                      Calendar Availability

Abstract

   This document specifies a new iCalendar (RFC 5545) component that
   allows the publication of available and unavailable time periods
   associated with a calendar user. This component can be used in
   standard iCalendar free-busy lookups, including the iCalendar
   Transport-independent Interoperability Protocol (iTIP; RFC 5546)
   free-busy requests, to generate repeating blocks of available or busy
   time with exceptions as needed.

   This document also defines extensions to the Calendaring Extensions
   to WebDAV (CalDAV) calendar access protocol (RFC 4791) and the
   associated scheduling protocol (RFC 6638) to specify how this new
   calendar component can be used when evaluating free-busy time.

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 7841.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc7953.

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1. Introduction

    Calendar users often have regular periods of time when they are
    either available to be scheduled or always unavailable. For example,
    an office worker will often wish only to appear free to their work
    colleagues during normal 'office hours' (e.g., Monday through Friday,
    9 am through 5 pm). Or, a university professor might only be
    available to students during a set period of time (e.g., Thursday
    afternoons, 2 pm through 5 pm during term time only). Ideally, users
    ought be able to specify such periods directly via their calendar
    user agent and have them automatically considered as part of the
    normal free-busy lookup for that user. In addition, it ought be
    possible to present different periods of available time depending on
    which user is making the request.

    iCalendar [RFC5545] defines a "VFREEBUSY" component that can be used
    to represent fixed busy time periods, but it does not provide a way
    to specify a repeating period of available or unavailable time.
    Since repeating patterns are often the case, "VFREEBUSY" components
    are not sufficient to solve this problem.

    This specification defines a new type of iCalendar component that can
    be used to publish user availability.

    CalDAV [RFC4791] provides a way for calendar users to access and
    manage calendar data and exchange this data via scheduling
    operations. As part of this, the CalDAV calendar-access [RFC4791]
    feature provides a CALDAV:free-busy-query REPORT that returns free-
    busy information for a calendar collection or hierarchy of calendar
    collections. Also, the CalDAV calendar-auto-schedule [RFC6638]
    feature allows free-busy information for a calendar user to be
    determined. Both of these operations involve examining user
    calendars for events that 'block time', with the blocked out periods
    being returned in a "VFREEBUSY" component.

    This specification extends the CalDAV calendar-access and CalDAV
    calendar-auto-schedule features to allow the new iCalendar
    availability components to be stored and manipulated and to allow
    free-busy lookups to use the information from any such components, if
    present.

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
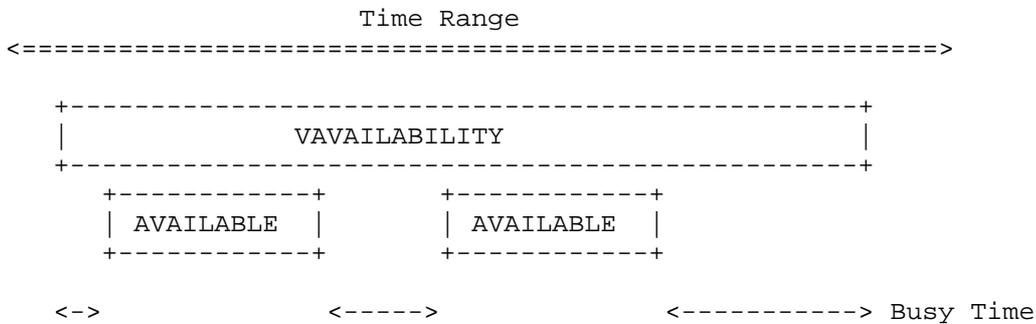   [RFC2119].

When XML element types in the namespaces "DAV:" and
"urn:ietf:params:xml:ns:caldav" are referenced in this document
outside of the context of an XML fragment, the string "DAV:" and
"CALDAV:" will be prefixed to the element type names respectively.

3. iCalendar Extensions

This specification adds a new "VAVAILABILITY" calendar component to
iCalendar. The "VAVAILABILITY" component is itself a container for
new "AVAILABLE" subcomponents.

The purpose of the "VAVAILABILITY" calendar component is to provide a
grouping of available time information over a specific range of time.
Within that, there are specific time ranges that are marked as
available via a set of "AVAILABLE" calendar subcomponents. Together
these can be used to specify available time that can repeat over set
periods of time, and which can vary over time.

