Stream: Internet Engineering Task Force (IETF)
RFC: 9073
Updates: 5545
Category: Standards Track
Published: August 2021
ISSN: 2070-1721
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RFC 9073
Event Publishing Extensions to iCalendar

Abstract

This specification updates RFC 5545 by introducing a number of new iCalendar properties and components that are of particular use for event publishers and in social networking.

This specification also defines a new "STRUCTURED-DATA" property for iCalendar (RFC 5545) to allow for data that is directly pertinent to an event or task to be included with the calendar data.

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 https://www.rfc-editor.org/info/rfc9073.

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1. Introduction

The currently existing iCalendar standard [RFC5545] lacks useful methods for referencing additional, external information relating to calendar components. Additionally, there is no standard way to provide rich-text descriptions or metadata associated with the event.

Current practice is to embed this information as links in the description or to add nonstandard properties, as defined in Section 3.8.8.2 of [RFC5545].

This document updates [RFC5545] to define a number of properties and components referencing such external information that can provide additional information about an iCalendar component. The intent is to allow the interchange of such information between applications or systems (e.g., between clients, between client and server, and between servers). Formats, such as vCard [RFC6350], are likely to be most useful to the receivers of such events as they may be used in other applications -- such as address books.

1.1. 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 BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

The notation used in this memo is the ABNF notation of [RFC5234] as used by iCalendar [RFC5545]. Any syntax elements shown below that are not explicitly defined in this specification come from iCalendar [RFC5545].

1.2. Terms Used in This Document

Event: When the word 'event' (perhaps with a capitalized 'E') is used, we are referring to gatherings, formal or informal (for example, a sports event, a party, or a concert).

Social Calendaring: Historically, calendar data and scheduling has been heavily biased towards meetings in a corporate environment. Some of the features defined in this document are to support a more informal, i.e., social, model. For example, we may want to record who is participating in a public event.

2. Components and Properties

Previous extensions to the calendaring standards have been largely restricted to the addition of properties or parameters. This is partly because iCalendar libraries had trouble handling components nested deeper than those defined in [RFC5545].

In a break with this 'convention', this specification defines a number of components rather than properties. This is a better match for the way [W3C.REC-xml-20081126] and JSON [RFC8259] handle such structures and allows richer definitions.

It also allows for the addition of extra properties inside the components and resolves some of the problems of trying to add detailed information as a parameter.

3. Typed References

The properties and components defined here can all reference external metadata, which may be used by applications to provide further information to users. By providing type information, clients and servers are able to discover interesting references and make use of them, perhaps for indexing or presenting additional, related information for the user.

As always, clients should exercise caution in following references to external data.

The "LOCATION" property [RFC5545] provides only an unstructured single text value for specifying the location where an event (or task) will occur. This is inadequate for use cases where structured location information (e.g., address, region, country, or postal code) is required or preferred and limits widespread adoption of iCalendar in those settings.

Using the "VLOCATION" component, rich information about multiple locations can be communicated in a "STRUCTURED-DATA" property; examples include address, region, country, postal code, parking availability, nearby restaurants, and the venue, among others. Servers and clients can retrieve the objects when storing the event and use them to index by geographic location.

When a calendar client receives a calendar component, it can search the set of locations looking for those of particular interest. The "LOCATION-TYPE" property and "FMTTYPE" parameter applied to the "STRUCTURED-DATA" property, if supplied, can be used to help the selection.

The "PARTICIPANT" component is designed to handle common use cases in event publication. It is generally important to provide information about the organizers of such events. Sponsors wish to be referenced in a prominent manner. In social calendaring, it is often important to identify the active participants (e.g,, a school sports team) and the inactive participants (e.g., the parents) in the event.

The "PARTICIPANT" component can be used to provide useful extra data about an attendee. For example, a location inside the PARTICIPANT gives the actual location of a remote attendee. (But see the note about privacy.)

Alternatively, the "PARTICIPANT" component can be used to provide a reference -- perhaps the address for mailing lists.

3.1. Use Cases

The main motivation for these changes has been event publication, but there are opportunities for use elsewhere. The following use cases will describe some possible scenarios.

3.1.1. Piano Concert Performance

In putting together a concert, there are many participants: piano tuner, performer, stage hands, etc. In addition, there are sponsors and various contacts to be provided. There will also be a number of related locations. A number of events can be created, all of which relate to the performance in different ways.

There may be an iCalendar Transport-independent Interoperability Protocol (iTIP) [RFC5546] meeting request for the piano tuner, who will arrive before the performance. Other members of staff may also receive meeting requests.

An event can also be created for publication, which will have a "PARTICIPANT" component for the pianist providing a reference to vCard information ([RFC6350]) about the performer. This event would also hold information about parking, local subway stations, and the venue itself. In addition, there may be sponsorship information for sponsors of the event and perhaps paid sponsorship properties, essentially advertising local establishments.

3.1.2. Itineraries

These additions also provide opportunities for the travel industry. When booking a flight, the "PARTICIPANT" component can be used to provide references to businesses at the airports and to rental car businesses at the destination.

The embedded location information can guide the traveler around the airport itself or to their final destination. The contact information can provide detailed information about the booking agent, airlines, car hire companies, and hotel.

3.1.2.1. Reserving Facilities

For a meeting, the size of a room and the equipment needed depends, to some extent, on the number of attendees actually in the room.

