

Digital Imaging and Communications in Medicine (DICOM)

Supplement 38

Basic Print Image Overlay Box SOP Class

Retire Print Image Overlay Box SOP Class

Changes to Stored Print SOP Classes

Prepared by:

DICOM Standards Committee, Working Group 6

1300 N. 17th Street

Rosslyn, Virginia 22209 USA

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Forward

The American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA) formed a joint committee to develop a standard for Digital Imaging and Communications in Medicine (DICOM). This DICOM Standard and the corresponding Supplements to the DICOM Standard were developed according to the NEMA procedures.

DICOM is developed in liaison with other standardization organizations including CEN TC251 in Europe and JIRA in Japan, with review also by other organizations including IEEE, HL7 and ANSI in the USA.

This document is a Supplement to the DICOM Standard. It is an extension to PS 3.3, 3.4 and 3.6 of the published DICOM Standard which consists of the following parts:

PS 3.1	Introduction and Overview
PS 3.2	Conformance
PS 3.3	Information Object Definitions
PS 3.4	Service Class Specifications
PS 3.5	Data Structures and Encoding
PS 3.6	Data Dictionary
PS 3.7	Message Exchange
PS 3.8	Network Communication Support for Message Exchange
PS 3.9	Point-to-Point Communication Support for Message Exchange
PS 3.10	Media Storage and File Format
PS 3.11	Media Storage Application Profiles
PS 3.12	Media Format and Physical Media for Media Interchange
PS 3.13	Print Management Point-to-Point Communication Support
PS 3.14	Grayscale Standard Display Function

These parts are related but independent documents.

Scope and Field of Application

Print Overlay SOP Classes

This Supplement describes a new Basic Print Image Overlay Box SOP Class. This SOP Class is explicitly intended for use with the Basic Print Management Meta SOP Classes. It replaces the existing Image Overlay Box SOP Class. Overlay pixel data are contained in the SOP Class instance.

The existing Image Overlay Box contains a reference to the image it is to be printed with. This new Basic Print Image Overlay Box is created or set without a reference to the image. The SCU then N-SETs the Image Box to contain the reference to the Overlay. This is the same procedure as Presentation LUT.

A single overlay plane is supported by this SOP Class. Overlays and images may have different numbers of rows and columns. Either the image or overlay can be magnified to an arbitrary size before they are superimposed. The image and overlay are superimposed before further processing, e.g. magnification to fit the Image Box and gray scale transformations.

Parts 3 and 4 are not clear on the cardinality of images and overlays. This supplement specifies that 1-n images reference 0-1 Basic Print Image Overlay Box SOP Instances.

Changes to Stored Print SOP Classes

The new Basic Print image Overlay Box SOP Class, retiring of Print Image Overlay Box SOP Class, and other changes recently approved require several changes to the Stored Print SOP Classes. These changes are specified in this Supplement.

Two new Attributes (Requested Resolution ID and Requested Decimate/Crop Behavior) were approved in Supplement 37 Printer Configuration Retrieval SOP Class and add new capabilities to Basic Print. These Attributes have been added to the Print Storage IOD.

The Print Storage IOD contains the Image Overlay Box List Module. A number of the Attributes in this Module are related to the retired Print Image Overlay Box SOP Class. These have been retired from the Print Storage IOD and replaced with the Attributes in the new Basic Print Image Overlay Box Module.

These changes add the new functions and a simpler specification of printing overlays to the Stored Print SOP Classes.

In addition, this Supplement corrects an error in the Hardcopy Image IODs. These IODs describes a printable image in which overlays and annotation have been burned into the image pixel data. It contains information that could also be conveyed in a Basic Print Session. However, the specification for the IOD includes the Overlay Plane Module. This Module is used in a number of other Image IODs to convey overlay data in either Group 60xx or imbedded in the image pixel data. There is no way to convey this information in a Basic Print Session. Thus, this Module should not have been included in the original IOD specification.

Since this document proposes changes to existing Parts of DICOM the reader should have a working understanding of the Standard.

