Digital Imaging and Communications in Medicine (DICOM)

Supplement 90: SOP Class Relationship Negotiation

DICOM Standards Committee, Working Group 6 Base Standard

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VERSION: Final Text

                 17 June 2004

Contents

Scope and Field of Application

This Supplement was developed to provide a mechanism by which Application Entities could claim conformance to a particular specialized Structured Reporting (SR) template, while other AEs could handle those SR objects in a generic fashion. This problem was discussed at an extraordinary DICOM Workshop on SOP Classes, held March 24, 2003 (formally named the "Open Discussion on the Principles and Content of DICOM Interoperability Policy").

This Supplement introduces several mechanisms by which SOP Class specializations may be supported.

PURPOSE

As the DICOM Standard is continuously maintained and extended, and as new features are added, new Service Classes and SOP Classes are added. In particular, new Storage SOP Classes are added relatively frequently. 20 Storage and 4 non-Storage SOP Classes were added between the 1999 and 2003 editions of the Standard, including three general Structured Reporting (SR) Storage SOP Classes. It is fundamental to the DICOM Standard that an application claims conformance to a SOP Class.

The multiplication of SOP Classes is on the verge of acceleration. The framework for SR allows the specification of a domain-specific report object definition through a Template. A common example would be an "evidence" SR report containing the measurements and analyses of a particular imaging modality and clinical specialty, such as cardiovascular MR imaging. While such domain-specific reports could be exchanged using a general SR Storage SOP Class, the fundamentals of DICOM would then insist that a receiver must claim conformance to *all* objects of that general SOP Class. It would be much preferable to specify a specialized SOP Class that would allow conformance claims to any domain-specific semantics or processing of those objects.

For instance, an application might extract measurements from the reports of a particular clinical specialty for longitudinal tracking of a chronic condition in each patient, or for performing a population-based study for outcomes quality research. If that application was required to claim conformance to a general SR Storage SOP Class, it would need to extract the relevant measurements from any and every possible template that might be used to send that data. However, if there exists a particular report template for its domain, which is made "visible" through a specialized SOP Class, the application can claim conformance to that SOP Class and know that it will receive data in the format constrained by that template.

However, this poses a problem for the installed base of equipment, particularly generic Storage Service Class association acceptors (such as archives), which must be continually reconfigured to support new Storage SOP Classes. Some implementations have adopted the approach of promiscuous acceptance of proposed Presentation Contexts, but this is dangerous since without knowing what "kind" of SOP Class is being proposed, it is not safe to accept it under the assumption that it is a Composite Instance Storage SOP Class. A means is needed for a device to reliably know that the SOP Class was of the Storage Service Class so that the simple capability of storing and regurgitating SOP Instances can be handled without continual reconfiguration.

Furthermore, in the case of specialized SR information objects, there may be applications that that can display any object conforming to the SR framework. Again, this poses a problem for a receiver that has not been reconfigured to recognize a new specialized SR SOP Class, even though it would be able to store, render, or make further use of the content of the instance if it knew that it conformed to the structure of the Comprehensive SR SOP Class.

Any proposal addressing this issue must also take into consideration the effects when adding new capabilities into an environment of existing applications, some of which may support new features and some of which may not.

Approach

This supplement addresses these issues by adding a new optional user information item to extended negotiation during Association establishment that

a) conveys that a SOP Class UID is within a specific Service Class (currently allowing only the specification of the Storage Service Class), and

b) optionally conveys one or more related more general SOP Class UIDs for which the negotiated SOP Class is a specialization.

The intent is not to introduce a generalized inheritance mechanism, but only to convey a limited amount of additional information that may be used by an association acceptor for specific SOP Classes that have not been pre-configured.

This supplement also formalizes a "fall-back" strategy that has been used by some applications when a new SOP Class is introduced. This mechanism allows a specialized SOP Instance to be sent using the SOP Class UID of a more general IOD, rather than the more appropriate specialized SOP Class UID, when the receiver does not support the latter. This is a sender-side only feature, and requires no mechanism on the part of the receiver. However, significant attributes of the specialized IOD may be lost if the receiver is not a "Level 2" storage SCP, i.e., only preserves type 1 and 2 attributes defined for the general SOP Class.

It must be empasized that these mechanisms are totally optional for both the association initiator and acceptor. Lack of support by one or the other would not affect existing functionality and interoperability. However, when implemented by both sides, these mechanisms can avoid some situations where interoperability would otherwise be unachievable, or would occur without the semantics of the specialized SOP Class.

The approach of this proposal also provides a means by which private Specialized SOP Classes (as defined in PS3.2) can be more effectively used, by allowing the association negotiation mechanism to identify the standard SOP Class that was specialized.