A meeting may have many attendees, none of which are co-located. The current "ATTENDEE" property does not allow for the addition of such metadata. The "PARTICIPANT" component allows attendees to specify their location.

4. Modifications to Calendar Components

The following changes to the syntax defined in iCalendar [RFC5545] are made here. New elements are defined in subsequent sections.

```
; Addition of PARTICIPANT, VLOCATION, and VRESOURCE
; as valid components
eventc     = "BEGIN" ":" "VEVENT" CRLF
             eventprop *alarmc *participantc *locationc *resourcec
             "END" ":" "VEVENT" CRLF

; Addition of properties STYLED-DESCRIPTION and STRUCTURED-DATA
eventprop  =/ *styleddescription
              *sdataprop

; Addition of PARTICIPANT, VLOCATION, and VRESOURCE
; as valid components
todoc      = "BEGIN" ":" "VTODO" CRLF
             todoprop *alarmc *participantc *locationc *resourcec
             "END" ":" "VTODO" CRLF

; Addition of properties STYLED-DESCRIPTION and STRUCTURED-DATA
todoprop =/ *styleddescription
            *sdataprop

; Addition of PARTICIPANT, VLOCATION, and VRESOURCE
; as valid components
journalc   = "BEGIN" ":" "VJOURNAL" CRLF
             jourprop *participantc *locationc *resourcec
             "END" ":" "VJOURNAL" CRLF

; Addition of properties STYLED-DESCRIPTION and STRUCTURED-DATA
jourprop =/ *styleddescription
            *sdataprop

; Addition of PARTICIPANT, VLOCATION, and VRESOURCE
; as valid components
freebusyc  = "BEGIN" ":" "VFREEBUSY" CRLF
             fbprop *participantc *locationc *resourcec
             "END" ":" "VFREEBUSY" CRLF

; Addition of property STYLED-DESCRIPTION
fbprop     =/ *styleddescription
```

5. New Property Parameters

5.1. Order

Parameter name: ORDER

Purpose: This parameter defines ordering for the associated property.

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

```
orderparam    = "ORDER" "=" integer
                ;           Must be greater than or equal to 1
```

Description: The "ORDER" parameter is **OPTIONAL** and is used to indicate the relative ordering of the corresponding instance of a property. Its value **MUST** be an integer greater than or equal to 1 that specifies the order, with 1 being the first in the ordering.

When the parameter is absent, the default **MUST** be to interpret the property instance as being ordered last, that is, the property will appear after any other instances of the same property with any value of ORDER.

When any "ORDER" parameters have the same value, all the associated properties appear as a group within which there is no defined order.

Note that the value of this parameter is to be interpreted only in relation to values assigned to other corresponding instances of the same property in the same entity.

This parameter **MUST NOT** be applied to a property that does not allow multiple instances.

Example uses: The ORDER may be applied to the "PARTICIPANT-TYPE" property to indicate the relative importance of the participant, for example, as a sponsor or a performer. For example, ORDER=1 could define the principal performer or soloist.

5.2. Schema

Parameter Name: SCHEMA

Purpose: This parameter specifies the schema used for the content of a "STRUCTURED-DATA" property value.

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

```
schemaparam    = "SCHEMA" "=" DQUOTE uri DQUOTE
```

Description: This property parameter **SHOULD** be specified on "STRUCTURED-DATA" properties. When present, it provides identifying information about the nature of the content of the corresponding "STRUCTURED-DATA" property value. This can be used to supplement the media type information provided by the "FMTTYPE" parameter on the corresponding property.