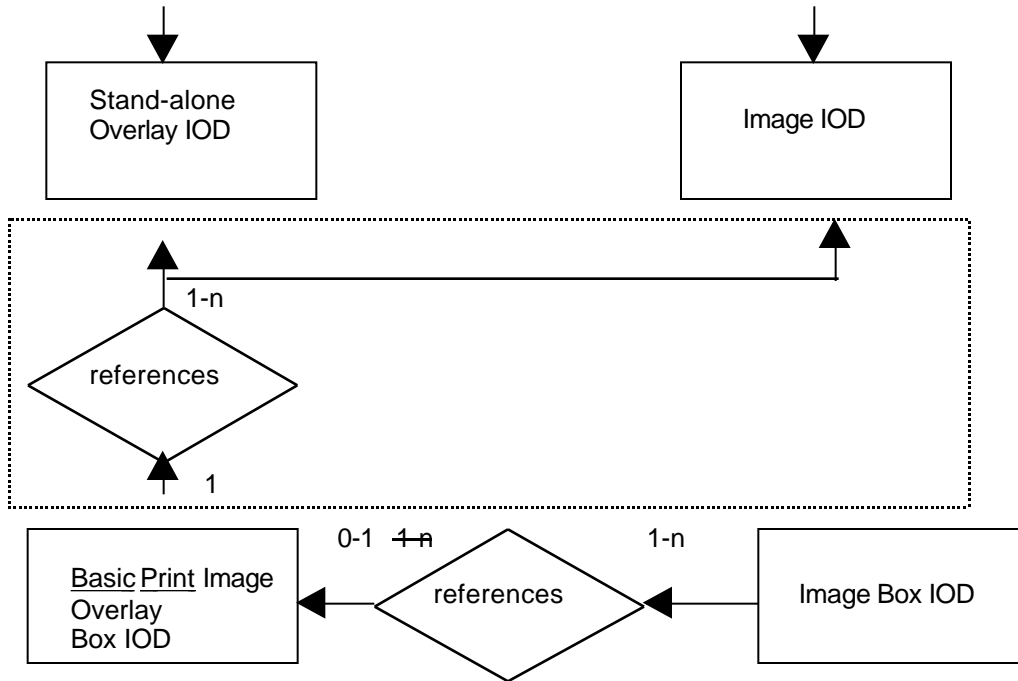
This Supplement includes a number of Addenda to existing Parts of DICOM:

PS 3.3 Addendum	Printer Configuration Information Object Definitions
PS 3.4 Addendum	Printer Configuration Service Class
PS 3.6 Addendum	Printer Configuration Additions to the Data Dictionary

PS 3.3 Addendum

ADDENDUM FOR BASIC PRINT IMAGE OVERLAY BOX SOP CLASS

PS 3.3 Change Figure 7-2



1-n Image Box IOD references 0-1 (not 1-n) Image Overlay Box IOD

Remove references inside dashed box.

PS 3.3 Add section B.x: Basic Print Image Overlay Box Information Object Definition

B.X: BASIC PRINT IMAGE OVERLAY BOX INFORMATION OBJECT DEFINITION

B.x.1 IOD Description

The Basic Print Image Overlay Box IOD is an abstraction of the presentation of an image overlay in a basic image box. It contains the overlay pixel data to be printed on the image. A single overlay plane is supported. Overlays may be printed on both color and grayscale images. However, printing of the overlay pixels is only supported in black or white.

B.x.2 IOD Modules

Module	Reference
SOP Common Information	C.12.1
Basic Print Image Overlay Box Module	C.11.x

Table C.13-6: Image Box Relationship Modify as indicated Add text at the bottom.

Attribute Name	Tag	Attribute Description
Referenced Image Overlay Box Sequence	(2020,0130)	A sequence which provides a references to an Overlay SOP Class/Instance pair. And a specific frame number in multi frame instances. Encoded as a sequence of items: (0008,1150), (0008,1155), and (0008,1160) A single item shall be present.
>Referenced SOP Class UID	(0008,1150)	Uniquely identifies the referenced SOP Class
>Referenced SOP Instance UID	(0008,1155)	Uniquely identifies the referenced SOP Instance
>Referenced Frame Number	(0008,1160)	Identifies the frame in the multi frame overlay(s) referenced by the Overlay Plane Sequence that is referenced by this Image Overlay Box Sequence. Frame number shall be increasing sequential order beginning with the value 1.

Referenced Frame Number (0008,1160) was previously an Attribute in this sequence. It has been retired from this Module. See PS 3.3-1998.

