic type	Application Entity

2. Implementation Model

Print-SCP includes a database, a temporary image storage facility, plus an interface to a printer. *Print-SCP* is a single application entity that stores images sent to it by service class users, maintains objects (film sessions, film boxes, image boxes, etc.) that model the printing requests of the service class user.

2.1 Application Data Flow Diagram
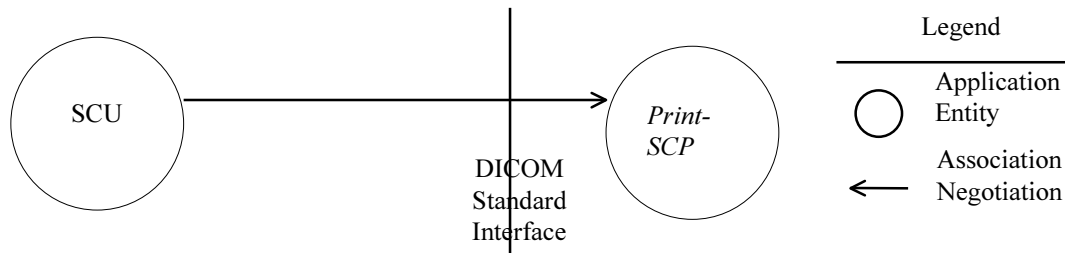
2.1.1 Request Printer Information

Print-SCP responds to N-GET query requests for the Printer object. The response notifies the SCU as to the current status of the printer.

2.1.2 Start a Film Session

The data structures required to manage a film session are created within the database.

2.1.3 Start a Film Box

Within the context of a film session, the service class user creates a film box. The data structures required to manage a film box are created within the database.
When a film box is created, a set of image boxes are created--one for each image slot in the requested format. The data structures required to manage an image box are created within the database.

2.1.4 Set Attributes of an Image Box

The service class user sets the attributes of a image box, which may include supplying a preformatted image.

2.1.5 Print

The service class user issues a request to print either a single film box, or all film boxes associated with a film session.

2.1.6 Delete

The service class user deletes a film session or film box.

2.2 Functional Definitions of AEs

Print-SCP is implemented as a single application entity for a service class provider.

2.3 Sequencing of Real World Activities

A film session must be created before any film boxes are created.
A film box must be created before any image boxes are created.
An image may be attached to an image box by value (i.e. the image itself is an element of an N-SET request of an image box).

When a film session is deleted, the current film session and its corresponding film boxes are deleted.
When a film box is deleted, the current film box is deleted along with all its corresponding image boxes.
When an image box is deleted, all corresponding objects, such as images have their reference count decremented.
Unreferenced images are deleted.

3. AE Specifications

3.1 Print-SCP Specifications

Print-SCP provides Standard Conformance to the following DICOM V3.0 **Verification** SOP Class as an SCP.

Table 1 Verification SOP Class

SOP Class	SOP Class UID
Verification	1.2.840.10008.1.1

Print-SCP provides Standard Conformance to the following DICOM V3.0 **Print Management** SOP Class as an SCP.

Table 2 Print Management SOP Class

SOP Class	SOP Class UID
Basic Greyscale Print Management Meta[1]	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta[2]	1.2.840.10008.5.1.1.18

Notes:
[1] Support includes by definition support for Basic Film Session SOP Class, Basic Film Box SOP Class, Basic Greyscale Image Box SOP Class, Printer SOP Class.
[2] Support includes by definition support for Basic Film Session SOP Class, Basic Film Box SOP Class, Basic Color Image Box SOP Class, Printer SOP Class.

3.1.1 Association Establishment Policies

3.1.1.1 General

Print-SCP contains limitations for PDU size, the maximum is 32760 bytes.

3.1.1.2 Number of Associations

The maximum number of simultaneous associations accepted by *Print-SCP* is 8.

3.1.1.3 Asynchronous Nature

Print-SCP allows a single outstanding operation on any association. Therefore, *Print-SCP* does not support asynchronous operations window negotiation.