Example:

```
STRUCTURED-DATA;FMTTYPE=application/ld+json;
 SCHEMA="https://schema.org/FlightReservation";
 ENCODING=BASE64;VALUE=BINARY:ICAgIDxzY3JpcHQgdHlwZT0iYXBwb
 GljYXRpb24vbGQranNvbiI+CiAgICB7CiAgICAgICJAY29
 udGV4dCI6ICJodHRwOi8vc2NoZW1hLm9yZyIsCiAgICAgICJAdHlwZSI
 6ICJGbGlnaHRSZXNlcnZhdGlvbiIsCiAgICAgICJyZXNlcnZhdGlvbkl
 kIjogIlJYSjM0UCIsCiAgICAgICJyZXNlcnZhdGlvblN0YXR1cyI6ICJ
 odHRwOi8vc2NoZW1hLm9yZy9SZXNlcnZhdGlvbkNvbmZpcm1lZCIsCiA
 gICAgICJwYXNzZW5nZXJQcmlvcml0eVN0YXR1cyI6ICJGYXN0IFRyYWN
 rIiwKICAgICAgInBhc3NlbmdlclNlcXVlbmNlTnVtYmVyIjogIkFCQzE
 yMyIsCiAgICAgICJzZWN1cml0eVNjcmVlbmluZyI6ICJUU0EgUHJlQ2h
 lY2siLAogICAgICAidW5kZXJOYW1lIjogewogICAgICAgICJAdHlwZSI
 6ICJQZXJzb24iLAogICAgICAgICJuYW1lIjogIkV2YSBHcmVlbiIKICA
 gICAgfSwKICAgICAgInJlc2VydmF0aW9uRm9yIjogewogICAgICAgICJ
 AdHlwZSI6ICJGbGlnaHQiLAogICAgICAgICJmbGlnaHROdW1iZXIiOiA
 iVUExMTAiLAogICAgICAgICJwcm92aWRlciI6IHsKICAgICAgICAgICJ
 AdHlwZSI6ICJBaXJsaW5lIiwKICAgICAgICAgICJuYW1lIjogIkNvbnR
 pbmVudGFsIiwKICAgICAgICAgICJpYXRhQ29kZSI6ICJDTyIsCiAgICA
 gICAgICAiYm9hcmRpbmdQb2xpY3kiOiAiaHR0cDovL3NjaGVtYS5vcmc
 vWm9uZUJvYXJkaW5nUG9saWN5IgogICAgICAgICAgIH0sCiAgICAgICAgInN
 lbGxlciI6IHsKICAgICAgICAgICJAdHlwZSI6ICJBaXJsaW5lIiwKICA
 gICAgICAgICJuYW1lIjogIlVuaXRlZCIsCiAgICAgICAgICAiaWF0YUN
 vZGUiOiAiVUEiCiAgICAgICAgfSwKICAgICAgICAiZGVwYXJ0dXJlQWl
 ycG9ydCI6IHsKICAgICAgICAgICJAdHlwZSI6ICJBaXJwb3J0IiwKICA
 gICAgICAgICJuYW1lIjogIlNhbiBGcmFuY2lzY28gQWlycG9ydCIsCiA
 gICAgICAgICAiaWF0YUNvZGUiOiAiU0ZPIgogICAgICAgICAgIH0sCiAgICA
 gICAgImRlcGFydHVyZVRpbWUiOiAiMjAxNy0wMy0wNFQyMDoxNTowMC0
 wODowMCIsCiAgICAgICAgICAgImFycml2YWxBaXJwb3J0IjogewogICAgICA
 gICAgIkB0eXBlIjogIkFpcnBvcnQiLAogICAgICAgICAgIm5hbWUiOiA
 iSm9obiBGLiBLZW5uZWR5IEludGVybmF0aW9uYWwgQWlycG9ydCIsCiA
 gICAgICAgICAiaWF0YUNvZGUiOiAiSkZLIgogICAgICAgICAgIH0sCiAgICA
 gICAgImFycml2YWxUaW1lIjogIjIwMTctMDMtMDVUMDY6MzA6MDAtMDU
 6MDAiCiAgICAgICAgICAgIH0KICAgICAgICAgICAgIH0KICAgICAgICAgICAgIDwvc2NyaXB0Pg==
```

5.3. Derived

Parameter Name: DERIVED

Purpose: This parameter specifies that the value of the associated property is derived from some other property value or values.

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

```
derivedparam    = "DERIVED" "=" ("TRUE" / "FALSE")
; Default is FALSE
```

Description: This property parameter **MAY** be specified on any property when the value is derived from some other property or properties. When present with a value of TRUE, clients **MUST NOT** update the property.

As an example, if a "STYLED-DESCRIPTION" property is present with FMTTYPE="application/rtf", then there may be an additional "STYLED-DESCRIPTION" property with FMTTYPE="text/html" and DERIVED=TRUE, as well as a value created from the rtf value.

Example:

```
STYLED-DESCRIPTION;FMTTYPE=text/html;
 DERIVED=TRUE:<html>...</html>
```

6. New Properties

This specification makes use of the "NAME" property, which is defined in [RFC7986].

6.1. Location Type

Property Name: LOCATION-TYPE

Purpose: This property specifies the type(s) of a location.

Value Type: The value type for this property is TEXT. The allowable values are defined below.

Description: This property **MAY** be specified in "VLOCATION" components and provides a way to differentiate multiple locations. For example, it allows event producers to provide location information for the venue and the parking.

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

```
loctype      = "LOCATION-TYPE" loctypeparam ":"
               text *("," text)
               CRLF

loctypeparam   = *(";" other-param)
```

Multiple values may be used if the location has multiple purposes, for example, a hotel and a restaurant.

Values for this parameter are taken from the values defined in Section 3 of [RFC4589]. New location types **SHOULD** be registered in the manner laid down in Section 5 of [RFC4589].

6.2. Participant Type

Property Name: PARTICIPANT-TYPE

Purpose: This property specifies the type of participant.

Value Type: The value type for this property is TEXT. The allowable values are defined below.

Property Parameters: Nonstandard parameters can be specified on this property.

Conformance: This property **MUST** be specified once within a "PARTICIPANT" component.

Description: This property defines the type of participation in events or tasks. Participants can be individuals or organizations, for example, a soccer team, the spectators, or the musicians.

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

```
participanttype   = "PARTICIPANT-TYPE" partvalueparam ":"
                    partvalue CRLF

partvalue    = ("ACTIVE"
               / "INACTIVE"
               / "SPONSOR"
               / "CONTACT"
               / "BOOKING-CONTACT"
               / "EMERGENCY-CONTACT"
               / "PUBLICITY-CONTACT"
               / "PLANNER-CONTACT"
               / "PERFORMER"
               / "SPEAKER"
               / iana-token)     ; Other IANA-registered
                                 ; values

partvalueparam   = *(";" other-param)
```

Example: The following is an example of this property.

```
PARTICIPANT-TYPE:SPEAKER
```

The registered values for the "PARTICIPANT-TYPE" property have the meanings described here:

ACTIVE: A participant taking an active role -- for example, a team member.

