DICOM Correction Proposal

STATUS	Final Text
Date of Last Update	2016/06/21
Person Assigned	Jim Philbin (james.philbin@jhmi.edu)
Submitter Name	Jim Philbin (james.philbin@jhmi.edu)
Submission Date	2015/11/13

Correction Number   CP1583
Log Summary: Define Errors for URI and RS Query Parameters
Name of Standard PS3.18 2017b
Rationale for Correction: The URI and RS query parameters in PS3.18, do not specify error status codes.
Correction Wording:

Update PS3.18, Section 6.1.1.5 as follows:

5 **6.1.1.5   Accept Query Parameter**

The <accept> query parameter is primarily designed for use in hyperlinks (URLs) embedded in documents, where the Accept header field is not accessible. It is similar to the Accept header field, except that it shall not have wildcards (<type>/* or */*).

The <accept> query parameter has the following syntax:

```
10    accept       = accept-name "=" 1#(media-type [weight])
      accept-name  = "%s" quoted-string
```

Note

The "%s" that prefixes the <accept-name> specifies that it is a case sensitive token. See [RFC7405].

Its value is a comma-separated list of one or more <media-type>s, possibly including parameters. It shall
15 be supported by the origin server. It is optional for the user agent.

The <accept-name> of the <accept> query parameter is defined by the Service. It is case-sensitive. Table 6.1.1-4 contains the <accept-name> of the <accept> query parameter for some services.

Table 6.1.1-4: <accept> Query Parameter Name by Service

Service	Name
URI	`accept-name = "contentType"`
WS	`not applicable`
RS	`accept-name = "accept"`

The <accept> query parameter should not be used when the user agent can specify the values in the
20 Accept header field.

All media types present in an <accept> query parameter shall be compatible with a media range in the Accept header field, either explicitly or implicitly through wildcards.

Note:

For example, the presence of image/jpeg in the <accept> query parameter will require the Accept header field to
25   include one of the following values: image/jpeg, image/*, or */*.

See Section 6.1.4.

6.1.1.6   Accept Header Field

The Accept header field is used to specify media ranges acceptable to the user agent. It has the
following syntax:

```
Accept = 1#(media-range [weight])
```

35   Where,

```
media-range = media-type
            / type "/" "*" parameters
            / "*/*" parameters
parameters ; See Section 6.1.1
```

40   The Accept header field shall be present. Its value shall be a comma-separated list of one or more media
ranges acceptable in the response. See [RFC7231, Section 5.3.2
<https://tools.ietf.org/html/rfc7231#section-5.3.2>].

A media range is either a media-type or a wildcard. Wildcards use the asterisk ("*") to group media types
into ranges, with <type>/* indicating all subtypes of that type, and */* indicating all media types from the
45   target's Resource's Category.

For example, the media range "image/*" matches "image/jpeg", which is the default media type for the
Single Frame Image Resource Category, and "text/*" matches "text/html", which is the default media type
for the Text Resource Category. The "*/*" media range matches the default media type for the target's
Resource Category.

50   If the origin server receives a request without an Accept header field, but that might have a response
payload, it shall return a 406 (Not Acceptable).

Any Accept header field values that are not valid or not supported shall be ignored.

55   ### 6.1.2.1   Acceptable Character Sets

The term Acceptable Character Sets denotes the character sets that are acceptable to the user agent in
the response. The Acceptable Character Sets are those specified in:

- the "charset" media type parameter
- the <character-set> query parameter
60   - the Accept-Charset header field
- the default character set for the media type, if any

When the **Aa**cceptable **Cc**haracter **Ss**ets contains a list of one or more Defined Terms they should be
ordered as specified in PS3.3, Section C.12.1.1.2, and PS3.5, Section 6.1.2.3. This is especially
important for ISO 2022 character sets.

