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**VALARM Extensions for iCalendar
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Abstract

This document defines a set of extensions to the iCalendar VALARM component to enhance use of alarms and improve interoperability between clients and servers.

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[1.](#) Introduction

The iCalendar [[RFC5545](#)] specification defines a set of components used to describe calendar data. One of those is the "VALARM" component which appears as a sub-component of "VEVENT" and "VTODO" components. The "VALARM" component is used to specify a reminder for an event or task. Different alarm actions are possible, as are different ways to specify how the alarm is triggered.

As iCalendar has become more widely used and as client-server protocols such as CalDAV [[RFC4791](#)] have become more popular, several issues with "VALARM" components have arisen. Most of these relate to the need to extend the existing "VALARM" component with new properties and behaviors to allow clients and servers to accomplish specific tasks in an interoperable manner. For example, clients typically need a way to specify that an alarm has been dismissed by a calendar user, or has been "snoozed" by a set amount of time. To date, this has been done through the use of custom "X-" properties specific to each client implementation, leading to poor interoperability.

This specification defines a set of extensions to "VALARM" components to cover common requirements for alarms not currently addressed in

iCalendar. Each extension is defined in a separate section below. For the most part, each extension can be supported independently of the others, though in some cases one extension will require another. In addition, this specification describes mechanisms by which clients can interoperably implement common features such as "snoozing".

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 [BCP 14](#) [1] [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

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. Extensible syntax for VALARM

[Section 3.6.6 of \[RFC5545\]](#) defines the syntax for "VALARM" components and properties within them. However, as written, it is hard to extend this by adding, e.g., a new property common to all types of alarm. Since many of the extensions defined in this document need to extend the base syntax, an alternative form for the base syntax is defined here, with the goal of simplifying specification of the extensions.

A "VALARM" calendar component is re-defined by the following notation:

```
alarmcext = "BEGIN" ":" "VALARM" CRLF
           alarmprop
           "END" ":" "VALARM" CRLF

alarmprop = *(
    ; the following are REQUIRED,
    ; but MUST NOT occur more than once

    action / trigger /

    ; one set of action properties MUST be
    ; present and MUST match the action specified
    ; in the ACTION property

    actionprops /
```



```
; the following is OPTIONAL,  
; and MAY occur more than once
```

```
x-prop / iana-prop
```

```
)
```

```
actionprops = audiopropext / disppropext / emailpropext
```

```
audiopropext = *(
```

```
; 'duration' and 'repeat' are both OPTIONAL,  
; and MUST NOT occur more than once each,  
; but if one occurs, so MUST the other
```

```
duration / repeat /
```

```
; the following is OPTIONAL,  
; but MUST NOT occur more than once
```

```
attach
```

```
)
```

```
disppropext = *(
```

```
; the following are REQUIRED,  
; but MUST NOT occur more than once
```

```
description /
```

```
; 'duration' and 'repeat' are both OPTIONAL,  
; and MUST NOT occur more than once each,  
; but if one occurs, so MUST the other
```

```
duration / repeat
```

```
)
```

```
emailpropext = *(
```

```
; the following are all REQUIRED,  
; but MUST NOT occur more than once
```

```
description / summary /
```

```
; the following is REQUIRED,  
; and MAY occur more than once
```



```
attendee /  
  
; 'duration' and 'repeat' are both OPTIONAL,  
; and MUST NOT occur more than once each,  
; but if one occurs, so MUST the other  
  
duration / repeat  
  
)
```

4. Alarm Unique Identifier

This extension adds a "UID" property to "VALARM" components to allow a unique identifier to be specified. The value of this property can then be used to refer uniquely to the "VALARM" component.

The "UID" property defined here follows the definition in [Section 3.8.4.7 of \[RFC5545\]](#) with the security and privacy updates in [Section 5.3 of \[RFC7986\]](#). In particular it MUST be a globally unique identifier that does not contain any security- or privacy-sensitive information.