3.1.1.4 Implementation Identifying Information

Print-SCP will respond with the following implementation identifying parameters:
- Implementation Class UID   **1.2.124.113532.1.1**
- Implementation Version Name   **MITRA19APR94**

3.1.1.5 Called/Calling Titles

Print-SCP operates in a "promiscuous" mode, accepting any valid called title (as defined by the AE VR type). In addition, several special called titles allow selection of logical devices within *Print-SCP*. The following shows the list of supported called titles:

Table 3 Called AE Titles

Called Title	Behavior
specialSlide	*Print-SCP* forces an Image Display Format of SLIDE, resulting in 35mm slide output (Codonics logical device 135). This behavior must further be enabled by specifying an Image Display Format (2010,0010) of STANDARD\4,5 or STANDARD\4,6.
specialBracket DoBracketing	*Print-SCP* forces a Bracketing print for each image printed as part of the association (Codonics logical device 9).
All others	*Print-SCP* acts in its default manner, as described throughout this document. Typically, the title 'PRINT_SCP' is used, but this is arbitrary.

3.1.2 Association Initiation by Real World Activity

Print-SCP does not initiate requests based upon real-world activities.

3.1.3 Association Acceptance Policy

3.1.3.1 Real World Activity - Verification

3.1.3.1.1 Associated Real World Activity - Verification

Print-SCP will respond to **Verification** requests to provide an SCU with the ability to determine if *Print-SCP* is receiving DICOM requests.

3.1.3.1.2 Presentation Context Table - Verification

Print-SCP supports the transfer syntaxes listed in Table 4. *Print-SCP* will accept any of the Presentation Contexts listed in
Table 5 for **Verification**.

Table 4 Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 5 Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
SOP Class	SOP Class UID			
Verification	1.2.840.10008.1.1	all from **Table 4**	SCP	None

3.1.3.1.3 SOP Specific Conformance - Verification

Print-SCP provides standard conformance to the DICOM **Verification** Service Class. *Print-SCP* returns one of the following status codes.

Table 6 Verification status codes.

Service Status	Further Meaning	Protocol Codes	Related Fields	Description
Error	Failed	C000		The operation was not successful.
Success	Success	0000		Operation performed properly.

3.1.3.1.4 Presentation Context Acceptance Criterion - Verification

Print-SCP will always accept a Presentation Context for the Verification SOP Class with the default DICOM transfer syntax listed in Table 4.

3.1.3.1.5 Transfer Syntax Selection Policies - Verification

Since no DICOM data object is associated with a **Verification** command, only the default DICOM transfer syntax is required/supported.

3.1.3.2 Real World Activity - Printing

3.1.3.2.1 Associated Real World Activity - Printing

Print-SCP will respond to **Print Management** requests to provide an SCU with the ability to produce hardcopy representations of DICOM images.
The SCU is responsible for describing a page, and requesting that it be printed. The page is described by specifying a format, which defines a number of image positions. Images can then be placed in these positions. The SCU provides the preformatted pixel data for the position.
When the SCU has finished describing the page, it specifies that printing can begin.

3.1.3.2.2 Presentation Context Table - Printing

Print-SCP supports the transfer syntaxes listed in Table 7. *Print-SCP* will accept any of the Presentation Contexts listed in Table 8 for **Print Management**.

Table 7 Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 8 Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
SOP Class	**SOP Class UID**			
Basic Greyscale Print Management Meta	1.2.840.10008.5.1.1.9	all from Table 7	SCP	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	all from Table 7	SCP	None
Basic Film Session	1.2.840.10008.5.1.1.1	all from Table 7	SCP	None
Basic Film Box	1.2.840.10008.5.1.1.2	all from Table 7	SCP	None
Basic Greyscale Image Box	1.2.840.10008.5.1.1.4	all from Table 7	SCP	None
Basic Color Image Box	1.2.840.10008.5.1.1.4.1	all from Table 7	SCP	None
Printer	1.2.840.10008.5.1.1.16	all from Table 7	SCP	None

3.1.3.2.3 SOP Specific Conformance - Printing

Print-SCP provides standard conformance to the DICOM **Printing** Service Classes by supporting a number of distinct Service classes described below.

3.1.3.2.3.1 SOP Specific Conformance to Basic Film Session SOP Class

Print-SCP supports all mandatory elements and attributes, as well as the Film Session Label attribute.