An illustration of how "VAVAILABILITY" and "AVAILABLE" components
work is shown below.

```
                       Time Range
     <=========================================================>

        +-------------------------------------------------+
        |                 VAVAILABILITY                   |
        +-------------------------------------------------+
         +-----------+         +-----------+
         | AVAILABLE |         | AVAILABLE |
         +-----------+         +-----------+

      <->              <----->               <-----------> Busy Time
```

The overall time range is shown at the top. A "VAVAILABILITY"
component spans part of the range. The time range covered by the
"VAVAILABILITY" component is considered to be busy, except for the
ranges covered by the "AVAILABLE" components within the
"VAVAILABILITY" component.

3.1. VAVAILABILITY Component

Component Name: VAVAILABILITY

Purpose: Provide a grouping of component properties and
   subcomponents that describe the availability associated with a
   calendar user.

   Format Definition: A "VAVAILABILITY" calendar component is defined
      by the following notation:

   availabilityc = "BEGIN" ":" "VAVAILABILITY" CRLF
                    availabilityprop *availablec
                    "END" ":" "VAVAILABILITY" CRLF

   availabilityprop = *(
                      ;
                      ; the following are REQUIRED
                      ; but MUST NOT occur more than once
                      ;
                      dtstamp / uid
                      ;
                      ; the following are OPTIONAL
                      ; but MUST NOT occur more than once
                      ;
                      busytype / class / created / description /
                      dtstart / last-mod / location / organizer /
                      priority /seq / summary / url /
                      ;
                      ; Either 'dtend' or 'duration' MAY appear
                      ; in an 'availableprop', but 'dtend' and
                      ; 'duration' MUST NOT occur in the same
                      ; 'availabilityprop'.
                      ; 'duration' MUST NOT be present if
                      ; 'dtstart' is not present
                      ;
                      dtend / duration /
                      ;
                      ; the following are OPTIONAL
                      ; and MAY occur more than once
                      ;
                      categories / comment / contact /
                      x-prop / iana-prop
                      ;
)

   availablec = "BEGIN" ":" "AVAILABLE" CRLF
                availableprop
                "END" ":" "AVAILABLE" CRLF

```
availableprop  = *(
              ;
              ; the following are REQUIRED
              ; but MUST NOT occur more than once
              ;
              dtstamp / dtstart / uid /
              ;
              ; Either 'dtend' or 'duration' MAY appear in
              ; an 'availableprop', but 'dtend' and
              ; 'duration' MUST NOT occur in the same
              ; 'availableprop'.
              ;
              dtend / duration /
              ;
              ; the following are OPTIONAL
              ; but MUST NOT occur more than once
              ;
              created / description / last-mod /
              location / recurid / rrule / summary /
              ;
              ; the following are OPTIONAL
              ; and MAY occur more than once
              ;
              categories / comment / contact / exdate /
              rdate / x-prop / iana-prop
              ;
              )
```

   Description: A "VAVAILABILITY" component indicates a period of time
      within which availability information is provided. A
      "VAVAILABILITY" component can specify a start time and an end time
      or duration. If "DTSTART" is not present, then the start time is
      unbounded. If "DTEND" or "DURATION" are not present, then the end
      time is unbounded. Within the specified time period, availability
      defaults to a free-busy type of "BUSY-UNAVAILABLE" (see
      Section 3.2), except for any time periods corresponding to
      "AVAILABLE" subcomponents.

      "AVAILABLE" subcomponents are used to indicate periods of free
      time within the time range of the enclosing "VAVAILABILITY"
      component. "AVAILABLE" subcomponents MAY include recurrence
      properties to specify recurring periods of time, which can be
      overridden using normal iCalendar recurrence behavior (i.e., use
      of the "RECURRENCE-ID" property).

If specified, the "DTSTART" and "DTEND" properties in
"VAVAILABILITY" components and "AVAILABLE" subcomponents MUST be
"DATE-TIME" values specified as either the date with UTC time or
the date with local time and a time zone reference.

The iCalendar object containing the "VAVAILABILITY" component MUST
contain appropriate "VTIMEZONE" components corresponding to each
unique "TZID" parameter value used in any DATE-TIME properties in
all components, unless [RFC7809] is in effect.

When used to publish available time, the "ORGANIZER" property
specifies the calendar user associated with the published
available time.

If the "PRIORITY" property is specified in "VAVAILABILITY"
components, it is used to determine how that component is combined
with other "VAVAILABILITY" components. See Section 4.

Other calendar properties MAY be specified in "VAVAILABILITY" or
"AVAILABLE" components and are considered attributes of the marked
block of time. Their usage is application specific. For example,
the "LOCATION" property might be used to indicate that a person is
available in one location for part of the week and a different
location for another part of the week (but see Section 9 for when
it is appropriate to add additional data like this).