The "VALARM" component defined in [Section 3](#) is extended here as:

```
alarmprop /= *(  
  
; the following is OPTIONAL,  
; but MUST NOT occur more than once  
  
uid  
  
)
```

5. Alarm Acknowledgement

There is currently no way for a "VALARM" component to indicate whether it has been triggered and acknowledged. With the advent of a standard client/server protocol for calendaring and scheduling data ([\[RFC4791\]](#)) it is quite possible for an event with an alarm to exist on multiple clients in addition to the server. If each of those is responsible for performing the action when an alarm triggers, then multiple "alerts" are generated by different devices. In such a situation, a calendar user would like to be able to "dismiss" the alarm on one device and have it automatically dismissed on the others too.

Also, with recurring events that have alarms, it is important to know when the last alarm in the recurring set was acknowledged, so that the client can determine whether past alarms have been missed.

To address these needs, this specification adds an "ACKNOWLEDGED" property to "VALARM" components to indicate when the alarm was last sent or acknowledged. This is defined by the syntax below.

```
alarmprop      /= *(  
    ; the following is OPTIONAL,  
    ; but MUST NOT occur more than once  
  
    acknowledged  
  
    )
```

5.1. Acknowledged Property

Property Name: ACKNOWLEDGED

Purpose: This property specifies the UTC date and time at which the corresponding alarm was last sent or acknowledged.

Value Type: DATE-TIME

Property Parameters: IANA and non-standard property parameters can be specified on this property.

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

Description: This property is used to specify when an alarm was last sent or acknowledged. This allows clients to determine when a pending alarm has been acknowledged by a calendar user so that any alerts can be dismissed across multiple devices. It also allows clients to track repeating alarms or alarms on recurring events or to-dos to ensure that the right number of missed alarms can be tracked.

Clients SHOULD set this property to the current date-time value in UTC when a calendar user acknowledges a pending alarm. Certain kinds of alarm may not provide feedback as to when the calendar user sees them, for example email based alerts. For those kinds of alarms, the client SHOULD set this property when the alarm is triggered and the action successfully carried out.

When an alarm is triggered on a client, clients can check to see if an "ACKNOWLEDGED" property is present. If it is, and the value of that property is greater than or equal to the computed trigger time for the alarm, then the client SHOULD NOT trigger the alarm. Similarly, if an alarm has been triggered and an "alert" presented to a calendar user, clients can monitor the iCalendar data to determine whether an "ACKNOWLEDGED" property is added or changed in the alarm component. If the value of any "ACKNOWLEDGED" property in the alarm changes and is greater than or equal to the trigger time of the alarm, then clients SHOULD dismiss or cancel any "alert" presented to the calendar user.

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

acknowledged = "ACKNOWLEDGED" acknowledgedparam ":" datetime CRLF

```
acknowledgedparam = *(
    ; the following is OPTIONAL,
    ; and MAY occur more than once

    (";" other-param)

)
```

Example: The following is an example of this property:

ACKNOWLEDGED:20090604T084500Z

6. Snoozing Alarms

Users often want to "snooze" an alarm, and this specification defines a standard approach to accomplish that.

To "snooze" an alarm, clients create a new "VALARM" component within the parent component of the "VALARM" that was triggered and is being "snoozed" (i.e., as a "sibling" component of the "VALARM" being snoozed). The new "VALARM" MUST be set to trigger at the user's chosen "snooze" interval after the original alarm triggered. Clients SHOULD use an absolute "TRIGGER" property with a "DATE-TIME" value specified in UTC.

When the "snooze" alarm is triggered and dismissed the client SHOULD remove the corresponding "VALARM" component, or set the "ACKNOWLEDGED" property (see [Section 5.1](#)). Alternatively, if the "snooze" alarm is itself "snoozed", the client SHOULD remove the

original "snooze" alarm and create a new one, with the appropriate trigger time and relationship set.

7. Alarm Proximity Trigger

VALARMS are currently triggered when a specific date-time is reached. It is also desirable to be able to trigger alarms based on location, e.g. when arriving at or departing from a particular location.

