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Internet Calendaring and Scheduling Core Object Specification (iCalendar)

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

There is a clear need to provide and deploy interoperable calendaring and scheduling services for the Internet. Current group scheduling and Personal Information Management (PIM) products are being extended for use across the Internet, today, in proprietary ways. This memo has been defined to provide the definition of a common format for openly exchanging calendaring and scheduling information across the Internet.

This memo is formatted as a registration for a MIME media type per [RFC 2048]. However, the format in this memo is equally applicable for use outside of a MIME message content type.

The proposed media type value is 'text/calendar'. This string would label a media type containing calendaring and scheduling information encoded as text characters formatted in a manner outlined below.

This MIME media type provides a standard content type for capturing calendar event, to-do and journal entry information. It also can be used to convey free/busy time information. The content type is suitable as a MIME message entity that can be transferred over MIME based email systems, using HTTP or some other Internet transport. In

addition, the content type is useful as an object for interactions between desktop applications using the operating system clipboard, drag/drop or file systems capabilities.

This memo is based on the earlier work of the vCalendar specification for the exchange of personal calendaring and scheduling information. In order to avoid confusion with this referenced work, this memo is to be known as the iCalendar specification.

This memo defines the format for specifying iCalendar object methods. An iCalendar object method is a set of usage constraints for the iCalendar object. For example, these methods might define scheduling messages that request an event be scheduled, reply to an event request, send a cancellation notice for an event, modify or replace the definition of an event, provide a counter proposal for an original event request, delegate an event request to another individual, request free or busy time, reply to a free or busy time request, or provide similar scheduling messages for a to-do or journal entry calendar component. The iCalendar Transport-independent Interoperability Protocol (iTIP) defined in [ITIP] is one such scheduling protocol.

Table of Contents

1	Introduction.....	5
2	Basic Grammar and Conventions.....	6
2.1	Formatting Conventions	7
2.2	Related Memos	8
2.3	International Considerations	8
3	Registration Information.....	8
3.1	Content Type	8
3.2	Parameters	9
3.3	Content Header Fields	10
3.4	Encoding Considerations	10
3.5	Security Considerations	10
3.6	Interoperability Considerations	11
3.7	Applications Which Use This Media Type	11
3.8	Additional Information	11
3.9	Magic Numbers	11
3.10	File Extensions	11
3.11	Contact for Further Information:	12
3.12	Intended Usage	12
3.13	Authors/Change Controllers	12
4	iCalendar Object Specification.....	13
4.1	Content Lines	13
4.1.1	List and Field Separators	16
4.1.2	Multiple Values	16
4.1.3	Binary Content	16

4.1.4 Character Set	17
4.2 Property Parameters	17
4.2.1 Alternate Text Representation	18
4.2.2 Common Name	19
4.2.3 Calendar User Type	20
4.2.4 Delegators	20
4.2.5 Delegates	21
4.2.6 Directory Entry Reference	21
4.2.7 Inline Encoding	22
4.2.8 Format Type	23
4.2.9 Free/Busy Time Type	23
4.2.10 Language	24
4.2.11 Group or List Membership	25
4.2.12 Participation Status	25
4.2.13 Recurrence Identifier Range	27
4.2.14 Alarm Trigger Relationship	27
4.2.15 Relationship Type	28
4.2.16 Participation Role	29
4.2.17 RSVP Expectation	29
4.2.18 Sent By	30
4.2.19 Time Zone Identifier	30
4.2.20 Value Data Types	32
4.3 Property Value Data Types	32
4.3.1 Binary	33
4.3.2 Boolean	33
4.3.3 Calendar User Address	34
4.3.4 Date	34
4.3.5 Date-Time	35
4.3.6 Duration	37
4.3.7 Float	38
4.3.8 Integer	38
4.3.9 Period of Time	39
4.3.10 Recurrence Rule	40
4.3.11 Text	45
4.3.12 Time	47
4.3.13 URI	49
4.3.14 UTC Offset	49
4.4 iCalendar Object	50
4.5 Property	51
4.6 Calendar Components	51
4.6.1 Event Component	52
4.6.2 To-do Component	55
4.6.3 Journal Component	56
4.6.4 Free/Busy Component	58
4.6.5 Time Zone Component	60
4.6.6 Alarm Component	67
4.7 Calendar Properties	73
4.7.1 Calendar Scale	73

4.7.2 Method	74
4.7.3 Product Identifier	75
4.7.4 Version	76
4.8 Component Properties	77
4.8.1 Descriptive Component Properties	77
4.8.1.1 Attachment	77
4.8.1.2 Categories	78
4.8.1.3 Classification	79
4.8.1.4 Comment	80
4.8.1.5 Description	81
4.8.1.6 Geographic Position	82
4.8.1.7 Location	84
4.8.1.8 Percent Complete	85
4.8.1.9 Priority	85
4.8.1.10 Resources	87
4.8.1.11 Status	88
4.8.1.12 Summary	89
4.8.2 Date and Time Component Properties	90
4.8.2.1 Date/Time Completed	90
4.8.2.2 Date/Time End	91
4.8.2.3 Date/Time Due	92
4.8.2.4 Date/Time Start	93
4.8.2.5 Duration	94
4.8.2.6 Free/Busy Time	95
4.8.2.7 Time Transparency	96
4.8.3 Time Zone Component Properties	97
4.8.3.1 Time Zone Identifier	97
4.8.3.2 Time Zone Name	98
4.8.3.3 Time Zone Offset From	99
4.8.3.4 Time Zone Offset To	100
4.8.3.5 Time Zone URL	101
4.8.4 Relationship Component Properties	102
4.8.4.1 Attendee	102
4.8.4.2 Contact	104
4.8.4.3 Organizer	106
4.8.4.4 Recurrence ID	107
4.8.4.5 Related To	109
4.8.4.6 Uniform Resource Locator	110
4.8.4.7 Unique Identifier	111
4.8.5 Recurrence Component Properties	112
4.8.5.1 Exception Date/Times	112
4.8.5.2 Exception Rule	114
4.8.5.3 Recurrence Date/Times	115
4.8.5.4 Recurrence Rule	117
4.8.6 Alarm Component Properties	126
4.8.6.1 Action	126
4.8.6.2 Repeat Count	126
4.8.6.3 Trigger	127

4.8.7 Change Management Component Properties	129
4.8.7.1 Date/Time Created	129
4.8.7.2 Date/Time Stamp	130
4.8.7.3 Last Modified	131
4.8.7.4 Sequence Number	131
4.8.8 Miscellaneous Component Properties	133
4.8.8.1 Non-standard Properties	133
4.8.8.2 Request Status	134
5 iCalendar Object Examples.....	136
6 Recommended Practices.....	140
7 Registration of Content Type Elements.....	141
7.1 Registration of New and Modified iCalendar Object Methods ..	141
7.2 Registration of New Properties	141
7.2.1 Define the property	142
7.2.2 Post the Property definition	143
7.2.3 Allow a comment period	143
7.2.4 Submit the property for approval	143
7.3 Property Change Control	143
8 References.....	144
9 Acknowledgments.....	145
10 Authors' and Chairs' Addresses.....	146
11 Full Copyright Statement.....	148

1 Introduction

The use of calendaring and scheduling has grown considerably in the last decade. Enterprise and inter-enterprise business has become dependent on rapid scheduling of events and actions using this information technology. However, the longer term growth of calendaring and scheduling, is currently limited by the lack of Internet standards for the message content types that are central to these knowledgeware applications. This memo is intended to progress the level of interoperability possible between dissimilar calendaring and scheduling applications. This memo defines a MIME content type for exchanging electronic calendaring and scheduling information. The Internet Calendaring and Scheduling Core Object Specification, or iCalendar, allows for the capture and exchange of information normally stored within a calendaring and scheduling application; such as a Personal Information Manager (PIM) or a Group Scheduling product.