Table 9 Attributes for a Basic Film Session

Attribute Name	Tag	Default	Valid Range	Error for illegal value
Number of Copies	(2000,0010)	1	1..99	None (closest endpoint used)
Print Priority[1]	(2000,0020)	MED	HIGH MED LOW	None
Medium Type[1,2]	(2000,0030)	PAPER	PAPER BLUE FILM CLEAR FILM	None
Film Destination[1]	(2000,0040)	PROCESSOR	PROCESSOR MAGAZINE BIN_i (where i > 0)	None
Film Session Label	(2000,0050)		No restrictions	None

Notes:

[1]These attributes do not affect printing in any way, but their values must be within the valid ranges.

[2] See Section 7.1 for a discussion of media size and type selection.

Print-SCP ignores the Memory Allocation attribute of the Basic Film Session object.

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Table 10 Print Management status codes.

Service Status	Further Meaning	Protocol Codes	Related Fields	Description
Success	Success	0000		Operation was performed properly.
Failed	Invalid Attribute	0106		An attribute had invalid contents.
	Missing Attribute	0120		A required attribute was not sent.
	Invalid Object	0117		The specified instance is inappropriate, at least for the desired action.
	Class Conflict	0119		The specified SOP instance is not a member of the specified SOP class.
Warning	Warning	B600	(2000,0060)	Memory allocation is not supported.
Failed	Not Supported	B601		Film session printing is not supported.
Warning	Warning	B602		Film session has no image boxes.
	Warning	B603		Film Box has no images (empty page.).
	Warning	C600		Film Session empty, no film boxes.
Failed	Local Failure	C601		Could not create print job from session.
	Local Failure	C602		Could not create print job from film box.
Warning	Warning	C603		Image size larger than image location.
Failed	Invalid Operation	C604		Image position is already filled.
	Local Failure	C605		Could not store image.
	Invalid Operation	C606		VOI LUT is already specified.
	Failed	C000		The operation was not successful.

3.1.3.2.3.2 SOP Specific Conformance to Basic Film Box SOP Class

Print-SCP supports all mandatory elements. The N-SET service element is also supported. Attempts to modify or delete any Film Box but the last one created generate invalid object errors and are ignored.

Upon creation of a film box, image boxes are created. If the Referenced Image Box Sequence is sent then the UIDs specified therein are used to identify them. Any shortfall of UIDs is covered by creating new instance UIDs in the appropriate Basic Image Box SOP class. The resulting set of UIDs is returned in the response.

Print-SCP supports the following attributes of the Basic Film Box SOP Class:

Table 11 Attributes for a Basic Film Box

Attribute Name	Tag	Default	Valid Range	Error for illegal value
Image Display Format[1]	(2010,0010)	STANDARD\2,2	SLIDE STANDARD\ C,R where: C = columns [1..9] R= rows [1..9]	None (default used)
Referenced Film Session Sequence	(2010,0500)	n/a	The Film Session	0106, 0120, C000, Error
Referenced Basic Image Box Sequence	(2010,0510)	n/a		sequence is ignored

Film Orientation	(2010,0040)	PORTRAIT	PORTRAIT LANDSCAPE	0106, 0120, C000, Error
Film Size ID[2]	(2010,0050)	8INX10IN	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM	None (default used)
Magnification Type[3]	(2010,0060)	NONE	NONE BILINEAR BICUBIC CUBIC MITCHELL LANCZOS REPLICATE SHARP1 SHARP2 SHARP3	None (default used)
Max Density	(2010,0130)	300	0..300	None (default used)
Configuration Information	(2010,0150)	None	See text below, and Table 12	None
Annotation Display Format Id	(2010,0030)	None	None	0106, 0120, C000, Error
Smoothing Type	(2010,0080)	None	None	0106, 0120, C000, Error
Border Density[4]	(2010,0100)	BLACK	0..300 BLACK WHITE	None (default used)
Empty Image Density[4]	(2010,0110)	BLACK	0..300 BLACK WHITE	None (default used)
Min Density[5]	(2010,0120)	0	0..300	None (default used)
Trim	(2010,0140)	NO	YES NO	None (default used)

Notes:
[1] See Section 3.1.1.5 for an alternative way to select the Image Display Format.
[2] This attribute does not affect media size selection for printing. See Section 7.1 for a discussion of how media size is determined.

