Correction Number CP-1934

Log Summary: QIDO Timezone Offset From UTC handling

Name of Standard
PS3.18

Rationale for Correction:

Timezone Offset From UTC attribute is included in Study, Series and Instance response tables, with a "Shall be present if known" condition, and without recognition that the timezone is "special" in that it may be used in the request to specify the timezone of matching keys (i.e., it is not matched itself).

Also, Timezone Offset From UTC cannot be specified as an ordinary return key at the Study and Series levels, since that would be inconsistent with the level of encoding in Composite objects, in which Timezone Offset From UTC is specified in the SOP Common Module, i.e., it may be different in different instances.

Currently there is no special behavior for use of the Timezone Offset From UTC to specify the interpretation of date and time in the response (as distinct from the request matching rule language), as there is for C-FIND in PS3.4.

Either:

• remove them from the "incorrect" levels
• change the condition to say "and the same value for all instances" (burdensome to check)
• add PS3.4-like "affects interpretation" like language rather than treating them as ordinary return keys; this is the proposed solution

[Ed.Note: Is there a need to address the PS3.4 Timezone query adjustment extended negotiation?]

[Ed.Note: Similar issues probably exist for Specific Character Set wrt. interpreting query parameters/response vs. ordinary return key.]

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

8.3.4.1 Attribute Matching

... 

8.3.4.1.1 Matching Rules

The matching semantics for each attribute are determined by the types of matching allowed by C-FIND. See ????.

Matching results shall be generated according to the Hierarchical Search Method described in ????.

Combined date-time matching shall be performed as specified in ????.

Note

If an origin server is acting as a proxy for a C-FIND SCP that does not support combined date-time matching, it shall perform a C-FIND request using only the date and filter any results that are outside the time range before returning a response.

If the Timezone Offset From UTC (0008,0201) Attribute is specified in the request, dates and times in the request are to be interpreted in the specified time zone. See ????.

10.6.1.2 Query Parameters

... 

10.6.1.2.1 Attribute/Value Pair Requirements

DICOM Attribute/Value pairs included as Query Parameters in the request shall satisfy the requirements in Section 8.3.4.1.

The user agent may include the following Attributes in the request:

• ... 

• Timezone Offset From UTC (0008,0201)

... 

10.6.3.3 Response Payload

10.6.3.3.1 Study Resource

For each matching Study, the origin server response shall contain Attributes in accordance with Table 10.6.3-3. The "Type" column in the table below refers to the Query/Retrieve Attribute Types defined in ????. The unique key for a Study resource Search response is the Study Instance UID (0020,000D).

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Type</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Character Set</td>
<td>(0008,0005)</td>
<td>C</td>
<td>Shall be present if known</td>
</tr>
<tr>
<td>Study Date</td>
<td>(0008,0020)</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Study Time</td>
<td>(0008,0030)</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timezone Offset From UTC</td>
<td>(0008,0201)</td>
<td>C</td>
<td>Shall be present if known any Attributes of time are to be interpreted explicitly in the designated local time zone</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note

While some of the above Attributes are optional in ????, they are consistent with those required in ??? Table 4.14-1.

In addition, the response shall contain:

- All other Study level Attributes passed as match or includefield parameters in the request that are supported by the origin server.
- If the includefield parameter has been specified in the request, and its value is "all", all available Study Level Attributes.

Series or Instance Level Attributes contained in includefield parameters shall not be returned.

10.6.3.3.2 Series Resources

For each matching Series, the origin server shall return all Attributes listed in Table 10.6.3-4. The "Type" column in the table below refers to the Query/Retrieve Attribute Types defined in ????. The unique key for a Series resource Search response is the Series Instance UID (00020,000E).

### Table 10.6.3-4. Series Resources Search Response Payload

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Type</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Character Set</td>
<td>(0008,0005)</td>
<td>C</td>
<td>Shall be present if known</td>
</tr>
<tr>
<td>Modality</td>
<td>(0008,0060)</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Timezone Offset From UTC</td>
<td>(0008,0201)</td>
<td>C</td>
<td>Shall be present if known any Attributes of time are to be interpreted explicitly in the designated local time zone</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

While some of the above Attributes are optional in ????, they are consistent with those required in ??? Table 4.14-1.