The iCalendar format is suitable as an exchange format between applications or systems. The format is defined in terms of a MIME content type. This will enable the object to be exchanged using several transports, including but not limited to SMTP, HTTP, a file system, desktop interactive protocols such as the use of a memory-based clipboard or drag/drop interactions, point-to-point asynchronous communication, wired-network transport, or some form of

unwired transport such as infrared might also be used.

The memo also provides for the definition of iCalendar object methods that will map this content type to a set of messages for supporting calendaring and scheduling operations such as requesting, replying to, modifying, and canceling meetings or appointments, to-dos and journal entries. The iCalendar object methods can be used to define other calendaring and scheduling operations such as requesting for and replying with free/busy time data. Such a scheduling protocol is defined in the iCalendar Transport-independent Interoperability Protocol (iTIP) defined in [ITIP].

The memo also includes a formal grammar for the content type based on the Internet ABNF defined in [RFC 2234]. This ABNF is required for the implementation of parsers and to serve as the definitive reference when ambiguities or questions arise in interpreting the descriptive prose definition of the memo.

2 Basic Grammar and Conventions

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 [RFC 2119].

This memo makes use of both a descriptive prose and a more formal notation for defining the calendaring and scheduling format.

The notation used in this memo is the ABNF notation of [RFC 2234]. Readers intending on implementing this format defined in this memo should be familiar with this notation in order to properly interpret the specifications of this memo.

All numeric and hexadecimal values used in this memo are given in decimal notation.

All names of properties, property parameters, enumerated property values and property parameter values are case-insensitive. However, all other property values are case-sensitive, unless otherwise stated.

Note: All indented editorial notes, such as this one, are intended to provide the reader with additional information. The information is not essential to the building of an implementation conformant with this memo. The information is provided to highlight a particular feature or characteristic of the memo.

The format for the iCalendar object is based on the syntax of the [RFC 2425] content type. While the iCalendar object is not a profile of the [RFC 2425] content type, it does reuse a number of the elements from the [RFC 2425] specification.

2.1 Formatting Conventions

The mechanisms defined in this memo are defined in prose. Many of the terms used to describe these have common usage that is different than the standards usage of this memo. In order to reference within this memo elements of the calendaring and scheduling model, core object (this memo) or interoperability protocol [ITIP] some formatting conventions have been used. Calendaring and scheduling roles are referred to in quoted-strings of text with the first character of each word in upper case. For example, "Organizer" refers to a role of a "Calendar User" within the scheduling protocol defined by [ITIP]. Calendar components defined by this memo are referred to with capitalized, quoted-strings of text. All calendar components start with the letter "V". For example, "VEVENT" refers to the event calendar component, "VTODO" refers to the to-do calendar component and "VJOURNAL" refers to the daily journal calendar component. Scheduling methods defined by [ITIP] are referred to with capitalized, quoted-strings of text. For example, "REQUEST" refers to the method for requesting a scheduling calendar component be created or modified, "REPLY" refers to the method a recipient of a request uses to update their status with the "Organizer" of the calendar component.

The properties defined by this memo are referred to with capitalized, quoted-strings of text, followed by the word "property". For example, "ATTENDEE" property refers to the iCalendar property used to convey the calendar address of a calendar user. Property parameters defined by this memo are referred to with lowercase, quoted-strings of text, followed by the word "parameter". For example, "value" parameter refers to the iCalendar property parameter used to override the default data type for a property value. Enumerated values defined by this memo are referred to with capitalized text, either alone or followed by the word "value". For example, the "MINUTELY" value can be used with the "FREQ" component of the "RECUR" data type to specify repeating components based on an interval of one minute or more.

2.2 Related Memos

Implementers will need to be familiar with several other memos that, along with this memo, form a framework for Internet calendaring and scheduling standards. This memo, [ICAL], specifies a core specification of objects, data types, properties and property parameters.

[ITIP] - specifies an interoperability protocol for scheduling between different implementations;

[IMIP] specifies an Internet email binding for [ITIP].

This memo does not attempt to repeat the specification of concepts or definitions from these other memos. Where possible, references are made to the memo that provides for the specification of these concepts or definitions.

2.3 International Considerations

In the rest of this document, descriptions of characters are of the form "character name (codepoint)", where "codepoint" is from the US-ASCII character set. The "character name" is the authoritative description; (codepoint) is a reference to that character in US-ASCII or US-ASCII compatible sets (for example the ISO-8859-x family, UTF-8, ISO-2022-xx, KOI8-R). If a non-US-ASCII compatible character set is used, appropriate code-point from that character set MUST be chosen instead. Use of non-US-ASCII-compatible character sets is NOT recommended.

3 Registration Information

The Calendaring and Scheduling Core Object Specification is intended for use as a MIME content type. However, the implementation of the memo is in no way limited solely as a MIME content type.

3.1 Content Type

The following text is intended to register this memo as the MIME content type "text/calendar".

To: ietf-types@uninett.no

Subject: Registration of MIME content type text/calendar.

MIME media type name: text

MIME subtype name: calendar

3.2 Parameters

Required parameters: none

Optional parameters: charset, method, component and optinfo

The "charset" parameter is defined in [RFC 2046] for other body parts. It is used to identify the default character set used within the body part.

The "method" parameter is used to convey the iCalendar object method or transaction semantics for the calendaring and scheduling information. It also is an identifier for the restricted set of properties and values that the iCalendar object consists of. The parameter is to be used as a guide for applications interpreting the information contained within the body part. It SHOULD NOT be used to exclude or require particular pieces of information unless the identified method definition specifically calls for this behavior. Unless specifically forbidden by a particular method definition, a text/calendar content type can contain any set of properties permitted by the Calendaring and Scheduling Core Object Specification. The "method" parameter MUST be the same value as that specified in the "METHOD" component property in the iCalendar object. If one is present, the other MUST also be present.

The value for the "method" parameter is defined as follows:

```
method = 1*(ALPHA / DIGIT / "-")
; IANA registered iCalendar object method
```

The "component" parameter conveys the type of iCalendar calendar component within the body part. If the iCalendar object contains more than one calendar component type, then multiple component parameters MUST be specified.

The value for the "component" parameter is defined as follows:

```
component = ("VEVENT" / "VTODO" / "VJOURNAL" / "VFREEBUSY"
/ "VTIMEZONE" / x-name / iana-token)
```

The "optinfo" parameter conveys optional information about the iCalendar object within the body part. This parameter can only specify semantics already specified by the iCalendar object and that can be otherwise determined by parsing the body part. In addition, the optional information specified by this parameter MUST be consistent with that information specified by the iCalendar object. For example, it can be used to convey the "Attendee" response status to a meeting request. The parameter value consists of a string value.

The parameter can be specified multiple times.

This parameter MAY only specify semantics already specified by the iCalendar object and that can be otherwise determined by parsing the body part.