Add section C.11.x: Basic Print Image Overlay Box Module

C.11.x Basic Print Image Overlay Box Module

Table C.11.x-1: Basic Print Image Overlay Box Module

Attribute Name	Tag	Attribute Description
Overlay Pixel Data Sequence	(2040,0020)	A sequence which provides overlay pixel data. A single item shall be present.
>Overlay Rows	(6000,0010)	See C.9.2.
>Overlay Columns	(6000,0011)	See C.9.2.
>Overlay Origin	(6000,0050)	See C.9.2

>Overlay Bits Allocated	(6000,0100)	Number of bits allocated in the Overlay. Enumerated Value: 1
>Overlay Bit Position	(6000,0102)	Bit in which Overlay is stored. Enumerated Value: 0
>Overlay Data	(6000,3000)	Overlay data shall be contained in this Attribute.
Overlay Magnification Type	(2040,0060)	Specifies magnification type if the overlay is magnified before being superimposed on the image. Defined Terms: REPLICATE BILINEAR CUBIC
Overlay Smoothing Type	(2040,0070)	Further specifies the type of interpolation function; only valid for Overlay Magnification Type (2010,0060) = CUBIC
Overlay or Image Magnification	(2040,0072)	Specifies magnification of the overlay or image before they are superimposed. Enumerated values: IMAGE = Image is to be magnified OVERLAY = Overlay is to be magnified. See C.11.x.1
Magnify to Number of Columns	(2040,0074)	Specifies the number of columns of the overlay or image after magnification. See C.11.x.1
Overlay Foreground Density	(2040,0080)	Defines the density for pixels which correspond with overlay bit = 1. The density of the other pixels remain unchanged. Defined Terms: BLACK WHITE
Overlay Background Density	(2040,0082)	Defines the density for pixels which correspond with overlay bit = 0 that are not superimposed on the image and Combined Print Image pixels that are not part of the overlay or image Defined Terms: BLACK WHITE

Note: Since the SOP Class that uses this Module supports only one overlay plane, Group 60xx Attributes have been specified to be Group 6000 rather than 60xx.

C.11.x.1 Overlay or Image Magnification

These Attributes specify any magnification of the overlay or image that has to be performed before they are superimposed. Overlay or Image Magnification (2040,0072) specifies whether the overlay or image is to be magnified. Magnify to Number of Columns (2040,0074) specifies the number of columns of the overlay or image after magnification. If Overlay or Image Magnification has the value OVERLAY, this value shall be greater than Overlay Columns (6000,0011). If Overlay or Image Magnification has the value IMAGE, this value shall be greater than Columns (0028,0011).

Since the SOP Class that uses this Module does not provide a mechanism to specify an overlay pixel aspect ratio different than the image that refers to it, the same magnification factor shall be applied to the rows and columns of the overlay or image before they are superimposed. See Basic Print Image Overlay Box SOP Class in PS 3.4.

ADDENDUM FOR RETIRING IMAGE OVERLAY BOX SOP CLASS

B.1.4 Retire this Section

B.14 IMAGE OVERLAY BOX INFORMATION OBJECT DEFINITION (RETIRED)

This section was previously defined in DICOM. It is now retired. See PS 3.3-1998.

C.13.10 Retire the following Sections

C.13.10 Image Overlay Box Presentation Module (Retired)

This section was previously defined in DICOM. It is now retired. See PS 3.3-1998.

C.13.11 Image Overlay Box Relationship Module (Retired)

This section was previously defined in DICOM. It is now retired. See PS 3.3-1998.

PRINT STORAGE RELATED ADDENDUM

A.24.3 and A.25.3 Remove Overlay Plane Module from Hardcopy Grayscale and Color Image IOD Modules

This corrects an error in the Hardcopy Image IODs, the IODs represents a preformatted image, it should not have contained the Overlay Plane Module.

A.24.3 IOD Module Table

**Table A.24-1
HARDCOPY GRAYSCALE IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7-1	M

Study	General Study	C.7-2	M
	Patient Study	C.7-3	U
Series	General Series	C.7.3.1	M
Equipment	General Equipment	C.7.5.1	U
	Hardcopy Equipment	C.8.8.1	M
Image	General Image	C.7.6.1	M
	HC Grayscale Image	C.8.8.2	M
	Overlay Plane	C.9.2	U
	SOP Common Information	C.12.1	M

The Overlay Plane Module (C.9.2) was previously in this IOD. Its use in this IOD has been retired.
 See PS 3.3-1998

A.25.3 IOD Module Table

**Table A.25-1
 HARDCOPY COLOR IMAGE IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7-1	M
Study	General Study	C.7-2	M
	Patient Study	C.7-3	U
Series	General Series	C.7.3.1	M
Equipment	General Equipment	C.7.5.1	U
	Hardcopy Equipment	C.8.8.1	M
Image	General Image	C.7.6.1	M
	HC Color Image	C.8.8.3	M
	Overlay Plane	C.9.2	U
	SOP Common Information	C.12.1	M