Note that the additional extended negotiation is defined in this Supplement only with the identifiers necessary for the Storage Service Class. Future supplements to the Standard may utilize this same mechanism for other Service Classes, as warranted.

DESIGN

During association establishment, a mechanism is already present allowing for additional Service Class specific information to be conveyed in a sub-item on a per-SOP Class basis (the SOP Class Extended Negotiation Sub-item, see PS 3.7 Section D.3.3.5). However, this can not be re-used for this supplement since:

• there is already an item defined for the SOP Classes of the Storage Service class, and it is of fixed length and too short to contain the information envisaged

• without *a priori* knowledge of the Service Class represented by a SOP Class, it is impossible to know what is the format of the Extended Negotiation Sub-item Service-class-application-information.

This is not an insurmountable obstacle however, since it is possible to define completely new User Information sub-items. Though it doesn't seem to be spelled out clearly in the standard (neither in PS 3.7 nor PS 3.8) that an association acceptor must allow and ignore unrecognized User Information sub-items, that is clearly the intent of the design.

Accordingly, it is proposed that an additional User Information sub-item, "SOP Class Common Extended Negotiation Sub-item" be added to PS 3.7, mirroring the existing sub-item defined in D.3.3.5. This new sub-item would mirror the existing pattern of adding one (and only one) sub-item per SOP Class as necessary.

Additionally, this proposal allows the encoding in a composite object of the Related General SOP Class UID for which the Instance SOP Class is a specialization. This allows applications to base the extended negotiation sub-item on the content of the object. It also enables applications to use the fall-back mechanism.

INTEROPERABILITY CONSIDERATIONS

A system has four options when sending an instance of a new SOP Class that is a specialization of an older SOP Classs:

1. It does not support the new extended negotiation, and is configured to send objects only in their specialized SOP Class. This is "classic" DICOM behavior.

2. It supports the new extended negotiation, and identifies the new SOP Class as a Storage SOP Class, and as a specialization of the related general SOP Class.

3. It supports the fall-back mechanism for sending an object under a compatible (but less restrictive) SOP Class. It proposes both the general and specialized SOP Classes during Association Negotiation, and if the specialized is not accepted, it falls back to send the object as an instance of the more general SOP Class.

4. It supports both the new extended negotiation and the fall-back mechanism.

The system receiving the objects has three options:

1. It is pre-configured with the specialized SOP Class UID.

2. It is not pre-configured with the specialized SOP Class UID, and does not support the new extended negotiation.

3. It is not pre-configured with the specialized SOP Class UID, but supports the new extended negotiation, and accepts the specializations of the general SOP Class or all objects of the Storage Service Class.

The resulting combinations of these options is shown in the following table. The preferred goal is send objects using the specialized SOP Class, with a less preferred outcome of object transfer using the general SOP Class (which may lose attributes of the specialized SOP Class).

Table 1 – Interoperation with and without extended negotiation

Receiving system capability / Sending system capability	pre-configured with specialized SOP Class UID	not pre-configured with specialized SOP Class UID	
		does not support extended negotiation	supports extended negotiation
does not support extended negotiation	Object sent using specialized SOP Class	Transfer fails	Transfer fails
supports the new extended negotiation	Object sent using specialized SOP Class	Transfer fails	Object sent using specialized SOP Class
supports fall-back mechanism	Object sent using specialized SOP Class	Object sent using general SOP Class	Object sent using general SOP Class
supports the new extended negotiation, and supports fall-back	Object sent using specialized SOP Class	Object sent using general SOP Class	Object sent using specialized SOP Class

This table shows that in the absence of the new extended negotiation capability, every new SOP Class must be configured on both the sending and receiving side. The fall-back mechanism, implemented on the sending side only, allows the transfer of new SOP Instances, but they lose the specialized SOP Class identification that may enable subsequent processing. However, if both the sending and receiving side implement the extended negotiation, every new object can be sent without loss of the semantic implications of its specialized SOP Class UID, and without any further pre-configuration of SOP Classes on the receiving side.

EXAMPLE OPERATION

As an example, consider the case of a system that handles image based measurements in DICOM SR objects. The system is composed of the following devices:

– several types of devices that make measurements (e.g., a OB/GYN ultrasound device, and a cardiac hemodynamic device)

– a central object storage subsystem

– several types of workstations that display measurements

– a trend analysis subsystem that processes certain types of measurements (e.g., a cardiac patient care system)

Some of the measurement devices can output their SR objects using a specialized SR SOP Class (here denoted the <Evidence> SOP Class), with a fall-back to Comprehensive SR. This corresponds to the last row of Table 1. When they open an association to the object storage subsystem, they propose both the Comprehensive SR SOP Class, and the <Evidence> SOP Class with extended negotiation indicating it is a specialization of the Comprehensive SR SOP Class within the Storage Service Class.