The value for the "optinfo" parameter is defined as follows:

optinfo = infovalue / qinfovalue

infovalue = iana-token / x-name

qinfovalue = DQUOTE (infovalue) DQUOTE

3.3 Content Header Fields

Optional content header fields: Any header fields defined by [RFC 2045].

3.4 Encoding Considerations

This MIME content type can contain 8bit characters, so the use of quoted-printable or BASE64 MIME content-transfer-encodings might be necessary when iCalendar objects are transferred across protocols restricted to the 7bit repertoire. Note that a text valued property in the content entity can also have content encoding of special characters using a BACKSLASH character (US-ASCII decimal 92) escapement technique. This means that content values can end up encoded twice.

3.5 Security Considerations

SPOOFING - - In this memo, the "Organizer" is the only person authorized to make changes to an existing "VEVENT", "VTODO", "VJOURNAL" calendar component and redistribute the updates to the "Attendees". An iCalendar object that maliciously changes or cancels an existing "VEVENT", "VTODO" or "VJOURNAL" or "VFREEBUSY" calendar component might be constructed by someone other than the "Organizer" and sent to the "Attendees". In addition in this memo, other than the "Organizer", an "Attendee" of a "VEVENT", "VTODO", "VJOURNAL" calendar component is the only other person authorized to update any parameter associated with their "ATTENDEE" property and send it to the "Organizer". An iCalendar object that maliciously changes the "ATTENDEE" parameters can be constructed by someone other than the real "Attendee" and sent to the "Organizer".

PROCEDURAL ALARMS - - An iCalendar object can be created that contains a "VEVENT" and "VTODO" calendar component with "VALARM" calendar components. The "VALARM" calendar component can be of type PROCEDURE and can have an attachment containing some sort of executable program. Implementations that incorporate these types of alarms are subject to any virus or malicious attack that might occur as a result of executing the attachment.

ATTACHMENTS - - An iCalendar object can include references to Uniform Resource Locators that can be programmed resources.

Implementers and users of this memo should be aware of the network security implications of accepting and parsing such information. In addition, the security considerations observed by implementations of electronic mail systems should be followed for this memo.

3.6 Interoperability Considerations

This MIME content type is intended to define a common format for conveying calendaring and scheduling information between different systems. It is heavily based on the earlier [VCAL] industry specification.

3.7 Applications Which Use This Media Type

This content-type is designed for widespread use by Internet calendaring and scheduling applications. In addition, applications in the workflow and document management area might find this content-type applicable. The [ITIP] and [IMIP] Internet protocols directly use this content-type also. Future work on an Internet calendar access protocol will utilize this content-type too.

3.8 Additional Information

This memo defines this content-type.

3.9 Magic Numbers

None.

3.10 File Extensions

The file extension of "ics" is to be used to designate a file containing (an arbitrary set of) calendaring and scheduling information consistent with this MIME content type.

The file extension of "ifb" is to be used to designate a file containing free or busy time information consistent with this MIME content type.

Macintosh file type codes: The file type code of "iCal" is to be used in Apple Macintosh operating system environments to designate a file containing calendaring and scheduling information consistent with this MIME media type.

The file type code of "iFBf" is to be used in Apple Macintosh operating system environments to designate a file containing free or busy time information consistent with this MIME media type.

3.11 Contact for Further Information:

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3.12 Intended Usage

COMMON

3.13 Authors/Change Controllers

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4 iCalendar Object Specification

The following sections define the details of a Calendaring and Scheduling Core Object Specification. This information is intended to be an integral part of the MIME content type registration. In addition, this information can be used independent of such content registration. In particular, this memo has direct applicability for use as a calendaring and scheduling exchange format in file-, memory- or network-based transport mechanisms.

4.1 Content Lines

The iCalendar object is organized into individual lines of text, called content lines. Content lines are delimited by a line break, which is a CRLF sequence (US-ASCII decimal 13, followed by US-ASCII decimal 10).

Lines of text SHOULD NOT be longer than 75 octets, excluding the line break. Long content lines SHOULD be split into a multiple line representations using a line "folding" technique. That is, a long line can be split between any two characters by inserting a CRLF immediately followed by a single linear white space character (i.e., SPACE, US-ASCII decimal 32 or HTAB, US-ASCII decimal 9). Any sequence of CRLF followed immediately by a single linear white space character is ignored (i.e., removed) when processing the content type.

For example the line:

```
DESCRIPTION:This is a long description that exists on a long line.
```

Can be represented as:

```
DESCRIPTION:This is a lo  
ng description  
that exists on a long line.
```

The process of moving from this folded multiple line representation to its single line representation is called "unfolding". Unfolding is accomplished by removing the CRLF character and the linear white space character that immediately follows.

When parsing a content line, folded lines MUST first be unfolded according to the unfolding procedure described above. When generating a content line, lines longer than 75 octets SHOULD be folded according to the folding procedure described above.

The content information associated with an iCalendar object is formatted using a syntax similar to that defined by [RFC 2425]. That is, the content information consists of CRLF-separated content lines.

The following notation defines the lines of content in an iCalendar object:

```

contentline      = name *("; " param ) ":" value CRLF
    ; This ABNF is just a general definition for an initial parsing
    ; of the content line into its property name, parameter list,
    ; and value string

; When parsing a content line, folded lines MUST first
; be unfolded according to the unfolding procedure
; described above. When generating a content line, lines
; longer than 75 octets SHOULD be folded according to
; the folding procedure described above.

name              = x-name / iana-token

iana-token = 1*(ALPHA / DIGIT / "-")
    ; iCalendar identifier registered with IANA

x-name            = "X-" [vendorid "-"] 1*(ALPHA / DIGIT / "-")
    ; Reserved for experimental use. Not intended for use in
    ; released products.

vendorid          = 3*(ALPHA / DIGIT)      ;Vendor identification

param              = param-name "=" param-value
                    *( "," param-value)
    ; Each property defines the specific ABNF for the parameters
    ; allowed on the property. Refer to specific properties for
    ; precise parameter ABNF.

param-name = iana-token / x-token

param-value      = paramtext / quoted-string

paramtext        = *SAFE-CHAR

value            = *VALUE-CHAR

quoted-string     = DQUOTE *QSAFE-CHAR DQUOTE

NON-US-ASCII      = %x80-F8
    ; Use restricted by charset parameter
    ; on outer MIME object (UTF-8 preferred)

```

QSAFE-CHAR = WSP / %x21 / %x23-7E / NON-US-ASCII
; Any character except CTLs and DQUOTE

SAFE-CHAR = WSP / %x21 / %x23-2B / %x2D-39 / %x3C-7E
/ NON-US-ASCII
; Any character except CTLs, DQUOTE, ";", ":", ",", "

VALUE-CHAR = WSP / %x21-7E / NON-US-ASCII
; Any textual character

CR = %x0D
; carriage return

LF = %x0A
; line feed

CRLF = CR LF
; Internet standard newline

CTL = %x00-08 / %x0A-1F / %x7F
; Controls

ALPHA = %x41-5A / %x61-7A ; A-Z / a-z

DIGIT = %x30-39
; 0-9

DQUOTE = %x22
; Quotation Mark

WSP = SPACE / HTAB

SPACE = %x20

HTAB = %x09

The property value component of a content line has a format that is property specific. Refer to the section describing each property for a definition of this format.

