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**CalDAV: Time Zones by Reference**  
**draft-ietf-tzdist-caldav-timezone-ref-03**

Abstract

This document defines an extension to the CalDAV calendar access protocol to allow clients and servers to exchange iCalendar data without the need to send full time zone data.

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## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Conventions Used in This Document . . . . .	<a href="#">3</a>
<a href="#">3.</a>	Time Zones by Reference . . . . .	<a href="#">3</a>
<a href="#">3.1.</a>	New Server Behavior . . . . .	<a href="#">3</a>
<a href="#">4.</a>	New Client Behavior . . . . .	<a href="#">7</a>
<a href="#">5.</a>	New WebDAV Properties . . . . .	<a href="#">8</a>
<a href="#">5.1.</a>	CALDAV:timezone-service-set . . . . .	<a href="#">8</a>
<a href="#">5.2.</a>	CALDAV:calendar-timezone-id . . . . .	<a href="#">8</a>
<a href="#">6.</a>	XML Element Definitions . . . . .	<a href="#">9</a>
<a href="#">6.1.</a>	CALDAV:calendar-query XML Element . . . . .	<a href="#">9</a>
<a href="#">6.2.</a>	CALDAV:timezone-id XML Element . . . . .	<a href="#">9</a>
<a href="#">7.</a>	Security Considerations . . . . .	<a href="#">10</a>
<a href="#">8.</a>	IANA Considerations . . . . .	<a href="#">10</a>
<a href="#">9.</a>	Acknowledgments . . . . .	<a href="#">10</a>
<a href="#">10.</a>	References . . . . .	<a href="#">10</a>
<a href="#">10.1.</a>	Normative References . . . . .	<a href="#">10</a>
<a href="#">10.2.</a>	Informative References . . . . .	<a href="#">11</a>
<a href="#">Appendix A.</a>	Change History (To be removed by RFC Editor before publication) . . . . .	<a href="#">11</a>
	Author's Address . . . . .	<a href="#">12</a>

**[1.](#) Introduction**

The CalDAV [[RFC4791](#)] Calendar Access protocol allows clients to access calendar data stored on a server in the iCalendar [[RFC5545](#)] data format. In iCalendar, calendar data that uses local time in any of its date and/or time values is specified as a date-time value in combination with a time zone identifier ("TZID" property parameter). The time zone identifier refers to a time zone definition (a "VTIMEZONE" component) that has all of the rules required to determine local time UTC offsets for the corresponding time zone. In many cases, these "VTIMEZONE" components can be larger, octet-wise, than the events or tasks which make use of them. However, iCalendar currently requires all iCalendar objects ("VCALENDAR" components) that refer to a time zone via its identifier to also include the corresponding "VTIMEZONE" component. This leads to inefficiencies in the CalDAV protocol because large amounts of "VTIMEZONE" data are continuously being exchanged, and for the most part these time zone definitions are unchanging. This is of particular problem to mobile or limited devices, with limited network bandwidth, cpu processing, and power constraints.

A set of standard time zone definitions are available at the IANA hosted time zone database [[RFC6557](#)]. That database provides the "raw" data for time zone definitions, and those can be converted into iCalendar "VTIMEZONE" components for use in iCalendar applications,

Daboo

Expires December 14, 2015

[Page 2]

as well as converted into other formats for use by other applications (e.g., "zoneinfo" files often found on Unix-based operating systems). A new Time Zone Data Distribution Service [[I-D.ietf-tzdist-service](#)] protocol is available that allows iCalendar applications to retrieve these standard time zone definitions in a timely and accurate fashion, instead of relying on possibly infrequent system updates of time zone data that frequently result in mismatched calendar data and resulting missed meetings between calendar users. Another benefit of the Time Zone Data Distribution Service is that it provides a single "reference" for standard time zone data that CalDAV clients and servers can make use of to "agree" on standard time zone definitions, and thus eliminate the need to exchange the data for those.