Depending on the capabilities of the object storage subsystem, as represented by the different columns of Table 1, the measurement objects will be sent either with the <Evidence> SOP Class UID, or with the Comprehensive SR SOP Class UID under the fall-back mechanism.

The object storage subsystem responds to queries from the workstations for stored objects, providing attributes per its conformance claim - i.e., it may or may not provide Instance level attributes such as SOP Class UID, Related General SOP Class UID, or root node concept (document title).

A general workstation, which can display Comprehensive SR objects, may elect to retrieve stored objects (e.g., using a study or series level retrieval). The object storage subsystem will propose the SOP Classes that it has stored. It may, or may not, also propose extended negotiation indicating that certain SOP Classes are specializations. If the <Evidence> SOP Class has been stored, negotiation and object transfer proceed similarly to the case of the measurement device sending to the object storage subsystem.

However, there is a potential for non-interoperability if the object storage subsystem is configured to support the <Evidence> SOP Class and the workstation is not, and one or the other does not support extended negotiation. If the object storage subsystem knows about the relationship between the <Evidence> SOP Class and the Comprehensive SR SOP Class, it can first indicate that relationship to the workstation using the Instance level Related General SOP Class UID query attribute. It can also provide fall-back transcoding of the specialized object to the Comprehensive SR SOP Class.

Note the special case of a trend analysis subsystem that operates with a the <Evidence> SOP Class. For its particular workflow, the object storage subsystem must support the <Evidence> SOP Class, either trough preconfiguration, or through support of extended negotiation. Further, in order for the analysis subsystem to be able to determine which stored objects are appropriate to its processing, the object storage subsystem must also provide the Instance level SOP Class UID query attribute.

FORM OF THIS SUPPLEMENT

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

- PS 3.2: Clarification of Specialized SOP Classes; specification of conformance statements for specialized and non-pre-configured SOP Classes.

- PS 3.3: Addition of related general SOP Class UID to SOP Common and to DICOMDIR.

- PS 3.4: Addition of SOP Class Common Extended Negotiation to Storage Service Class, definition of related general SOP Class for selected Standard SOP Classes, and specification of fall-back behavior.

- PS 3.6: Addition of related general SOP Class UID attributes.

- PS 3.7: Add definition of SOP Class Common Extended Negotiation Sub-item.

- PS 3.8: Clarification of extensibility of user information sub-items.

Part 2 Addendum

3.11.4 Specialized SOP Class

A SOP Class derived from a Standard SOP Class that has been specialized in an implementation by additional Type 1, 1C, 2, 2C, or 3 Attributes**, by enumeration of specific permitted values for Attributes, or by enumeration of specific permitted Templates**. The additional Attributes may either be drawn from the Data Dictionary in PS 3.6, or may be Private Attributes. **The enumeration of permitted Attribute values or Templates shall be a subset of those permitted in the related Standard SOP Class.** Since the semantics of the related Standard SOP Class may be modified by the additional Attributes, a Specialized SOP Class utilizes a Privately Defined UID which differs from the UID for the related Standard SOP Class.

Note**s**: **1.** Since a Specialized SOP Class has a different UID than a Standard or Standard Extended SOP Class, other DICOM implementations may not recognize the Specialized SOP Class. Because of this limitation, a Specialized SOP Class should only be used when a Standard or Standard Extended SOP Class would not be appropriate. Before different implementations can exchange Instances of a Specialized SOP Class, the implementations must agree on the UID, content (in particular the additional Type 1, 1C, 2, and 2C Attributes), and semantics of the Specialized SOP Class. A Specialized SOP Class may be used to create a new or experimental SOP Class that is closely related to a Standard SOP Class.

2. The Association Negotiation for a Specialized SOP Class may include a SOP Class Common Extended Negotiation Sub-Item (as defined in PS 3.7) for identification of the Service Class and of the Related General SOP Class from which it was specialized. This may allow a receiving application, without prior agreement on the Specialized SOP Class IOD, to process Instances of that class as if they were instances of a Related General SOP Class.

7.3   RULES GOVERNING TYPES OF SOP CLASSES

…

Specialized SOP Classes may:

a.   contain additional Standard and/or Private Type 1, 1C, 2, or 2C Attributes;

b.   add Private and Standard Type 3 Attributes which may or may not be published in the Conformance Statement;

Note: The usage of any unpublished Attributes may be ignored by other users and providers of the Specialized SOP Class.

c. enumerate the permitted values for Attributes within the set allowed by the Standard SOP Class;

d. enumerate the permitted Templates for Content Items within the set allowed by the Standard SOP Class.

