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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.

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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 to 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 to 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].

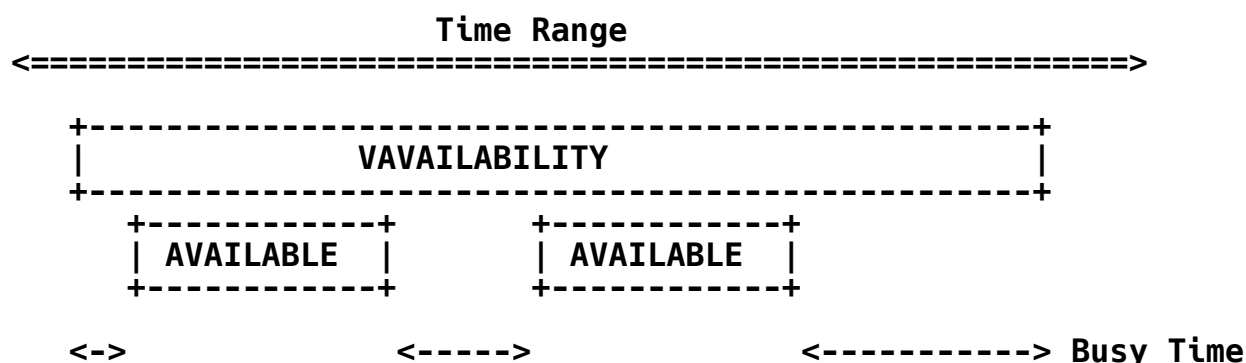
When XML element types in the namespaces "DAV:" and "urn:ietf:params:xml:ns:caldav" are referenced in this document outside of the context of an XML fragment, the string "DAV:" and "CALDAV:" will be prefixed to the element type names respectively.

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.



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 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.

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:9BADCF1F6-0FC4-44BF-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:20111105T133225Z
DTSTART;TZID=America/Montreal:20111102T000000
BEGIN:AVAILABLE
UID:466D5C68-5C4A-4078-AF5D-9C55EA9145D7
SUMMARY:Monday to Friday from 8:00 to 18:00
DTSTART;TZID=America/Montreal:20111102T080000
DTEND;TZID=America/Montreal:20111102T180000
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:20111105T133225Z
DTSTART;TZID=America/Montreal:20111102T000000
BEGIN:AVAILABLE
UID:A833E850-892B-43F6-98B6-C15A6BFC5D27
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Montreal:20111102T080000
DTEND;TZID=America/Montreal:20111102T180000
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:20111105T133225Z
DTSTART;TZID=America/Denver:20111102T000000
DTEND;TZID=America/Denver:20111103T000000
PRIORITY:1
BEGIN:AVAILABLE
UID:A35AA091-3846-48ED-96F6-881E8A0D0A93
SUMMARY:Monday to Friday from 9:00 to 17:00
DTSTART;TZID=America/Denver:20111102T080000
DTEND;TZID=America/Denver:20111102T180000
RRULE:FREQ=WEEKLY;BYDAY=MO,TU,WE,TH,FR
LOCATION:Denver
END:AVAILABLE
END:VAVAILABILITY
END:VCALENDAR
```

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