Example: The following is an example of a "VAVAILABILITY" calendar
   component used to represent the availability of a user, always
   available Monday through Friday, 9:00 am to 5:00 pm in the
   America/Montreal time zone:

```
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:0428C7D2-688E-4D2E-AC52-CD112E2469DF
DTSTAMP:20111005T133225Z
BEGIN:AVAILABLE
UID:34EDA59B-6BB1-4E94-A66C-64999089C0AF
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111002T090000
DTEND;TZID=America/Montreal:20111002T170000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
END:AVAILABLE
END:VAVAILABILITY
```

   The following is an example of a "VAVAILABILITY" calendar
   component used to represent the availability of a user available
   Monday through Thursday, 9:00 am to 5:00 pm, at the main office,
   and Friday, 9:00 am to 12:00 pm, in the branch office in the
   America/Montreal time zone between October 2nd and December 2nd
   2011:

```
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:84D0F948-7FC6-4C1D-BBF3-BA9827B424B5
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Montreal:20111002T000000
DTEND;TZID=America/Montreal:20111202T000000
BEGIN:AVAILABLE
UID:7B33093A-7F98-4EED-B381-A5652530F04D
SUMMARY:Monday to Thursday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111002T090000
DTEND;TZID=America/Montreal:20111002T170000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH
LOCATION:Main Office
END:AVAILABLE
BEGIN:AVAILABLE
UID:DF39DC9E-D8C3-492F-9101-0434E8FC1896
SUMMARY:Friday from 9:00 to 12:00
DTSTART;TZID=America/Montreal:20111006T090000
DTEND;TZID=America/Montreal:20111006T120000
RRULE:FREQ=WEEKLY
LOCATION:Branch Office
END:AVAILABLE
END:VAVAILABILITY
```

   The following is an example of three "VAVAILABILITY" calendar
   components used to represent the availability of a traveling
   worker: Monday through Friday, 9:00 am to 5:00 pm each day.
   However, for three weeks the calendar user is working in Montreal,
   then one week in Denver, then back to Montreal. Note that each
   overall period is covered by separate "VAVAILABILITY" components.
   The last of these has no DTEND so it continues on "forever". This
   example shows one way "blocks" of available time can be
   represented. See Section 4 for another approach using priorities.

```
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:BE082249-7BDD-4FE0-BDBA-DE6598C32FC9
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Montreal:20111002T000000
DTEND;TZID=America/Montreal:20111023T030000
BEGIN:AVAILABLE
UID:54602321-CEDB-4620-9099-757583263981
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111002T090000
DTEND;TZID=America/Montreal:20111002T170000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Montreal
END:AVAILABLE
END:VAVAILABILITY
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:A1FF55E3-555C-433A-8548-BF4864B5621E
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Denver:20111023T000000
DTEND;TZID=America/Denver:20111030T000000
BEGIN:AVAILABLE
UID:57DD4AAF-3835-46B5-8A39-B3B253157F01
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Denver:20111023T090000
DTEND;TZID=America/Denver:20111023T170000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Denver
END:AVAILABLE
END:VAVAILABILITY
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:1852F9E1-E0AA-4572-B4C4-ED1680A4DA40
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Montreal:20111030T030000
BEGIN:AVAILABLE
UID:D27C421F-16C2-4ECB-8352-C45CA352C72A
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111030T090000
DTEND;TZID=America/Montreal:20111030T170000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Montreal
END:AVAILABLE
END:VAVAILABILITY
```

3.2. Busy Time Type

   Property Name: BUSYTYPE

   Purpose: This property specifies the default busy time type.

   Value Type: TEXT

   Property Parameters: IANA and nonstandard property parameters can be
      specified on this property.

   Conformance: This property can be specified within "VAVAILABILITY"
      calendar components.

   Format Definition: This property is defined by the following
      notation:

   busytype   = "BUSYTYPE" busytypeparam ":" busytypevalue CRLF

   busytypeparam = *(";" other-param)

   busytypevalue = "BUSY" / "BUSY-UNAVAILABLE" /
                   "BUSY-TENTATIVE" / iana-token / x-name
                 ; Default is "BUSY-UNAVAILABLE".

   Description: This property is used to specify the default busy time
      type. The values correspond to those used by the "FBTYPE"
      parameter used on a "FREEBUSY" property, with the exception that
      the "FREE" value is not used in this property. If not specified
      on a component that allows this property, the default is "BUSY-
      UNAVAILABLE".