INACTIVE: A participant taking an inactive role -- for example, an audience member.

SPONSOR: A sponsor of the event. The "ORDER" parameter may be used with this participant type to define the relative order of multiple sponsors.

CONTACT: Contact information for the event. The "ORDER" parameter may be used with this participant type to define the relative order of multiple contacts.

BOOKING-CONTACT: Contact information for reservations or payment.

EMERGENCY-CONTACT: Contact in case of emergency.

PUBLICITY-CONTACT: Contact for publicity.

PLANNER-CONTACT: Contact for the event planner or organizer.

PERFORMER: A performer -- for example, the soloist or the accompanist. The "ORDER" parameter may be used with this participant type to define the relative order of multiple performers. For example, ORDER=1 could define the principal performer or soloist.

SPEAKER: Speaker at an event.

6.3. Resource Type

Property Name: RESOURCE-TYPE

Purpose: This property specifies the type of resource.

Value Type: The value type for this property is TEXT. The allowable values are defined below.

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

```
restypeprop   = "RESOURCE-TYPE" restypeparam ":"
                restypevalue CRLF

restypevalue  = ("ROOM"
                / "PROJECTOR"
                / "REMOTE-CONFERENCE-AUDIO"
                / "REMOTE-CONFERENCE-VIDEO"
                / iana-token)     ; Other IANA-registered
                ; values

restypeparam   = *(";" other-param)
```

Description: This property **MAY** be specified in "VRESOURCE" components and provides a way to differentiate multiple resources.

The registered values are described below. New resource types **SHOULD** be registered in the manner laid down in this specification.

ROOM: A room for the event/meeting.

PROJECTOR: Projection equipment.

REMOTE-CONFERENCE-AUDIO: Audio remote conferencing facilities.

REMOTE-CONFERENCE-VIDEO: Video remote conferencing facilities.

6.4. Calendar Address

Property Name: CALENDAR-ADDRESS

Purpose: This property specifies the calendar address for a participant.

Value Type: CAL-ADDRESS

Property Parameters: IANA-registered or nonstandard property parameters can be specified on this property.

Conformance: This property **MAY** be specified once within a "PARTICIPANT" component.

Description: This property provides a calendar user address for the participant. If there is an "ATTENDEE" property with the same value, then the participant is schedulable.

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

```
calendaraddress   = "CALENDAR-ADDRESS" caladdressparam ":"
                cal-address CRLF

caladdressparam   = *(";" other-param)
```

6.5. Styled-Description

Property Name: STYLED-DESCRIPTION

Purpose: This property provides for one or more rich-text descriptions to replace that provided by the "DESCRIPTION" property.

Value Type: There is no default value type for this property. The value type can be set to URI or TEXT. Other text-based value types can be used when defined in the future. Clients **MUST** ignore any properties with value types they do not understand.

Property Parameters: IANA-registered, nonstandard, id, alternate text representation, format type, derived, and language property parameters can be specified on this property.

Conformance: The property can be specified multiple times in the "VEVENT", "VTODO", "VJOURNAL", "VFREEBUSY", "PARTICIPANT", or "VALARM" calendar components.

If it does appear more than once, there **MUST** be exactly one instance of the property with no "DERIVED" parameter or DERIVED=FALSE. All others **MUST** have DERIVED=TRUE.

Additionally, if there is one or more "STYLED-DESCRIPTION" property, then the "DESCRIPTION" property should either be absent or have the parameter DERIVED=TRUE.

Description: This property supports rich-text descriptions, for example, HTML. Event publishers typically wish to provide more and better-formatted information about the event.

This property is used in the "VEVENT" and "VTODO" components to capture lengthy textual descriptions associated with the activity. This property is used in the "VJOURNAL" calendar component to capture one or more textual journal entries. This property is used in the "VALARM" calendar component to capture the display text for a DISPLAY category of alarm and to capture the body text for an EMAIL category of alarm. In the "PARTICIPANT" component, it provides a detailed description of the participant.

VALUE=TEXT is used to provide rich text inline as the property value.

VALUE=URI is used to provide a link to rich-text content, which is expected to be displayed inline as part of the event.

In either case, the "DESCRIPTION" property should be absent or contain a plain-text rendering of the styled text.

Applications **MAY** attempt to guess the media type of the resource via inspection of its content if and only if the media type of the resource is not given by the "FMTTYPE" parameter. If the media type remains unknown, calendar applications **SHOULD** treat it as type "text/html" and process the content as defined in [W3C.REC-html51-20171003].

Multiple "STYLED-DESCRIPTION" properties may be used to provide different formats or different language variants. However, all but one **MUST** have DERIVED=TRUE.

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

```
styleddescription = "STYLED-DESCRIPTION" styleddescparam ":"
                    styleddescval CRLF

styleddescparam   = *(
                    ; The following is REQUIRED
                    ; but MUST NOT occur more than once.
                    ;
                    (";" "VALUE" "=" ("URI" / "TEXT")) /
                    ;
                    ; The following are OPTIONAL
                    ; but MUST NOT occur more than once.
                    ;
                    (";" altrepparam) / (";" languageparam) /
                    (";" fmttypeparam) / (";" derivedparam) /
                    ;
                    ; The following is OPTIONAL
                    ; and MAY occur more than once.
                    ;
                    (";" other-param)
                    )

styleddescval   = ( uri / text )
;Value MUST match value type
```

Example: The following is an example of this property. It points to an HTML description.

```
STYLED-DESCRIPTION;VALUE=URI:http://example.org/desc001.html
```

6.6. Structured-Data

Property Name: STRUCTURED-DATA

Purpose: This property specifies ancillary data associated with the calendar component.