The Overlay Plane Module (C.9.2) was previously in this IOD. . Its use in this IOD has been retired.
 See PS 3.3-1998

C.16.2 Film Box Module (of Print Storage IOD)

Add the following attribute added to Basic Print by the Printer Configuration Supplement

**Table C.16-2
 Film Box Module**

Attribute Name	Tag	Type	Description
>Requested Resolution ID	(2020,0050)	3	See C.13.3

C.16.3 Image Box Module (of Print Storage IOD)

Add the following attribute added to Basic Print by the Printer Configuration Supplement

**Table C.16-3
Image Box Module**

Attribute Name	Tag	Type	Description
>Requested Decimate/Crop Behavior	(2020,0040)	3	See C.13.5

Modify C.16.5 Image Overlay Box List Module (Module of Stored Print IOD)

A number of the Attributes in this Module are related to the retired Print Image Overlay Box SOP Class. These have been retired from the Print Storage IOD and replaced with the Attributes in the new Basic Print Image Overlay Box Module.

C.16.5 Image Overlay Box List Module

**Table C.16-5
Image Overlay Box List Module**

Attribute Name	Tag	Type	Description
Image Overlay Box Content Sequence	(2130,0060)	3	The content of the Basic Print Image_Overlay Box SOP Instance. If sent, one or more Items shall be included in this sequence. Encoded as a sequence of items.
> SOP Instance UID	(0008,1155)	1C	SOP Instance UID of the contained Basic Print Image Overlay Box SOP Class. Required if Sequence is sent.
>Overlay Pixel Data Sequence	(2040,0020)	1C	A sequence which provides overlay pixel data. A single item shall be present. Required if Sequence is sent.
>>Overlay Rows	(6000,0010)	1C	See C.9.2 Required if Sequence is sent.
>>Overlay Columns	(6000,0011)	1C	See C.9.2 Required if Sequence is sent.
>>Overlay Origin	(6000,0050)	1C	See C.9.2 Required if Sequence is sent.
>>Overlay Bits Allocated	(6000,0100)	1C	See C.11.x. Required if Sequence is sent.
>>Overlay Bit Position	(6000,0102)	1C	See C.11.x. Required if Sequence is sent.
>>Overlay Data	(6000,3000)	1C	See C.11.x. Required if Sequence is sent.
>Overlay or Image Magnification	(2040,0072)	1C	See C.11.x Required if Magnify to Number of Columns (2040,0074) is present.

>Magnify to Number of Columns	(2040,0074)	1C	See C.11.x Required if Overlay or Image Magnification (2040,0072) is present.
>Overlay Magnification Type	(2040,0060)	3	See C.11.x. See C.13.10 for description.
>Overlay Smoothing Type	(2040,0070)	3	See C.11.x. See C.13.10 for description.
>Overlay Foreground Density	(2040,0080)	3	See C.11.x. See C.13.10 for description.
>Overlay Background Density	(2040,0082)	3	See C.11.x
>Referenced Overlay Plane Sequence	(2040,0010)	4C	See C.13.10.1 for description. Overlay planes encoded as part of a Standalone Overlay IOD are not permitted. Required if Sequence is sent.
>>Referenced SOP Class UID	(0008,1150)	4C	See C.13.10 for description. Required if Referenced Overlay Plane Sequence is sent.
>>>Referenced SOP Instance UID	(0008,1155)	4C	See C.13.10 for description. Required if Referenced Overlay Plane Sequence is sent.
>>>Referenced Frame Number	(0008,1160)	4C	See C.13.6 for description. Required if Overlay Plane Sequence is sent and a Multi frame Image is referenced.
>>>Referenced Overlay Plane Groups	(2040,0011)	4C	See C.13.10 for description. Required if Referenced Overlay Plane Sequence is sent.
>Overlay Mode	(2040,0090)	3	See C.13.10 for description.
>Threshold Density	(2040,0100)	3	See C.13.10 for description.

Referenced Overlay Plane Sequence (2040,0010), Referenced SOP Class UID (0008,1150), Referenced SOP Instance UID (0008,1155), Referenced Frame Number (0008,1160), Referenced Overlay Plane Groups (2040,0011), Overlay Mode (2040,0090), and Threshold Density (2040,0100) were previously Attributes in this Module. They have been retired from this Module. See PS 3.3-1998.

PS 3.4 Addendum

ADDENDUM FOR BASIC PRINT IMAGE OVERLAY BOX SOP CLASS

3.9 Add the following definition

Combined Print Image: a pixel matrix created by superimposing an image and an overlay, the size of which is defined by the smallest rectangle enclosing the superimposed image and overlay.