   Example: The following is an example of this property:

   BUSYTYPE:BUSY

4. Combining VAVAILABILITY Components

   The "VAVAILABILITY" component allows a calendar user to describe
   their availability over extended periods of time through the use of
   recurrence patterns. This availability might be relatively constant
   from year to year.

   However, there is usually some degree of irregularity, as people take
   vacations or perhaps spend a few weeks at a different office. For
   that period of time there is a need to redefine their availability.
   Rather than modify their existing availability, the "PRIORITY"
   property allows new "VAVAILABILITY" components to override others of

lower ordinal priority. Note that iCalendar [RFC5545] defines the
"PRIORITY" property such that a value of 0 is undefined, 1 is the
highest priority, and 9 is the lowest.

When combining "VAVAILABILITY" components, an absence of a "PRIORITY"
property or a value of 0 implies the lowest level of priority. When
two or more VAVAILABILITY components overlap, and they have the same
PRIORITY value, the overlapping busy time type is determined by the
following order: BUSY > BUSY-UNAVAILABLE > BUSY-TENTATIVE. That is,
if one component has a BUSYTYPE set to BUSY and the other has
BUSYTYPE set to BUSY-UNAVAILABLE, then the effective busy time type
over the time range that they overlap would be BUSY. It is up to the
creator of such components to ensure that combining them produces a
consistent and expected result.

To calculate the available time, order the intersecting
"VAVAILABILITY" components by priority (the lowest to highest
"PRIORITY" values are 0, 9, 8, 7, 6, 5, 4, 3, 2, 1).

Step through the resulting list of "VAVAILABILITY" components. For
each, the time range covered by the "VAVAILABILITY" component is set
to busy and then portions of it defined by the "AVAILABLE" components
in the "VAVAILABILITY" component are set to free.

Note that, if any "VAVAILABILITY" component completely covers the
date range of interest, then any lower priority "VAVAILABILITY"
components can be ignored.

Typically, a calendar user's "default" availability (e.g., business
hours of Monday through Friday, 9:00 am to 5:00 pm) would use the
lowest level of priority: zero. Any overrides to the "default" would
use higher levels as needed. To avoid having to keep readjusting the
"PRIORITY" property value when an override has to be "inserted"
between two existing components, priority values SHOULD be "spaced
out" over the full range of values. The table below illustrates this
via an example. The first row shows the priority range from low to
high, the second row shows the corresponding "PRIORITY" property
value, and the third row shows which "VAVAILABILITY" component has
that priority. The "default" availability is created with priority
zero (shown as {a} in the table), then the first override created
with priority 5 (shown as {b} in the table), a subsequent
availability can be inserted between the two by using priority 7
(shown as {c} in the table), and another, taking precedence over all
existing ones, with priority 3 (shown as {d} in the table). As seen
in the table, additional "slots" are open for more "VAVAILABILITY"
components to be added with other priorities if needed.

```
      +-----+----+----+-----+----+-----+----+-----+----+------+
      | Low |    |    |     |    |     |    |     |    | High |
      +-----+----+----+-----+----+-----+----+-----+----+------+
      |  0  | 9  | 8  |  7  | 6  |  5  | 4  |  3  | 2  |  1   |
      +-----+----+----+-----+----+-----+----+-----+----+------+
      | {a} |    |    | {c} |    | {b} |    | {d} |    |      |
      +-----+----+----+-----+----+-----+----+-----+----+------+
```

5. Calculating Free-Busy Time

    This section describes how free-busy time information for a calendar
    user is calculated in the presence of "VAVAILABILITY" calendar
    components.

    An iCalendar "VFREEBUSY" component is used to convey "rolled-up"
    free-busy time information for a calendar user. This can be
    generated as the result of an iTIP [RFC5546] free-busy request or
    through some other mechanism (e.g., a CalDAV calendar-access
    CALDAV:free-busy-query REPORT).

    When one or more "VAVAILABILITY" components are present and intersect
    the time range for the free-busy request, first the available time is
    calculated, as outlined in Section 4. Once that is done, regular
    "VEVENT" and "VFREEBUSY" components can be "overlaid" in the usual
    way to block out time.

    An example procedure for this is as follows:

    1. Initially mark the entire period of the free-busy request as
        free.

    2. For each "VAVAILABILITY" component ordered by PRIORITY (lowest to
        highest):

        A. Determine if the "VAVAILABILITY" intersects the time range of
            the free-busy request. If not, ignore it.

        B. Determine if the "VAVAILABILITY" is completely overridden by
            a higher priority component. If so, ignore it.

