Digital Imaging and Communications in Medicine (DICOM)

Supplement 88: Media Creation Management Service Class

DICOM Standards Committee, Working Group 5 Interchange Media

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Scope and Field of Application

The Media Creation Management Service Class defines a mechanism by which an SCU can instruct a device to create Interchange Media containing a set of Composite SOP Instances that have already been transferred to the media creation device using the Storage Service Class.

This Service Class does not address archival storage requirements. There is no requirement that an SCP of this Service Class will commit to taking responsibility for archival of Composite Instances, such that an SCU may then discard them. In other words, Media Creation does not imply Storage Commitment.

The application profile(s) for the set of instances – which implies the form of media created (i.e., CD, DVD or MOD) - can either be left to the discretion of the SCP, or explicitly specified in the media creation request.

The request suggests whether or not a label is to be printed on the media, be it from information contained in the instances (such as patient demographics) or from text explicitly specified in the request, if the SCP has labeling capability (it is not required to).

The Service Class contains a limited capability to return status information. A media creation request may initially either fail or be accepted. Subsequently, the SCP may be polled as to the status of the request (idle, pending/creating, successful or failed) by the SCU on the same or on a separate Association.

FORM OF THIS SUPPLEMENT

This Supplement makes changes to the following existing Parts of DICOM:

- PS 3.3 Information Object Definitions
- PS 3.4 Service Class Specifications
- PS 3.6 Data Dictionary
- PS 3.11 Media Storage Application Profiles
- PS 3.16 Content Mapping Resource

PS 3.3: Add Section B.25:

B.25 MEDIA CREATION MANAGEMENT INFORMATION OBJECT DEFINITION

B.25.1 IOD Description

A "Media Creation Management Information Object Definition" is an abstraction of the information that describes the attributes and the status of a media creation request.

B.25.2 IOD Modules

Table B.25.2-1 lists the modules that make up the Media Creation Management IOD.

Table B.25.2-1
MEDIA CREATION MANAGEMENT IOD MODULES

Module	Reference	Module Description
SOP Common	C.12.1	Contains SOP common information
Media Creation Management	C.22.1	Contains references to the SOP instances to be used for this media creation request, and the information about its status.

PS 3.3: Add Section C.22:

C.22 MEDIA CREATION MANAGEMENT SPECIFIC MODULES

The following Sections specify Modules used for Media Creation Management.

C.22.1 Media Creation Management Module

Table C.22.1-1
MEDIA CREATION MANAGEMENT MODULE ATTRIBUTES

Attribute name	Tag	Attribute Description
Storage Media File-Set ID	(0088,0130)	User or implementation specific human readable identification of the Storage Media to be created.
Storage Media File-Set UID	(0088,0140)	Uniquely identifies a Storage Media to be created.
Number of Copies	(2000,0010)	Number of copies of set of media to be created for storing this file-set. Note: If the entire request fits on a single piece of media per copy, then this value corresponds to the actual number of pieces of media to be created.
Request Priority	(2200,0020)	Specifies the priority of the request. Enumerated Values: HIGH MED LOW

Label Using Information Extracted From Instances	(2200,0001)	Specifies whether or not to extract label information from the instances. Enumerated Values: YES NO
Label Text	(2200,0002)	Unformatted free text to include in the label instead of or in addition to information extracted from the instances.
Label Style Selection	(2200,0003)	An implementation-dependent code string that may be used as a hint to select a particular layout or format of label.
Media Disposition	(2200,0004)	Unstructured text that describes where and to whom the media is to be sent.
Barcode Value	(2200,0005)	String that describes the bar code value to be printed on the media label. Note It is SCU responsibility to convey a value for this attribute coherent in length and content with the requested Barcode Symbology (2200,0006).
Barcode Symbology	(2200,0006)	Code string that describes the bar code symbology that shall be used for printing the Barcode Value (2200,0005). See Section C.22.1.1 for Defined Terms.
Allow Media Splitting	(2200,0007)	A flag indicating if the SCP is allowed to split this request over more than one piece of media. Enumerated Values: YES NO Note: 1. The SCP is not required to support the split of a media creation request across more than one piece of media. 2. If the size of the set of SOP instances is greater than the media storage capacity, and this flag has been set to NO, the SCP shall refuse to process the request.
Allow Lossy Compression	(2200,000F)	A flag indicating if the SCP is allowed to perform lossy compression. Enumerated Values: YES NO

Include Non-DICOM Objects	(2200,0008)	A flag indicating if the SCP should include in the media additional Non-DICOM information/objects Defined Terms: NO FOR_PHYSICIAN FOR_PATIENT FOR_TEACHING FOR_RESEARCH
Include Display Application	(2200,0009)	A flag indicating if the SCP should include on the media a DICOM Instance Display Application. Enumerated Values: NO YES
Preserve Composite Instances After Media Creation	(2200,000A)	A flag to indicate whether or not the SCU intends to issue a subsequent media creation request referencing some or all of the instances contained in Referenced SOP Sequence (0008,1199). Enumerated Values: YES NO
Referenced SOP Sequence	(0008,1199)	A sequence of repeating Items where each Item references a single SOP Instance, the Media Application Profile to be used, and, where applicable, the icon representing the referenced image
>Referenced SOP Class UID	(0008,1150)	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	Uniquely identifies the referenced SOP Instance.
>Requested Media Application Profile	(2200,000C)	The Media Application Profile to be used for this SOP Instance. Note: This is the label of the profile as defined in PS 3.11, e.g. “STD-XABC-CD”.
>Icon Image Sequence	(0088,0200)	This Icon Image is representative of the Image.
>> Include ‘Image Pixel Macro’ Table C.7-11.2		
Execution Status	(2100,0020)	Execution status of a request. See Section C.22.1.2 for Enumerated Values
Execution Status Info	(2100,0030)	Additional information about Execution Status (2100,0020). When Execution Status is DONE, CREATING or IDLE, Defined Terms are: NORMAL See Section C.22.1.3 for Defined Terms when the Execution Status is PENDING or FAILURE.