Modify the following Section as Indicated.

H.3.3.2 List of Optional SOP Classes

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

SOP Class Name	Reference	Usage SCU/SCP
Basic Annotation Box SOP Class	H.4.4	U/U
Print Job SOP Class	H.4.5	U/U
Basic Print Image Overlay Box SOP Class	H.4.@	U/U
Image Overlay Box SOP Class	H.4.8	U/U

H.4.1.2.4.1 and H.4.2.2.4.2 Modify the following Status Codes to N-Action of Film Session and Film Box

Status	Meaning	Code
Warning	Image size is larger than the Image Box size. The Image has been cropped to fit.	B609
	Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit.	B60A
Failure	Image size is larger than image box size (by using the specified magnification value)	C603
	Combined Print Image size is larger than the Image Box size	C613

H.4.3.1.2.1.2, H.4.3.2.2.1.2, and H.4.3.3.2.1.2 Add the following Status Code to N-SET of Image Boxes

Status	Meaning	Code
Warning	Image size is larger than the Image Box size. The Image has been cropped to fit.	B609
	Image size or Combined Print Image size is larger than the Image Box size. The Image or Combined Print Image has been decimated to fit.	B60A
Failure	Image size is larger than image box size	C603
	Combined Print Image size is larger than the Image Box size	C613

Modify N-DELETE (of Film Session and Basic Film Box)

H.4.1.2.3 N-DELETE

The N-DELETE is used to delete the complete Basic Film Session SOP Instance hierarchy. As a result, all references to Image SOP Instances within the film session are deleted.

The Basic Film Session SOP Instance hierarchy ~~shall~~ consists of one Basic Film Session SOP Instance, one or more Basic Film Box SOP Instances, one or more Image Box SOP Instances, ~~and~~ zero or more Basic Annotation Box SOP Instances, zero or more Presentation LUT SOP Instances, and zero or more Basic Print Image Overlay Box SOP instances.

Note: The Basic Film Session SOP Instance hierarchy can be visualized as a reversed tree with the Basic Film Session SOP Instance as the root and the Image Box SOP Instances as the leaves.

H.4.1.2.3.1 Status

There are no specific status codes.

H.4.1.2.3.2 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Session SOP Instance hierarchy. The SCU shall specify the SOP Instance UID of the Basic Film Session (root).

The SCP shall delete the specified SOP Instance hierarchy. The SCP shall return the status code of the requested SOP Instance hierarchy deletion.

The SCP shall not delete Image SOP Instances in the hierarchy, ~~VOI LUT Box SOP Instances, Presentation LUT Box Instances, or Basic Print Image Overlay Box Instances~~ as long as there are outstanding references to these SOP Instances.

Note: It is beyond the scope of the Standard to specify when the SCP actually deletes SOP Instances with outstanding references. ~~the Image SOP Instances or VOI LUT Box SOP Instances.~~ See Note in Section H.4.3.3.2.1.3.

H.4.2.2.3 N-DELETE

The N-DELETE is used to delete the last created Basic Film Box SOP Instance hierarchy. As a result all the information describing the last film is deleted.

The Basic Film Box SOP Instance hierarchy ~~shall~~ consists of one Basic Film Box SOP Instance, one or more Image Box SOP Instances, ~~and~~ zero or more Basic Annotation Box SOP Instances, zero or more Presentation LUT SOP Instances, and zero or more Basic Print Image Overlay Box SOP instances.

Note: There is no provision in the DICOM Standard to delete previously created Film Box SOP Instances.

H.4.2.2.3.1 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Film Box SOP Instance hierarchy. The SCU shall specify the SOP Instance UID of the last created Basic Film Box (root).

The SCP shall delete the specified SOP Instance hierarchy and shall remove the UID of the deleted Basic Film Box SOP Instance from the list of SOP Instance UIDs of the Film Box UIDs Attribute of the parent Basic Film Session SOP Instance.

The SCP shall return the status code of the requested SOP Instance hierarchy deletion. The meaning of success, warning, and failure status codes is defined in Section H.2.5.

The SCP shall not delete ~~Image SOP Instances in the hierarchy, VOI LUT Box SOP Instances, Presentation LUT Box Instances, or Basic Print Image Overlay Box Instances~~ as long as there are outstanding references to these SOP Instances.

Note: It is beyond the scope of the Standard to specify when the SCP actually deletes SOP Instances with outstanding references. ~~the Image SOP Instances or VOI LUT Box SOP Instances.~~ See Note in Section H.4.3.3.2.1.3.