This specification defines a new mode of operation for CalDAV clients and servers which allow them to exchange iCalendar data without the need to send "VTIMEZONE" components for known, standard time zone definitions. This can significantly reduce the amount of data that needs to be sent between client and server, giving rise to performance and efficiency improvements for each of them.

## **[2.](#) Conventions Used in This Document**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

Other notations used in this memo follow the notations of [[RFC4791](#)].

## **[3.](#) Time Zones by Reference**

Note that this specification only defines changes to iCalendar data sent or received via the CalDAV protocol (both [[RFC4791](#)] and [[RFC6638](#)], and extensions). These changes do not apply to other means of exchanging calendar data, such as iTIP [[RFC5546](#)] based scheduling mechanisms (e.g., iMIP [[RFC6047](#)]), or other methods.

### **[3.1.](#) New Server Behavior**

#### **[3.1.1.](#) Server Advertised Capability**

A server that supports this specification MUST include "calendar-no-timezone" as a field in the DAV response header from an OPTIONS request on a calendar home collection (see [Section 6.2.1 of \[\[RFC4791\]\(#\)\]](#)) or calendar collection (see [Section 4.2 of \[\[RFC4791\]\(#\)\]](#)). Clients MUST check for the presence of that field in the DAV response header before changing their behavior as per [Section 4](#).

Daboo

Expires December 14, 2015

[Page 3]

### **3.1.2. Associated Time Zone Data Distribution Service**

A CalDAV server supporting this specification **MUST** have one or more associated time zone distribution services [[I-D.ietf-tzdist-service](#)] that provide data for the set of time zones known to the server and expected to be used by clients. A CalDAV server advertises the set of time zone distribution services it makes use of via a CALDAV:timezone-service-set WebDAV property (see [Section 5.1](#)) defined on calendar home collections. Clients can use the time zone data distribution services listed in this property to fetch current time zone definitions for the time zone identifiers in iCalendar data retrieved from the server. This allows clients to keep their "built-in" time zone definitions up to date. It also allows clients to use an "on-demand" model for populating their local time zone definition cache, only fetching a time zone definition when it is first seen in calendar data, potentially allowing for savings on storage space by eliminating the need to store time zone data that is not currently being used.

When making use of the time zone data distribution services advertised by a CalDAV server, clients **MUST** follow all the requirements of the time zone data distribution service protocol [[I-D.ietf-tzdist-service](#)], taking care to refresh time zone data in a timely fashion.

### **3.1.3. Time Zones in CalDAV Responses**

Servers **MUST** support the HTTP "Prefer" header [[RFC7240](#)] with "vtimezone=yes" and "vtimezone=no" preference values (see [Section 8](#)). If the "vtimezone=yes" preference is set by a client on any HTTP request that returns iCalendar data, then the server **MUST** include all the appropriate "VTIMEZONE" components in the iCalendar data (all the ones that are referenced by "TZID" property parameters). If the "vtimezone=no" preference is set by a client on any HTTP request that returns iCalendar data, then the server **MUST NOT** return any "VTIMEZONE" components if the time zone identifier matches one provided by any of the advertised time zone distribution servers (see [Section 3.1.2](#)). However, the server **MUST** return the appropriate "VTIMEZONE" component for each time zone with an identifier not available on the advertised time zone distribution servers. This behaviour applies to all HTTP requests on CalDAV resources that return iCalendar data either directly (such as a "GET" request on a calendar object resource), or embedded in a "structured" response such as a DAV:multistatus returned by a "REPORT" or "PROPFIND" request.

Observation and experiments have shown that, in the vast majority of cases, CalDAV clients have typically ignored time zone definitions in

Daboo

Expires December 14, 2015

[Page 4]

data received from servers, and instead make use of their own "built-in" definitions for the corresponding time zone identifier. This means that it is reasonable for CalDAV servers to unilaterally decide not to send "VTIMEZONE" components for standard time zones that clients are expected to have "built-in" (i.e., IANA time zones). Thus, in the absence of an explicit "vtimezone=yes" or "vtimezone=no" preference in the request from a client, servers advertizing the "calendar-no-timezone" capability MAY opt to not send standard "VTIMEZONE" components.