This specification adds the following properties to "VALARM" components to indicate when an alarm can be triggered based on location.

"PROXIMITY" - indicates that a location based trigger is to be used and which direction of motion is used for the trigger

"STRUCTURED-LOCATION" [[I-D.ietf-calext-eventpub-extensions](#)] - used to indicate the actual location to trigger off, specified using a geo: URI [[RFC5870](#)] which allows for two or three coordinate values with an optional uncertainty

```
alarmprop      /= *(  
    ; the following is OPTIONAL,  
    ; but MUST NOT occur more than once  
  
    proximity /  
  
    ; the following is OPTIONAL,  
    ; and MAY occur more than once, but only  
    ; when a PROXIMITY property is also present  
  
    structured-location  
  
    )
```

Typically, when a "PROXIMITY" property is used there is no need to specify a time-based trigger using the "TRIGGER" property. However, since "TRIGGER" is defined as a required property for a "VALARM" component, for backwards compatibility it has to be present, but ignored. To indicate a "TRIGGER" that is to be ignored, clients SHOULD use a value a long time in the past. A value of "19760401T005545Z" has been commonly used for this purpose.

7.1. Proximity Property

Property Name: PROXIMITY

Purpose: This property indicates that a location based trigger is applied to an alarm.

Value Type: TEXT

Property Parameters: IANA and non-standard property parameters can be specified on this property.

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

Description: This property is used to indicate that an alarm has a location-based trigger. Its value identifies the direction of motion used to trigger the alarm. One or more location values are set using "STRUCTURED-LOCATION" properties.

When the property value is set to "ARRIVE", the alarm is triggered when the calendar user agent arrives in the vicinity of any of the specified locations. When set to "DEPART", the alarm is triggered when the calendar user agent departs from the vicinity of any specified locations.

When the property value is set to "CONNECT", the alarm is triggered when the calendar user agent connects to a Bluetooth(R) [BTcore]-enabled automobile. When set to "DISCONNECT", the alarm is triggered when the calendar user agent disconnects from a Bluetooth(R)-enabled automobile.

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

```
proximity = "PROXIMITY" proximityparam ":" proximityvalue CRLF
```

```
proximityparam = *(  
    ; the following is OPTIONAL,  
    ; and MAY occur more than once  
  
    (";" other-param)  
    )
```

```
proximityvalue = "ARRIVE" / "DEPART" /  
    "CONNECT" / "DISCONNECT" / iana-token / x-name
```


Example: The following is an example of this property:

```
PROXIMITY:ARRIVE
```

7.2. Example

The following example shows a "VALARM" component with a proximity trigger set to trigger when the device running the calendar user agent leaves the vicinity defined by the structured location property. Note use of the "u=" parameter with the "geo" URI to define the precision of the location determination.

```
BEGIN:VALARM
UID:77D80D14-906B-4257-963F-85B1E734DBB6
TRIGGER;VALUE=DATE-TIME:19760401T005545Z
ACTION:DISPLAY
DESCRIPTION:Remember to buy milk
TRIGGER;VALUE=DATE-TIME:19760401T005545Z
PROXIMITY:DEPART
STRUCTURED-LOCATION;VALUE=URI:geo:40.443,-79.945;u=10
END:VALARM
```

8. Security Considerations

VALARMS, if not monitored properly, can be used to "spam" users and/or leak personal information. For instance, an unwanted audio or display alert could be considered spam. Or an email alert could be used to leak a user's location to a third party or to send unsolicited email to multiple users. Therefore, CalDAV clients and servers that accept iCalendar data from a third party (e.g. via iTIP [RFC5546], a subscription feed, or a shared calendar) SHOULD remove all VALARMS from the data prior to storing in their calendar system.