        C. For the time period covered by the "VAVAILABILITY" component,
            mark time in the free-busy request result set as busy, using
            the busy time type derived from the "BUSYTYPE" property in
            the "VAVAILABILITY" component.

        D. Append the "VAVAILABILITY" component to a list of components
            for further processing in step 3, if it has not been ignored.

   3. For each "VAVAILABILITY" component in the list resulting from
       step 2, in order from the first item to the last item:

       A. For each "AVAILABLE" component in the "VAVAILABILITY"
           component:

           i.   Expand all recurring instances, taking into account
                 overridden instances, ignoring instances or parts of
                 instances that fall outside of the free-busy request
                 time range or the time period specified by the
                 "VAVAILABILITY" component.

           ii.   For each instance, mark the corresponding time in the
                 free-busy request result set as free.

   4. For each "VEVENT" or "VFREEBUSY" component, apply normal free-
       busy processing within the free-busy request time range.

5.1. Examples

   In the examples below, a table is used to represent time slots for
   the period of a free-busy request. Each time slot is two hours long.
   The column header represents the hours from midnight local time.
   Each row below the column headers represents a step in the free-busy
   result set determination, following the procedure outlined above.

   Each cell in the rows below the column header contains a single
   character that represents the free-busy type for the corresponding
   time period at the end of the process step represented by the row.
   The characters in the row are:

   F Represents "FREE" time in that slot.

   B Represents "BUSY" time in that slot.

   U Represents "BUSY-UNAVAILABLE" time in that slot.

   T Represents "BUSY-TENTATIVE" time in that slot.

   I Represents data to be ignored in that slot (as per step 2.B
      above).

5.1.1. Simple Example

   Appendix A shows the user's calendar. This includes one
   "VAVAILABILITY" component giving available time within the requested
   time range of 8:00 am to 6:00 pm, together with one "VEVENT"
   component representing a two hour meeting starting at 12:00 pm.

A free-busy request for Monday, 6th November 2011, midnight to
midnight in the America/Montreal time zone would be calculated as
follows using the steps described above.

Step	0	2	4	6	8	10	12	14	16	18	20	22
1.	F	F	F	F	F	F	F	F	F	F	F	F
2.	U	U	U	U	U	U	U	U	U	U	U	U
3.	U	U	U	U	F	F	F	F	F	U	U	U
4.	U	U	U	U	F	F	B	F	F	U	U	U

5.1.2. Further Example

Appendix B shows another way to represent the availability of the
traveling worker shown above. Here we represent their base
availability of Monday through Friday, 8:00 am to 6:00 pm each day
with a "VAVAILABILITY" with default "PRIORITY" (there is no "DTEND"
property so that this availability is unbounded). For the week the
calendar user is working in Denver (October 23rd through October
30th), we represent their availability with a "VAVAILABILITY"
component with priority 1, which overrides the base availability.
There is also a two hour meeting starting at 12:00 pm (in the
America/Denver time zone).

A free-busy request for Monday, 24th October 2011, midnight to
midnight in the America/Montreal time zone, would be calculated as
follows using the steps described above. Note that there is a two
hour offset in the in the available time, compared to the previous
example, due to the two hour difference between the time zone of the
free-busy request and the time zone of the user's availability and
meeting. "2.P0" shows the base availability, and "2.P1" shows the
higher priority availability. "3.P1" only shows the higher priority
availability contributing to the overall free-busy since the default
availability is ignored (as per step 2.B described above).

Step	0	2	4	6	8	10	12	14	16	18	20	22
1.	F	F	F	F	F	F	F	F	F	F	F	F
2.P0	I	I	I	I	I	I	I	I	I	I	I	I
2.P1	U	U	U	U	U	U	U	U	U	U	U	U
3.P1	U	U	U	U	U	F	F	F	F	F	U	U
4.	U	U	U	U	U	F	F	B	F	F	U	U

6. Use with iTIP

   This specification does not define how "VAVAILABILITY" components are
   used in scheduling messages sent using the iTIP [RFC5546] protocol.
   It is expected that future specifications will define how iTIP
   scheduling can make use of "VAVAILABILITY" components.

