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Correction Number CP-2303
Log Summary: Clarify Frame Pixel Data Retrieve Response for single BitsStored multi-frame images encoded in Native format
Name of Standard
PS3.18
Rationale for Correction:
When BitsAllocated is 1 (e.g., a BINARY Segmentation), frames may span byte or word boundaries, since there is no padding between frames. This means that when performing a Frame Pixel Data retrieve, the extracted binary pixel data for the entire frame needs to be shifted to the beginning of the 1st byte, since there is no provision for communicating any offset within the first byte..
Correction Wording:

Amend DICOM PS3.18 as follows (changes to existing text are bold and underlined for additions and ~~struckthrough~~ for removals):

8.7.3.3 Bulkdata Media Types

Bulkdata representations are only supported by RESTful services. There are two categories of Bulkdata: uncompressed and compressed.

The Selected Media Type will be the default media type for the Resource Category when the origin server supports none of the Acceptable Media Types, as described in ???, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

The origin server may support additional Transfer Syntaxes.

If no media type Transfer Syntax parameter is specified, then the Explicit VR Little Endian Transfer Syntax "1.2.840.10008.1.2.1" shall be used, unless the origin server has only access to the pixel data in lossy compressed form or the pixel data in a lossless compressed form that is of such length that it cannot be encoded in the Explicit VR Little Endian Transfer Syntax.

Note

The tables in this section have no entries for the URI service, since they do not support separate retrieval of Bulkdata.

Depending on the Selected Media Type, the pixel data of a resource in the Single Frame Image Resource Category is encoded in:

- one compressed Bulkdata representation, or
- one uncompressed Bulkdata representation.

Depending on the Selected Media Type, the pixel data of a resource in the Multi-Frame Image Resource Category is encoded in:

- multiple Single Frame Image compressed Bulkdata representations: one for each frame, or
- one Multi-Frame Image uncompressed Bulkdata representation.

Depending on the Selected Media Type, the pixel data of a resource in the Video Resource Category is encoded in:

- one Video compressed Bulkdata representation, or
- one Video uncompressed Bulkdata representation.

8.7.3.3.1 Uncompressed Bulkdata Media Types

Table 8.7.3-4 specifies the default media type and Transfer Syntax UIDs, by Resource Category (see ???) that can be used with uncompressed Bulkdata for the RESTful services. Uncompressed Bulkdata is encoded as a stream of uncompressed bytes (octets) in Little Endian byte order.

Note

1. This is the same encoding defined in PS3.19 for the returned value of the getData() call for uncompressed Bulkdata.
2. In a Multi-Frame Image with a Bits Allocated (0028.0100) of 1 that is uncompressed, the individual frames are not padded, therefore successive bits are packed into bytes or words in Native format as described in Section 8.2 "Native or Encapsulated Format Encoding" in PS3.5. This means that if only selected frames of a Multi-Frame Image are to be encoded in the response, each frame needs to be extracted from the Multi-Frame Image pixel data and successively concatenated in the response, with no padding at the start of first byte in the response, and with no padding between successive encoded frames in the response. I.e., all the frame-specific bitstreams are successively encoded with no padding at the beginning or in between.

Table 8.7.3-4. Transfer Syntax UIDs for Uncompressed Data in Bulkdata

Category	Media Type	Transfer Syntax UID	Transfer Syntax Name	RESTful
Single Frame Image	application/octet-stream	1.2.840.10008.1.2.1	Explicit VR Little Endian	D

Category	Media Type	Transfer Syntax UID	Transfer Syntax Name	RESTful
Multi-Frame Image	application/octet-stream	1.2.840.10008.1.2.1	Explicit VR Little Endian	D
Video	application/octet-stream	1.2.840.10008.1.2.1	Explicit VR Little Endian	D
Text	application/octet-stream	1.2.840.10008.1.2.1	Explicit VR Little Endian	D
Other	application/octet-stream	1.2.840.10008.1.2.1	Explicit VR Little Endian	D

Note

Even though the Transfer Syntax is Explicit VR Little Endian, the Value Representation is not actually encoded at the beginning of the octet-stream. The Value Representation is contained in the Metadata that references the Bulkdata.