In addition, the response shall contain:

- All other Series Level Attributes passed as match Query Parameters, or Series or Study Level Attributes passed as includefield parameters in the request that are supported by the origin server.
- If the "includefield" parameter has been specified in the request and its value is "all", include all available Series Level Attributes.
- If the Target Resource is All Series, then include all Study Level Attributes specified in Section 10.6.3.3.1.

Instance Level Attributes contained in includefield parameters shall not be returned.

10.6.3.3.3 Instance Resources

For each matching Instance, the origin server shall return all Attributes listed in Table 10.6.3-5, if present in the Instance. The Type column in the table below refers to the Query/Retrieve Attribute Types defined in ????. The unique key for an Instance resource search response is the SOP Instance UID (0008,0018).

### Table 10.6.3-5. Instance Resources Search Response Payload

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Type</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Character Set</td>
<td>(0008,0005)</td>
<td>C</td>
<td>Shall be present if known</td>
</tr>
<tr>
<td>SOP Class UID</td>
<td>(0008,0016)</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>SOP Instance UID</td>
<td>(0008,0018)</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Instance Availability</td>
<td>(0008,0056)</td>
<td>C</td>
<td>Shall be present if known</td>
</tr>
<tr>
<td>Attribute Name</td>
<td>Tag</td>
<td>Type</td>
<td>Condition</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------</td>
<td>------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Timezone Offset From UTC</td>
<td>(0008,0201)</td>
<td>C</td>
<td>Shall be present if known any Attributes of time are to be interpreted explicitly in the designated local time zone</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

While some of the above Attributes in are optional in ????, they are consistent with the those required in ??? Table 4.14-1.

In addition, the response shall contain:

- All other Instance Level Attributes passed as match parameters, or Study, Series, or Instance Level Attributes passed as includefield parameters that are supported by the origin server.
- If the "includefield" parameter has been specified in the request and its value is "all", Attribute include all available Instance Level Attributes.
- If the Target Resource is All Instances, then include all Study level Attributes specified in Section 10.6.3.3.1.
- If the Target Resource is All Instances or Study's Instances, then include all Series level Attributes specified in Section 10.6.3.3.2.

For reference DICOM PS3.4:

**C.2.2.2 Attribute Matching**

...  

The Timezone Offset From UTC (0008,0201) Attribute may be present in the Identifier but is not matched if Timezone query adjustment is negotiated. If Timezone query adjustment is negotiated, it specifies how Attribute values of VR of DT and TM (including related Attribute values of VR of DA, if present) are interpreted in the Request and Response Identifiers if those values lack a specific timezone offset specification.

**C.2.2.2.1 Single Value Matching**

...  

**C.2.2.2.1.3 Attributes of VR of DA, DT or TM**

If the Timezone Offset From UTC (0008,0201) Attribute is present in the Identifier and Timezone query adjustment was negotiated, it shall be used to adjust values of Attributes of VR of TM (and associated Attributes of VR of DA, if present) from the local timezone to UTC. It shall also adjust values of Attributes of VR of DT that do not specify a timezone offset. The encoding and semantics of the Timezone Offset From UTC (0008,0201) Attribute shall be as defined in the SOP Common Module in ????.

The manner in which matching is performed is implementation dependent and shall be specified in the conformance statement.

**Note**

1. This definition implies that values of VR of TM, DA and DT are matched by their meaning, not as literal strings. For example:
   - the DT "19980128103000.0000" matches "19980128103000"
   - the DT "19980128103000" with no timezone offset matches "19980128073000" with timezone offset "+0300"
   - the TM "2230" matches "223000"

2. If an application is concerned about how Single Value Matching of dates and times is performed by another application, it may consider using Range Matching instead, which is always performed by meaning, with both values in the range the same.
3. Exclusion of the "-" character for Single Value Matching implies that a Key Attribute with a VR of DT may not contain a negative offset from Universal Coordinated Time (UTC) if Single Value Matching is intended. Use of the "-" character in values of VR of TM, DA and DT indicates Range Matching.

4. If an application is in a local time zone that has a negative offset then it cannot perform Single Value Matching using a local time notation. Instead, it can convert the Key Attribute value to UTC and use an explicit suffix of "+0000".