Total Number of Pieces of Media Created	(2200,000B)	Number of pieces of media that have been successfully created, in order to store all copies of the requested file-set. Note: If the entire request fits on a single piece of media per copy, then this value corresponds to the number of copies of media created.
Failed SOP Sequence	(0008,1198)	A sequence of repeating Items describing SOP Instances for which media creation failed.
>Referenced SOP Class UID	(0008,1150)	Uniquely identifies the referenced SOP Class.
>Referenced SOP Instance UID	(0008,1155)	Uniquely identifies the referenced SOP Instance.
>Requested Media Application Profile	(2200,000C)	The Media Application Profile used for this SOP Instance. Note: This is the label of the profile as defined in PS 3.11, e.g. “STD-XABC-CD”.
>Failure Reason	(0008,1197)	The reason that media creation failed for this SOP Instance. See Section C.22.1.4.
>Failure Attributes	(2200,000E)	Attributes associated with the Failure Reason (0008,1197). See Section C.22.1.4.
Referenced Storage Media Sequence	(2200,000D)	A Sequence describing the identifiers of all pieces of media created to satisfy the request. One or more items are allowed. Note: If the SCP splits a media creation request across more than one piece of media (e.g. if it doesn’t fit on one), then all the created pieces of media will be included in this Sequence.
> Storage Media File-Set ID	(0088,0130)	User or implementation specific human readable identification of the Storage Media that has been created.
> Storage Media File-Set UID	(0088,0140)	Uniquely identifies the Storage Media that has been created.

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96 **C.22.1.1 Barcode Symbology**

97 Defined Terms for Barcode Symbology (2200,0006) are:

CODE128	Code 128. ISO/IEC 15417:2000 Information technology – Automatic identification and data capture techniques – Bar code symbology specification – Code128
CODE39	Code 39. ISO/IEC 16388:1999 Information technology – Automatic identification and data capture techniques – Bar code symbology specifications – Code 39
INTER_2_5	Interleaved 2 of 5. (also known as USS ITF 2/5, I-2/5, ITF 2of5) ISO/IEC 16390:1999 Information technology – Automatic identification and data capture techniques – Bar code symbology specifications – Interleaved 2 of 5

HIBC	ANSI/HIBC 1-1996 Health Industry Bar Code (HIBC) Provider Applications Standard

Note This table doesn't suppose to list all the bar code symbologies in use (there are currently more than 400). Implementations supporting other symbologies can extend this list. Implementation specific code values shall be defined in the Conformance Statement.

C.22.1.2 Execution Status

Enumerated Values for Execution Status (2100,0020) are:

IDLE	The SCP has created the media creation management instance, but it has not been yet scheduled. Note It describes the status of a new media creation management instance (N-CREATE operation performed) for which the N-ACTION action has not been yet issued.
PENDING	This media creation management instance is still scheduled for processing.
CREATING	This media creation management instance is being processed.
DONE	This media creation management instance has been successfully processed.
FAILURE	This media creation management instance failed to be processed.

C.22.1.3 Execution Status Info

Defined Terms for Execution Status Info (2100,0030) are:

CHECK_MCD_OP	The media creation request could not be accomplished since the device is not ready at this time and needs to be checked by an operator (e.g., covers/doors opened or device jammed).
CHECK_MCD_SRV	The media creation request could not be accomplished since the device is not ready at this time and needs to be checked by a vendor service engineer (e.g., internal component failure).
DIR_PROC_ERR	The DICOMDIR building process failed for some unspecified reason (e.g., mandatory attributes or values missing).
DUPL_REF_INST	Duplicated instances in the Referenced SOP Sequence (0008,1199).
INST_AP_CONFLICT	One or more of the elements in the Referenced SOP Sequence (0008,1199) are in conflict (e.g., the SOP Class specified is not consistent with the requested Application Profile).
INST_OVERSIZED	A single instance size exceeds the actual media capacity. Note: DICOM media does not support spanning of instances across volumes.
INSUFFIC_MEMORY	There is not enough memory available to complete this request.

MCD_BUSY	Media creation device is not available at this time, but should become ready without user intervention (e.g the media creation device's buffer capacity is full). The SCU should retry later.
MCD_FAILURE	Media creation device fails to operate. This may depend on permanent or transient hardware failures (e.g robot arm broken, DVD writer failed) or because it has been disabled by an operator.
NO_INSTANCE	One or more of the SOP Instances in the Referenced SOP Sequence (0008,1199) are not available.
NOT_SUPPORTED	One or more of the Application Profiles, and/or SOP Classes, referenced in the Referenced SOP Sequence (0008,1199) are not supported by the SCP.
OUT_OF_SUPPLIES	No more supplies (e.g., blank media, labeling ink) are available for the media creation device. Operator intervention is required to replenish the supply. Note This service is not supposed to provide detailed device status information, however sophisticated media creating devices can extend this table to return more information about the supply to be replenished. Implementation specific code values shall be defined in the Conformance Statement.
PROC_FAILURE	A general processing failure was encountered.
QUEUED	This Media Creation Management instance is still in queue
SET_OVERSIZED	The file-set size exceeds the actual media capacity, and the device is not capable of splitting across multiple pieces of media.
UNKNOWN	There is an unspecified problem

Note: For most of the above statuses, the SCU can obtain more details about the processing errors (e.g., what are the SOP instances not available) by using the Failure Reason Attribute (0008,1197) within the Failed SOP Sequence (0008,1198).

C.22.1.4 Failure Reason

Defined Terms for Failure Reason (0008,1197) are:

Code	Further meaning	Description
0110H	Processing failure	A general failure in processing the operation was encountered.
0112H	No such object instance	One or more of the instances listed in the Referenced SOP Sequence (0008,1199) was not available.
0122H	Referenced SOP Class not supported	A media creation has been requested for a SOP Instance with a SOP Class that is not supported by the SCP.
0119H	Class/Instance conflict	The SOP Class of an instance in the Referenced SOP Instance Sequence did not correspond to the SOP class of the SOP Instance stored at the SCP.

