

DICOM Correction Proposal

STATUS	Letter Ballot
Date of Last Update	2016/01/18
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Correction Number	CP-1483
Log Summary:	Clarify BulkDataURI
Name of Standard	PS3.18, PS3.19 (no changes needed)
Rationale for Correction:	<p>The meaning of BulkDataURI is undefined, and has caused some confusion amongst developers. Additionally, it is sometimes identified as BulkDataURL. Updates proposed to clarify and make consistent.</p> <p>The use of URL in PS 3.19 was checked. The uses of URL in the application hosting are for a different element, and are uses that require the use of a URL (rather than a URI). The PS 3.19 uses all need to be an actual location and protocol.</p> <p>PS 3.3 issue: can we change WADO-RS now? Or does installed base force use to preserve use of URL? See sections 10.3 and C.4.23. Other uses of URL, URN are correct in their context.</p>
Correction Wording:	

4 Terms and Definitions

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4.7 BulkDataURI

A Uniform Resource Identifier in accordance with RFC 3986 that identifies an octet-stream representing the value of a DICOM attribute.

Note: The octet-stream does not include the Attribute Tag, Value Representation, or Attribute Length. In a Pixel Data attribute under a compressed Transfer Syntax, it does include the Basic Offset Table and Data Stream Fragment Item tags and lengths.

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6.5 WADO-RS Request/Response

The DICOM RESTful Service defines several action types. An implementation shall support all the following six action types:

1. RetrieveStudy

This action retrieves the set of DICOM instances associated with a given study unique identifier (UID). The response can be DICOM or bulk data depending on the "Accept" type, and is encapsulated in a multipart MIME response.

2. RetrieveSeries

This action retrieves the set of DICOM instances associated with a given study and series UID. The response can be DICOM or bulk data depending on the "Accept" type, and is encapsulated in a multipart MIME response.

3. RetrieveInstance

This action retrieves the DICOM instance associated with the given study, series, and SOP Instance UID. The response can be DICOM or bulk data depending on the "Accept" type, and is encapsulated in a multipart MIME response.

4. RetrieveFrames

This action retrieves the DICOM frames for a given study, series, SOP Instance UID, and frame numbers. The response is pixel data, and encapsulated in a multipart MIME response.

5. RetrieveBulkdata

This action retrieves the bulk data for a given ~~bulk data URL~~ BulkDataURI. The response is a single bulk data item.

6. RetrieveMetadata

This action retrieves the DICOM instances presented as the full study metadata with the bulk data removed.

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6.5.1 WADO-RS – RetrieveStudy

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6.5.1.2.2 Bulk Data Response

- Content-Type:
 - multipart/related; type=application/octet-stream; boundary={MessageBoundary}
 - multipart/related; type={MediaType}; boundary={MessageBoundary}
 - The entire multipart response contains all bulk data for the specified Study that can be converted to one of the requested media types.
 - Each item in the response is one of:
 - an uncompressed bulk data element encoded in Little Endian binary format with the following headers:
 - Content-Type: application/octet-stream
 - Content-Location: {BulkDataURLURI}
 - a compressed bulk data element from a SOP Instance in the Study encoded in a single-frame compression {MediaType} with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}
 - a compressed frame from a multi-frame SOP Instance in the Study encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameNumber}
- Note
- Each frame will come in a separate part.
- a set of compressed frames from a SOP Instance in the Study encoded in a multi-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameList}]

- {FrameList} is a list of frames separated by %2C (comma). It may be omitted if the message part includes all frames for the specified bulk pixel data object.

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6.5.2 WADO-RS - RetrieveSeries

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6.5.2.2 Bulk Data Response

- Content-Type:
 - multipart/related; type= application/octet-stream; boundary={MessageBoundary}
 - multipart/related; type={MediaType}; boundary={MessageBoundary}
- The entire multipart response contains all bulk data for the specified Series that can be converted to one of the requested media types.
- Each item in the response is one of:
 - an uncompressed bulk data element encoded in Little Endian binary format with the following headers:
 - Content-Type: application/octet-stream
 - Content-Location: {BulkDataURLURI}
 - a compressed bulk data element from a SOP Instance in the Series encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}
 - a compressed frame from a multi-frame SOP Instance in the Series encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameNumber}
 - a set of compressed frames from a multi-frame SOP Instance in the Series encoded in a multi-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameList}
 - {FrameList} is a list of frames separated by %2C (comma). It may be omitted if the message part includes all frames for the specified bulk pixel data object.