#### **3.1.4. Time Zones in CalDAV Requests**

In addition to servers not sending time zone definitions to clients in iCalendar data, this specification also allows clients to not include time zone definitions when sending iCalendar data to the server, as per [Section 4](#). This behaviour applies to all HTTP requests on CalDAV resources that include iCalendar data either directly in the request body (such as a "PUT" request on a calendar object resource), or embedded in a "structured" request body such as a one used by "PROPPATCH" request.

Note that, as per [Section 4](#), clients might send time zone definitions for time zones that are not advertised by any of the time zone services associated with the server. In that case, servers have various choices:

1. Servers can preserve the original time zone definitions in the iCalendar data sent by the client, so that those can be returned to that or other clients who subsequently request iCalendar data.
2. Servers can refuse to accept any unknown/non-standard time zones, in which case they MUST reject the HTTP request containing such data using a WebDAV precondition code of CALDAV:valid-timezone.
3. Servers can, with appropriate knowledge, map the unknown/non-standard time zone to a standard time zone definition that accurately matches the one supplied by the client. In doing so, servers will need to re-write the iCalendar data to make use of the new standard time zone identifier chosen by the mapping procedure. Any subsequent request to fetch the calendar data would see the new time zone identifier in the calendar data. Note there is one important situation where this re-mapping is not appropriate: an attendee's copy of an event. In that case the original time zone definition needs to be preserved as the organizer's calendar user agent will expect to see that in any iTIP replies sent by the attendee.





### **3.1.5. Support Time Zone Identifiers in WebDAV Properties**

CalDAV defines a CALDAV:calendar-timezone WebDAV property that is used by clients to set a default time zone for the server to use when doing time-based queries on calendar data (see [Section 5.3.2 of \[RFC4791\]](#)). The content of that WebDAV property is an iCalendar "VTIMEZONE" component. This specification defines a new CALDAV:calendar-timezone-id WebDAV property that allows the default time zone to be set via its time zone identifier, rather than providing the full "VTIMEZONE" component (see [Section 5.2](#)). This WebDAV property MUST be present on all resources that also support the CALDAV:calendar-timezone WebDAV property. Its value MUST match the value of the "TZID" iCalendar property in the "VTIMEZONE" component in the CALDAV:calendar-timezone WebDAV property on the same resource. The server MUST accept clients setting either the CALDAV:calendar-timezone or the CALDAV:calendar-timezone-id, and it MUST adjust the value of the alternate property to reflect any changes. i.e., if a client sets the CALDAV:calendar-timezone-id WebDAV property value to "America/New\_York", then the server will return the full "VTIMEZONE" data for that time zone in the CALDAV:calendar-timezone WebDAV property.

If a client attempts to update the CALDAV:calendar-timezone-id with a value that does not correspond to a time zone that is known to the server, the server MUST reject the property update using a CALDAV:valid-timezone pre-condition error. In such cases, clients MAY repeat the request using the CALDAV:calendar-timezone instead, and provide the full iCalendar data for the time zone being set.

### **3.1.6. Support Time Zone Identifiers in CALDAV:calendar-query REPORT**

CalDAV calendar query reports support a CALDAV:timezone XML element that is used by clients to set a specific time zone for the server to use when doing time-based queries on calendar data (see [Sections 7.3 and 9.8 of \[RFC4791\]](#)). The content of that XML element is an iCalendar "VTIMEZONE" component. This specification defines a new CALDAV:timezone-id XML element, that can be used as an alternative to the CALDAV:timezone XML element, that allows a specific time zone to be set via its time zone identifier, rather than providing the full "VTIMEZONE" component (see [Section 6.2](#)). Servers MUST support clients providing a time zone identifier for use in a calendar query REPORT using this new element.