PS 3.4 Table H.4-10- Basic Grayscale Image Box N-SET Attributes Modify as shown.

Referenced Overlay Sequence	(0008,1130)	U/MC (Required if optional Overlay SOP was negotiated)
>SOP Class UID	(0008,1150)	MC/M (Required if sequence is present)
>SOP Instance UID	(0008,1155)	MC/M (Required if sequence is present)
<u>Referenced Image Overlay Box Sequence</u>	(2020,0130)	U/MC (Required if optional Overlay SOP was negotiated)
<u>>SOP Class UID</u>	(0008,1150)	MC/M (Required if sequence is present)
<u>>SOP Instance UID</u>	(0008,1155)	MC/M (Required if sequence is present)

PS 3.4 Add New Section

H.4. @ Basic Print Image Overlay Box SOP Class

H.4. @.1 IOD Description

The Basic Print Image Overlay Box IOD is an abstraction of the presentation of an image overlay in an image box. The Basic Print Image Overlay Box is referenced by one or more Basic Image Box IODs. The Basic Image Box IODs may be either color or grayscale. However, there is no provision in the SOP Class for printing the overlay in color.

The following functionality is provided by this SOP Class:

- Overlay data are contained in the SOP Instance
- A single 1-bit overlay is provided
- Overlay rows and columns may be different than image rows and columns
- The overlay or image (but not both) may be magnified before they are superimposed
- The overlay and image are superimposed to form a Combined Print Image before the image is further processed (e.g. magnification and applying gray scale transformations) for printing.

This SOP Class does not provide a mechanism:

- to print images that would require the Combined Print Image to be cropped to fit the Image Box, or
- to superimpose and print images and overlays that have different pixel aspect ratios.

Note: The Combined Print Image is a pixel matrix created by superimposing an image and overlay, the size of which is defined by the smallest rectangle enclosing the superimposed image and overlay.

H.4.@.2 DIMSE Service Group

Table H.4-* shows DIMSE Services applicable to the IOD.

Table H.4-*
IOD DIMSE SERVICES

DIMSE Service Element	Usage SCU/SCP
N-CREATE	M/M
N-SET	U/M
N-DELETE	U/M

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

This Section describes the behavior of the DIMSE Services which are specific for this IOD. The general behavior of the DIMSE services is specified in PS 3.7.

H.4.@.2.1 N-CREATE

The N-CREATE is used to create an instance of the Basic Print Image Overlay Box SOP Class.

H.4.@.2.1.1 Attributes

The Attribute list of the N-CREATE is defined in Table H.4-%.

Table H.4-%
N-CREATE and N-SET ATTRIBUTES

Attribute Name	Tag	N-CREATE Usage SCU/SCP	N-SET Usage SCU/SCP
Overlay Pixel Data Sequence	(2040,0020)	M/M	U/M
>Overlay Rows	(6000,0010)	M/M	U/M
>Overlay Columns	(6000,0011)	M/M	U/M
>Overlay Origin	(6000,0050)	M/M	<u>U</u> /M
>Overlay Bits Allocated	(6000,0100)	M/M	U/M
>Overlay Bit Position	(6000,0102)	M/M	U/M

>Overlay Data	(6000,3000)	M/M	U/M
Overlay or Image Magnification	(2040,0072)	MC/M Required if Magnify to Number of Columns (2040,0074) is present.	MC/M Required if Magnify to Number of Columns (2040,0074) is present.
Magnify to Number of Columns	(2040,0074)	MC/M Required if Overlay or Image Magnification (2040,0072) is present.	MC/M Required if Overlay or Image Magnification (2040,0072) is present.
Overlay Magnification Type	(2040,0060)	U/M	U/M
Overlay Foreground Density	(2040,0080)	U/M	U/M
Overlay Background Density	(2040,0082)	U/M	U/M
Overlay Smoothing Type	(2040,0070)	U/U	U/U

H.4. @ .2.1.2 Status

The status value which is specific for this SOP Class is defined as follows.

Status	Meaning	Code
Failure	Combined Print Image requires cropping to fit Image Box. This is not supported in this SOP Class.	C616

H.4. @ .2.1.3 Behavior

The SCU uses the N-CREATE to request the SCP to create a Basic Print Image Overlay Box SOP Instance. The SCU shall initialize Attributes of the SOP Class as specified in Section H.2.4.

The SCP shall create the SOP Instance and shall initialize Attributes of the SOP Class as specified in Section H.2.4.