Value Type: There is no default value type for this property. The value type can be set to TEXT, BINARY, or URI.

Property Parameters: IANA-registered, nonstandard, inline encoding, and value data type property parameters can be specified on this property. The format type and schema parameters can be specified on this property and **MUST** be present for text or inline binary encoded content information.

Conformance: This property can be specified multiple times in an iCalendar object. Typically, it would be used in the "VEVENT", "VTODO", or "VJOURNAL" calendar components.

Description: The existing properties in iCalendar cover key elements of events and tasks, such as start time, end time, location, summary, etc. However, different types of events often have other specific "fields" that are useful to include in the calendar data. For example, an event representing an airline flight could include the airline, flight number, departure and arrival airport codes, check-in and gate-closing times, etc. As another example, a sporting event might contain information about the type of sport, the home and away teams, the league the teams are in, information about nearby parking, etc.

This property is used to specify ancillary data in some structured format, either directly (inline) as a "TEXT" or "BINARY" value or as a link via a "URI" value.

Rather than define new iCalendar properties for the variety of event types that might occur, it would be better to leverage existing schemas for such data. For example, schemas available at <https://schema.org> include different event types. By using standard schemas, interoperability can be improved between calendar clients and noncalendaring systems that wish to generate or process the data.

This property allows the direct inclusion of ancillary data whose schema is defined elsewhere. This property also includes parameters to clearly identify the type of the schema being used so that clients can quickly and easily spot what is relevant within the calendar data and present that to users or process it within the calendaring system.

iCalendar does support an "ATTACH" property, which can be used to include documents or links to documents within the calendar data. However, that property does not allow data to be included as a "TEXT" value (a feature that "STRUCTURED-DATA" does allow), plus attachments are often treated as "opaque" data to be processed by some other system rather than the calendar client. Thus, the existing "ATTACH" property is not sufficient to cover the specific needs of inclusion of schema data. Extending the "ATTACH" property to support a new value type would likely cause interoperability problems. Additionally, some implementations manage attachments by stripping them out and replacing with a link to the resource. Thus, a new property to support inclusion of schema data is warranted.

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

```
sdataprop    = "STRUCTURED-DATA" sdataparam
                 (
                   ";" "VALUE" "=" "TEXT"
                   ":" text
                 ) /
                 (
                   ";" "ENCODING" "=" "BASE64"
                   ";" "VALUE" "=" "BINARY"
                   ";" binary
                 ) /
                 (
                   ";" "VALUE" "=" "URI"
                   ":" uri
                 )
                 CRLF

sdataparam  = *(
                 ;
                 ; The following is OPTIONAL for a URI value,
                 ; REQUIRED for a TEXT or BINARY value,
                 ; and MUST NOT occur more than once.
                 ;
                 (";" fmttypeparam) /
                 (";" schemaparam) /
                 ;
                 ; The following is OPTIONAL
                 ; and MAY occur more than once.
                 ;
                 (";" other-param)
                 ;
              )
```

Example: The following is an example of this property.

```
STRUCTURED-DATA;FMTTYPE=application/ld+json;
 SCHEMA="https://schema.org/SportsEvent";
 VALUE=TEXT:{\n
   "@context": "http://schema.org"\,\n
   "@type": "SportsEvent"\,\n
   "homeTeam": "Pittsburgh Pirates"\,\n
   "awayTeam": "San Francisco Giants"\n
 }\n
```

7. New Components

7.1. Participant

Component name: PARTICIPANT

Purpose: This component provides information about a participant in an event or task.

Conformance: This component can be specified multiple times in a "VEVENT", "VTODO", "VJOURNAL", or "VFREEBUSY" calendar component.

Description: This component provides information about a participant in a calendar component. A participant may be an attendee in a scheduling sense, and the "ATTENDEE" property may be specified in addition. Participants can be individuals or organizations, for example, a soccer team, the spectators, or the musicians.

"STRUCTURED-DATA" properties, if present, may refer to definitions of the participant -- such as a vCard.

The "CALENDAR-ADDRESS" property, if present, will provide a cal-address. If an "ATTENDEE" property has the same value, the participant is considered schedulable. The "PARTICIPANT" component can be used to contain additional metadata related to the attendee.

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

```
participantc = "BEGIN" ":" "PARTICIPANT" CRLF
               partprop *locationc *resourcec
               "END" ":" "PARTICIPANT" CRLF

partprop     = *(
               ;
               ; The following are REQUIRED
               ; but MUST NOT occur more than once.
               ;
               participanttype / uid /
               ;
               ; The following are OPTIONAL
               ; but MUST NOT occur more than once.
               ;
               calendaraddress / created / description / dtstamp /
               geo / last-mod / priority / seq /
               status / summary / url /
               ;
               ; The following are OPTIONAL
               ; and MAY occur more than once.
               ;
               attach / categories / comment
               contact / location / rstatus / related /
               resources / strucloc / strucres /
               styleddescription / sdataprop / iana-prop
               ;
               )
```

Note: When the "PRIORITY" property is supplied, it defines the ordering of "PARTICIPANT" components with the same value for the "PARTICIPANT-TYPE" property.