0201H	Media Application Profiles conflict	One or more of the Media Application Profiles referenced in the Reference SOP Sequence (0008,1199) are in conflict (e.g. for the same request a STD-GEN-CD and a STD-GEN-DVD is referenced).
0202H	Media Application Profile / Instance conflict	The SOP Class of an instance in the Referenced SOP Sequence (0008,1199) did not correspond to a SOP class permitted for the requested or supported Media Application Profiles.
0203H	Media Application Profile / Compression conflict	The profile for an instance in the Referenced SOP Sequence (0008,1199) specified lossy compression but Allow Lossy Compression (2200,000F) has a value of NO.
0204H	Media Application Profile not supported	Media creation has been requested for an Application Profile that is not supported by the SCP.
0205H	Instance size exceeded	A single instance size exceeds the actual media capacity. Note: DICOM media does not support spanning of instances across volumes.
0120H	Missing attribute	A required Attribute (e.g., Patient ID) was not supplied. The missing Attribute(s) shall be listed in Failure Attributes (2200,000E).
0121H	Missing attribute value	A required Attribute Value (e.g., the Content Date for a Structured Report) was not supplied. The Attribute(s) with missing values shall be listed in Failure Attributes (2200,000E).

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PS 3.4: Add Annex X:

Annex X MEDIA CREATION MANAGEMENT SERVICE CLASS (Normative)

X.1 OVERVIEW

X.1.1 Scope

The Media Creation Management Service Class defines a mechanism by which an SCU can instruct a device to create Interchange Media containing a set of Composite SOP Instances that have already been transferred to the media creation device using the Storage Service Class.

This Service Class does not address archival storage requirements. It is intended only for the management of media creation devices. There is no requirement by the Standard that an SCP of this Service Class will commit to taking responsibility for archival of Composite Instances, such that an SCU may then discard them. Such behavior is entirely outside the scope of the Standard. In other words, Media Creation does not imply Storage Commitment.

The application profile(s) for the set of instances – which implies the form of the media created (i.e., CD, DVD or MOD) – can either be left to the discretion of the SCP, or explicitly specified in the media creation request. In the latter case, if the device is unable to create the requested profiles, an error shall be returned.

Notes: 1. More than one profile may be requested or used by default, since the requested set of instances may not be compatible with a single profile. DICOM media may always contain instances written by more than one profile. See PS 3.2.

2. It is the responsibility of the SCU to negotiate and store instances with an appropriate Transfer Syntax should a specific Transfer Syntax be required by a requested profile. The SCP is not required to support compression or decompression of stored instances in order to convert stored instances into a form suitable for a requested profile. It may do so, if so requested, but the level of lossy compression would be at the discretion of the SCP. If the degree of compression is important to the application, then the SCU may compress the images before sending them to the SCP.

The request controls whether or not a label is to be generated on the media, be it from information contained in the instances (such as patient demographics) or from text explicitly specified in the request.

Notes: 1. An SCP may or may not be physically capable of labeling the media. This capability is outside the scope of conformance to the Standard. Inability to create a label is not an error.

2. De-identification of instances (and labels), such as for teaching file media or clinical trial media is the responsibility of the SCU and is outside the scope of this service. That is, the SCU must de-identify the composite instances before sending them, prior to the media creation request.

The Service Class contains a limited capability to return status information. A media creation request may initially either fail or be accepted. Subsequently, the SCP may be polled as to the status of the request (idle, pending/creating, successful or failed) by the SCU on the same or on a separate Association. There is no asynchronous notification. There is no dependence on the duration or persistence of an Association.

Note: There is no requirement to manage the handling of transient failures (such as an empty supply of blank media or labels or ink). Whether or not the SCP queues stored instances and requests in such cases, or fails to accept the request, is outside the scope of the Standard.

X.2 CONFORMANCE OVERVIEW

The application-level services addressed by this Service Class are specified via the Media Creation Management SOP Class.

The Media Creation Management SOP Class specifies attributes, operations and behavior applicable to the SOP Class. The conformance requirements shall be specified in terms of the Service Class Provider (SCP) and the Service Class User (SCU).

The Media Creation Management Service Class uses the Media Creation Management IOD as defined in PS 3.3 and the N-CREATE, N-ACTION and N-GET Services specified in PS 3.7.

X.2.1 Association Negotiation

Association establishment is the first phase of any instance of communication between peer DICOM AEs. The Association negotiation rules as specified in PS 3.7 shall be used to negotiate the supported SOP Classes.

Support for the SCP/SCU role selection negotiation is not applicable. The SOP Class Extended Negotiation is not defined for this Service Class.

X.3 MEDIA CREATION MANAGEMENT SOP CLASS

The SCU transmits the SOP Instances to the SCP using the Storage Service Class. The request for media creation is transmitted to the SCP and contains a list of references to one or more SOP Instances. Success or failure of media creation is subsequently indicated by the SCU requesting the status from the SCP on the same or a separate association.

X.3.1 DIMSE Service Group

The following DIMSE-N Services are applicable to the Media Creation Management SOP Class.

DIMSE Service Element	Usage SCU/SCP
N-CREATE	M/M
N-ACTION	M/M
N-GET	U/M

The DIMSE-N Services and Protocol are specified in PS 3.7.

X.3.2 Operations

The DICOM AEs that claim conformance to this SOP Class as an SCU shall invoke the N-CREATE and the N-ACTION operations. The DICOM AEs that claim conformance to this SOP Class as an SCP shall support the N-CREATE, the N-ACTION and the N-GET operations.