All names of properties, property parameters, enumerated property values and property parameter values are case-insensitive. However, all other property values are case-sensitive, unless otherwise stated.

4.1.1 List and Field Separators

Some properties and parameters allow a list of values. Values in a list of values MUST be separated by a COMMA character (US-ASCII decimal 44). There is no significance to the order of values in a list. For those parameter values (such as those that specify URI values) that are specified in quoted-strings, the individual quoted-strings are separated by a COMMA character (US-ASCII decimal 44).

Some property values are defined in terms of multiple parts. These structured property values MUST have their value parts separated by a SEMICOLON character (US-ASCII decimal 59).

Some properties allow a list of parameters. Each property parameter in a list of property parameters MUST be separated by a SEMICOLON character (US-ASCII decimal 59).

Property parameters with values containing a COLON, a SEMICOLON or a COMMA character MUST be placed in quoted text.

For example, in the following properties a SEMICOLON is used to separate property parameters from each other, and a COMMA is used to separate property values in a value list.

```
ATTENDEE;RSVP=TRUE;ROLE=REQ-PARTICIPANT:MAILTO:
jsmith@host.com
```

```
RDATE;VALUE=DATE:19970304,19970504,19970704,19970904
```

4.1.2 Multiple Values

Some properties defined in the iCalendar object can have multiple values. The general rule for encoding multi-valued items is to simply create a new content line for each value, including the property name. However, it should be noted that some properties support encoding multiple values in a single property by separating the values with a COMMA character (US-ASCII decimal 44). Individual property definitions should be consulted for determining whether a specific property allows multiple values and in which of these two forms.

4.1.3 Binary Content

Binary content information in an iCalendar object SHOULD be referenced using a URI within a property value. That is the binary content information SHOULD be placed in an external MIME entity that can be referenced by a URI from within the iCalendar object. In applications where this is not feasible, binary content information

can be included within an iCalendar object, but only after first encoding it into text using the "BASE64" encoding method defined in [RFC 2045]. Inline binary content SHOULD only be used in applications whose special circumstances demand that an iCalendar object be expressed as a single entity. A property containing inline binary content information MUST specify the "ENCODING" property parameter. Binary content information placed external to the iCalendar object MUST be referenced by a uniform resource identifier (URI).

The following example specifies an "ATTACH" property that references an attachment external to the iCalendar object with a URI reference:

```
ATTACH:http://xyz.com/public/quarterly-report.doc
```

The following example specifies an "ATTACH" property with inline binary encoded content information:

```
ATTACH;FMTTYPE=image/basic;ENCODING=BASE64;VALUE=BINARY:
MIICajCCAdOgAwIBAgICBEUwDQYJKoZIhvcNAQEEBQAwdzELMAkGA1U
EBhMCVVMxLDAqBgNVBAoTIO5ldHNjYXB1IENvbnW1bmljYXRpb25zIE
<...remainder of "BASE64" encoded binary data...>
```

4.1.4 Character Set

There is not a property parameter to declare the character set used in a property value. The default character set for an iCalendar object is UTF-8 as defined in [RFC 2279].

The "charset" Content-Type parameter can be used in MIME transports to specify any other IANA registered character set.

4.2 Property Parameters

A property can have attributes associated with it. These "property parameters" contain meta-information about the property or the property value. Property parameters are provided to specify such information as the location of an alternate text representation for a property value, the language of a text property value, the data type of the property value and other attributes.

Property parameter values that contain the COLON (US-ASCII decimal 58), SEMICOLON (US-ASCII decimal 59) or COMMA (US-ASCII decimal 44) character separators MUST be specified as quoted-string text values. Property parameter values MUST NOT contain the DOUBLE-QUOTE (US-ASCII decimal 22) character. The DOUBLE-QUOTE (US-ASCII decimal 22) character is used as a delimiter for parameter values that contain restricted characters or URI text. For example:

DESCRIPTION;ALTREP="http://www.wiz.org":The Fall'98 Wild Wizards
Conference - - Las Vegas, NV, USA

Property parameter values that are not in quoted strings are case insensitive.

The general property parameters defined by this memo are defined by the following notation:

```

parameter = altrepparam           ; Alternate text representation
           / cnparam              ; Common name
           / cutypeparam          ; Calendar user type
           / delfromparam         ; Delegator
           / deltoparam           ; Delegatee
           / dirparam             ; Directory entry
           / encodingparam        ; Inline encoding
           / fmttypeparam         ; Format type
           / fbtypeparam          ; Free/busy time type
           / languageparam        ; Language for text
           / memberparam          ; Group or list membership
           / partstatparam        ; Participation status
           / rangeparam           ; Recurrence identifier range
           / trigrelparam         ; Alarm trigger relationship
           / reltypeparam         ; Relationship type
           / roleparam            ; Participation role
           / rsvpparam            ; RSVP expectation
           / sentbyparam          ; Sent by
           / tzidparam            ; Reference to time zone object
           / valuetyeparam        ; Property value data type
           / ianaparam
           ; Some other IANA registered iCalendar parameter.
           / xparam
           ; A non-standard, experimental parameter.

```

```
ianaparam = iana-token "=" param-value *("," param-value)
```

```
xparam    =x-name "=" param-value *("," param-value)
```

4.2.1 Alternate Text Representation

Parameter Name: ALTREP

Purpose: To specify an alternate text representation for the property value.

Format Definition: The property parameter is defined by the following notation:

altrepparam = "ALTREP" "=" DQUOTE uri DQUOTE

Description: The parameter specifies a URI that points to an alternate representation for a textual property value. A property specifying this parameter MUST also include a value that reflects the default representation of the text value. The individual URI parameter values MUST each be specified in a quoted-string.

Example:

```
DESCRIPTION;ALTREP="CID:<part3.msg.970415T083000@host.com>":Project
  XYZ Review Meeting will include the following agenda items: (a)
  Market Overview, (b) Finances, (c) Project Management
```

The "ALTREP" property parameter value might point to a "text/html" content portion.

```
Content-Type:text/html
Content-Id:<part3.msg.970415T083000@host.com>

<html><body>
<p><b>Project XYZ Review Meeting</b> will include the following
agenda items:<ol><li>Market
Overview</li><li>Finances</li><li>Project Management</li></ol></p>
</body></html>
```

4.2.2 Common Name

Parameter Name: CN

Purpose: To specify the common name to be associated with the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

cnparam = "CN" "=" param-value

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter specifies the common name to be associated with the calendar user specified by the property. The parameter value is text. The parameter value can be used for display text to be associated with the calendar address specified by the property.

Example:

```
ORGANIZER;CN="John Smith":MAILTO:jsmith@host.com
```

4.2.3 Calendar User Type

Parameter Name: CUTYPE

Purpose: To specify the type of calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
cutypeparam      = "CUTYPE" "="
                  ( "INDIVIDUAL"           ; An individual
                  / "GROUP"                 ; A group of individuals
                  / "RESOURCE"              ; A physical resource
                  / "ROOM"                  ; A room resource
                  / "UNKNOWN"               ; Otherwise not known
                  / x-name                   ; Experimental type
                  / iana-token              ; Other IANA registered
                                          ; type

                  ; Default is INDIVIDUAL
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter identifies the type of calendar user specified by the property. If not specified on a property that allows this parameter, the default is INDIVIDUAL.