C.2.2.2.5 Range Matching

C.2.2.2.5.1 Range Matching of Attributes of VR of DA

In the absence of extended negotiation, then:

a. A string of the form "<date1> - <date2>", where <date1> is less or equal to <date2>, shall match all occurrences of dates that fall between <date1> and <date2> inclusive

b. A string of the form "- <date1>" shall match all occurrences of dates prior to and including <date1>

c. A string of the form "<date1> -" shall match all occurrences of <date1> and subsequent dates

C.2.2.2.5.2 Range Matching of Attributes of VR of TM

All comparison specified in the following shall be based on a direct comparison of times within a day. "Prior" includes all times starting from midnight of the same day to the specified time. "Subsequent" includes all times starting with the specified time until any time prior to midnight of the following day. Range matching crossing midnight is not supported.

No offset from Universal Coordinated Time is permitted in the TM VR values. If Timezone Offset From UTC (0008,0201) is present in the query identifier, the specified time values and the definition of midnight are in the specified timezone.

In the absence of extended negotiation, then:

a. A string of the form "<time1> - <time2>", where <time1> is less or equal to <time2>, shall match all occurrences of times that fall between <time1> and <time2> inclusive

b. A string of the form "- <time1>" shall match all occurrences of times prior to and including <time1>

c. A string of the form "<time1> -" shall match all occurrences of <time1> and subsequent times

C.2.2.2.5.3 Range Matching of Attributes of VR of DT

a. A string of the form "<datetime1> - <datetime2>", where <datetime1> is less or equal to <datetime2>, shall match all moments in time that fall between <datetime1> and <datetime2> inclusive

b. A string of the form "- <datetime1>" shall match all moments in time prior to and including <datetime1>

c. A string of the form "<datetime1> -" shall match all moments in time subsequent to and including <datetime1>

d. The offset from Universal Coordinated Time, if present in the Value of the Attribute, shall be taken into account for the purposes of the match.

C.2.2.2.5.4 Range Matching General Rules

If extended negotiation of combined datetime matching is successful, then a pair of Attributes that are of VR DA and TM, both of which specify the same form of Range Matching, shall have the concatenated string values of each Range Matching component matched as if they were a single Attribute of VR DT.

Note

For example, a Study Date of "20060705-20060707" and a Study Time of "1000-1800" will match the time period of July 5, 10am until July 7, 6pm, rather than the three time periods of 10am until 6pm on each of July 5, July 6 and July 7, as would be the case without extended negotiation.
Regardless of other extended negotiation, an application may use the value of Timezone Offset From UTC (0008,0201) to adjust values of Attributes of VR TM and DT from the local timezone to UTC for matching. See Section C.2.2.2.1.

Note
If extended negotiation of combined datetime matching is successful, the timezone offset may effect a change in date if the local time and UTC are on different sides of midnight.

Range matching is not defined for types of Attributes other than dates and times.

C.4.1.1.3 Identifier
Both the C-FIND request and response contain an Identifier encoded as a Data Set (see ????).

Note
The definition of a Data Set in ???? specifically excludes the range of groups below group 0008, and this includes in particular Meta Information Header elements such as Transfer Syntax UID (0002,0010). The C-FIND request and identifier do not support a mechanism for ascertaining the manner in which an SCP might have encoded a stored image whether it be by requesting Transfer Syntax UID (0002,0010) or by any other mechanism.

C.4.1.1.3.1 Request Identifier Structure
An Identifier in a C-FIND request shall contain:

• ...

• Conditionally, the Attribute Specific Character Set (0008,0005). This Attribute shall be included if expanded or replacement character sets may be used in any of the Attributes in the Request Identifier. It shall not be included otherwise.

• Conditionally, the Attribute Timezone Offset From UTC (0008,0201). This Attribute shall be included if Key Attributes of time are to be interpreted explicitly in the designated local time zone. It shall not be present otherwise, i.e., it shall not be sent with a zero-length value.

...

C.4.1.1.3.2 Response Identifier Structure
The C-FIND response shall not contain Attributes that were not in the request or specified in this section.

An Identifier in a C-FIND response shall contain:

• ...

• Conditionally, the Attribute Specific Character Set (0008,0005). This Attribute shall be included if expanded or replacement character sets may be used in any of the Attributes in the Response Identifier. It shall not be included otherwise. The C-FIND SCP is not required to return responses in the Specific Character Set requested by the SCU if that character set is not supported by the SCP. The SCP may return responses with a different Specific Character Set.

• Conditionally, the Attribute Timezone Offset From UTC (0008,0201). This Attribute shall be included if any Attributes of time in the Response Identifier are to be interpreted explicitly in the designated local time zone. It shall not be present otherwise, i.e., it shall not be sent with a zero-length value.