X.3.2.1 Create a Media Creation Request

The Create a Media Creation Request operation allows an SCU to create an instance of the Media Creation Management SOP Class and initialize Attributes of the SOP Class. The SCP uses this operation to create a new media creation request containing the set of SOP Instances that shall be included in the Interchange Media. This operation shall be invoked through the N-CREATE primitive

X.3.2.1.1 Attributes

The DICOM AEs that claim conformance to this SOP Class as an SCU may choose to provide a subset of the Attributes maintained by the SCP. The DICOM AEs that claim conformance to this SOP Class as an SCP shall support a subset of the Media Creation Management specified in Table X.3.2.1.1-1.

Table X.3.2.1.1-1
MEDIA CREATION MANAGEMENT – N-CREATE ATTRIBUTES

Attribute	Tag	Requirement Type SCU/SCP
Specific Character Set	(0008,0005)	1C/1C (Required if expanded or replacement character set is used)
Storage Media File-Set ID	(0088,0130)	3/3 See Section X.3.2.1.1.1.
Storage Media File-Set UID	(0088,0140)	3/3 See Section X.3.2.1.1.1.
Label Using Information Extracted From Instances	(2200,0001)	3/1C See Section X.3.2.1.1.4.
Label Text	(2200,0002)	3/1C See Section X.3.2.1.1.4.
Label Style Selection	(2200,0003)	3/1C See Section X.3.2.1.1.4.
Barcode Value	(2200,0005)	3/3 See Section X.3.2.1.1.4
Barcode Symbology	(2200,0006)	3/3 See Section X.3.2.1.1.4
Media Disposition	(2200,0004)	3/3 See Section X.3.2.1.1.5.
Allow Media Splitting	(2200,0007)	3/1C See Section X.3.2.1.1.6
Allow Lossy Compression	(2200,000F)	3/1C See Section X.3.2.1.1.9
Include Non-DICOM Objects	(2200,0008)	3/1C See Section X.3.2.1.1.7
Include Display Application	(2200,0009)	3/1C See Section X.3.2.1.1.8
Preserve Composite Instances After Media Creation	(2200,000A)	3/3
Referenced SOP Sequence	(0008,1199)	1/1

>Referenced SOP Class UID	(0008,1150)	1/1
>Referenced SOP Instance UID	(0008,1155)	1/1
>Requested Media Application Profile	(2200,000C)	3/1 See Section X.3.2.1.1.2.
>Icon Image Sequence	(0088,0200)	3/1C See Section X.3.2.1.1.3.

X.3.2.1.1.1 Storage Media File-set Attributes

If present, the Storage Media File-Set ID (0088,0130) and Storage Media File-Set UID (0088,0140) shall be used on the media created. If absent, the media shall contain values generated by the SCP.

If the media request will not fit on a single volume (single piece or side of media), then whether or not the SCP ignores Storage Media File-Set ID (0088,0130), or uses it as a prefix and appends information to distinguish volumes, is implementation dependent. Different values of Storage Media File-Set UID (0088,0140) shall be used for different volumes.

If multiple copies are requested, the same Storage Media File-Set ID (0088,0130) and Storage Media File-Set UID (0088,0140) shall be used on all copies.

Note: Care should be taken with multiple copies written to rewritable media that their contents do not diverge even though their identifiers are identical.

X.3.2.1.1.2 Requested Media Application Profile

The Requested Media Application Profile (2200,000C), if present, shall be used by the SCP for the specified SOP Instance. If absent for a particular instance, the choice of Media Application Profile for that instance shall be at the discretion of the SCP.

Notes: 1. Different Media Application Profiles may be used for different instances on the same piece of media.

2. The form of the DICOMDIR directory records that the SCP must create may be significantly influenced by the media application profiles used.

X.3.2.1.1.3 Icon Image Sequence

The Icon Image Sequence (0088,0200), if present:

- shall be used by the SCP for inclusion in the instance-level DICOM Directory Record for the specified SOP Instance, if the Media Application Profile requires its inclusion, and the icon supplied by the SCU meets the requirements of the profile
- may be used by the SCP for inclusion in the instance-level DICOM Directory Record for the specified SOP Instance, if the Media Application Profile does not require its inclusion

If absent for a particular instance, the choice of Media Application Profile for that instance dictates whether or not the SCP is required to create its own Icon Image Sequence (0088,0200) from the contents of the SOP Instance.

Notes: 1. Some Media Application Profiles require the inclusion of an Icon Image Sequence (0088,0200) in the directory records.

2. Some Media Application Profiles specify constraints on the form of the Icon Image Sequence (0088,0200).

3. The SCP may choose to extend the Media Application Profile by generating and including icons anyway.

X.3.2.1.1.4 Labeling

The SCP may or may not have the capability to print a label on (or for) the media. If it does, then the following SCP behavior shall apply and the specified attributes are required to be supported by the SCP.

The Label Using Information Extracted From Instances (2200,0001) attribute is a flag that instructs the SCP whether or not to create any label using the Patient and Study information contained within the instances themselves.

Note: The SCP may implement whatever it considers to be an appropriate subset of any attributes of any Modules at the Patient, Specimen and Study entities in the DICOM Information Model specified in PS 3.3. Typically included are such attributes as Patient Name (0010,0010), Patient ID (0010,0020), Study ID (0020,0010), and Study Date (0008,0020).

The Label Text (2200,0002) attribute is additional text that the SCP shall include on any label, either in addition to or instead of any extracted demographics, depending on the value of Label Using Information Extracted From Instances (2200,0001).

The Label Style Selection (2200,0003) attribute is a code string, which if present, may be used by the SCP to choose one or more implementation-dependent styles of labeling.

The Barcode Value (2200,0005) and the Barcode Symbology (2200,0006), if present, may be used by the SCP to print a barcode on the label.

Note It is SCU responsibility to convey a value for the Barcode Value (2200,0005) Attribute consistent in length and content with the requested Barcode Symbology (2200,0006).

X.3.2.1.1.5 Media Disposition

The Media Disposition (2200,0004), if present, may be used by the SCP to determine where and to whom to send the media when completed.

Note: For example, it may contain the name and address of a referring doctor, and be used to print a label for an envelope or mailer, or as additional material to be printed on the media label.