65 **Any Accept-Charset header field values that are not defined in Annex D or not supported shall be ignored.**

Update PS3.18, Section 6.1.2.2 as follows:

6.1.2.2 Character Set Query Parameter

70 The <character-set> query parameter is primarily designed for use in hyperlinks (URLs) embedded in documents, where the Accept-Charset header field is not accessible.

The <character-set> query parameter has the following syntax:

```
character-set = name "=" 1#(charset [weight])
```

The <character-set> query parameter value is a comma-separated list of one or more <charset>s. It is
75 similar to the Accept-Charset header field, except that it shall not have wildcards. It shall be supported by the origin server. It is optional for the user agent.

All <charset>s present in the <character-set> query parameter may have a corresponding character set in the Accept-Charset header field, either explicitly or implicitly through wildcards.

The <name> of the <character-set> query parameter is defined by the Service. Table 6.1.2-1 contains
80 the names of the <character-set> query parameter for some services.

Table 6.1.2-1: <character-set> Query Parameter Name by Service

Service	Name
URI	name = "charset"
WS	not applicable
RS Studies	name = "charset"

If this parameter has a value that is not supported it shall be ignored.

See Section 6.1.4.

---

85 *Update PS3.18, Section 6.1.2.3 as follows:*

6.1.2.3 Accept-Charset Header Field

The Accept-Charset header field has the following syntax:

```
Accept-Charset = 1#(charset [weight]) / ("*" [weight])
```

The user agent may provide a list of Acceptable Character Sets in the Accept-Charset header field of the
90 request. Its value is a comma-separated list of one or more <charset>s and/or the wildcard value ("*"). It shall be supported by the origin server. It is optional for the user agent.

The values of the Accept-Charset header field values are prioritized by their <weight> parameter.

If no wildcard ("*") is present, then any character sets not explicitly mentioned in the header field are considered "not acceptable" to the client.

95 A request without an Accept-Charset header field implies that the user agent will accept any charset in response.

If the media type defines a "charset" parameter, it should be included with the media type in the Accept header field, rather than in the Accept-Charset header field.

Any Accept-Charset header field values that are not supported shall be ignored.

100

6.1.4 Query Parameters

[RFC3986] does not permit an empty query component, i.e., if the "?" appears in the Target URI, then there shall be at least one Query Parameter in the URI.

105 The origin server may define and support additional Query Parameters, or additional Query Parameter values for an existing Query Parameter. If an origin server defines new or extends existing Query Parameters, they shall be included in the Conformance Statement and, if the service supports it, the Retrieve Capabilities response.

The origin server shall ignore any unsupported Query Parameters. The origin server shall process the
110 request as if the unsupported parameters were not present, and should include a payload containing an appropriate warning or error message.

If a supported Query Parameter has an invalid value, the origin server shall return a 400 (Bad Request) error response, and should include should include a payload containing an appropriate warning or error message.

115

~~6.2.3 List of Character Sets Supported in the Response~~ Reserved

~~The "Accept-charset" field of the GET method request shall specify the character set of the object to be~~
~~retrieved. If the "Accept-charset" field of the GET method is not present, or the Web Enabled DICOM Server~~
120 ~~does not support the specified character set, the character set of the response will be at the discretion of the~~
~~Web Enabled DICOM Server.~~

~~Note Typically the user of a Web Client does not have control over the "Accept-charset" field. An optional~~
~~parameter specifies the character set to be used in the returned object.~~

125

6.2.2.1 Query Parameters

See Section 6.1.4.

130

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

135 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
140 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.

145 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 BulkDataURI.

150 6. RetrieveMetadata

This action retrieves the DICOM instances presented as the study, series, or instance metadata with the bulk data removed.

WADO-RS requests may contain the following query parameters:

• "accept" The <accept> query parameter is specified in Section 6.1.1.5. The syntax is:

155

```
accept = "accept=" 1#media-type
```

• "charset" The <character-set> query parameter is specified in Section 6.1.2.2. The syntax is:

160
```
character-set = "charset" = 1#charset
```

WADO-RS requests shall include an "Accept" header field (see Section 6.1.1.6) specifying the Acceptable Media Types.