7. CalDAV Extensions

7.1. CalDAV Requirements Overview

   This section lists what functionality is required of a CalDAV server,
   which supports "VAVAILABILITY" components in stored calendar data. A
   server:

   o MUST advertise support for "VAVAILABILITY" components in
      CALDAV:supported-calendar-component-set properties on calendars
      that allow storing of such components;

   o MUST support CALDAV:free-busy-query REPORTs that aggregate the
      information in any "VAVAILABILITY" components in the calendar
      collections targeted by the request;

   o MUST support "VAVAILABILITY" components stored in a
      CALDAV:calendar-availability Web Distributed Authoring and
      Versioning (WebDAV) property on a CalDAV scheduling Inbox
      collection, if the CalDAV calendar-auto-schedule feature is
      supported;

   o MUST support iTIP [RFC5546] free-busy requests that aggregate the
      information in any "VAVAILABILITY" components in calendar
      collections that contribute to free-busy, or in any
      "VAVAILABILITY" components stored in the CALDAV:calendar-
      availability property on the CalDAV scheduling Inbox collection of
      the calendar user targeted by the iTIP free-busy request, if the
      CalDAV calendar-auto-schedule feature is available.

   Processing of "VAVAILABILITY" components MUST conform to all the
   requirements CalDAV imposes on calendar object resources (see
   Section 4.1 of [RFC4791]).

7.2. New Features in CalDAV

7.2.1. Calendar Availability Support

   A server supporting the features described in this document MUST
   include "calendar-availability" as a field in the DAV response header
   from an OPTIONS request. A value of "calendar-availability" in the
   DAV response header indicates to clients that the server supports all
   the requirements specified in this document.

7.2.1.1. Example: Using OPTIONS for the Discovery of Calendar
          Availability Support

   >> Request <<

   OPTIONS /home/bernard/calendars/ HTTP/1.1
   Host: cal.example.com

   >> Response <<

   HTTP/1.1 200 OK
   Allow: OPTIONS, GET, HEAD, POST, PUT, DELETE, TRACE, COPY, MOVE
   Allow: PROPFIND, PROPPATCH, LOCK, UNLOCK, REPORT, ACL
   DAV: 1, 2, 3, access-control, calendar-access,
    calendar-availability
   Date: Fri, 11 Nov 2005 09:32:12 GMT
   Content-Length: 0

   In this example, the OPTIONS method returns the value "calendar-
   availability" in the DAV response header to indicate that the
   collection "/home/bernard/calendars/" supports the new features
   defined in this specification.

7.2.2. CalDAV Time Range Queries

   Section 9.9 of [RFC4791] describes how to specify time ranges to
   limit the set of calendar components returned by the server. This
   specification extends [RFC4791] to describe how to apply time range
   filtering to "VAVAILABILITY" components.

   A "VAVAILABILITY" component is said to overlap a given time range if
   the condition for the corresponding component state specified in the
   table below is satisfied. The conditions depend on the presence of
   the "DTSTART", "DTEND", and "DURATION" properties in the
   "VAVAILABILITY" component. Note that, as specified above, the
   "DTEND" value MUST be a "DATE-TIME" value equal to or after the
   "DTSTART" value, if specified.

```
+-----------------------------------------------------------+
| VAVAILABILITY has the DTSTART property?                   |
|   +-------------------------------------------------------+
|   | VAVAILABILITY has the DTEND property?                 |
|   |   +---------------------------------------------------+
|   |   | VAVAILABILITY has the DURATION property?          |
|   |   |   +-----------------------------------------------+
|   |   |   | Condition to evaluate                         |
+---+---+---+-----------------------------------------------+
| Y | Y | N | (start < DTEND  AND  end > DTSTART)            |
+---+---+---+-----------------------------------------------+
| Y | N | Y | (start < DTSTART+DURATION  AND  end > DTSTART) |
+---+---+---+-----------------------------------------------+
| Y | N | N | (end > DTSTART)                               |
+---+---+---+-----------------------------------------------+
| N | Y | N | (start < DTEND)                               |
+---+---+---+-----------------------------------------------+
| N | N | * | TRUE                                          |
+---+---+---+-----------------------------------------------+
```

7.2.3. CALDAV:free-busy-query REPORT

   A CALDAV:free-busy-query REPORT can be executed on a calendar
   collection that contains iCalendar "VAVAILABILITY" components. When
   that occurs, the server MUST aggregate the information in any
   "VAVAILABILITY" components when generating the free-busy response, as
   described in Section 5.

7.2.4. CALDAV:calendar-availability Property

   Name: calendar-availability

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

   Purpose: Defines a "VAVAILABILITY" component that will be used in
      calculating free-busy time when an iTIP free-busy request is
      targeted at the calendar user who owns the Inbox.