Privacy Issues: When a "LOCATION" property is supplied, it provides information about the location of a participant at a given time or times. This may represent an unacceptable privacy risk for some participants. User agents **MUST NOT** broadcast this information without the express permission of the participants whose location would be exposed. For further comments, see Section 10.

Example: The following is an example of this component. It contains a "STRUCTURED-DATA" property that points to a vCard providing information about the event participant.

```
BEGIN:PARTICIPANT
UID: em9lQGZvb2GFtcGxlLmNvbQ
PARTICIPANT-TYPE:PERFORMER
STRUCTURED-DATA;VALUE=URI:
 http://dir.example.com/vcard/aviolinist.vcf
END:PARTICIPANT
```

Example: The following is an example for the primary contact.

```
BEGIN:PARTICIPANT
UID: em9lQGZvb2GFtcGxlLmNvbQ
STRUCTURED-DATA;VALUE=URI;
 http://dir.example.com/vcard/contacts/contact1.vcf
PARTICIPANT-TYPE:CONTACT
DESCRIPTION:A contact
END:PARTICIPANT
```

Example: The following is an example for a participant with contact and location.

```
BEGIN:PARTICIPANT
UID: em9lQGZvb2GFtcGxlLmNdrt
STRUCTURED-DATA;VALUE=URI;
 http://dir.example.com/vcard/contacts/my-card.vcf
PARTICIPANT-TYPE:SPEAKER
DESCRIPTION:A participant
BEGIN:VLOCATION
UID:123456-abcdef-98765432
NAME:My home location
STRUCTURED-DATA;VALUE=URI:
 http://dir.example.com/addresses/my-home.vcf
END:VLOCATION
END:PARTICIPANT
```

7.1.1. Schedulable Participant

A "PARTICIPANT" component may represent someone or something that needs to be scheduled, as defined for ATTENDEE in [RFC5545] and [RFC5546]. The "PARTICIPANT" component may also represent someone or something that is NOT to receive scheduling messages.

For backwards compatibility with existing clients and servers when used to schedule events and tasks, the "ATTENDEE" property **MUST** be used to specify the scheduling parameters as defined for that property.

For other, future uses, the "CALENDAR-ADDRESS" property **MUST** be used to specify those parameters.

A "PARTICIPANT" component is defined to be schedulable if:

- it contains a "CALENDAR-ADDRESS" property and
- that property value is the same as the value for an "ATTENDEE" property.

If both of these conditions apply, then the participant defined by the value of the URL property will take part in scheduling operations, as defined in [RFC5546].

An appropriate use for the "PARTICIPANT" component in scheduling would be to store "SEQUENCE" and "DTSTAMP" properties associated with replies from each "ATTENDEE" property. A "LOCATION" property within the "PARTICIPANT" component might allow better selection of meeting times when participants are in different time zones.

7.2. Location

Component name: VLOCATION

Purpose: This component provides rich information about the location of an event using the structured data property or, optionally, a plain-text typed value.

Conformance: This component can be specified multiple times in a "VEVENT", "VTODO", "VJOURNAL", "VFREEBUSY", or "PARTICIPANT" calendar component.

Description: There may be a number of locations associated with an event. This component provides detailed information about a location.

When used in a component, the value of this property provides information about the event venue or of related services, such as parking, dining, stations, etc.

"STRUCTURED-DATA" properties, if present, may refer to representations of the location -- such as a vCard.

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

```
locationc    = "BEGIN" ":" "VLOCATION" CRLF
               locprop
               "END" ":" "VLOCATION" CRLF

locprop      = *(
               ;
               ; The following are REQUIRED
               ; but MUST NOT occur more than once.
               ;
               uid /
               ;
               ; The following are OPTIONAL
               ; but MUST NOT occur more than once.
               ;
               description / geo / loctype / name
               ;
               ; The following are OPTIONAL
               ; and MAY occur more than once.
               ;
               sdataprop / iana-prop
             )
```

The "NAME" property is defined in [RFC7986].

Example: The following is an example of this component. It points to a venue.

```
BEGIN:VLOCATION
UID:123456-abcdef-98765432
NAME:The venue
STRUCTURED-DATA;VALUE=URI:
 http://dir.example.com/venues/big-hall.vcf
END:VLOCATION
```

7.3. Resource

Component name: VRESOURCE

Purpose: This component provides a typed reference to external information about a resource or, optionally, a plain-text typed value. Typically, a resource is anything that might be required or used by a calendar entity and possibly has a directory entry.

Conformance: This component can be specified multiple times in a "VEVENT", "VTODO", "VJOURNAL", "VFREEBUSY", or "PARTICIPANT" calendar component.

Description: When used in a component, this component provides information about resources used for the event, such as rooms, projectors, and conferencing capabilities.

The RESOURCE-TYPE value registry provides a place in which resource types may be registered.

"STRUCTURED-DATA" properties, if present, may refer to representations of the resource -- such as a vCard.