Example:

```
ATTENDEE;CUTYPE=GROUP:MAILTO:ietf-calsch@imc.org
```

4.2.4 Delegators

Parameter Name: DELEGATED-FROM

Purpose: To specify the calendar users that have delegated their participation to the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
delfromparam     = "DELEGATED-FROM" "=" DQUOTE cal-address DQUOTE
                  *("," DQUOTE cal-address DQUOTE)
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. This parameter can be specified on a property that has a value type of calendar address. This parameter specifies those calendar users that have delegated their participation in a group scheduled event or to-do to the calendar user specified by the property. The value MUST be a MAILTO URI as defined in [RFC 1738]. The individual calendar address parameter values MUST each be specified in a quoted-string.

Example:

```
ATTENDEE;DELEGATED-FROM="MAILTO:jsmith@host.com":MAILTO:
jdoe@host.com
```

4.2.5 Delegates

Parameter Name: DELEGATED-TO

Purpose: To specify the calendar users to whom the calendar user specified by the property has delegated participation.

Format Definition: The property parameter is defined by the following notation:

```
deltoparam = "DELEGATED-TO" "=" DQUOTE cal-address DQUOTE
              *("," DQUOTE cal-address DQUOTE)
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. This parameter specifies those calendar users whom have been delegated participation in a group scheduled event or to-do by the calendar user specified by the property. The value MUST be a MAILTO URI as defined in [RFC 1738]. The individual calendar address parameter values MUST each be specified in a quoted-string.

Example:

```
ATTENDEE;DELEGATED-TO="MAILTO:jdoe@host.com","MAILTO:jpublic@
host.com":MAILTO:jsmith@host.com
```

4.2.6 Directory Entry Reference

Parameter Name: DIR

Purpose: To specify reference to a directory entry associated with the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
dirparam      = "DIR" "=" DQUOTE uri DQUOTE
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter specifies a reference to the directory entry associated with the calendar user specified by the property. The parameter value is a URI. The individual URI parameter values MUST each be specified in a quoted-string.

Example:

```
ORGANIZER;DIR="ldap://host.com:6666/o=eDABC%20Industries,c=3DUS??
(cn=3DBJim%20Dolittle)":MAILTO:jimdo@host1.com
```

4.2.7 Inline Encoding

Parameter Name: ENCODING

Purpose: To specify an alternate inline encoding for the property value.

Format Definition: The property parameter is defined by the following notation:

```
encodingparam      = "ENCODING" "="
                    ( "8BIT"
                      ; "8bit" text encoding is defined in [RFC 2045]
                      / "BASE64"
                      ; "BASE64" binary encoding format is defined in [RFC 2045]
                      / iana-token
                      ; Some other IANA registered iCalendar encoding type
                      / x-name)
                      ; A non-standard, experimental encoding type
```

Description: The property parameter identifies the inline encoding used in a property value. The default encoding is "8BIT", corresponding to a property value consisting of text. The "BASE64" encoding type corresponds to a property value encoded using the "BASE64" encoding defined in [RFC 2045].

If the value type parameter is ";VALUE=BINARY", then the inline encoding parameter MUST be specified with the value ";ENCODING=BASE64".

Example:

```
ATTACH;FMTYPE=IMAGE/JPEG;ENCODING=BASE64;VALUE=BINARY:MIICajC
CAAdOgAwIBAgICBEUwDQYJKoZIhvcNAQEEBQAwdzELMAkGALUEBhMCVVMxLDA
qBgNVBAoTI05ldHNjYXB1IENvbW11bmljYXRpb25zIENvcnBvcnF0aW9uMRw
<...remainder of "BASE64" encoded binary data...>
```

4.2.8 Format Type

Parameter Name: FMTYPE

Purpose: To specify the content type of a referenced object.

Format Definition: The property parameter is defined by the following notation:

```
fmttypeparam      = "FMTYPE" "=" iana-token
                    ; A IANA registered content type
                    / x-name
                    ; A non-standard content type
```

Description: This parameter can be specified on properties that are used to reference an object. The parameter specifies the content type of the referenced object. For example, on the "ATTACH" property, a FTP type URI value does not, by itself, necessarily convey the type of content associated with the resource. The parameter value MUST be the TEXT for either an IANA registered content type or a non-standard content type.

Example:

```
ATTACH;FMTYPE=application/binary:ftp://domain.com/pub/docs/
agenda.doc
```

4.2.9 Free/Busy Time Type

Parameter Name: FBTYPE

Purpose: To specify the free or busy time type.

Format Definition: The property parameter is defined by the following notation:

```
fbtypeparam      = "FBTYPE" "=" ("FREE" / "BUSY"
                    / "BUSY-UNAVAILABLE" / "BUSY-TENTATIVE"
                    / x-name
                    ; Some experimental iCalendar data type.
                    / iana-token)
```

; Some other IANA registered iCalendar data type.

Description: The parameter specifies the free or busy time type. The value FREE indicates that the time interval is free for scheduling. The value BUSY indicates that the time interval is busy because one or more events have been scheduled for that interval. The value BUSY-UNAVAILABLE indicates that the time interval is busy and that the interval can not be scheduled. The value BUSY-TENTATIVE indicates that the time interval is busy because one or more events have been tentatively scheduled for that interval. If not specified on a property that allows this parameter, the default is BUSY.

Example: The following is an example of this parameter on a FREEBUSY property.

```
FREEBUSY;FBTYPE=BUSY:19980415T133000Z/19980415T170000Z
```

4.2.10 Language

Parameter Name: LANGUAGE

Purpose: To specify the language for text values in a property or property parameter.

Format Definition: The property parameter is defined by the following notation:

```
languageparam = "LANGUAGE" "=" language
```

```
language = <Text identifying a language, as defined in [RFC 1766]>
```

Description: This parameter can be specified on properties with a text value type. The parameter identifies the language of the text in the property or property parameter value. The value of the "language" property parameter is that defined in [RFC 1766].

For transport in a MIME entity, the Content-Language header field can be used to set the default language for the entire body part. Otherwise, no default language is assumed.

Example:

```
SUMMARY;LANGUAGE=us-EN:Company Holiday Party
```

```
LOCATION;LANGUAGE=en:Germany
```

```
LOCATION;LANGUAGE=no:Tyskland
```


The following example makes use of the Quoted-Printable encoding in order to represent non-ASCII characters.