WADO-RS requests may optionally support the "Accept-Charset" header field. See Section 6.1.2.3.

165

See Section 6.1.4.

Update Section 6.5.8.1.2 as follows:

6.5.8 WADO-RS - Retrieve Rendered Transaction

...

170 **6.5.8.1.2 Query Parameters**

The query parameters defined in this section specify various rendering transformations to be applied to the images and video contained in the target resource.

The origin server shall support all of the query parameters defined in this section. An origin server may define additional parameters. If additional parameters are defined, they shall be documented in the Conformance Statement 175 and in the Retrieve Capabilities response. The origin server shall ignore any unknown parameters.

The following rules pertain to all parameters defined in this section:

1. All parameters are optional for the user agent.

2. All parameters are required to be supported by the origin server.

3. These parameters only apply to resources that are images and video.

180 4. Instances that are not images will be rendered in an Acceptable Media Type, if one exists; otherwise, they will not be rendered.

5. The set of transformations specified by the parameters in this section shall be applied to the images as if they were a Presentation State, that is, in the order specified by the applicable image rendering pipeline specified in PS 3.4.

185

See Section 6.1.4.

Update Section 6.5.8.1.2.1 as follows:

6.5.8.1.2.1   Image Annotation

190   The annotation parameter specifies that the rendered images shall be annotated with patient and/or procedure information. Its value is a comma-separated list of one or more keywords. It has the following syntax:

```
%s"annotation=" 1#( %s"patient" / %s"technique" )
```

Where

195   `"patient"`   Indicates that the rendered images shall be annotated with patient information (e.g., patient name, birth date, etc.).

`"technique"`   Indicates that the rendered images shall be annotated with information about the procedure that was performed (e.g., image number, study date, image position, etc.).

200   When this parameter is not present, no annotations shall be applied.

The origin server shall apply the annotations after all other parameters have been applied.

The origin server may support additional keywords, which should be included in the Conformance Statement and the Retrieve Capabilities response.

The origin server shall ignore any unsupported parameter values.

205   Note

1. The exact nature and presentation of the annotation is determined by the origin server. The annotation is burned into the rendered image pixels.

2. A user agent wanting more control over annotations may retrieve an image, omitting the "annotation" parameter; and separately retrieve the metadata; and create customized annotations on the image.

210   Update Section 6.5.8.1.2.2 as follows:

6.5.8.1.2.2   Image Quality

The "quality" parameter specifies the requested quality of the rendered images. It has the following syntax:

```
%s"quality=" integer
```

215   Where

`integer`   is an unsigned integer between 1 and 100 inclusive, with 100 being the best quality.

If the value of this parameter is less than 1 or greater than 100, the response shall be a 400 (Bad Request), and should include a payload containing an appropriate error message.

The "quality" parameter is only supported for media types that allow lossy compression.

220   Note:

1. Decompression and re-compression may degrade the image quality if the original image was already irreversibly compressed. If the image has been already lossy compressed using the same format as required (e.g., jpeg), it may be sent as it is without decompressing and re-compressing it.

2. The specific interpretation of the meaning of this parameter is determined by the origin server.

225

Update Section 6.5.8.1.2.3 as follows:

6.5.8.1.2.3   Scaling a Region of a Source Image(s) to a Viewport

The "viewport" parameter specifies a rectangular region of the source image(s) to be cropped, and a rectangular region corresponding to the size of the user agent's viewport to which the cropped image
230   should be scaled.

If the target resource is a Presentation State Instance, the syntax for this parameter is:

    %s"viewport=" vw "," vh

Otherwise it is:

    %s"viewport=" vw "," vh ["," [sx] "," [sy] "," [sw] "," [sh]]

235   Where

vw and vh   Are positive integers specifing the width and height, in pixels, of the rendered image.

sx and sy   Are decimal numbers whose absolute values specify, in pixels, the top-left corner of the region of the source image(s) to be rendered. If either <sx> or <sy> is not specified it defaults to 0.