   Conformance: This property MAY be protected and SHOULD NOT be
      returned by a PROPFIND DAV:allprop request. Support for this
      property is REQUIRED. The value of this property MUST be a valid
      iCalendar object containing only one "VAVAILABILITY" component,
      and optionally, "VTIMEZONE" components - other iCalendar
      components MUST NOT be present. "VTIMEZONE" components SHOULD NOT
      be present if [RFC7809] is in effect. For more complex
      availability scenarios, clients can store multiple "VAVAILABILITY"
      components in the calendar user's calendar collections.

   Description: This property allows a user to specify their
      availability by including an "VAVAILABILITY" component in the
      value of this property. If present, the server MUST use this
      "VAVAILABILITY" component when determining free-busy information
      as part of an iTIP free-busy request being handled by the server.

   Definition:

   <!ELEMENT calendar-availability (#PCDATA) >
   ; Data value MUST be an iCalendar object containing
   ; "VAVAILABILITY" or "VTIMEZONE" components.

   Example:

   <C:calendar-availability xmlns:D="DAV:"
   xmlns:C="urn:ietf:params:xml:ns:caldav"
   >BEGIN:VCALENDAR
   CALSCALE:GREGORIAN
   PRODID:-//example.com//iCalendar 2.0//EN
   VERSION:2.0
   BEGIN:VAVAILABILITY
   UID:9BADC1F6-0FC4-44BF-AC3D-993BEC8C962A
   DTSTAMP:20111005T133225Z
   DTSTART;TZID=America/Montreal:20111002T000000
   BEGIN:AVAILABLE
   UID:6C9F69C3-BDA8-424E-B2CB-7012E796DDF7
   SUMMARY:Monday to Friday from 9:00 to 18:00
   DTSTART;TZID=America/Montreal:20111002T090000
   DTEND;TZID=America/Montreal:20111002T180000
   RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
   END:AVAILABLE
   END:VAVAILABILITY
   END:VCALENDAR
   </C:calendar-availability>

7.2.5. iTIP Free-Busy Requests

   The CalDAV calendar-auto-schedule feature (see Section 5 of
   [RFC6638]) includes a mechanism for free-busy information to be
   requested via the CalDAV protocol. Any "VAVAILABILITY" components in
   any calendar collections targeted during such a request MUST be
   included as part of the calculation of the overall free-busy
   information. In addition, the "VAVAILABILITY" component specified in
   the CALDAV:calendar-availability property on the owner's Inbox MUST
   also be included in the free-busy calculation. Processing of all
   such "VAVAILABILITY" components is done as per Section 5.

8. Security Considerations

    Calculation of availability information, particularly with multiple
    overlapping time ranges, can be complex, and CalDAV servers MUST
    limit the complexity of such data stored by a client.

    An attacker able to "inject" availability information into a calendar
    user's calendar data could ensure that the user never appears free
    for meetings or appears free at inappropriate times. Calendar
    systems MUST ensure that availability information for a calendar user
    can only be modified by authorized users.

    Security considerations in [RFC5545], [RFC5546], [RFC4791],
    [RFC6638], and [RFC7809] MUST also be adhered to.

9. Privacy Considerations

    Free-busy and availability information can be used by attackers to
    infer the whereabouts or overall level of "activity" of the
    corresponding calendar user. Any calendar system that allows a user
    to expose their free-busy and availability information MUST limit
    access to that information to only authorized users.

    When "VAVAILABILITY" components are sent to or shared with other
    calendar users, care has to be taken not to expose more information
    than is needed by each recipient. For example, a business owner will
    likely not want their customers to know where they might be or what
    they might be doing, but family members might be willing to expose
    such information to each other. Thus, calendaring systems allowing
    "VAVAILABILITY" components to be sent or shared to other calendar
    users MUST provide a way for nonessential properties to be removed
    (e.g., "SUMMARY", "LOCATION", and "DESCRIPTION").

    iCalendar "VFREEBUSY" information generated from "VAVAILABILITY"
    components MUST NOT include information other than busy or free time
    periods. In particular, user specified property values such as
    "SUMMARY", "LOCATION", and "DESCRIPTION" MUST NOT be copied into the
    free-busy result data.

    Privacy considerations in [RFC5545], [RFC5546], [RFC4791], [RFC6638],
    and [RFC7809] MUST also be adhered to.

