

DICOM Correction Proposal

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Correction Number	CP-1625
Log Summary:	Define Conformance for an All-SOP-Class Storage Server
Name of Standard	PS3.4
Rationale for Correction:	<p>We need to minimize the impediments to deployment of new SOP Classes. One such impediment is the need to configure storage servers for all new SOP Classes. We can facilitate this by defining a standard capability for support of all SOP Classes of PS3.4 Annex B, that can be (semi-)automatically updated with the current list.</p> <p>An earlier attempt to address this issue defined extended negotiation of the Storage SOP Class (see PS3.4 Section B.3.1.3), which allows an SCU to assert that a negotiated SOP Class is in fact conformant to Annex B. However, this mechanism requires implementation of extended negotiation for this capability by both the SCP and SCU, and has not proven to be practical.</p> <p>Rather, the method proposed here uses simple (non-extended) Association Negotiation, but imposes requirements on the server to be updateable to the current list of defined SOP Classes.</p> <p>This CP does not address the more important issue of display, which is a major impediment to the adoption of new SOP Classes, but PS3.4 Annex B does not address display requirements.</p>
Correction Wording:	

Amend PS3.4 Section B.4.1, adding subsection headings as well as amended text, and moving a clause to Section B.5.1

B.4.1 Conformance as an SCP

B.4.1.1 Levels of Conformance

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

- Level 0 (Local). Level 0 conformance indicates that a user-defined subset of the Attributes of the image will be stored, and all others will be discarded. This subset of the Attributes shall be defined in the Conformance Statement of the implementer.
- Level 1 (Base). Level 1 conformance indicates that all Type 1 and 2 Attributes defined in the IOD associated with the SOP Class will be stored, and may be accessed. All other elements may be discarded. The SCP may, but is not required to validate that the Attributes of the SOP Instance meets the requirements of the IOD.
- Level 2 (Full). Level 2 conformance indicates that all Type 1, Type 2, and Type 3 Attributes defined in the Information Object Definition associated with the SOP Class, as well as any Standard Extended Attributes (including Private Attributes) included in the SOP Instance, will be stored and may be accessed. The SCP may, but is not required to validate that the Attributes of the SOP Instance meet the requirements of the IOD.

Note

A Level 2 SCP may discard (not store) Type 3 Attributes that are empty (zero length and no Value), since the meaning of an empty Type 3 Attribute is the same as absence of the Attribute. See PS3.5 definition of "Type 3 Optional Data Elements".

B.4.1.2 Support of Additional SOP Classes

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 (see Section B.3.1.3), without asserting conformance to that SOP Class in its Conformance Statement.

Note

1. The SCP may support storage of all SOP Classes of the Storage Service Class, preserving all Attributes as a Level 2 SCP.
2. **This Extended Negotiation allows an SCP to determine that a private SOP Class (per PS3.2 Section 3.11.5) in a proposed Presentation Context follows the semantics of the Storage Service Class, and may be handled accordingly.**

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.

Note

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.

Note

An SCP that has access to the current content of Table B.5-1, might use that to determine acceptance of proposed Presentation Context SOP Classes. This allows an SCP, even without Extended Negotiation, to be able to identify all standard SOP Classes of the Storage Service Class. Access to Table B.5-1 may be through private means, or to the publication of PS3 on the web site of the DICOM Standards Committee. This provides an automated alternative to manually editing a table of supported Storage SOP Classes, which.

~~Level 2 (Full) Storage SCP Conformance is required for support of the Enhanced Multi-Frame Image Conversion Extended Negotiation of the Query/Retrieve Service Class, since effective use of that option requires the storage of Type 3 Attributes. See Section C.3.5 New Instance Creation for Enhanced Multi-frame Image Conversion.~~

B.4.1.3 Coercion of Attributes

At any level of conformance, the SCP of the Storage Service Class may modify the values of certain Attributes in order to coerce the SOP Instance into the Query Model of the SCP. The Attributes that may be modified are shown in Table B.4-1.

Table B.4-1. Attributes Subject to Coercion

Attribute Name	Tag
Patient ID	(0010,0020)
Study Instance UID	(0020,000D)

Attribute Name	Tag
Series Instance UID	(0020,000E)

The SCP of the Storage Service Class may modify the values of Code Sequence Attributes to convert from one coding scheme into another. This includes changing from deprecated values of Coding Scheme Designator (0008,0102) or Code Value (0008,0100) to currently valid values.

If an SCP performs such a modification, it shall return a C-STORE response with a status of Warning.

Note

1. Modification of these Attributes may be necessary if the SCP is also an SCP of a Query/Retrieve SOP Classes. These SOP Classes are described in this Standard. For example, an MR scanner may be implemented to generate Study Instance UIDs for images generated on the MR. When these images are sent to an archive that is HIS/RIS aware, it may choose to change the UID of the study assigned to the study by the PACS. The mechanism by which it performs this coercion is implementation dependent.
2. An SCP may, for instance, convert Coding Scheme Designator values "SNM3" to "SRT", in accordance with the DICOM conventions for SNOMED (see PS3.16).
3. Modification of Attributes that may be used to reference a SOP Instance by another SOP Instance (such as Study Instance UID and Series Instance UID Attributes) will make that reference invalid. Modification of these Attributes is strongly discouraged.
4. Other Attributes may be modified/corrected by an SCP of a Storage SOP Class.
5. Modification of Attributes may affect digital signatures referencing the content of the SOP Instance.

B.4.1.3 Levels of Digital Signature

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

- Signature Level 1. SCP may not preserve Digital Signatures and does not replace them.
- Signature Level 2. SCP does not preserve the integrity of incoming Digital Signatures, but does validate the signatures of SOP Instances being stored, takes implementation-specific measures for insuring the integrity of data stored, and will add replacement Digital Signatures before sending SOP Instances elsewhere.
- Signature Level 3. SCP does preserve the integrity of incoming Digital Signatures (i.e., is bit-preserving and stores and retrieves all Attributes regardless of whether they are defined in the IOD).

<i>Amend PS3.4 Section B.4.3.2</i>

B.4.3.2 Conformance Statement for an SCP

The following issues shall be documented in the Conformance Statement of any implementation claiming conformance to the Storage Service Class as an SCP:

- The level of conformance, as defined by Section B.4.1.1, shall be stated.
- The level of Digital Signature support, as defined by Section B.4.1.3, shall be stated.
- The optional elements that will be discarded (if any) shall be listed for each IOD supported.
- **The mechanisms by which additional SOP Classes are dynamically supported, as defined by Section B.4.1.2, shall be stated.**

- The Conformance Statement shall document the policies concerning the Attribute Lossy Image Compression (0028,2110).
- The behavior of the SCP in the case of a successful C-STORE operation shall be described. This includes the following:
 - the access method for a stored SOP Instance
 - the duration of the storage
- The meaning of each case of an unsuccessful C-STORE response status shall be described, as well as appropriate recovery action.
- The meaning of each case of a warning C-STORE response status shall be described, as well as appropriate action.
- If the SCP performs coercion on any Attributes, this shall be stated, and the conditions under which it may occur shall be described.

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B.5.1 Specialization for Standard SOP Classes

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B.5.1.x Enhanced Multi-Frame Image SOP Classes

An SCP of any of the Enhanced Multi-Frame Image SOP Classes that makes SOP Instances available through the Enhanced Multi-Frame Image Conversion Extended Negotiation of the Query/Retrieve Service Class (see Section C.3.5) shall provide Level 2 (Full) Storage SCP Conformance.

Note

Effective use of the Image Conversion option requires the storage of Type 3 Attributes.