X.3.2.1.1.6 Allow Media Splitting

The SCP may or may not have the capability to split a request over more than one piece of media (e.g. if it doesn't fit on one). If it does, then the following SCP behavior shall apply and the specified attributes are required to be supported by the SCP.

The Allow Media Splitting Attribute (2200,0007) shall be used by the SCP to determine if it is permitted to split this request over more than one piece of media.

Notes: 1. If the file-set size exceeds the media storage capacity, and this flag has been set to NO, the SCP shall refuse to process the request.

2. If the requested Media Application Profile allows for lossless compression, and images are not already compressed, such compression may be applied by the SCP in order to fit all instances on a single piece of media. This also applies to lossy compression if it has not been allowed by the value of Allow Lossy Compression (2200,000F).

X.3.2.1.1.7 Include Non-DICOM Objects

The SCP may or may not have the capability to include on the created media additional Non-DICOM objects (e.g., HTML files, JPEG images) that are a rendering of the DICOM instances. If it does, then the following SCP behavior shall apply and the specified attributes are required to be supported by the SCP.

The Include Non-DICOM Objects (2200,0008) shall be used to request the SCP to add additional Non-DICOM objects onto the created media.

An SCP is not required to be able to add such files. Inability to add Non-DICOM objects is not an error.

If Include Non-DICOM Objects (2200,0008) is set to NO, the SCP shall not include additional non-DICOM objects on the media.

X.3.2.1.1.8 Include Display Application

The SCP may or may not have the capability to include on the created media an application for displaying DICOM instances. If it does, then the following SCP behavior shall apply and the specified attributes are required to be supported by the SCP.

The Include Display Application (2200,0009) shall be used to request the SCP to add an application for displaying DICOM instances onto the created media.

An SCP is not required to be able to add such an application. Inability to add a display application is not an error.

Whether the display application is capable of displaying all stored instances is beyond the scope of the standard.

Whether the display application automatically executes when media is inserted for reading is beyond the scope of the standard.

Which platforms are supported by the display application(s) is beyond the scope of the standard.

Note: Multiple files may need to be included in the media to support the display application, rather than a single executable file, and these may be present, even if the Include Non-DICOM Objects (2200,0008) Attribute has a value of NO.

If Include Display Application (2200,0009) is set to NO, the SCP shall not include a display application on the media.

X.3.2.1.1.9 Allow Lossy Compression

If Allow Lossy Compression (2200,000F) has a value of YES, the SCP is allowed to perform lossy compression under the following circumstances:

- if it receives uncompressed or lossless compressed images yet is requested to use a profile that requires lossy compression, or
- if Allow Media Splitting (2200,0007) is NO, and the request would otherwise need to be split across media.

If Allow Lossy Compression (2200,000F) has a value of YES but the requested profile does not permit lossy compression, lossy compression shall not be performed.

The level of compression is at the SCP's discretion.

The SCP shall not decompress and recompress already lossy compressed images, but may use images that have already been lossy compressed.

The SCP is never required to perform lossy compression.

If Allow Lossy Compression (2200,000F) has a value of NO, the SCP is not allowed to perform lossy compression. If Allow Lossy Compression (2200,000F) has a value of NO and the requested profile requires lossy compression, an error shall be returned.

X.3.2.1.2 Service Class User Behavior

The SCU shall use the N-CREATE primitive to inform the SCP that a new media creation request has been placed and to convey the proprieties of this request. The request proprieties (e.g. the set of SOP Instances that the creating interchange media shall contain) are referenced in the IOD Attributes as specified in Table X.3.2.1.1-1.

Upon receipt of a successful N-CREATE Response Status Code from the SCP, the SCU now knows that the SCP has received the N-CREATE request and a new media creation request has been created.

Upon receipt of a failure N-CREATE Response Status Code from the SCP, the SCU now knows that the SCP will not process the request. The actions taken by the SCU upon receiving the status is beyond the scope of this Standard.

At any time after receipt of the N-CREATE-Response, the SCU may release the association on which it sent the N-CREATE-Request.

Notes: An N-GET of the corresponding of the Media Creation Management SOP Class may be performed on the same or subsequent associations.

X.3.2.1.3 Service Class Provider Behavior

Upon receipt of the N-CREATE request, the SCP shall return, via the N-CREATE response primitive, the N-CREATE Response Status Code applicable to the associated request. A success status conveys that the SCP has successfully received the N-CREATE request.

Warning statuses shall not be returned.

Any other status (i.e. a failure status) conveys that the SCP is not processing the media creation request.

Notes: 1. It is not specified by the Standard what checks the SCP shall accomplish after the N-CREATE request primitive reception and before returning the N-CREATE response. Implementations are discouraged from performing extended validation of the contents of the N-CREATE request, such as availability of the referenced Composite SOP Instances, support for the requested profiles, etc. In case of N-CREATE failure, the SCU would not be able to perform an N-GET to determine the detailed reasons for failure, and allow operators to apply suitable correction actions to make the request processable (e.g. resending any missing Composite SOP Instances). Such checks are better deferred until after receipt of the N-ACTION request, after which an N-GET may be performed.

2. The Standard does not require the SCP to queue multiple requests, though implementations are encouraged to do so. As a consequence, a new request before a previous request has been completed may fail immediately, or may return a successful response and be queued. The size of any such queue is beyond the scope of the Standard.

3. How long the instance of the Media Creation Management SOP Class persists once the Execution Status (2100,0020) has been set to IDLE is beyond the scope of the Standard.

The N-CREATE implicitly creates the Execution Status (2100,0020) and Execution Status Info (2100,0030) Attributes, which may subsequently be retrieved by an N-GET.

X.3.2.1.4 Status Codes.

There are no specific status codes. See PS 3.7 for response status codes.

X.3.2.2 Initiate Media Creation

The Initiate Media Creation operation allows an SCU to request an SCP to create Interchange Media according to an already created Media Creation Management SOP Instance. An SCP shall use this operation to schedule the creation of Interchange Media. This operation shall be invoked through the N-ACTION primitive.