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

```
resourcec    = "BEGIN" ":" "VRESOURCE" CRLF
               resprop
               "END" ":" "VRESOURCE" CRLF

resprop      = *(
               ;
               ; The following are REQUIRED
               ; but MUST NOT occur more than once.
               ;
               uid /
               ;
               ; The following are OPTIONAL
               ; but MUST NOT occur more than once.
               ;
               description / geo / name / restype /
               ;
               ; The following are OPTIONAL
               ; and MAY occur more than once.
               ;
               sdataprop / iana-prop
             )
```

The "NAME" property is defined in [RFC7986].

Example: The following is an example of this component. It refers to a projector.

```
BEGIN:VRESOURCE
UID:456789-abcdef-98765432
NAME:The projector
RESOURCE-TYPE:projector
STRUCTURED-DATA;VALUE=URI:http://dir.example.com/projectors/3d.vcf
END:VRESOURCE
```

8. Extended Examples

The following are some examples of the use of the properties defined in this specification. They include additional properties defined in [RFC7986], which includes "IMAGE".

8.1. Example 1

The following is an example of a "VEVENT" describing a concert. It includes location information for the venue itself, as well as references to parking and restaurants.

```
BEGIN:VEVENT
CREATED:20200215T145739Z
DESCRIPTION: Piano Sonata No 3\n
 Piano Sonata No 30
DTSTAMP:20200215T145739Z
DTSTART;TZID=America/New_York:20200315T150000Z
DTEND;TZID=America/New_York:20200315T163000Z
LAST-MODIFIED:20200216T145739Z
SUMMARY:Beethoven Piano Sonatas
UID:123456
IMAGE;VALUE=URI;DISPLAY=BADGE;FMTTYPE=image/png:h
 ttp://example.com/images/concert.png
BEGIN:PARTICIPANT
PARTICIPANT-TYPE:SPONSOR
UID:dG9tQGZvb2Jhci5xlLmNvbQ
STRUCTURED-DATA;VALUE=URI:http://example.com/sponsor.vcf
END:PARTICIPANT
BEGIN:PARTICIPANT
PARTICIPANT-TYPE:PERFORMER:
UID:em9lQGZvb2GFtcGxlLmNvbQ
STRUCTURED-DATA;VALUE=URI:http://www.example.com/people/johndoe.vcf
END:PARTICIPANT
BEGIN:VLOCATION
UID:123456-abcdef-98765432
NAME:The venue
STRUCTURED-DATA;VALUE=URI:http://dir.example.com/venues/big-hall.vcf
END:VLOCATION
BEGIN:VLOCATION
UID:123456-abcdef-87654321
NAME:Parking for the venue
STRUCTURED-DATA;VALUE=URI:http://dir.example.com/venues/parking.vcf
END:VLOCATION
END:VEVENT
```

8.2. Example 2

The following is an example of a "VEVENT" describing a meeting. One of the attendees is a remote participant.

```
BEGIN:VEVENT
CREATED:20200215T145739Z
DTSTAMP:20200215T145739Z
DTSTART;TZID=America/New_York:20200315T150000Z
DTEND;TZID=America/New_York:20200315T163000Z
LAST-MODIFIED:20200216T145739Z
SUMMARY:Conference planning
UID:123456
ORGANIZER:mailto:a@example.com
ATTENDEE;PARTSTAT=ACCEPTED;CN=A:mailto:a@example.com
ATTENDEE;RSVP=TRUE;CN=B:mailto:b@example.com
BEGIN:PARTICIPANT
PARTICIPANT-TYPE:ACTIVE:
UID:v39lQGZvb2GFtcGxlLmNvbQ
STRUCTURED-DATA;VALUE=URI:http://www.example.com/people/b.vcf
LOCATION:At home
END:PARTICIPANT
END:VEVENT
```

9. Security Considerations

This specification extends [RFC5545] and makes further use of possibly linked data. While calendar data is not unique in this regard, it is worth reminding implementors of some of the dangers and safeguards.

9.1. URIs

See [RFC3986] for a discussion of the security considerations relating to URIs. Because of the issues discussed there and below, clients **SHOULD NOT** follow URIs and fetch content automatically and should only do so at the explicit request of the user.

Fetching remote resources carries inherent risks. Connections must only be allowed on well-known ports, using allowed protocols (generally just HTTP/HTTPS on their default ports). The URL must be resolved externally and not allowed to access internal resources. Connecting to an external source reveals IP (and therefore generally location) information.

A maliciously constructed iCalendar object may contain a very large number of URIs. In the case of published calendars with a large number of subscribers, such objects could be widely distributed. Implementations should be careful to limit the automatic fetching of linked resources to reduce the risk of this being an amplification vector for a denial-of-service attack.

9.2. Malicious Content

For the "STRUCTURED-DATA" property, agents need to be aware that a client could attack underlying storage by sending extremely large values and could attack processing time by uploading a recurring event with a large number of overrides and then repeatedly adding, updating, and deleting structured data.

Agents should set reasonable limits on storage size and number of instances and apply those constraints. Calendar protocols should ensure there is a way to report on such limits being exceeded.

Malicious content could be introduced into the calendar server by way of the "STRUCTURED-DATA" property and propagated to many end users via scheduling. Servers **SHOULD** check this property for malicious or inappropriate content. Upon detecting such content, servers **SHOULD** remove the property.