240   sw and sh   Are decimal numbers whose absolute values specify, in pixels, the width and height of the region of the source image(s) to be rendered. If <sw> is not specified, the origin server shall render to the right edge of the source image. If <sh> is not specified, the origin server shall render to the bottom edge of the source image. If <sw> is a negative value, the image is flipped horizontally. If <sh> is a negative value, the image is flipped
245   vertically.

The source image region parameters (sx, sy, sw, and sh) shall not be present when rendering a Presentation State Instance. If they are present the origin server shall return a **400 (Bad Request).**

The origin server shall first crop, if specified, then scale the source images, maintaining their original aspect ratio, until either the rendered image width is the same as the viewport width or the image height is
250   the same as the viewport height, whichever avoids truncation. In other words, viewport scaling makes the image(s) as large as possible, within the viewport, without overflowing the viewport area and without distorting the image.

If any of the optional parameter values are not present the default value shall be used. Individual values may be elided, but the commas between the values shall be present. For example:

255   viewport=512,512,,,512,512

The missing <sx> and <sy> parameter values shall default to 0.

If trailing values are elided, then the trailing commas shall be omitted. For example:

    viewport=1024,1024

The missing <sx>, <sy>, <sw>, <sh> will have their default values, which means the image(s) will not be
260   cropped, and the full image will be rendered.

If the viewport parameter is not present, the rendered image(s) shall not be scaled, i.e., the rendered image(s) shall contain the same sized pixel matrix as the source DICOM image.

If this parameter specifies an ill-defined source region or viewport, the origin server shall return a 400 (Bad Request) response, and should include a payload containing an appropriate error
265   **message.**

Note

The default values for <sx> and <sy> differ from the defaults in the Specified Displayed Area in Presentation States, which uses integer values with the top left corner being (1,1). See PS3.3 Section C.10.4.

270 | Update Section 6.5.8.1.2.4 as follows:

6.5.8.1.2.4   Windowing

The "window" parameter controls the windowing of the images as defined in PS3.3 Section C.8.11.3.1.5. It has the following syntax:

```
%s"window=" center "," width "," function
```

275 Where

center   is a decimal number containing the window-center value

width   is a decimal number containing the window-width value

function   is one of the following keywords: "linear", "linear-exact", or "sigmoid".

Note:

These correspond to the differently capitalized and punctuated values of VOI LUT Function (0028,1056). See PS3.3 Section C.11.2.1.2.

~~All three parameter values are required.~~

280 **All three parameter shall be present with valid values.**

If any of the parameter values are missing or invalid, the origin server shall return a 400 (Bad Request) response, and should include a payload containing an appropriate error message.

If the target resource is a Presentation State, this parameter shall not be used. If this parameter is present when the target resource is a Presentation state, the origin server shall return a ~~409~~

285 ~~(Conflict)~~**400 (Bad Request)**.

Update Section 6.5.8.2.1 as follows:

6.5.8.2.1   Presentation State Instance

If the target resource is a Presentation State Instance, that instance may contain references to one or
290 more series, each of which may contain one or more instances, each of which may contain one or more frames. The response shall return rendered versions of all supported Instances and frames referenced by the Presentation State Instance.

For example, if the Presentation State instance references a multi-frame image, then the response will contain all frames specified by the target resource, or if the Presentation State instance references a
295 series, then the response will contain all instances contained in that series.

If the target resource is a Presentation State Instance, then only the Charset, Annotation, Quality, and Viewport parameters may also be present. If any other Retrieve Rendered Transaction Query Parameters are present the response shall be 400 (Bad Request), and should include a payload containing an appropriate error message.

300 **…**

Append the following at the end of Section 6.7.1.1:

See Section 6.1.4.