9. IANA Considerations

9.1. Property Registrations

This document defines the following new iCalendar properties to be added to the registry defined in [Section 8.2.3 of \[RFC5545\]](#):

Property	Status	Reference
ACKNOWLEDGED	Current	RFCXXXX, Section 5.1
PROXIMITY	Current	RFCXXXX, Section 7.1

9.2. Proximity Value Registry

This document creates a new iCalendar registry for values of the "PROXIMITY" property:

Value	Status	Reference
ARRIVE	Current	RFCXXXX, Section 7.1
DEPART	Current	RFCXXXX, Section 7.1
CONNECT	Current	RFCXXXX, Section 7.1
DISCONNECT	Current	RFCXXXX, Section 7.1

10. Acknowledgments

This specification came about via discussions at the Calendaring and Scheduling Consortium. Also, thanks to the following for providing feedback: Bernard Desruisseaux, Mike Douglass, Jacob Farkas, Jeffrey Harris, and Ciny Joy.

11. References

11.1. Normative References

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- [RFC4791] Daboo, C., Desruisseaux, B., and L. Dusseault, "Calendaring Extensions to WebDAV (CalDAV)", [RFC 4791](#), DOI 10.17487/RFC4791, March 2007, <<https://www.rfc-editor.org/info/rfc4791>>.
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- [RFC5870] Mayrhofer, A. and C. Spanring, "A Uniform Resource Identifier for Geographic Locations ('geo' URI)", [RFC 5870](#), DOI 10.17487/RFC5870, June 2010, <<https://www.rfc-editor.org/info/rfc5870>>.
- [RFC7986] Daboo, C., "New Properties for iCalendar", [RFC 7986](#), DOI 10.17487/RFC7986, October 2016, <<https://www.rfc-editor.org/info/rfc7986>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

11.2. Informative References

- [BTcore] Bluetooth Special Interest Group, "Bluetooth Core Specification Version 5.0", December 2016, <<https://www.bluetooth.com/specifications/bluetooth-core-specification>>.
- [RFC5546] Daboo, C., Ed., "iCalendar Transport-Independent Interoperability Protocol (iTIP)", [RFC 5546](#), DOI 10.17487/RFC5546, December 2009, <<https://www.rfc-editor.org/info/rfc5546>>.

11.3. URIs

- [1] <https://tools.ietf.org/html/bcp14>

Appendix A. Change History (To be removed by RFC Editor before publication)

Changes in -05:

1. Added Murchison as editor.
2. Updated keywords boilerplate.
3. Added reference to UID security/privacy recommendations.
4. Removed default alarms.
5. Removed ALARM-AGENT property.
6. Added text about using TRIGGER value in the past in addition to ACTION:NONE to have a default alarm be ignored.
7. Removed text about related alarms.

8. Removed URL alarm action.
9. Added reference to [draft-ietf-calext-eventpub-extensions](#) for STRUCTURED-LOCATION.
10. Added CONNECT and DISCONNECT PROXIMITY property values.
11. Added Security Considerations.
12. Editorial fixes.

Changes in -04:

1. Changed "ID" to "AGENT-ID".
2. Add more text on using "ACKNOWLEDGED" property.
3. Add "RELATED-TO" as a valid property for VALARMS.
4. Add "SNOOZE" relationship type for use with VALARMS.
5. State that "TRIGGER" is typically ignored in proximity alarms.
6. Added "PROXIMITY" value registry.
7. Added a lot more detail on default alarms including new action and property.

Changes in -03: none - resubmission of -02

Changes in -02:

1. Updated to 5545 reference.
2. Clarified use of absolute trigger in UTC in snooze alarms
3. Snooze alarms should be removed when completed
4. Removed status and replaced last-triggered by acknowledged property
5. Added location-based trigger
6. IANA registry tables added

Changes in -01:

1. Removed DESCRIPTION as an allowed property in the URI alarm.

2. Added statement about what to do when ALARM-AGENT is not present.
3. Allow multiple ALARM-AGENT properties to be present.
4. Removed SNOOZE-UNTIL - snoozing now accomplished by creating a new VALARM.
5. Remove VALARM by reference section.
6. Added more detail to CalDAV default alarms.

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