X.3.2.2.1 Action Information

The DICOM AEs which claim conformance to this SOP Class as an SCU and/or an SCP shall support the Action Types and Action Information as specified in Table X.3.2.2.1-1.

Table X.3.2.2.1-1
MEDIA CREATION REQUEST – ACTION INFORMATION

Action Type Name	Action Type ID	Attribute	Tag	Requirement Type SCU/SCP
Initiate Media Creation	1	Number of Copies	(2000,0010)	3/1
		Request Priority	(2200,0020)	3/3 See Section X.3.2.2.1.1

X.3.2.2.1.1 Priority

The Request Priority (2200,0020), if present, may be used by the SCP to prioritize a higher priority request over other pending lower priority requests.

X.3.2.2.2 Service Class User Behavior

The SCU shall use the N-ACTION primitive to request the SCP to create Interchange Media according to an already created Media Creation Management SOP Instance. Action Information is specified in Table X. 3.2.2.1-1.

Upon receipt of a successful N-ACTION Response Status Code from the SCP, the SCU now knows that the SCP has received the N-ACTION Initiate Media Creation request and will process the request.

Upon receipt of a failure N-ACTION Response Status Code from the SCP, the SCU now knows that the SCP will not process the Initiate Media Creation request. The actions taken by the SCU upon receiving the status is beyond the scope of this Standard.

At any time after receipt of the N-ACTION-Response, the SCU may release the association on which it sent the N-ACTION-Request.

Notes: 1. An N-GET of the corresponding of the Media Creation Management SOP Class may be performed on the same or subsequent associations.

2. The duration for which the SOP Instance UID of an instance of the Media Creation Management SOP Class remains active once the request has been completed or has failed is implementation dependent, but should be sufficiently long to allow an SCU to determine the ultimate outcome of the request.

X.3.2.2.3 Service Class Provider Behavior

Upon receipt of the N-ACTION Initiate Media Creation request, the SCP shall return, via the N-ACTION response primitive, the N-ACTION Response Status Code applicable to the associated request. A success status conveys that the SCP has successfully scheduled the request.

Notes: 1. The extent of validation of the contents of the request, the availability of the referenced Composite SOP Instances, support for the requested profiles and other checks that may determine the ultimate success or failure of the request are not specified by the Standard. In particular, a request may be immediately accepted successfully, but subsequently fail for some reason, or the N-ACTION response primitive may contain a status that reflects a more thorough (and prolonged) check.

2. How long any Composite Instances that have been transferred via the Storage Service Class to the SCP for the purpose of a Media Creation Request persist, is beyond the scope of the Standard. The Preserve Composite Instances After Media Creation (2200,000A) flag is provided as a hint only. Even if this flag is set, a subsequent request referencing some or all of the same instances may fail if the SCP had reason to flush its cache of instances in the interim, and the SCU may need to be prepared to re-send them.

3. How long the instance of the Media Creation Management SOP Class persists once the Execution Status (2100,0020) has been set to DONE or FAILED is beyond the scope of the Standard.

The N-ACTION implicitly creates or updates the Execution Status (2100,0020), Execution Status Info (2100,0030), Total Number of Pieces of Media Created (2200,000B), Failed SOP Sequence (0008,1198) and Referenced Storage Media Sequence (2200,000D) Attributes, which may subsequently be retrieved by an N-GET.

X.3.2.2.4 Status Codes

There are no specific status codes. See PS 3.7 for response status codes.

X.3.2.3 Cancel Media Creation

The Cancel Media Creation operation allows an SCU to request an SCP to cancel a media creation request, whether or not it has begun to be processed. This operation shall be invoked through the N-ACTION primitive.

X.3.2.3.1 Action Information

The DICOM AEs that claim conformance to this SOP Class as an SCU and/or an SCP shall support the Action Types and Action Information as specified in Table X.3.2.3.1-1.

Table X.3.2.3.1-1
MEDIA CREATION REQUEST – ACTION INFORMATION

Action Type Name	Action Type ID	Attribute	Tag	Requirement Type SCU/SCP
Cancel Media Creation	2			

X.3.2.3.2 Service Class User Behavior

The SCU shall use the N-ACTION primitive to request the SCP to cancel the media creation request corresponding to the Affected SOP Instance UID in the N-ACTION request primitive, whether or not it has been initiated with an N-ACTION Initiate Media Creation request, and whether or not it has begun to be processed (i.e. is pending or in progress).

Upon receipt of a successful N-ACTION Response Status Code from the SCP, the SCU knows that the SCP has received the N-ACTION Cancel Media Creation request, has cancelled any pending or in progress media creation, and deleted the Media Creation Management SOP Instance.

Note: Successful cancellation implies that a subsequent N-GET of the corresponding Media Creation Management SOP Instance would fail.

Upon receipt of a failure N-ACTION Response Status Code from the SCP, the SCU knows that the SCP will not process the Cancel Media Creation request. The actions taken by the SCU upon receiving the status is beyond the scope of this Standard.

Note: Cancellation failure implies that media creation has already completed (successfully or not), or will proceed. The status of the media creation request may still be obtained with an N-GET, unless the reason for failure was that the SOP Instance did not exist.

X.3.2.3.3 Service Class Provider Behavior

Upon receipt of the N-ACTION Cancel Media Creation request, the SCP shall return, via the N-ACTION response primitive, the N-ACTION Response Status Code applicable to the associated request. A success status conveys that the SCP has successfully cancelled the request.

The N-ACTION implicitly creates or updates the Execution Status (2100,0020), Execution Status Info (2100,0030), Total Number of Pieces of Media Created (2200,000B), Failed SOP Sequence (0008,1198) and Referenced Storage Media Sequence (2200,000D) Attributes, which may subsequently be retrieved by an N-GET.

X.3.2.3.4 Status Codes

The status values that are specific for this SOP Class and DIMSE Service are defined in Table X.3.2.3.4-1.See PS 3.7 for general response status codes.