10. IANA Considerations

10.1. Component Registrations

   This document defines the following new iCalendar components, which
   have been added to the registry defined in Section 8.3.1 of
   [RFC5545]:

```
      +---------------+---------+------------------------+
      | Component     | Status  | Reference              |
      +---------------+---------+------------------------+
      | VAVAILABILITY | Current | RFC 7953, Section 3.1  |
      | AVAILABLE     | Current | RFC 7953, Section 3.1  |
      +---------------+---------+------------------------+
```

10.2. Property Registrations

   This documents defines the following new iCalendar properties, which
   have been added to the registry defined in Section 8.3.2 of
   [RFC5545]:

```
      +----------+---------+------------------------+
      | Property | Status  | Reference              |
      +----------+---------+------------------------+
      | BUSYTYPE | Current | RFC 7953, Section 3.2  |
      +----------+---------+------------------------+
```

11. Normative References

   [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
              Requirement Levels", BCP 14, RFC 2119,
              DOI 10.17487/RFC2119, March 1997,
              <http://www.rfc-editor.org/info/rfc2119>.

   [RFC4791] Daboo, C., Desruisseaux, B., and L. Dusseault,
              "Calendaring Extensions to WebDAV (CalDAV)", RFC 4791,
              DOI 10.17487/RFC4791, March 2007,
              <http://www.rfc-editor.org/info/rfc4791>.

   [RFC5545] Desruisseaux, B., Ed., "Internet Calendaring and
              Scheduling Core Object Specification (iCalendar)",
              RFC 5545, DOI 10.17487/RFC5545, September 2009,
              <http://www.rfc-editor.org/info/rfc5545>.

   [RFC5546] Daboo, C., Ed., "iCalendar Transport-Independent
              Interoperability Protocol (iTIP)", RFC 5546,
              DOI 10.17487/RFC5546, December 2009,
              <http://www.rfc-editor.org/info/rfc5546>.

   [RFC6638] Daboo, C. and B. Desruisseaux, "Scheduling Extensions to
              CalDAV", RFC 6638, DOI 10.17487/RFC6638, June 2012,
              <http://www.rfc-editor.org/info/rfc6638>.

   [RFC7809] Daboo, C., "Calendaring Extensions to WebDAV (CalDAV):
              Time Zones by Reference", RFC 7809, DOI 10.17487/RFC7809,
              March 2016, <http://www.rfc-editor.org/info/rfc7809>.

Appendix A. Example Calendar #1

```
BEGIN:VCALENDAR
CALSCALE:GREGORIAN
PRODID:-//example.com//iCalendar 2.0//EN
VERSION:2.0
BEGIN:VEVENT
DTSTAMP:20111113T044111Z
DTSTART;TZID=America/Montreal:20111106T120000
DURATION:PT2H
SUMMARY:Meeting
UID:768CB0C2-8642-43F7-A6C4-F8BB04B829B4
END:VEVENT
BEGIN:VAVAILABILITY
UID:452DFCA7-3203-4A3D-9A9A-99753A383B41
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Montreal:20111002T000000
BEGIN:AVAILABLE
UID:466D5C68-5C4A-4078-AF5D-9C55EA9145D7
SUMMARY:Monday to Friday from 8:00 to 18:00
DTSTART;TZID=America/Montreal:20111002T080000
DTEND;TZID=America/Montreal:20111002T180000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
END:AVAILABLE
END:VAVAILABILITY
END:VCALENDAR
```

Appendix B. Example Calendar #2

```
BEGIN:VCALENDAR
CALSCALE:GREGORIAN
PRODID:-//example.com//iCalendar 2.0//EN
VERSION:2.0
BEGIN:VEVENT
DTSTAMP:20111113T044111Z
DTSTART;TZID=America/Denver:20111106T120000
DURATION:PT2H
SUMMARY:Lunch meeting in Denver
UID:2346C09A-42BF-439E-916C-FC83AF869171
END:VEVENT
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:627A87FA-E5F1-43C0-B3B1-567DA10F2A83
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Montreal:20111002T000000
BEGIN:AVAILABLE
UID:A833E850-892B-43F6-98B6-C15A6BFC5D27
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111002T080000
DTEND;TZID=America/Montreal:20111002T180000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Montreal
END:AVAILABLE
END:VAVAILABILITY
BEGIN:VAVAILABILITY
ORGANIZER:mailto:bernard@example.com
UID:F01411E3-38B8-4490-8A1F-0CCEC57A0943
DTSTAMP:20111005T133225Z
DTSTART;TZID=America/Denver:20111023T000000
DTEND;TZID=America/Denver:20111030T000000
PRIORITY:1
BEGIN:AVAILABLE
UID:A35AA091-3846-48ED-96F6-881E8A0D0A93
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Denver:20111023T080000
DTEND;TZID=America/Denver:20111023T180000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Denver
END:AVAILABLE
END:VAVAILABILITY
END:VCALENDAR
```

Acknowledgements

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