An implementation claiming conformance with a Specialized SOP Class shall include in its Conformance Statement the identity of the Standard SOP Class being specialized, a description of usage of all Standard and Private Type 1, 1C, 2, and 2C Attributes in the Specialized SOP Class, **a description of the constraints on Attributes values and Templates,** and the associated Privately Defined UID~~s~~.

PS 3.2: Add conformance for non-pre-configured SOP Classes with extended negotiation to Overview

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A.1 DICOM CONFORMANCE STATEMENT OVERVIEW

…

The first column shall specify the SOP Classes exactly as named in PS 3.6. **The phrase "and specializations" may be added to indicate support of all specializations negotiated through the SOP Class Common Extended Negotiation. If the implementation supports all SOP Classes of a particular Service Class through SOP Class Common Extended Negotiation, the first column shall specify "All services of the <x> Service Class".**

TABLE A.1-1 NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Image Transfer		
CT Image Storage	Yes	No
US Image Storage	Yes	Yes
Query/Retrieve		
Patient Root Information Model FIND	Option	No
Notes, Reports, Measurements Transfer		
Comprehensive SR, and specializations	**No**	**Yes**
………		

PS 3.2: Add conformance for non-pre-configured SOP Classes with extended negotiation to AE definition

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Table A.4.2-1
SOP CLASS(es) for AE <1>

SOP Class Name	SOP Class UID	SCU	SCP
SOP Class UID Name as specified in the registry table of DICOM Unique Identifiers (UID) in PS 3.6 **, with phrase "and specializations" as appropriate**	UID as specified in PS 3.6	Yes/No	Yes/No

PS 3.2: Add conformance for non-pre-configured SOP Classes with extended negotiation to Association Initiator Presentation Context definition

A.4.2.1.3.1.2 Proposed Presentation Contexts

Each time an association is initiated, …

Table A.4.2-7
Proposed Presentation Contexts for
Application Entity <x> and Real-World Activity <i>

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
name_a	AS_UID_a	XS_Name_1, ..., XS_Name_n	XS_UID_1, _, XS_UID_n	SCP l SCU l BOTH	None l See Note <1> l See table A.4.2-8
…	…	…	…	…	…

> Note<1>: <Describe the content of any extended negotiation done for the SOP Classes of this Presentation Context. One note may serve multiple Presentation Contexts, as a single Abstract Syntax often corresponds to a single SOP class which may appear in different Presentation Contexts.>

In Table A.4.2-7, the following meanings are assigned to the fields: …

> <XS_UID_n>   The UID of the corresponding transfer syntax

If the AE through this Real World Activity might propose any of the SOP Classes of a particular Service Class (e.g., the Storage Service Class), the Abstract Syntax Name and UID shall be those of the Service Class.   This section shall describe the conditions under which a SOP Class of that Service Class will be proposed in a Presentation Context.

> **Note: For instance, an AE may receive instances of a non-preconfigured SOP Class through support of SOP Class Common Extended Negotiation.   These instances may be be limited to specializations of a particular SOP Class, or they may be any SOP Class within the Service Class, and any such limits should be described.**

This section shall describe the conditions under which the AE may change the SOP Class UID of SOP Instances sent, due to fall-back mechanisms.

> **Note: For instance, if the SCP does not accept the proposed Abstract Syntax (SOP Class) for which there is a Related General SOP Class that was accepted, the AE may modify SOP Instances of the refused SOP Class to use the Related General SOP Class for transmission.**

PS 3.2: Add conformance for non-pre-configured SOP Classes with extended negotiation to Association Acceptor Presentation Context definition

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A.4.2.1.4.1.2 Accepted Presentation Contexts

Table A.4.2-11
Acceptable Presentation Contexts for
Application Entity <x> and Real-World Activity <i>

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
name_a	AS_UID_a	XS_Name_a	XS_UID_a	SCP l SCU l Both	None l See Note <1> l See table A.4.2-12
…	…	…	…	…	…

> Note<1>: <Describe the content of any extended negotiation done for the SOP Classes of this Presentation Context. **In particular, acceptance of specialized SOP Classes of the Abstract Syntax specified in this Presentation Context shall be noted.** One note may serve multiple Presentation Contexts, as a single Abstract Syntax often corresponds to a single SOP class which may appear in different Presentation Contexts.>

In Table A.4.2-11, the following meanings are assigned to the fields:…

    <XS_UID_n>   The UID of the corresponding transfer syntax

If the AE through this Real World Activity supports all SOP Classes of a particular Service Class (e.g., the Storage Service Class) through SOP Class Common Extended Negotiation, the Abstract Syntax Name and UID shall be those of the Service Class, and this shall be noted under Extended Negotiation.