Table X.3.2.3.4-1
RESPONSE STATUSES

Service Status	Further Meaning	Response Status Codes
Failure	Media creation request already completed.	C201H
	Media creation request already in progress and cannot be interrupted.	C202H
	Cancellation denied for unspecified reason.	C203H

X.3.2.4 Get Media Creation Result

The Get Media Creation Result operation allows an SCU to request of an SCP the status of a media creation request. This operation shall be invoked through the N-GET primitive used in conjunction with the appropriate Media Creation Management SOP Instance corresponding to the creation request.

X.3.2.4.1 Attributes

The Application Entity which claims conformance to this SOP Class as an SCU may choose to interpret the Attributes maintained by the SCP which the SCU receives via the operations of the SOP Class. The Application Entity that claims conformance as an SCP to this SOP Class shall support the Attributes specified in Table X.3.2.4.1-1.

Table X.3.2.4.1-1
MEDIA CREATION MANAGEMENT SOP CLASS N-GET ATTRIBUTES

Attribute Name	Tag	Requirement Type (SCU/SCP)

Specific Character Set	(0008,0005)	3/1C (Required if expanded or replacement character set is used)
Execution Status	(2100,0020)	3/1
Execution Status Info	(2100,0030)	3/1
Total Number of Pieces of Media Created	(2200,000B)	3/1
Failed SOP Sequence	(0008,1198)	3/2
Referenced Storage Media Sequence	(2200,000D)	3/2
All Other Attributes of the Media Creation Management Module		3/3

X.3.2.4.2 Service Class User

The SCU shall specify in the N-GET request primitive the UID of the Media Creation Management SOP Instance for which Attribute Values are to be returned. The SCU shall be permitted to request that Attribute Values be returned for any Media Creation Management SOP Class Attribute specified in Section X.3.2.1.1. Additionally, values may be requested for optional Media Creation Management Module Attributes.

The SCU shall specify the list of Media Creation Management SOP Class Attributes for which the Attribute Values are to be returned. The encoding rules for this list are specified in the N-GET request primitive specified in PS 3.7.

In an N-GET operation, Sequence Attributes can only be requested in their entirety, and only the top level Sequence Attribute can be included in the request.

The SCU shall be capable of receiving all requested Attribute Values provided by the SCP in response to the N-GET indication primitive. The SCU may request Attribute values for optional Attributes that are not maintained by the SCP. In such a case the SCU shall function properly regardless of whether the SCP returns values for those Attributes or not. This Service Class Specification places no requirements on what the SCU shall do as a result of receiving this information.

Note: In order to interpret accurately the character set used for Attribute values returned, it is recommended that the Attribute value for Specific Character Set (0008,0005) be requested in the N-GET request primitive.

X.3.2.4.3 Service Class Provider

This operation allows the SCU to request from the SCP, selected Attribute Values for a specific Media Creation Management SOP Instance. This operation shall be invoked through the use of the DIMSE N-GET Service used in conjunction with the appropriate Media Creation Management SOP Instance.

The SCP shall return, via the N-GET response primitive, the N-GET Response Status Code applicable to the associated request. Contingent on the N-GET Response Status, the SCP shall return, via the N-GET Response Primitive, Attribute Values for all requested Attributes maintained by the SCP (see Table X.3.2.4.1-1). The SCP shall not return Data Elements for optional Attributes that are not maintained by the SCP.

The SCP shall return the entire content of a Sequence if a Sequence Attribute is requested.

X.3.2.4.4 Status Codes

The status values that are specific for this SOP Class and DIMSE Service are defined in Table X.3.2.4.4-1.

See PS 3.7 for response status codes.

Table X.3.2.4.4-1
RESPONSE STATUSES

Service Status	Further Meaning	Response Status Codes
Warning	Requested optional Attributes are not supported	0001

X.3.3 Media Creation Management SOP Class UID

The Media Creation Management SOP Class shall be uniquely identified by the Media Creation Management SOP Class UID, which shall have the value “1.2.840.10008.5.1.1.33”.

X.4 CONFORMANCE REQUIREMENTS

Implementations claiming Standard SOP Class Conformance to the Media Creation Management SOP Class shall be conformant as described in this Section and shall include within their Conformance Statement information as described in this Section and sub-Sections.

An implementation may claim conformance to this SOP Class as an SCU, SCP or both. The Conformance Statement shall be in the format defined in PS 3.2.

X.4.1 SCU Conformance

An implementation that is conformant to this SOP Class as an SCU shall meet conformance requirements for

- the operations and actions which it invokes

The mechanisms used by the SCU to transfer SOP Instances to the SCP using the Storage Service Class prior to initiating a request operation shall also be documented, and in particular the Transfer Syntaxes that may be proposed.

X.4.1.1 Operations

The SCU shall document in the Conformance Statement the actions and behavior which cause the SCU to generate an N-CREATE primitive (Create Media Creation Request), an N-ACTION primitive (Initiate Media Creation and Cancel Media Creation) or an N-GET primitive (Get Media Creation Result).

The SCU shall specify the SOP Class UIDs for which it may request media creation.

The SCU shall specify the Media Application Profiles for which it may request media creation.

The SCU shall specify if it supports the optional Storage Media File-Set ID & UID Attributes in the N-CREATE.

The SCU shall specify if it supports the optional Icon Image Sequence Attributes in the N-CREATE.

The SCU shall describe its use of expanded or replacement character sets, both in the N-CREATE, the N-GET and in its use of the Storage Service Class for composite instances.

The SCU shall specify whether or not it retries failed requests.

Note: This allows the reader of a Conformance Statement to determine whether or not human intervention will be needed in the event of transient failures, or whether the SCU may be able to recover automatically.

The ConformanceStatement shall be formatted as defined in PS 3.2

X.4.2 SCP Conformance

An implementation that is conformant to this SOP Class as an SCP shall meet conformance requirements for

- the operations and actions which it performs

The Storage Service Class mechanisms accepted by the SCP prior to receiving a request operation shall also be documented, and in particular the Transfer Syntaxes that may be accepted.