6.5.3 WADO-RS - RetrieveInstance

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6.5.3.2 Bulk Data Response

- Content-Type:
 - multipart/related; type=application/octet-stream; boundary={MessageBoundary}
 - multipart/related; type={MediaType}; boundary={MessageBoundary}
- The entire multipart response contains all bulk data for the specified Instance that can be converted to one of the requested media types.
- Each item in the response is one of:
 - an uncompressed bulk data element encoded in Little Endian binary format with the following headers:

- Content-Type: application/octet-stream
- Content-Location: {BulkDataURLURI}
- a compressed bulk data element from a SOP Instance encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}
- a compressed frame from a multi-frame SOP Instance encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameNumber}
- a set of compressed frames from a multi-frame SOP Instance encoded in a multi-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameList}
 - {FrameList} is a list of frames separated by %2C (comma). It may be omitted if the message part includes all frames for the specified bulk pixel data object.

6.5.4 WADO-RS - RetrieveFrames

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6.5.4.2.1 Pixel Data Response

- Content-Type:
 - multipart/related; type=application/octet-stream; boundary={MessageBoundary}
 - multipart/related; type={MediaType}; boundary={MessageBoundary}
- The entire multipart response contains all requested Frames for the specified Instance.
- Each item in the response is one of:
 - an uncompressed frame encoded in Little Endian binary format with the following headers:
 - Content-Type: application/octet-stream
 - Content-Location: {BulkDataURLURI}/frames/{FrameNumber}]
 - a compressed frame encoded in a single-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameNumber}
 - a set of compressed frames encoded in a multi-frame media type with the following headers:
 - Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}/frames/{FrameList}
 - {FrameList} is a list of frames separated by %2C (comma). It may be omitted if the message part includes all frames for the specified bulk pixel data object.
- The frames will be returned in the order specified by the Frame List.

6.5.5 WADO-RS - RetrieveBulkdata

This action retrieves the bulk data for a given ~~bulk data URL~~ BulkDataURI. The response is a single bulk data item.

6.5.5.1 Request

The specific Services resource to be used for the RetrieveBulkdata action shall be as follows:

- Resource
 - {BulkDataURLURI}, where
 - {BulkDataURLURI} is the URL of a bulk data element. This may be the URL URI attribute of a BulkData element received in response to a WADO-RS RetrieveMetadataRequest.
 - The server shall always return the same bulk data for a specified BulkDataURLURI if the data is available.
 - If the resource specified by the BulkDataURLURI is not available, the server shall return:
 - 404 - Not Found, if the server expects to be able to return the resource again in the future
 - 410 - Gone, if the server does not expect the resource to be valid in the future
 - The server determines the period of time a BulkDataURLURI resource is available.
- Method
 - GET
- Headers
 - Accept
 - multipart/related; type=application/octet-stream
Specifies that the response can be Little Endian uncompressed bulk data.
 - multipart/related; type={MediaType}
Specifies that the response can be pixel data encoded using a {MediaType} listed in Table 6.5-1 (including parameters).
 - Range
 - See RFC 7230 Section 14.35. If omitted in the request the server shall return the entire bulk data object.

6.5.5.2 Response

The Server shall provide the document(s) indicated in the request. In order to parse the bulk data items it is necessary to also retrieve the metadata for the Study.

The Server shall return the document(s) or an error code when the document(s) cannot be returned. If the server cannot encode the pixel data using any of the requested media types, then an error status shall be returned.

All response formats have a content type of multipart/related with a message boundary separator. The response format depends on the Accept header specified in the request.

6.5.5.2.1 Bulk Data Response

- Content-Type:
 - multipart/related; type=application/octet-stream; boundary={MessageBoundary}
- The single item in the response is one of:
 - an uncompressed bulk data element encoded in Little Endian binary format with the following headers:
 - Content-Type: application/octet-stream
 - Content-Location: {BulkDataURLURI}
 - a compressed bulk data element from a SOP Instance encoded in a single-frame media type with the following headers:

- Content-Type: {MediaType}
 - Content-Location: {BulkDataURLURI}
- If the Range header is specified in the request, the server shall return only the specified bytes of the bulk data object. See RFC 7230 Section 14.35.

6.5.6 WADO-RS - RetrieveMetadata

This action retrieves the DICOM instances presented as the full study metadata with the bulk data removed. The response is metadata for the DICOM attributes.

The full study metadata includes all attributes of the study; however, a RESTful Service is permitted to replace the Value Field of an attribute with a BulkDataURLURI for attributes with Value Representations (VR) of FL, FD, IS, LT, OB, OD, OF, OW, SL, SS, ST, UL, UN, US, and UT. The client can use the BulkDataURLURI with the RetrieveBulkData action to retrieve the original Value Field of that attribute.

Note

1. The server is not required to replace any attribute with a BulkDataURLURI; this is intended to allow the server to provide clients with metadata of a reasonably small size by leaving out large data Value Fields.
2. Attributes with binary Value Fields are encoded as XML Base64 binary values.
3. Some DICOM instances, such as SR documents, may be entirely described in the metadata.

6.8 RS Capabilities Service

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Table 6.8-1. Resources and Methods

Resource	Methods supported (excluding RetrieveCapabilities)	Reference
{SERVICE}	N/A	N/A
...		
{BulkDataURLURI}	RetrieveBulkData	6.8.1.2.2.1