9.3. HTML Content

When processing HTML content, applications need to be aware of the many security and privacy issues, as described in the IANA Considerations section of [W3C.REC-html51-20171003].

10. Privacy Considerations

10.1. Tracking

Properties with a "URI" value type can expose their users to privacy leaks, as any network access of the URI data can be tracked both by a network observer and by the entity hosting the remote resource. Clients **SHOULD NOT** automatically download data referenced by the URI without explicit instruction from users.

To help alleviate some of the concerns, protocols and services could provide proxy services for downloading referenced data.

10.2. Revealing Locations

The addition of location information to the new participant component provides information about the location of participants at a given time. This information **MUST NOT** be distributed to other participants without those participant's express permission. Note that there may be a number of participants who may be unaware of their inclusion in the data.

Agents processing and distributing calendar data must be aware that it has the property of providing information about a future time when a given individual may be at a particular location, which could enable targeted attacks against that individual.

The same may be true of other information contained in the participant component. In general, revealing only as much as is absolutely necessary should be the approach taken.

For example, there may be some privacy considerations relating to the "ORDER" parameter, as it provides an indication of the organizer's perception of the relative importance of other participants.

11. IANA Considerations

11.1. Additional iCalendar Registrations

11.1.1. Properties

This document defines the following iCalendar properties that have been added to the "Properties" registry defined in Section 8.2.3 of [RFC5545]:

Property	Status	Reference
CALENDAR-ADDRESS	Current	RFC 9073, Section 6.4
LOCATION-TYPE	Current	RFC 9073, Section 6.1
PARTICIPANT-TYPE	Current	RFC 9073, Section 6.2
RESOURCE-TYPE	Current	RFC 9073, Section 6.3
STRUCTURED-DATA	Current	RFC 9073, Section 6.6
STYLED-DESCRIPTION	Current	RFC 9073, Section 6.5

Table 1: Additions to the Properties Registry

11.1.2. Parameters

This document defines the following iCalendar property parameters that have been added to the "Parameters" registry defined in Section 8.2.4 of [RFC5545]:

Parameter	Status	Reference
ORDER	Current	RFC 9073, Section 5.1
SCHEMA	Current	RFC 9073, Section 5.2
DERIVED	Current	RFC 9073, Section 5.3

Table 2: Additions to the Parameters Registry

11.1.3. Components

This document defines the following iCalendar components that have been added to the "Components" registry defined in Section 8.3.1 of [RFC5545]:

Component	Status	Reference
PARTICIPANT	Current	RFC 9073, Section 7.1
VLOCATION	Current	RFC 9073, Section 7.2
VRESOURCE	Current	RFC 9073, Section 7.3

Table 3: Additions to the Components Registry

11.2. Participant Types and Resource Types Registries

This section defines new registration tables for PARTICIPANT-TYPE and RESOURCE-TYPE values. These tables are updated using the same approaches laid down in Section 8.2.1 of [RFC5545].

This document creates new IANA registries for participant and resource types. IANA will maintain these registries and, following the policies outlined in [RFC8126], new tokens are assigned after Expert Review. The Expert Reviewer will generally consult the IETF GEOPRIV Working Group mailing list or its designated successor. Updates or deletions of tokens from the registration follow the same procedures. The Expert Review should be guided by a few common-sense considerations. For example, tokens should not be specific to a country, region, organization, or company; they should be well defined and widely recognized. The Expert's support of IANA will include providing IANA with the new token(s) when the update is provided only in the form of a schema and providing IANA with the new schema element(s) when the update is provided only in the form of a token. To ensure widespread usability across protocols, tokens **MUST** follow the character set restrictions for XML Names [W3C.REC-xml-20040204]. Each registration must include the name of the token and a brief description similar to the ones offered herein for the initial registrations contained this document.

11.2.1. Participant Types

Participant Type	Status	Reference
ACTIVE	Current	RFC 9073, Section 6.2
INACTIVE	Current	RFC 9073, Section 6.2
SPONSOR	Current	RFC 9073, Section 6.2
CONTACT	Current	RFC 9073, Section 6.2
BOOKING-CONTACT	Current	RFC 9073, Section 6.2
EMERGENCY-CONTACT	Current	RFC 9073, Section 6.2
PUBLICITY-CONTACT	Current	RFC 9073, Section 6.2
PLANNER-CONTACT	Current	RFC 9073, Section 6.2

Participant Type	Status	Reference
PERFORMER	Current	RFC 9073, Section 6.2
SPEAKER	Current	RFC 9073, Section 6.2

Table 4: Initial Contents of the Participant Types Registry

11.2.2. Resource Types

Resource Type	Status	Reference
PROJECTOR	Current	RFC 9073, Section 6.3
ROOM	Current	RFC 9073, Section 6.3
REMOTE-CONFERENCE-AUDIO	Current	RFC 9073, Section 6.3
REMOTE-CONFERENCE-VIDEO	Current	RFC 9073, Section 6.3

Table 5: Initial Contents of the Resource Types Registry

12. Normative References

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Acknowledgements

The author would like to thank Chuck Norris of eventful.com for his work, which led to the development of this RFC.

The author would also like to thank the members of CalConnect: The Calendaring and Scheduling Consortium, the Event Publication technical committee, and the following individuals for contributing their ideas and support:

Cyrus Daboo, John Haug, Dan Mendell, Ken Murchison, and Scott Otis.

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