[3] If this attribute is not sent or is set to NONE, then the Scaling parameter from the printer's front panel menu is used. The SHARP* values are only available on NP1660 printers with printer software version 2.2.4, or later.

[4] For BLACK, Max Density value is used; for WHITE, Min Density value is used.

[5] Min Density values <= 20 are accepted, but have no effect. This is in order to compensate for the highest base density of the supported media types, which is approximately 0.20 O.D. for blue film.

The Configuration Information string (2010,0150) can be used to specify certain parameters specific to Codonics printers, and to override Magnification Type. A full description of these parameters can be found in the User's Manual (available in online form on all printers at 'http://printer-ip-address'). The following parameters are supported:

Table 12 Configuration Information Parameters

Parameter Name	Valid Range
MCM	0..255
TCR	0..100
CONTRAST	-100..+100
GAMMA	0.0 .. 10.0
SCALING	see Magnification Type (2010,0060) in Table 11

Any number of parameters (0..5) may be included in any order, separated by the backslash character ('\'). Each parameter must be specified as a 'name=value' string without whitespace. The 'name' and 'value' strings are case-insensitive, and need only contain enough characters to make them unique (of course, numerical values must be completely specified). Here is an example string which sets all five parameters:

mcm=0\tcr=15\con=10\g=2.25\scal=sharp2

Note that the names and value ranges for these parameters are taken directly from the menus available on the printer's front panel interface, for easy reference. The values for parameters not specified in this string are taken from the front panel settings, or from the system defaults.

The SCALING parameter is included primarily for use by SCUs that don't support the Magnification Type (2010,0060) attributes in Film Box and Color and Greyscale Image Boxes. If the SCALING parameter is specified in this string, and is set to a value other than 'NONE', it overrides all of the Magnification Type attributes.

3.1.3.2.3.3 SOP Specific Conformance to Basic Greyscale Image Box SOP Class

Print-SCP supports all mandatory service elements (N-SET). Attempts to set image boxes that do not belong to the current film box generate invalid object errors and are ignored. Every effort is made to print each image. The following attributes are supported:

Table 13 Attributes for a Basic Greyscale Image Box

Attribute Name	Tag	Default	Valid Range	Error for illegal value
Image Position	(20200010)	n/a	1..images_per_page	None (default of 1 used)
Preformatted Greyscale Image Sequence	(2020,0110)	n/a	n/a	
> Samples Per Pixel	(0028,0002)	n/a	1	None (default of 1 used)

> Photometric Interpretation	(0028,0004)	n/a	MONOCHROME1 MONOCHROME2	None (default of MONOCHOROME1 used)
> Rows	(0028,0010)	n/a	1..4096	None[1]
> Columns	(0028,0011)	n/a	1..4096	None[1]
> Pixel Aspect Ratio	(0028,0034)	1\1	100\1 .. 1\100	None[1]
> Bits Allocated	(0028,0100)	n/a	8,16	None[1]
> Bits Stored	(0028,0101)	n/a	8,12	None[1]
> High Bit	(0028,0102)	n/a	7,11	None[1]
> Pixel Representation	(0028,0103)	n/a	0000	None (default of 0000 used)
> Pixel Data	(7FE0,0010)	n/a	---	None
Polarity	(2020,0020)	NORMAL	NORMAL REVERSE	None (default used)
Magnification Type[2]	(2010,0060)	NONE	NONE BILINEAR BICUBIC CUBIC MITCHELL LANCZOS REPLICATE SHARP1 SHARP2 SHARP3	None (default used)
Smoothing Type	(2010,0080)	None	None	None

Notes:

[1] If these values are not valid, an image with the words 'Image Corrupt' will be printed in place of the invalid image.

[2] If this attribute is not sent or is set to NONE, then the Scaling parameter from the printer's front panel menu is used. The SHARP* values are only available on NP1660 printers with printer software version 2.2.4, or later.