In the event that the Abstract Syntax of the Presentation Context represents a Meta-SOP Class…

Part 3 Addendum

3.4 DICOM SERVICE CLASS SPECIFICATIONS

This Part of the Standard makes use of the following terms defined in PS 3.4:

…

j. Related General SOP Class

Table C.12-1
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
…			
Related General SOP Class UID	**(0008,001A)**	**3**	**Uniquely identifies a Related General SOP Class for the SOP Class of this Instance. See PS 3.4.**
Original Specialized SOP Class UID	**(0008,001B)**	**3**	**The SOP Class in which the Instance was originally encoded, but which has been replaced during a fall-back conversion to the current Related General SOP Class. See PS 3.4.**

Table F.3-3
DIRECTORY INFORMATION MODULE

Attribute Name	Tag	Type	Attribute Description
…			

>Referenced SOP Class UID in File	(0004,1510)	1C	Unique ID for the SOP Class ~~related to the IOD~~ **of the Instance** stored in the referenced File. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset (0004,1504). Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.
>Referenced SOP Instance UID in File	(0004,1511)	1C	Unique Identifier for the SOP Instance ~~related to the IOD~~ stored in the referenced file. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset. Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.
>Referenced Transfer Syntax UID in File	(0004,1512)	1C	Unique Identifier for the Transfer Syntax used to encode the ~~IOD~~ **Instance** stored in the referenced file. This UID shall be present whether the File is referenced directly by Referenced File ID (0004,1500) or indirectly by an MRDR Directory Record Offset. Required only if the Directory Record references a SOP Instance. Shall not be used in a Multi-Referenced File Directory Record.
>Referenced Related General SOP Class UID in File	**(0004,151A)**	**1C**	**Unique ID for the Related General SOP Class(es) related to the SOP Class of the Instance stored in the referenced file.** **Required if the Directory Record references a SOP Instance that encodes the Related General SOP Class UID (0008,001A). Shall not be used in a Multi-Referenced File Directory Record.** **Note: This may be useful to an FSR that does not support the SOP Class of the referenced Instance, but which does support one of the Related General SOP Classes.**
…			

Part 4 Addendum

3.9 DICOM SERVICE CLASS DEFINITIONS

The following definitions are commonly used in this Part of the DICOM Standard:

...

Service-Object Pair (SOP) Class: the union of a specific set of DIMSE Services and one related Information Object Definition (as specified by a Service Class Definition) which completely defines a precise context for communication.

Service-Object Pair (SOP) Instance: a concrete occurrence of an Information Object and a communication context.

Related General SOP Class: a SOP Class that is related to another SOP Class as being more generalized in terms of behavior defined in the standard, and which may be used to identically encode an instance with the same attributes and values, other than the SOP Class UID. In particular, this may be the SOP Class from which a Specialized SOP Class (see PS3.2) is derived.

B.1.1 Scope

The Storage Service Class defines an application-level class-of-service which facilitates the simple transfer of ~~images in a manner functionally similar to ACR-NEMA 300-1988~~ **information Instances (objects).** It allows one DICOM AE to send images**, waveforms, reports, etc.,** to another.

Information Object Definitions for Instances that are transferred under the Storage Service Class shall adhere to the Composite Instance IOD Information Model specified in PS3.3, and include at least the Patient, Study, and Series Information Entities.

B.3 ASSOCIATION NEGOTIATION

SCUs and SCPs of Storage SOP Classes operate on SOP Instances specific to the SOP Class. They may use the SOP Class Extended Negotiation Sub-Item defined in PS 3.7. This Sub-Item allows DICOM AEs to exchange application information specific to SOP Class specifications. This is achieved by defining the Service-class-application-information field.

SCUs may use the SOP Class Common Extended Negotiation Sub-Item defined in PS 3.7. This Sub-Item allows DICOM AEs to exchange information about the nature of the SOP Classes.

The SOP Class Extended Negotiation Sub-Item **and SOP Class Common Extended Negotiation Sub-Item** negotiation is optional for storage based SOP Classes.

The following negotiation rules apply to all DICOM SOP Classes and Specialized ~~DICOM~~ SOP Classes of the Storage Service Class.