8.7.3.3.2 Compressed Bulkdata Media Types

Compressed Bulkdata contains only the compressed octet stream without the fragment delimiters.

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Compressed multi-frame image pixel data is encoded as individual frames. E.g., each frame of a JPEG 2000 multi-frame image will be encoded separately as image/jp2 representations, rather than as a single video/mj2 (???) or application/octet-stream representation. See ??? for details on how multiple representations can be packaged into a multipart payload.

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10.4 Retrieve Transaction

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10.4.1 Request

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10.4.1.1 Target Resources

10.4.1.1.5 Bulkdata Resources

Bulkdata Resources (defined in Table 10.4.1.5-1) are used to retrieve data elements (typically containing large data, such as Pixel Data) extracted from DICOM Instances.

Table 10.4.1.5-1. Retrieve Transaction Bulkdata Resources

Resource	URI Template
Study Bulkdata	/studies/{study}/bulkdata
Series Bulkdata	/studies/{study}/series/{series}/bulkdata
Instance Bulkdata	/studies/{study}/series/{series}/instances/{instance}/bulkdata
Bulkdata	{bulkdataURI}

Note

1. Bulkdata resources that contain pixel data can be retrieved equivalently as described in Section 10.4.1.1.6.
2. Refer to Section 10.4.1.1.6 for URI templates for Bulkdata consisting of Frame Pixel Data.

10.4.1.1.6 Pixel Data Resources

Pixel Data Resources (defined in Table 10.4.1.6-1) are used to retrieve data elements containing top-level pixel data from DICOM Instances.

Pixel data is a subset of bulkdata. The Pixel Data resources provide a convenient method to access that specific subset.

Table 10.4.1.6-1. Retrieve Transaction Pixel Data Resources

Resource	URI Template
Study Pixel Data	/studies/{study}/pixeldata
Series Pixel Data	/studies/{study}/series/{series}/pixeldata
Instance Pixel Data	/studies/{study}/series/{series}/instances/{instance}/pixeldata
Frame Pixel Data	/studies/{study}/series/{series}/instances/{instance}/frames/{frames}

Note

1. Frame Pixel Data is inherently pixel data so a /pixeldata subresource is not needed in the URI Template.
2. The Frame Pixel Data resource originally appeared in ???.

10.4.2 Behavior

The origin server shall prepare representation(s) of the Target Resource in the Selected Media Type. See ???.

10.4.3 Response

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10.4.3.3 Response Payload

A success response shall have a payload containing one or more representations of the Target Resource in the Selected Media Type (see ??? and Section 10.4.4). The payload shall conform to ???.

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10.4.3.3.5 Bulkdata Resource Payload

The payload for a Bulkdata Resource (see Section 10.4.1.1.5) shall contain all the bulkdata for the resource. When the resource is a single Bulkdata URI, the payload will contain the single corresponding element. When the resource is a Study, Series or Instance Bulkdata resource, the payload will contain all the bulkdata of the corresponding instance(s). Bulkdata in a multipart response shall have a Content-Location header field that corresponds to the URI contained in the corresponding Element in the Metadata.

10.4.3.3.6 Pixel Data Resource Payload

The payload for a Pixel Data Resource (see Section 10.4.1.1.6) shall contain all the Pixel Data of the resource. Pixel Data in a multipart response shall have a Content-Location header field that corresponds to the URI contained in the corresponding Element in the Metadata. The Pixel Data is the content of the Pixel Data (7FE0,0010), Float Pixel Data (7FE0,0008), or Double Float Pixel (7FE0,0009) Data Element in the top level Data Set, as defined in PS3.5, of the corresponding instance(s).

Note

This does not include Pixel Data nested within an Icon Image Sequence or a private Data Element.