3.1.3.2.3.4 SOP Specific Conformance to Basic Color Image Box SOP Class

Supports all mandatory service elements (N-SET). Attempts to set image boxes that do not belong to the current film box generate invalid object errors and are ignored. Every effort is made to print each image. The following attributes are supported:

Table 14 Attributes for a Basic Color Image Box

Attribute Name	Tag	Default	Valid Range	Error for illegal value
Image Position	(20200010)	n/a	1..images_per_page	None (default of 1 used)
Preformatted Color Image Sequence	(2020,0111)	n/a	n/a	
> Samples Per Pixel	(0028,0002)	n/a	3	None (default of 3 used)

> Photometric Interpretation	(0028,0004)	n/a	RGB	None (default of RGB used)
> Planar Configuration	(0028,0006)	n/a	0000 (interleaved) 0001 (planar)	None[1]
> Rows	(0028,0010)	n/a	1..4096	None[1]
> Columns	(0028,0011)	n/a	1..4096	None[1]
> Pixel Aspect Ratio	(0028,0034)	1\1	100\1 .. 1\100	None[1]
> Bits Allocated	(0028,0100)	n/a	8	None[1]
> Bits Stored	(0028,0101)	n/a	8	None[1]
> High Bit	(0028,0102)	n/a	7	None[1]
> Pixel Representation	(0028,0103)	n/a	0000	None (default of 0000 used)
> Pixel Data	(7FE0,0010)	n/a	---	None
Polarity	(2020,0020)	NORMAL	NORMAL REVERSE	None (default used)
Magnification Type[2]	(2010,0060)	NONE	NONE BILINEAR BICUBIC CUBIC MITCHELL LANCZOS REPLICATE SHARP1 SHARP2 SHARP3	None (default used)
Smoothing Type	(2010,0080)	None	None	None

Notes:

[1] If these values are not valid, an image with the words 'Image Corrupt' will be printed in place of the invalid image.

[2] If this attribute is not sent or is set to NONE, then the Scaling parameter from the printer's front panel menu is used. The SHARP* values are only available on NP1660 printers with printer software version 2.2.4, or later.

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3.1.3.2.3.5 SOP Specific Conformance to Printer SOP Class

N-EVENT-REPORT commands are not generated for any execution status changes. The N-GET service element is supported.

The following attributes are supported:

Table 15 Attributes for a Printer

Attribute Name	Tag	Default	Valid Range
Printer Status	(2110,0010)	NORMAL	NORMAL WARNING FAILURE
Printer Status Info	(2110,0020)	STANDARD	see Table 16
Printer Name[1]	(2110,0030)	Codonics Print-SCP (hostname)	
Manufacturer	(0008,0070)	Codonics	
Manufacturer Model Name	(0008,1090)	NP1600/1660MD	NP1600/1660MD NP1600MD NP1660MD
Device Serial Number[2]	(0018,1000)	nnnnnnnn	
Software Versions[3]	(0018,1020)	n.n	
Date Last Calibration[4]	(0018,1200)	yyyymmdd	
Time Last Calibration[4]	(0018,1201)	hhmmss.ffffff	

Notes:

[1] The printer's network hostname is included in this attribute.

[2] The printer's serial number is an 8 character alphanumeric string.

[3] The software version contains at least a major and minor revision number, and may contain additional designators.

[4] Calibration date and time reflects the date and time of the software version release.

Table 16 Printer Status Info

NORMAL	WARNING[1]	FAILURE
STANDARD	LOAD A-SIZE LOAD A-DVPAPER LOAD A-CVPAPER LOAD A-CVTRANS LOAD A4-SIZE LOAD A4-DVPAPER LOAD A4-CVPAPER LOAD A4-CVTRANS LOAD LA-SIZE LOAD LA-DVPAPER LOAD LA-CVPAPER LOAD LA-CVTRANS LOAD LA4-SIZE LOAD LA4-DVPAPER LOAD LA4-CVPAPER LOAD LA4-CVTRANS LOAD XLA-SIZE LOAD XLA-DVPAPER LOAD XLA-CVPAPER LOAD XLA-CVTRANS LOAD XLA4-SIZE LOAD XLA4-DVPAPE LOAD XLA4-CVPAPE LOAD XLA4-CVTRAN LOAD XLW-SIZE LOAD XLW-DVPAPER LOAD XLW-CVPAPER LOAD 8X10-SIZE LOAD 8X10-DVFILM	SUPPLY MISSING SUPPLY EMPTY RIBBON MISSING RIBBON EMPTY TOP COVER OPEN UNKNOWN

Notes:
[1] WARNING conditions are only reported on NP-1660MD printers, since they relate to the Advanced Queuing feature not available on the NP-1600MD printer.