The Association-requester (Storage SCU role) in the A-ASSOCIATE request shall convey:

— one Abstract Syntax, in a Presentation Context, for each supported SOP Class ~~and/or Meta SOP Class~~ of the Storage Service Class

— optionally, one SOP Class Extended Negotiation Sub-Item, for each supported SOP Class ~~and/or Meta SOP Class~~ of the Storage Service Class

— **optionally, one SOP Class Common Extended Negotiation Sub-Item, for each supported SOP Class of the Storage Service Class**

The Association-acceptor (Storage SCP role) in the A-ASSOCIATE request shall accept:

— one Abstract Syntax, in a Presentation Context, for each supported SOP Class ~~and/or Meta SOP Class~~ of the Storage Service Class

— optionally, one SOP Class Extended Negotiation Sub-Item, for each supported SOP Class ~~and/or Meta SOP Class~~ of the Storage Service Class

B.3.1 Extended Negotiation

At the time of Association establishment implementations may exchange information about their respective capabilities, as described in PS 3.7 and PS 3.8. SCUs and SCPs may use the SOP Class Extended Negotiation Sub-Item Structure as described in PS 3.7 to exchange information about the level of conformance and options supported. **SCUs may use the SOP Class Common Extended Negotiation Sub-Item defined in PS 3.7 to exchange information about the nature of the SOP Classes.**

Extended negotiation is optional. In the event that either the SCU or the SCP does not support extended negotiation, the defaults shall apply.

B.3.1.1 Service-Class-Application-Information (A-ASSOCIATE-RQ)

…

B.3.1.2 Service-Class-Application-Information (A-ASSOCIATE-AC)

…

B.3.1.3 Service Class UID (A-ASSOCIATE-RQ)

SOP Class Common Extended Negotiation Sub-Item allows the SCU to convey the Service Class UID of each proposed SOP Class.

The Storage Service Class UID shall be "1.2.840.10008.4.2".

B.3.1.4   Related General SOP Classes (A-ASSOCIATE-RQ)

A limited set of Standard SOP Classes in the Storage Service Class are defined to have one or more Related General SOP Classes. The Related General SOP Classes may be conveyed using the SOP Class Relationship Extended Negotiation during association establishment as defined in PS 3.7. Table B.3-3 identifies which Standard SOP Classes participate in this mechanism. If a Standard SOP Class is not listed in this table, Related General SOP Classes shall not be included in a Related Storage SOP Class Extended Negotiation Sub-Item.

Note: Implementation-defined Specialized SOP Classes (see PS3.2) of the Storage Service Class may convey a Related General SOP Class.

Table B.3-3
STANDARD AND RELATED GENERAL SOP CLASSES

SOP Class Name	Related General SOP Class Name
12-lead ECG Waveform Storage	General ECG Waveform Storage
Digital Mammography Image Storage - For Presentation	Digital X-Ray Image Storage - For Presentation
Digital Mammography Image Storage - For Processing	Digital X-Ray Image Storage - For Processing
Digital Intra-oral X-Ray Image Storage - For Presentation	Digital X-Ray Image Storage - For Presentation
Digital Intra-oral X-Ray Image Storage - For Processing	Digital X-Ray Image Storage - For Processing
Basic Text SR	Enhanced SR
	Comprehensive SR
Enhanced SR	Comprehensive SR
Procedure Log	Enhanced SR
	Comprehensive SR

PS 3.4: Modify section B.4 for SCP Conformance for Related SOP Classes:

B.4.1 Conformance as An SCP

Three levels of conformance to the Storage SOP Classes as an SCP may be provided: …

Three levels of Digital Signature support are defined for an SCP which claims conformance to Level 2 (Full) storage support: …

An SCP that claims conformance to Level 2 (Full) support of the Storage Service Class may accept any Presentation Context negotiation of a SOP Class that specifies the Storage Service Class during the SOP Class Common Extended Negotiation, without asserting conformance to that SOP Class in its Conformance Statement.

Note: The SCP may support storage of all SOP Classes of the Storage Service Class, preserving all attributes as a Level 2 SCP.

An SCP that claims conformance to Level 2 (Full) support of a Related General SOP Class may accept any Presentation Context negotiation of a SOP Class that specifies that Related General SOP Class during the SOP Class Common Extended Negotiation, without asserting conformance to that specialized SOP Class in its Conformance Statement.

Notes: 1. The term "specialized" in this section is used generically, including both Implementation-defined Specialized SOP Classes and Standard SOP Classes specified in Table B.3-3.

2. The SCP may handle instances of such specialized SOP Classes using the semantics of the Related General SOP Class, but preserving all additional (potentially Type 1 or 2) attributes as a Level 2 SCP.