X.4.2.1 Operations

The SCP shall document in the ConformanceStatement the behavior and actions of the SCP upon receiving the N-CREATE primitive (Create Media Creation Request), N-ACTION primitive (Initiate Media Creation and Cancel Media Creation) or the N-GET primitive (Get Media Creation Result) .

The SCP shall specify the SOP Class UIDs for which it will accept media creation requests.

The SCP shall specify the Media Application Profiles for which it will accept media creation requests, and what default profiles it will use in the event that they are not specified by the SCU.

Note: The forms of media that can be created are implicit in the list of Media Application Profiles supported, each of which is media-specific.

The SCP shall specify whether or not it supports creation of optional Icon Image Sequence Attributes in the DICOMDIR if none are supplied by the SCU.

The SCP shall specify the manner of use of label information, and in particular which:

- attributes are extracted from the Composite Instances when so instructed

- barcode symbologies – if any – are supported

The SCP shall describe its use of expanded or replacement character sets, both in the N-CREATE, the N-GET and in its extraction of information from the Composite Instances for incorporation in the DICOMDIR and on the media label. The SCP shall describe its use of the attributes both in the N-CREATE, and N-ACTION and the Composite Instances to create the media label.

The SCP shall specify if and how it supports the following optional Attributes in the N-CREATE and N-ACTION :

- Storage Media File-Set ID (0088,0130) & Storage Media File-Set UID (0088,0140)

- Media Disposition (2200,0004)

- Priority (2000,0020)

- Preserve Composite Instances After Media Creation (2200,000A)

The SCP shall specify the duration of persistence of received Composite Instances after a request has been processed successfully or unsuccessfully.

The SCP shall specify how long it will maintain:

- the result of the creation of media after the request has succeeded or failed
- the Media Creation Management Instances whose status is IDLE.

The SCP shall specify the action taken when a permanent failure (e.g., a media writing failure) or a transient failure (e.g., no empty media available) occurs, and their relationship with the media creation request status transaction.

Note: For example, how many times the SCP will retry writing a new piece of media before setting the Execution Status (2100,0020) to FAILURE, how many media creation requests the SCP is able to queue, the SCP behavior when the request queue, if any, is full.

The SCP shall specify if it is able to split a media creation request over more than one piece of media, if the file-set doesn't fit on one.

The SCP shall specify if it is able to add to the created media Non-DICOM objects (e.g., html files, JPEG images), how these objects are organized, and how it interprets the Include Non-DICOM Objects (2200,0008) Attribute.

The SCP shall specify if it is able to add to the created media DICOM display applications, and how it interprets the Include Display Application (2200,0009) Attribute.

The Conformance Statement shall be formatted as defined in PS 3.2.

PS 3.6: Add the following data elements to Section 6:

Tag	Name	VR	VM
(2200,0001)	Label Using Information Extracted From Instances	CS	1
(2200,0002)	Label Text	UT	1
(2200,0003)	Label Style Selection	CS	1
(2200,0004)	Media Disposition	LT	1
(2200,0005)	Barcode Value	LT	1
(2200,0006)	Barcode Symbology	CS	1
(2200,0007)	Allow Media Splitting	CS	1
(2200,0008)	Include Non-DICOM Objects	CS	1
(2200,0009)	Include Display Application	CS	1
(2200,000A)	Preserve Composite Instances After Media Creation	CS	1
(2200,000B)	Total Number of Pieces of Media Created	US	1
(2200,000C)	Requested Media Application Profile	LO	1
(2200,000D)	Referenced Storage Media Sequence	SQ	1
(2200,000E)	Failure Attributes	AT	1-n
(2200,000F)	Allow Lossy Compression	CS	1
(2200,0020)	Request Priority	CS	1

PS 3.6: Add the following UID to Annex A:

UID Value	UID Name	UID Type	Part
1.2.840.10008.5.1.1.33	Media Creation Management SOP Class UID	SOP Class	PS3.4

PS 3.11: Modify Section 8 as follows:

CLASS AND PROFILE IDENTIFICATION - SECTION X.1

Section X.1 of the Application Profile defines the class and specific Application Profiles in that class.

This section assigns an identifier to each Application Profile of the form ttt-x...x-y...y, where “ttt” indicates the type of Application Profile, "x...x" is an abbreviation of a significant term for the clinical context and "y...y" is a significant term for a distinguishing feature of the specific Application Profile. The “ttt” type term shall be one of STD, AUG, or PRI, indicating whether the Application Profile is a Standard, Augmented, or Private Application Profile respectively (see PS 3.2~~). **Neither "x...x" nor "y...y" is restricted in length or content.**~~ **Identifiers shall be written such that they may be encoded with LO (Long String) Value Representation (see PS 3.5).**

PS 3.16: Modify CID 30 as follows:

CID 30 DICOM Devices

This Context Group includes codes that may be used to identify a class of equipment that uses DICOM.

Context ID 30
DICOM Devices
Type: Extensible Version: 20040617

Coding Scheme Designator	Code Value	Code Meaning
INCLUDE CID 29 Acquisition Modality		
DCM	ARCHIVE	Archive
DCM	COMP	Computation Server
DCM	CAD	Computer Assisted Detection/Diagnosis
DCM	DSS	Department System Scheduler
DCM	FILMD	Film Digitizer
DCM	PRINT	Hard Copy Print Server
DCM	CAPTURE	Image Capture
DCM	LOG	Procedure Logging
DCM	RT	Radiation Therapy Device
DCM	WSD	Workstation
DCM	**MCD**	**Media Creation Device**

PS 3.16: Annex D to add definition:

Code Value	Code Meaning	Definition	Notes
MCD	Media Creation Device	A device that creates DICOM PS 3.10 interchange media. For example, a CD creator that is managed by the Media Creation Management Service Class.	