Print-SCP accepts Film Boxes during NORMAL, WARNING and FAILURE states. If a WARNING and FAILURE condition exist simultaneously, the FAILURE condition is reported. If more than one WARNING condition exists, then the condition first encountered is reported.

3.1.3.2.3.6 SOP Specific Conformance to Basic Greyscale Print Management Meta SOP Class

The Meta SOP class is supported at negotiation, and is implemented as the individual SOP classes defined by the DICOM specification.

3.1.3.2.3.7 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The Meta SOP class is supported at negotiation, and is implemented as the individual SOP classes defined by the DICOM specification.

3.1.3.2.4 Presentation Context Acceptance Criterion - Printing

Print-SCP will accept any number of **Print Management** Presentation Contexts per association request. Any one Abstract Syntax may be specified more than once in an association request, if the Transfer Syntaxes differ between the Presentation Contexts.

3.1.3.2.5 Transfer Syntax Selection Policies - Printing

Print-SCP currently only supports the default Little Endian transfer syntax.

4. Communications Profiles

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

4.1 TCP/IP Stack

Print-SCP inherits its TCP/IP stack from the computer system upon which it executes. It executes on an embedded SPARC system running Solaris 2.4, or later.

4.1.1 Physical Media Support

Print-SCP is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the computer system upon which it executes (see section 4.1). Current support includes 10 and 100 Mbit Ethernet.

5. Extensions/Specializations/Privatizations

Print-SCP does not provide any extensions, specializations, or privatizations for any of its supported SOP classes.

6. Specific Details

All details should be specified in the appropriate sections. Any details not specified by DICOM 3.0 or this specification are undefined and subject to change without notice.

7. Configuration

7.1 Configuration of media selection

The selection of media size and type for a given print job does not depend on the Film Size ID (2010,0050) or Medium Type (2000,0030) attributes. Instead, the printer's configuration is used to select these.

7.1.1 NP-1600MD printer configuration

Print-SCP can be installed on an NP1600MD printer. This printer does not support media selection configuration. As a result, all hardcopy print jobs received by *Print-SCP* are printed on whatever media is loaded at the time the print is actually made.

7.1.2 NP-1660MD printer configuration

Print-SCP can be installed on an NP1660MD printer. This printer supports configuration of media selection for color and greyscale print jobs received by *Print-SCP*. A print job is considered color if it contains Basic Color Image Boxes, or greyscale if it contains Basic Greyscale Image Boxes.
The configuration defines what media size and type combination is used for each type of job. If unspecified, then the currently loaded media is used, as with the NP1600MD printer.
Configuration is accomplished by way of an Advanced Queuing Key, which is entered at the printer's front panel. The format of this key is beyond the scope of this document, but is described in detail in the "DICOM & DEFF Advanced Queuing Keys Technical Brief", available from Codonics.

7.1.3 Available Media Sizes

The NP-series printers support the following media sizes:

Table 17 Available Media Sizes

Media Size	Maximum Pixel Matrix
A	2400 x 2680
A4	2400 x 2890
Long A	2400 x 3000
Long A4	2400 x 3000
Extra Long A	2400 x 3600
Extra Long A4	2400 x 3600
Extra Long Wide	2544 x 3600
8in x 10in[1]	2280 x 2565

Notes:
[1] This size only available on NP-1660MD printers.

7.2 Configuration of TCP Port

Print-SCP listens for incoming DICOM messages on port number 104, by default. While the port number can be configured, this configuration is not supported by the standard configuration tools available on the NP series printers. Therefore, it is recommended that port 104 be used in all cases.

8. Support for Extended Character Sets

Print-SCP is known to support the following character sets:

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