If a client attempts use a CALDAV:timezone-id XML element with a value that does not correspond to a time zone that is known to the server, the server MUST reject the request with a CALDAV:valid-timezone pre-condition error. In such cases, clients MAY repeat the

Daboo

Expires December 14, 2015

[Page 6]

request using the CALDAV:timezone XML element instead, and provide the full iCalendar data for the time zone being used.

#### 4. New Client Behavior

When a server advertises the "calendar-no-timezone" field in a DAV response header (as per [Section 3.1.1](#)):

1. Clients SHOULD include an HTTP "Prefer" header with a "vtimezone=no" preference to ensure that the CalDAV server does not include "VTIMEZONE" components in any iCalendar data returned in a response (see [Section 3.1.3](#), for those time zones whose identifier is one provided by any of the advertised time zone distribution servers (see [Section 3.1.2](#)). In this case, clients MUST retrieve the missing standard time zone definitions from the set of time zone distribution servers advertised by the CalDAV server (see [Section 3.1.2](#)).
2. Clients can include an HTTP "Prefer" header with a "vtimezone=yes" preference to ensure that the CalDAV server does include all "VTIMEZONE" components in any iCalendar data returned in a response (see [Section 3.1.3](#)).
3. Clients can expect servers not to include standard time zone definitions in any iCalendar data they receive from the server, if no "vtimezone=yes" and no "vtimezone=no" preference is set in the HTTP request. Clients MUST retrieve standard time zone definitions from the set of time zone distribution servers advertised by the CalDAV server (see [Section 3.1.2](#)), or a known.
4. Clients SHOULD remove standard time zone definitions from iCalendar data they send to the server, provided the corresponding time zone identifier is one available on any of the server's advertised time zone distribution servers (see [Section 3.1.2](#)).
5. Clients MUST send time zone definitions in iCalendar data for any time zone identifiers not available via any of the server's advertised time zone distribution servers. Clients MUST be prepared for the server to reject such data or map the time zone to one in the set of standard time zones provided by the server's associated time zone services (as per [Section 3.1.4](#)).
6. Clients SHOULD make use of the CALDAV:calendar-timezone-id WebDAV property (see [Section 3.1.5](#)) and CalDAV:timezone-id XML element (see [Section 3.1.6](#)) for specifying default and specific time zones to use in calendar queries executed by the server.



## 5. New WebDAV Properties

### 5.1. CALDAV:timezone-service-set

Name: `timezone-service-set`

Namespace: `urn:ietf:params:xml:ns:caldav`

Purpose: Specifies one or more time zone data distribution servers being used by the CalDAV server to provide standard time zone data.

Conformance: This property SHOULD be defined on CalDAV calendar home collection resources. If defined, it SHOULD NOT be returned by a PROPFIND DAV:allprop request (as defined in [Section 14.2 of \[RFC4918\]](#)).

Description: The CALDAV:timezone-service-set property lists one or more time zone data distribution servers that the CalDAV server is using to provide its set of time zone data. See [Section 3.1.2](#) for more details.

Definition:

```
<!ELEMENT timezone-service-set (DAV:href+)>
```

DAV:href value: URI of a time zone data distribution service as defined by this specification.

Example:

```
<C:timezone-service-set
  xmlns:D="DAV:"
  xmlns:C="urn:ietf:params:xml:ns:caldav">
  <D:href>https://timezones.example.com</D:href>
</C:timezone-service-set>
```

### 5.2. CALDAV:calendar-timezone-id

Name: `calendar-timezone-id`

Namespace: `urn:ietf:params:xml:ns:caldav`

Purpose: Specifies a time zone identifier for a calendar collection.

Conformance: This property SHOULD be defined on all resources where the CALDAV:calendar-timezone property is also defined. If defined, it SHOULD NOT be returned by a PROPFIND DAV:allprop request (as defined in [Section 14.2 of \[RFC4918\]](#)).