B.4.2 Conformance as An SCU

The SCU shall generate only C-STORE requests with SOP Instances which meet the requirements of the IOD associated with the SOP Class.

B.4.2.1 SCU Fall-Back Behavior

During Association Negotiation, an application may propose a specialized SOP Class and its related general SOP Class in separate Presentation Contexts as a Storage SCU. If the Association Acceptor rejects the specialized SOP Class Presentation Context, but accepts the related general SOP Class Presentation Context, the application may send instances of the specialized SOP Class as instances of the related general SOP Class. In this fall-back behavior, the SOP Class UID of the instance shall be the UID of the related general SOP Class, and any special semantics associated with the specialized SOP Class may be lost; the SOP Instance UID shall remain the same.

Note: The SCU may include the SOP Class UID of the original intended specialized SOP Class in the attribute Original Specialized SOP Class UID (0008,001B) of the instance sent under the related general SOP Class. In some cases, e.g., when all intermediate storage applications are Level 2 SCPs, this may allow an ultimate receiver of the instance to recast it as an instance of the specialized SOP Class IOD. However, this transformation is not guaranteed.

PS 3.4: Amend Annex O requirements

B.5.1.5 Structured Reporting Storage SOP Classes

The requirements of Annex O apply to the following SOP Classes:

- Basic Text SR

- Enhanced SR**, and SOP Classes for which it is the Related General SOP Class**

- Comprehensive SR**, and SOP Classes for which it is the Related General SOP Class**

- Mammography CAD SR

- ~~**Procedure Log**~~

PS 3.4: Add Related General SOP Class to Annex C instance level query

Table C.6-4
COMPOSITE OBJECT INSTANCE LEVEL KEYS FOR THE PATIENT ROOT QUERY/RETRIEVE INFORMATION MODEL

Description	Tag	Type
…		
SOP Instance UID	(0008,0018)	U
SOP Class UID	(0008,0016)	O
Related General SOP Class UID	**(0008,001 A)**	**O**
…		

Part 6 Addendum

6   Registry of DICOM data elements

Tag	Name	VR	VM
…			
(0008,001A)	Related General SOP Class UID	UI	1-n
(0008,001B)	Original Specialized SOP Class UID	UI	1

8   Registry of DICOM directory structuring elements

Tag	Name	VR	VM
…			
(0004,151A)	Referenced Related General SOP Class UID in File	UI	1-n

Table A-1
UID VALUES

UID Value	UID NAME	UID TYPE	Part
…	…	…	…
1.2.840.10008.4.2	Storage Service Class	Service Class	PS 3.4

Part 7 Addendum

3.8 DICOM SERVICE CLASS DEFINITIONS

This part of the Standard makes use of the following terms defined in PS 3.4:

> …

> **f)   Related General SOP Class**

D.3.3.6   SERVICE-OBJECT PAIR (SOP) CLASS COMMON EXTENDED NEGOTIATION

The SOP Class Common Extended Negotiation allows, at Association establishment, peer DICOM AEs to exchange application information, the form of which is generic, and not specific to individual Service Classes, as compared to the information defined in D.3.3.5. This is an optional feature that Association-requesters and Association-acceptors may or may not choose to support.

The information included for each SOP Class for which a sub-item is present consists of a Service Class UID and (optionally) a Related General SOP Class UID.

The Service Class UID conveys the Service Class of the SOP Class.

> Note: Explicit conveyance of the Service Class may allow the selection of the proper format for the Service-class-application-information of the SOP Class Extended Negotiation Sub-item.

The Related General SOP Class UID conveys zero or more Related General SOP Class for the SOP Class.

> Notes: 1. Consider the example of negotiation of support for a Procedure Log Storage SOP Class. That SOP Class is of the Storage Service Class. The encoding of the IOD would be compatible with the more general Enhanced SR Storage SOP Class. Therefore, the following common extended negotiation sub-item could optionally be included:
>
> | | | |
> |---|---|---|
> | SOP Class UID: | 1.2.840.10008.5.1.4.1.1.88.40 | Procedure Log |
> | Service Class UID: | 1.2.840.10008.4.2 | Storage Service Class |
> | Related General SOP Class UID: | 1.2.840.10008.5.1.4.1.1.88.22 | Enhanced SR |
>
> 2. The Related SOP Class may be absent, though the Service Class may still be included. For example, there may be a new image storage SOP Class without a Related SOP Class defined in PS 3.4, yet it is still useful to an Association-acceptor to be informed that the new SOP Class is of the Storage Service Class:
>
> | | | |
> |---|---|---|
> | SOP Class UID: | 1.2.840.10008.5.1.4.1.1.7.1 | MF Single Bit SC Image Storage |
> | Service Class UID: | 1.2.840.10008.4.2 | Storage Service Class |

Related General SOP Class UID: (none)

The Association-requester may only offer one SOP Class Common Extended Negotiation item for each SOP Class UID.