The SCP shall return the status code of the requested SOP Instance creation. The meaning of success, warning, and failure status codes is defined in Section H.2.5.

The SCP shall create the Combined Print Image by magnifying the overlay or image (per Overlay or Image Magnification (2040,0072) to yield the number of columns in the overlay or image specified by Magnify to Number of Columns (2040,0074) prior to superimposing the image and overlay. The same magnification factor shall be applied to rows and columns of the overlay or image

The overlay and image shall be superimposed before the image is further processed (e.g. magnification and applying gray scale transformations) for printing. Thus if Overlay Foreground Density (2040,0080) is specified as WHITE and Polarity is REVERSE, the printed overlay pixels will be black. Any Presentation LUT then applied will produce the same transformation of overlay pixels as it does image pixels.

If the SCP supports cropping of image rows and columns, and cropping of the Combined Print Image would be required for it to fit the Image Box, then failure code C616 shall be returned.

H.4.@.2.2 N-SET

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

H.4.@.2.2.1 Attributes

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

H.4.@.2.2.2 Status

There are no specific status codes

H.4.@.2.2.3 Behavior

The SCU uses the N-SET to request the SCP to update a Basic Print Image Overlay Box SOP Instance. The SCU shall specify the SOP Instance UID to be updated and shall specify the list of Attributes for which the Attribute values are to be set.

The SCP shall set new values for the specified Attributes of the specified SOP Instance.

The SCP shall return the status code of the requested SOP Instance update. The meaning of success, warning, and failure status codes is defined in Section H.2.5.

H.4.@.2.3 N-DELETE

The N-DELETE is used to delete the Basic Print Image Overlay Box SOP Instance.

H.4.@.2.3.1 Status

There are no specific status codes.

H.4.@.2.3.2 Behavior

The SCU uses the N-DELETE to request the SCP to delete the Basic Print Image Overlay Box SOP Instance. The SCU shall specify the Basic Print Image Overlay Box SOP Instance UID.

If there are no outstanding references to the specified Basic Print Image Overlay Box SOP Instance, the SCP shall delete it. The SCP shall not delete the SOP Instance if there are outstanding references to it. The SCP shall return the status code of the requested Basic Print Image Overlay Box SOP Instance deletion. The meaning of success, warning, and failure status codes is defined in Section H.2.5.

Note: If references to the SOP instance exist, the SCP will fail the N-DELETE. The SCU could remove the references using N-SETs of the Image Box and then repeat the N-DELETE of the Basic Print Image Overlay Box SOP Instance.

H.4.@.3 SOP Class Definition and UID

The Basic Print Image Overlay Box SOP Class UID is "1.2.840.10008.5.1.1.24.1".

Retire the following section

H.4.8 Image Overlay Box SOP Class (Retired)

This section was previously defined in DICOM. It is now retired. See PS 3.4-1998.

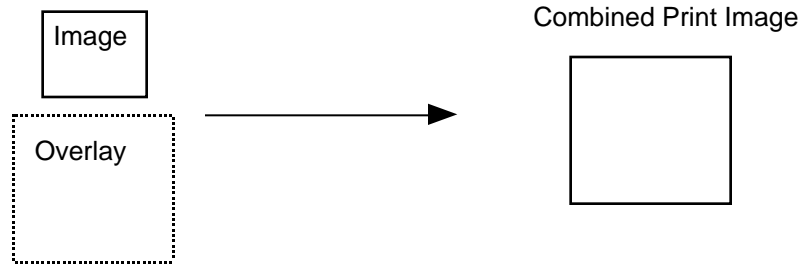
H.8 OVERLAY EXAMPLES (Informative)

These examples are provided for informational purposes only. It illustrates several examples of superimposing overlays and images.

Example 1

Image Rows, Columns	256, 256
Overlay Rows, Columns	512, 512
Overlay or Image Magnification	IMAGE
Magnify to Number of Columns	512
Overlay Origin	1\1

