DICOM Change Proposal

STATUS	Assigned
Date of Last Update	28 July 2025
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Change Number	CP-2473
Log Summary: Clarify HTTP response codes for zero result in Search Transaction	
Name of Standard PS3.18	

Rationale for Change:

During the EU 2024 Connectathon, inconsistencies were observed in HTTP response codes for QIDO-RS [RAD-129] Query responses with zero results.

In the current standard, PS3.18 Section 8.3.4.4.1 mandates a 204 (No Content) response with an empty payload when no matches are found. This contradicts RFC 9110, which states in Section 15.3.5 that a 204 response must contain no content or trailers. In contrast, RFC 9110 Section 15.3.1 clarifies that a 200 (OK) response may include a zero-length payload, making it more appropriate for indicating a successful query with no matches.

This behavior is also inconsistent with related specifications:

- DIMSE C-FIND (PS3.4, Table C.4-1 and Section C.4.1.3.2.2) defines "Success" for completed queries with zero results.

- IHE ITI PDQm [ITI-78] Case 3 explicitly requires a 200 (OK) response with an empty payload when no matches are found.

Prior to the DICOMweb re-documentation effort, only 200 (OK) was required in this case.

This CP aligns DICOMweb behavior with both HTTP semantics (RFC 9110) and existing DICOM and IHE conventions, and improves interoperability between client and server implementations.

Change Wording:

Modify PS3.18, 8.3.4.4.1 Paging Behavior is, as follows:

8.3.4.4.1 Paging Behavior

The search requests shall be idempotent, that is, two separate search requests with the same Target Resource, Query Parameters, and header fields shall return the same ordered list of matches, if the set of matches on the origin server has not changed.

Given the following definitions:

offset   the value of the "offset" query parameter.

limit   the value of the "limit" query parameter. For a Repository Query, this is the value of Maximum Number of Records (0008,0429).

`maxResults` the maximum number of results the origin server allows in a single response (i.e., system limit).

`matches` the number of matches resulting from the search. If Prior Record Key (0008,041C) is provided in the query, then the value will be the number of matches after the record identified by the attribute value.

`results` the number of results returned in the response. It is equal to the minimum of:

- The maximum of zero and the value of matches - offset

- The value of maxResults

- The value of limit

`remaining` the number of matches that were not yet returned.

The results returned in the response are determined as follows:

- If (results <= 0) then there are no matches, and a ~~204 (No Content)~~**200 (OK)** response shall be returned with an empty payload. **When the Acceptable Media Type is application/dicom+json, the empty payload shall be encoded as an empty JSON array ([]). When the Acceptable Media Type is application/dicom+xml, the empty payload shall be encoded as an empty NativeDicomModel root element.**

  Note

    Previous versions of the Standard specified a 204 (No Content) response when there were no matches. The 200 (OK) response with an empty payload is consistent with other DICOMweb services and with [RFC 9110], which recommends using 200 when the response semantics include a payload, even if empty.

- Otherwise, a 200 (OK) response shall be returned with a payload containing the results.

- If (remaining > 0) the response shall include a Warning header field (see [RFC7234] Section 5.5) containing the following:

  ```
  Warning: 299 <service>: There are <remaining> additional results that can be requested
  ```

The response may include a payload containing an appropriate Status Report.

If the set of matching results has changed due to changes in the origin server contents, then the ordered list of results may be different for subsequent transactions with identical requests, and the results of using the "offset" and "limit" parameters may be inconsistent.

Modify PS3.18, 10.6.3.1 Status Codes, within 10.6 Search Transaction, as follows:

10.6.3.1 Status Codes

Table 10.6.3-1 shows some common status codes corresponding to this transaction. See also Section 8.5 for additional status codes.

Table 10.6.3-1. Status Code Meaning

Status	Code	Meaning
Success	200 (OK)	The search completed successfully, and the results are contained in the payload. If there are additional results available or there are warnings the Warning header field shall contain a URL referencing a Search Status report. **This status code may also be used to indicate a successful search that yields zero results, in which case the payload shall include an empty list of results.**
	~~204 (No Content)~~	~~The search completed successfully, but there were zero results.~~

Status	Code	Meaning
Failure	400 (Bad Request)	The was a problem with the request. For example, the Query Parameter syntax is incorrect.
	413 (Payload Too Large)	The search was too broad, and the body of the response should contain a Status Report with additional information about the failure.

10.6.3.2 Response Header Fields

The origin server shall support header fields as required in Table 10.6.3-2.

Table 10.6.3-2. Response Header Fields

Name	Value	Origin Server Usage	Description
Content-Type	media-type	C	The DICOM Media Type of the response payload Shall be present if the response has a payload
Content-Length	uint	C	Shall be present if no transfer coding has been applied to the payload
Transfer-Encoding	encoding	C	Shall be present if a transfer encoding has been applied to the payload

10.6.3.3 Response Payload

A success response shall contain a list of matching results in an Acceptable Media Type. See Section 8.7.4.

If (results = 0) then there are no matches, and a 200 (OK) response shall be returned with an empty payload.

A failure response payload may contain a Status Report describing any failures, warnings, or other useful information.

Add RFC9110 to 2.2 Internet Engineering Task Force (IETF) and Internet Assigned Names Authority (IANA), as follows:

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[RFC9110] IETF. June 2022. HTTP Semantics. http://tools.ietf.org/html/rfc9110 .

> **Kommentiert [SN1]:** Also in cp2292