No response is necessary, hence the SOP Class Common Extended Negotiation items shall be omitted in the A-ASSOCIATE response.

D.3.3.6.1   SOP class common extended negotiation sub-item structure (A-ASSOCIATE-RQ)

The SOP Class Common Extended Negotiation Sub-item shall be made of a sequence of mandatory fields, the last two of which may be zero-length. Multiple SOP Class Common Extended Negotiation Sub-Items may be present in the User Data Item of the A-ASSOCIATE-RQ, however, only one Sub-Item per SOP Class UID shall be present. Table D.3-12 shows the sequence of mandatory fields.

Table D.3-12
SOP CLASS COMMON EXTENDED NEGOTIATION SUB-ITEM FIELDS
(A-ASSOCIATE-RQ)

Item Bytes	Field Name	Description of Field
1	Item-type	57H
2	Sub-item-version	This field indicates the version of the Sub-item. Fields added to the Sub-item definition in succeeding editions of the Standard will not affect the semantics of previously defined fields. The version of the Sub-item defined in this edition of the Standard is 0.
3-4	Item-Length	This Item-length shall be the number of bytes from the first byte of the following field to the last byte of the Reserved field. It shall be encoded as an unsigned binary number.
5-6	SOP-class-uid-length	The SOP-class-uid-length shall be the number of bytes in the SOP-class-uid field. It shall be encoded as an unsigned binary number.
7-x	SOP-class-uid	The SOP Class identifier encoded as a UID as defined in PS 3.5.
(x+1)-(x+2)	Service-class-uid-length	The Service-class-uid-length shall be the number of bytes in the Service-class-uid field. It shall be encoded as an unsigned binary number.
(x+3)-y	Service-class-uid	The Service Class identifier encoded as a UID as defined in PS 3.5.
(y+1)-(y+2)	Related-general-sop-class-identification-length	The Related-general-sop-class-identification-length shall be the number of bytes in the Related-general-sop-class-identification field. Shall be zero if no Related General SOP Classes are identified.
(y+3)-z	Related-general-sop-class-identification	The Related-general-sop-class-identification is a sequence of pairs of length and UID sub-fields. Each pair of sub-fields shall be formatted in accordance with Table D.3-13.
(z+1)-k	Reserved	Reserved for additional fields of the sub-item. Shall be zero-length for Version 0 of Sub-item definition.

Table D.3-13
RELATED-GENERAL-SOP-CLASS-IDENTIFICATION   SUB-FIELDS

Bytes	Sub-Field Name	Description of Sub-Field
1-2	Related-general-sop-class-uid-length	The Related-general-sop-class-uid-length shall be the number of bytes in the Related-general-sop-class-uid sub-field. It shall be encoded as an unsigned binary number.
3-n	Related-general-sop-class-uid	The Related General SOP Class identifier encoded as a UID as defined in PS 3.5.

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PS 3.8: Add informative note to clarify where user information sub-items are defined.

7.1.1.6 User information

This parameter shall be used by the requestor and the acceptor of the association to include DICOM Application Entity user information. Its meaning shall depend on the application context that accompanies the primitive. The usage of this parameter is specified in Annex D.

Note**s**:
1. This parameter is used to carry initialization information for the DICOM Application Entities as defined in the application context specified by the value of the accompanying Application Context Name parameter.

2. Annex D specifies some user information sub-items, and references PS3.7 for the specification of additional sub-items. PS3.7, in turn, references PS3.4 for the specification of Service-class-application-information used in some sub-items.

PS 3.8: Add informative note to make it clear that an association acceptor must be prepeared to gracefully ignore new user information sub-items.

D.2 EXTENDED USER INFORMATION NEGOTIATION

The user information parameter, of the A-ASSOCIATE primitive, can be extended to support the negotiation needs of DICOM Application Entities using the UL Service. This will result in the definition of specific user information sub-items. These sub-items shall be assigned unique item-type values registered in PS 3.7.

Note**s**:
1. The values of the Sub-Items types in the User Information Field are assigned by this standard in the range of 51H through FFH. Sub-Item values are defined by PS 3.7 and PS 3.8.

2. Succeeding editions of the Standard may define additional user information Sub-Items in a manner that does not affect the semantics of previously defined Sub-Items. Association acceptors compliant to an earlier edition of the Standard are required to ignore such unrecognized user information Sub-Items and not reject an Association because of their presence.