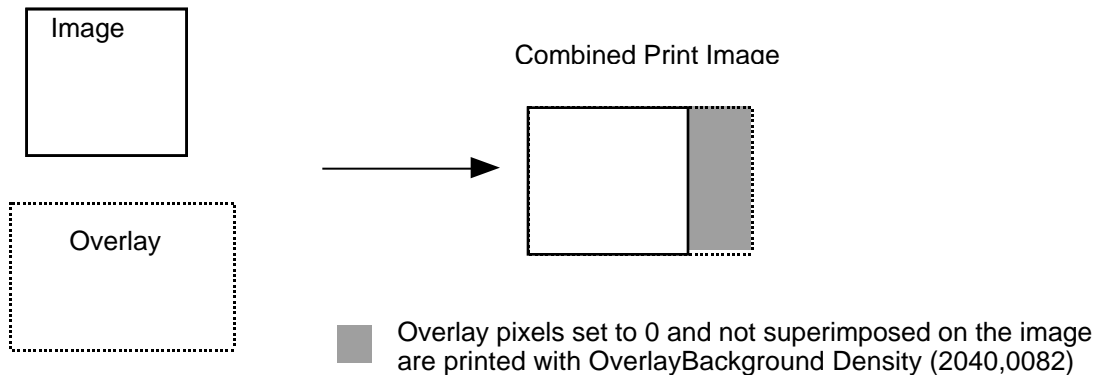
In this case, the image is magnified to have 512 rows and columns before being superimposed with the image. The upper left corner of the overlay is placed on the origin of the image. The Combined Print Image has 512 rows and columns



Example 2

Image Rows, Columns	512, 512
Overlay Rows, Columns	512, 599
Overlay or Image Magnification	absent
Magnify to Number of Columns	absent
Overlay Origin	1\1

In this case, neither the overlay or image is magnified before burning into the image. The upper left corner of the overlay is placed on the origin (1\1) of the image. The Combined Print Image has 512 rows and 599 columns



Example 3

Image Rows, Columns	512, 512
Overlay Rows, Columns	256, 300
Overlay or Image Magnification	OVERLAY
Magnify to Number of Columns	600
Overlay Origin	1\43

In this example, the overlay is magnified to have 512 rows and 600 columns. The overlay and image are superimposed with the overlay origin 44 pixels to the left of the image origin (1\1). The Combined Print Image has 512 rows and 600 columns.

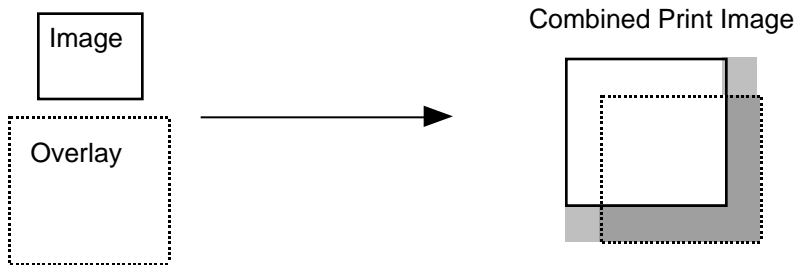


■ Overlay pixels set to 0 and not superimposed on the image are printed with OverlayBackground Density (2040,0082)

Example 4

Image Rows, Columns	256, 256
Overlay Rows, Columns	512, 512
Overlay or Image Magnification	IMAGE
Magnify to Number of Columns	512
Overlay Origin	100\100

In this case, the image is magnified to have 512 rows and columns before being superimposed with the overlay. The upper left corner of the overlay is placed 99 pixels down and to the right of the image origin. The Combined Print Image has 611 rows and columns.



- Overlay pixels set to 0 and not superimposed on the image are printed with Overlay Background Density (2040,0082)
- Combined Print Image pixels that are not part of the overlay or image are printed with Overlay Background Density (2040,0082)

PRINT STORAGE RELATED ADDENDUM**H.4.9.2.2.2 Status (of N-ACTION of Pull Print Request SOP Class)**

Add the following additional status values from Basic Print Image Overlay Box SOP Class:

Status	Meaning	Code
Warning	Image size is larger than the Image Box size. The Image has been cropped to fit.	B609
	Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit.	B60A
Failure	Combined Print Image size is larger than the Image Box size	C613

PS 3.6 Addendum

PS 3.6 Add to Section 6

Tag	Name	VR	VM	
(2040,0020)	Overlay Pixel Data Sequence	SQ	1	
(2040,0072)	Overlay or Image Magnification	CS	1	
(2040,0074)	Magnify to Number of Columns	US	1	
(2040,0082)	Overlay Background Density	CS	1	

PS 3.6 Mark the following Retired in Section 6

Overlay Mode (2040,0090)

Threshold Density (2040,0100)

Add the following to PS 3.6 Annex A

UID Value	UID Name	UID Type	Part
1.2.840.10008.5.1.1.24.1	Basic Print Image Overlay Box SOP Class	SOP Class	PS 3.4

Mark the following Retired PS 3.6 Annex A

Image Overlay Box SOP Class UID "1.2.840.10008.5.1.1.24".