Description: The CALDAV:calendar-timezone-id property is used as an alternative to the CALDAV:calendar-timezone property (see [Section 5.3.2 of \[RFC4791\]](#)). It allows clients to set the default time zone using only a time zone identifier. It also indicates to the client, the time zone identifier of the current default time zone. See [Section 3.1.5](#) for more details.

Definition:

```
<!ELEMENT calendar-timezone-id (#PCDATA)>
PCDATA value: an time zone identifier.
```

Example:

```
<C:calendar-timezone-id
  xmlns:C="urn:ietf:params:xml:ns:caldav">US-Eastern<
/C:calendar-timezone-id>
```

## **6. XML Element Definitions**

### **6.1. CALDAV:calendar-query XML Element**

The CALDAV:calendar-query XML element, defined in [Section 9.5 of \[RFC4791\]](#), is modified to allow use of the CALDAV:timezone-id XML element as follows:

Definition:

```
<!ELEMENT calendar-query ((DAV:allprop |
                           DAV:propname |
                           DAV:prop)?, filter,
                           (timezone | timezone-id)?)>
```

### **6.2. CALDAV:timezone-id XML Element**

Name: timezone-id

Namespace: urn:ietf:params:xml:ns:caldav

Purpose: Specifies the time zone identifier for a time zone component to use when determining the results of a report.

Description: The CALDAV:timezone-id XML element is used as an alternative to the CALDAV:timezone XML element (see [Section 9.8 of \[RFC4791\]](#)) in calendar query reports, to allow a client to specify a time zone using a time zone identifier rather than providing the full iCalendar time zone data. See [Section 3.1.6](#) for more details.





Definition:

```
<!ELEMENT timezone-id (#PCDATA)>
PCDATA value: an time zone identifier.
```

## **7. Security Considerations**

This specification does not introduce any new security concerns beyond those addressed in CalDAV [[RFC4791](#)] and iCalendar [[RFC5545](#)].

## **8. IANA Considerations**

IANA is requested to add the following registration to the "HTTP Preferences" registry defined by [[RFC7240](#)].

Preference: vtimezone

Value: One of either "yes" or "no"

Description: Indicates whether the client prefers a CalDAV server to send "VTIMEZONE" iCalendar components in responses.

Reference: [this RFC], [Section 3.1.3](#).

## **9. Acknowledgments**

Thanks to Mike Douglass, Andrew McMillan, and Ken Murchison. This specification came about via discussions at the Calendaring and Scheduling Consortium.

## **10. References**

### **10.1. Normative References**

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## **[10.2.](#) Informative References**

- [RFC5546] Daboo, C., "iCalendar Transport-Independent Interoperability Protocol (iTIP)", [RFC 5546](#), December 2009.
- [RFC6047] Melnikov, A., "iCalendar Message-Based Interoperability Protocol (iMIP)", [RFC 6047](#), December 2010.
- [RFC6557] Lear, E. and P. Eggert, "Procedures for Maintaining the Time Zone Database", [BCP 175](#), [RFC 6557](#), February 2012.

## **[Appendix A.](#) Change History (To be removed by RFC Editor before publication)**

Changes in -03:

1. Chair Review: minor editorial changes
2. Chair Review: expanded item #3 in [Section 3.1.4](#) to clarify the behavior and indicate when it would not be appropriate.

Changes in -02:

1. Ticket #27: added an HTTP Prefer header preference to allow clients to explicitly state whether they want or do not want VTIMEZONES from the server.

Changes in -01:

1. Ticket #24: rewording intro to [Section 3](#) to remove the MUST.
2. Ticket #26: rewording [Section 3.1.1](#) to not provide advice about how to handle limited devices.

Changes in -00:

1. Initial WG draft derived from [draft-daboo-caldav-timezone-ref-01](#), with some terminology changes to match WG name.



2. "timezone" -> "time zone" (<https://tools.ietf.org/wg/tzdist/trac/ticket/6>).

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