```
LOCATION;LANGUAGE=da:K=F8benhavn
LOCATION;LANGUAGE=en:Copenhagen
```

4.2.11 Group or List Membership

Parameter Name: MEMBER

Purpose: To specify the group or list membership of the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
memberparam      = "MEMBER" "=" DQUOTE cal-address DQUOTE
                  *( "," DQUOTE cal-address DQUOTE )
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter identifies the groups or list membership for the calendar user specified by the property. The parameter value either a single calendar address in a quoted-string or a COMMA character (US-ASCII decimal 44) list of calendar addresses, each in a quoted-string. The individual calendar address parameter values MUST each be specified in a quoted-string.

Example:

```
ATTENDEE;MEMBER="MAILTO:ietf-calsch@imc.org":MAILTO:jsmith@host.com

ATTENDEE;MEMBER="MAILTO:projectA@host.com", "MAILTO:projectB@host.
com":MAILTO:janedoe@host.com
```

4.2.12 Participation Status

Parameter Name: PARTSTAT

Purpose: To specify the participation status for the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
partstatparam    = "PARTSTAT" "="
                  ( "NEEDS-ACTION"          ; Event needs action
                    / "ACCEPTED"             ; Event accepted
                    / "DECLINED"             ; Event declined
```

```

        / "TENTATIVE"                ; Event tentatively
        / "DELEGATED"                ; accepted
        / "DELEGATED"                ; Event delegated
        / x-name                      ; Experimental status
        / iana-token)                ; Other IANA registered
        ; status
; These are the participation statuses for a "VEVENT". Default is
; NEEDS-ACTION
partstatparam    /= "PARTSTAT" "="
                  ( "NEEDS-ACTION"    ; To-do needs action
                  / "ACCEPTED"        ; To-do accepted
                  / "DECLINED"        ; To-do declined
                  / "TENTATIVE"       ; To-do tentatively
                  ; accepted
                  / "DELEGATED"       ; To-do delegated
                  / "COMPLETED"       ; To-do completed.
                  ; COMPLETED property has
                  ;date/time completed.
                  / "IN-PROCESS"      ; To-do in process of
                  ; being completed
                  / x-name            ; Experimental status
                  / iana-token)       ; Other IANA registered
                  ; status
; These are the participation statuses for a "VTODO". Default is
; NEEDS-ACTION

partstatparam    /= "PARTSTAT" "="
                  ( "NEEDS-ACTION"    ; Journal needs action
                  / "ACCEPTED"        ; Journal accepted
                  / "DECLINED"        ; Journal declined
                  / x-name            ; Experimental status
                  / iana-token)       ; Other IANA registered
                  ; status
; These are the participation statuses for a "VJOURNAL". Default is
; NEEDS-ACTION

```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter identifies the participation status for the calendar user specified by the property value. The parameter values differ depending on whether they are associated with a group scheduled "VEVENT", "VTODO" or "VJOURNAL". The values MUST match one of the values allowed for the given calendar component. If not specified on a property that allows this parameter, the default value is NEEDS-ACTION.

Example:

```
ATTENDEE;PARTSTAT=DECLINED:MAILTO:jsmith@host.com
```

4.2.13 Recurrence Identifier Range

Parameter Name: RANGE

Purpose: To specify the effective range of recurrence instances from the instance specified by the recurrence identifier specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
rangeparam = "RANGE" "=" ("THISANDPRIOR"
    ; To specify all instances prior to the recurrence identifier
    / "THISANDFUTURE")
    ; To specify the instance specified by the recurrence identifier
    ; and all subsequent recurrence instances
```

Description: The parameter can be specified on a property that specifies a recurrence identifier. The parameter specifies the effective range of recurrence instances that is specified by the property. The effective range is from the recurrence identified specified by the property. If this parameter is not specified an allowed property, then the default range is the single instance specified by the recurrence identifier value of the property. The parameter value can be "THISANDPRIOR" to indicate a range defined by the recurrence identified value of the property and all prior instances. The parameter value can also be "THISANDFUTURE" to indicate a range defined by the recurrence identifier and all subsequent instances.

Example:

```
RECURRENCE-ID;RANGE=THISANDPRIOR:19980401T133000Z
```

4.2.14 Alarm Trigger Relationship

Parameter Name: RELATED

Purpose: To specify the relationship of the alarm trigger with respect to the start or end of the calendar component.

Format Definition: The property parameter is defined by the following notation:

```
trigrelparam      = "RELATED" "="
                    ( "START"          ; Trigger off of start
                      / "END"          ; Trigger off of end
```

Description: The parameter can be specified on properties that specify an alarm trigger with a DURATION value type. The parameter specifies whether the alarm will trigger relative to the start or end of the calendar component. The parameter value START will set the alarm to trigger off the start of the calendar component; the parameter value END will set the alarm to trigger off the end of the calendar component. If the parameter is not specified on an allowable property, then the default is START.

Example:

```
TRIGGER;RELATED=END:PT5M
```

4.2.15 Relationship Type

Parameter Name: RELTYPE

Purpose: To specify the type of hierarchical relationship associated with the calendar component specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
reltypeparam      = "RELTYPE" "="
                    ("PARENT"      ; Parent relationship. Default.
                     / "CHILD"      ; Child relationship
                     / "SIBLING"    ; Sibling relationship
                     / iana-token    ; Some other IANA registered
                                   ; iCalendar relationship type
                     / x-name)      ; A non-standard, experimental
                                   ; relationship type
```

Description: This parameter can be specified on a property that references another related calendar. The parameter specifies the hierarchical relationship type of the calendar component referenced by the property. The parameter value can be PARENT, to indicate that the referenced calendar component is a superior of calendar component; CHILD to indicate that the referenced calendar component is a subordinate of the calendar component; SIBLING to indicate that the referenced calendar component is a peer of the calendar component. If this parameter is not specified on an allowable property, the default relationship type is PARENT.

Example:

```
RELATED-TO;RELTYPE=SIBLING:<19960401-080045-4000F192713@host.com>
```

4.2.16 Participation Role

Parameter Name: ROLE

Purpose: To specify the participation role for the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
roleparam = "ROLE" "="  
            ( "CHAIR"                ; Indicates chair of the  
              / "REQ-PARTICIPANT"    ; calendar entity  
              / "OPT-PARTICIPANT"    ; Indicates a participant whose  
              / "NON-PARTICIPANT"    ; participation is required  
              / "NON-PARTICIPANT"    ; Indicates a participant whose  
              / "NON-PARTICIPANT"    ; participation is optional  
              / "NON-PARTICIPANT"    ; Indicates a participant who is  
              / "NON-PARTICIPANT"    ; copied for information  
              / "NON-PARTICIPANT"    ; purposes only  
              / "NON-PARTICIPANT"    ; Experimental role  
              / "NON-PARTICIPANT"    ; Other IANA role  
            ; Default is REQ-PARTICIPANT
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter specifies the participation role for the calendar user specified by the property in the group schedule calendar component. If not specified on a property that allows this parameter, the default value is REQ-PARTICIPANT.

Example:

```
ATTENDEE;ROLE=CHAIR:MAILTO:mrbig@host.com
```

4.2.17 RSVP Expectation

Parameter Name: RSVP

Purpose: To specify whether there is an expectation of a favor of a reply from the calendar user specified by the property value.

Format Definition: The property parameter is defined by the following notation:

```
rsvpparam = "RSVP" "=" ( "TRUE" / "FALSE" )  
            ; Default is FALSE
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter identifies the expectation of a reply from the calendar user specified by the property value. This parameter is used by the "Organizer" to request a participation status reply from an "Attendee" of a group scheduled event or to-do. If not specified on a property that allows this parameter, the default value is FALSE.

Example:

```
ATTENDEE;RSVP=TRUE:MAILTO:jsmith@host.com
```

4.2.18 Sent By

Parameter Name: SENT-BY

Purpose: To specify the calendar user that is acting on behalf of the calendar user specified by the property.

Format Definition: The property parameter is defined by the following notation:

```
sentbyparam      = "SENT-BY" "=" DQUOTE cal-address DQUOTE
```

Description: This parameter can be specified on properties with a CAL-ADDRESS value type. The parameter specifies the calendar user that is acting on behalf of the calendar user specified by the property. The parameter value MUST be a MAILTO URI as defined in [RFC 1738]. The individual calendar address parameter values MUST each be specified in a quoted-string.

Example:

```
ORGANIZER;SENT-BY:"MAILTO:sray@host.com":MAILTO:jsmith@host.com
```

4.2.19 Time Zone Identifier

Parameter Name: TZID

Purpose: To specify the identifier for the time zone definition for a time component in the property value.

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

```
tzidparam  = "TZID" "=" [tzidprefix] paramtext CRLF
```

```
tzidprefix = "/"
```

Description: The parameter MUST be specified on the "DTSTART", "DTEND", "DUE", "EXDATE" and "RDATE" properties when either a DATE-TIME or TIME value type is specified and when the value is not either a UTC or a "floating" time. Refer to the DATE-TIME or TIME value type definition for a description of UTC and "floating time" formats. This property parameter specifies a text value which uniquely identifies the "VTIMEZONE" calendar component to be used when evaluating the time portion of the property. The value of the TZID property parameter will be equal to the value of the TZID property for the matching time zone definition. An individual "VTIMEZONE" calendar component MUST be specified for each unique "TZID" parameter value specified in the iCalendar object.

The parameter MUST be specified on properties with a DATE-TIME value if the DATE-TIME is not either a UTC or a "floating" time.

The presence of the SOLIDUS character (US-ASCII decimal 47) as a prefix, indicates that this TZID represents a unique ID in a globally defined time zone registry (when such registry is defined).

Note: This document does not define a naming convention for time zone identifiers. Implementers may want to use the naming conventions defined in existing time zone specifications such as the public-domain Olson database [TZ]. The specification of globally unique time zone identifiers is not addressed by this document and is left for future study.

The following are examples of this property parameter:

```
DTSTART;TZID=US-Eastern:19980119T020000
```

```
DTEND;TZID=US-Eastern:19980119T030000
```

The TZID property parameter MUST NOT be applied to DATE-TIME or TIME properties whose time values are specified in UTC.

The use of local time in a DATE-TIME or TIME value without the TZID property parameter is to be interpreted as a local time value, regardless of the existence of "VTIMEZONE" calendar components in the iCalendar object.

For more information see the sections on the data types DATE-TIME and TIME.

4.2.20 Value Data Types

Parameter Name: VALUE

Purpose: To explicitly specify the data type format for a property value.

Format Definition: The "VALUE" property parameter is defined by the following notation:

```
valuetypeparam = "VALUE" "=" valuetype
```

```
valuetype      = ("BINARY"  
                  / "BOOLEAN"  
                  / "CAL-ADDRESS"  
                  / "DATE"  
                  / "DATE-TIME"  
                  / "DURATION"  
                  / "FLOAT"  
                  / "INTEGER"  
                  / "PERIOD"  
                  / "RECUR"  
                  / "TEXT"  
                  / "TIME"  
                  / "URI"  
                  / "UTC-OFFSET"  
                  / x-name  
                  ; Some experimental iCalendar data type.  
                  / iana-token)  
                  ; Some other IANA registered iCalendar data type.
```

Description: The parameter specifies the data type and format of the property value. The property values MUST be of a single value type. For example, a "RDATE" property cannot have a combination of DATE-TIME and TIME value types.

If the property's value is the default value type, then this parameter need not be specified. However, if the property's default value type is overridden by some other allowable value type, then this parameter MUST be specified.

4.3 Property Value Data Types

The properties in an iCalendar object are strongly typed. The definition of each property restricts the value to be one of the value data types, or simply value types, defined in this section. The value type for a property will either be specified implicitly as the default value type or will be explicitly specified with the "VALUE"

parameter. If the value type of a property is one of the alternate valid types, then it MUST be explicitly specified with the "VALUE" parameter.

4.3.1 Binary

Value Name: BINARY

Purpose: This value type is used to identify properties that contain a character encoding of inline binary data. For example, an inline attachment of an object code might be included in an iCalendar object.

Formal Definition: The value type is defined by the following notation:

```
binary      = *(4b-char) [b-end]
; A "BASE64" encoded character string, as defined by [RFC 2045].
```

```
b-end       = (2b-char "==") / (3b-char "=")
```

```
b-char = ALPHA / DIGIT / "+" / "/"
```

Description: Property values with this value type MUST also include the inline encoding parameter sequence of ";ENCODING=BASE64". That is, all inline binary data MUST first be character encoded using the "BASE64" encoding method defined in [RFC 2045]. No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following is an abridged example of a "BASE64" encoded binary value data.

```
ATTACH;VALUE=BINARY;ENCODING=BASE64:MIICajCCAdOgAwIBAgICBEUwDQY
JKoZIhvcNAQEEBQAwdzELMAkGA1UEBhMCVVMxLDAqBgNVBAoTI05ldHNjYXB1I
ENvbW11bmljYXRpb25zIENvcnBvcnF0aW9uMRwwGgYDVQQLEXNJbmZv
<...remainder of "BASE64" encoded binary data...>
```

4.3.2 Boolean

Value Name: BOOLEAN

Purpose: This value type is used to identify properties that contain either a "TRUE" or "FALSE" Boolean value.

Formal Definition: The value type is defined by the following notation:

boolean = "TRUE" / "FALSE"

Description: These values are case insensitive text. No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following is an example of a hypothetical property that has a BOOLEAN value type:

GIBBERISH:TRUE

4.3.3 Calendar User Address

Value Name: CAL-ADDRESS

Purpose: This value type is used to identify properties that contain a calendar user address.

Formal Definition: The value type is as defined by the following notation:

cal-address = uri

Description: The value is a URI as defined by [RFC 1738] or any other IANA registered form for a URI. When used to address an Internet email transport address for a calendar user, the value MUST be a MAILTO URI, as defined by [RFC 1738]. No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example:

ATTENDEE:MAILTO:jane_doe@host.com

4.3.4 Date

Value Name: DATE

Purpose: This value type is used to identify values that contain a calendar date.

Formal Definition: The value type is defined by the following notation:

date = date-value

date-value = date-fullyear date-month date-mday
date-fullyear = 4DIGIT

date-month	= 2DIGIT	;01-12
date-mday	= 2DIGIT	;01-28, 01-29, 01-30, 01-31
		;based on month/year

Description: If the property permits, multiple "date" values are specified as a COMMA character (US-ASCII decimal 44) separated list of values. The format for the value type is expressed as the [ISO 8601] complete representation, basic format for a calendar date. The textual format specifies a four-digit year, two-digit month, and two-digit day of the month. There are no separator characters between the year, month and day component text.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following represents July 14, 1997:

19970714

4.3.5 Date-Time

Value Name: DATE-TIME

Purpose: This value type is used to identify values that specify a precise calendar date and time of day.

Formal Definition: The value type is defined by the following notation:

date-time	= date "T" time	;As specified in the date and time
		;value definitions

Description: If the property permits, multiple "date-time" values are specified as a COMMA character (US-ASCII decimal 44) separated list of values. No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

The "DATE-TIME" data type is used to identify values that contain a precise calendar date and time of day. The format is based on the [ISO 8601] complete representation, basic format for a calendar date and time of day. The text format is a concatenation of the "date", followed by the LATIN CAPITAL LETTER T character (US-ASCII decimal 84) time designator, followed by the "time" format.

The "DATE-TIME" data type expresses time values in three forms:

The form of date and time with UTC offset MUST NOT be used. For example, the following is not valid for a date-time value:

DTSTART:19980119T230000-0800 ;Invalid time format

FORM #1: DATE WITH LOCAL TIME

The date with local time form is simply a date-time value that does not contain the UTC designator nor does it reference a time zone. For example, the following represents January 18, 1998, at 11 PM:

DTSTART:19980118T230000

Date-time values of this type are said to be "floating" and are not bound to any time zone in particular. They are used to represent the same hour, minute, and second value regardless of which time zone is currently being observed. For example, an event can be defined that indicates that an individual will be busy from 11:00 AM to 1:00 PM every day, no matter which time zone the person is in. In these cases, a local time can be specified. The recipient of an iCalendar object with a property value consisting of a local time, without any relative time zone information, SHOULD interpret the value as being fixed to whatever time zone the ATTENDEE is in at any given moment. This means that two ATTENDEES, in different time zones, receiving the same event definition as a floating time, may be participating in the event at different actual times. Floating time SHOULD only be used where that is the reasonable behavior.

In most cases, a fixed time is desired. To properly communicate a fixed time in a property value, either UTC time or local time with time zone reference MUST be specified.

The use of local time in a DATE-TIME value without the TZID property parameter is to be interpreted as floating time, regardless of the existence of "VTIMEZONE" calendar components in the iCalendar object.

FORM #2: DATE WITH UTC TIME

The date with UTC time, or absolute time, is identified by a LATIN CAPITAL LETTER Z suffix character (US-ASCII decimal 90), the UTC designator, appended to the time value. For example, the following represents January 19, 1998, at 0700 UTC:

DTSTART:19980119T070000Z

The TZID property parameter MUST NOT be applied to DATE-TIME properties whose time values are specified in UTC.

FORM #3: DATE WITH LOCAL TIME AND TIME ZONE REFERENCE

The date and local time with reference to time zone information is identified by the use the TZID property parameter to reference the appropriate time zone definition. TZID is discussed in detail in the section on Time Zone. For example, the following represents 2 AM in New York on January 19, 1998:

```
DTSTART;TZID=US-Eastern:19980119T020000
```

Example: The following represents July 14, 1997, at 1:30 PM in New York City in each of the three time formats, using the "DTSTART" property.

```
DTSTART:19970714T133000          ;Local time
DTSTART:19970714T173000Z         ;UTC time
DTSTART;TZID=US-Eastern:19970714T133000 ;Local time and time
                                   ; zone reference
```

A time value MUST ONLY specify 60 seconds when specifying the periodic "leap second" in the time value. For example:

```
COMPLETED:19970630T235960Z
```

4.3.6 Duration

Value Name: DURATION

Purpose: This value type is used to identify properties that contain a duration of time.

Formal Definition: The value type is defined by the following notation:

```
dur-value  = ([ "+" ] / "-") "P" (dur-date / dur-time / dur-week)

dur-date   = dur-day [dur-time]
dur-time   = "T" (dur-hour / dur-minute / dur-second)
dur-week   = 1*DIGIT "W"
dur-hour   = 1*DIGIT "H" [dur-minute]
dur-minute = 1*DIGIT "M" [dur-second]
dur-second = 1*DIGIT "S"
dur-day    = 1*DIGIT "D"
```

Description: If the property permits, multiple "duration" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values. The format is expressed as the [ISO 8601] basic format for the duration of time. The format can represent durations in terms of weeks, days, hours, minutes, and seconds.

No additional content value encoding (i.e., BACKSLASH character encoding) are defined for this value type.

Example: A duration of 15 days, 5 hours and 20 seconds would be:

P15DT5H0M20S

A duration of 7 weeks would be:

P7W

4.3.7 Float

Value Name: FLOAT

Purpose: This value type is used to identify properties that contain a real number value.

Formal Definition: The value type is defined by the following notation:

float = (["+"] / "-") 1*DIGIT ["." 1*DIGIT]

Description: If the property permits, multiple "float" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example:

1000000.0000001
1.333
-3.14

4.3.8 Integer

Value Name: INTEGER

Purpose: This value type is used to identify properties that contain a signed integer value.

Formal Definition: The value type is defined by the following notation:

integer = (["+"] / "-") 1*DIGIT

Description: If the property permits, multiple "integer" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values. The valid range for "integer" is -2147483648 to 2147483647. If the sign is not specified, then the value is assumed to be positive.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example:

```
1234567890
-1234567890
+1234567890
432109876
```

4.3.9 Period of Time

Value Name: PERIOD

Purpose: This value type is used to identify values that contain a precise period of time.

Formal Definition: The data type is defined by the following notation:

period = period-explicit / period-start

period-explicit = date-time "/" date-time
; [ISO 8601] complete representation basic format for a period of
; time consisting of a start and end. The start MUST be before the
; end.

period-start = date-time "/" dur-value
; [ISO 8601] complete representation basic format for a period of
; time consisting of a start and positive duration of time.

Description: If the property permits, multiple "period" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values. There are two forms of a period of time. First, a period of time is identified by its start and its end. This format is expressed as the [ISO 8601] complete representation, basic format for "DATE-TIME" start of the period, followed by a SOLIDUS character (US-ASCII decimal 47), followed by the "DATE-TIME" of the end of the period. The start of the period MUST be before the end of the period. Second, a period of time can also be defined by a start and a positive duration of time. The format is expressed as the [ISO 8601] complete representation, basic format for the "DATE-TIME" start of

the period, followed by a SOLIDUS character (US-ASCII decimal 47), followed by the [ISO 8601] basic format for "DURATION" of the period.

Example: The period starting at 18:00:00 UTC, on January 1, 1997 and ending at 07:00:00 UTC on January 2, 1997 would be:

```
19970101T180000Z/19970102T070000Z
```

The period start at 18:00:00 on January 1, 1997 and lasting 5 hours and 30 minutes would be:

```
19970101T180000Z/PT5H30M
```

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

4.3.10 Recurrence Rule

Value Name: RECUR

Purpose: This value type is used to identify properties that contain a recurrence rule specification.

Formal Definition: The value type is defined by the following notation:

```
recur      = "FREQ"=freq *(
              ; either UNTIL or COUNT may appear in a 'recur',
              ; but UNTIL and COUNT MUST NOT occur in the same 'recur'

              ( ";" "UNTIL" "=" enddate ) /
              ( ";" "COUNT" "=" 1*DIGIT ) /

              ; the rest of these keywords are optional,
              ; but MUST NOT occur more than once

              ( ";" "INTERVAL" "=" 1*DIGIT )           /
              ( ";" "BYSECOND" "=" byseclist )         /
              ( ";" "BYMINUTE" "=" byminlist )          /
              ( ";" "BYHOUR" "=" byhrlist )             /
              ( ";" "BYDAY" "=" byweekdaylist )        /
              ( ";" "BYMONTHDAY" "=" bymodaylist )     /
              ( ";" "BYYEARDAY" "=" byyrdaylist )      /
              ( ";" "BYWEEKNO" "=" bywknolist )        /
              ( ";" "BYMONTH" "=" bymolist )           /
              ( ";" "BYSETPOS" "=" bysplist )          /
              ( ";" "WKST" "=" weekday )               /
```



```

        ( ";" x-name "=" text )
    )

freq      = "SECONDLY" / "MINUTELY" / "HOURLY" / "DAILY"
           / "WEEKLY" / "MONTHLY" / "YEARLY"

enddate   = date
enddate   =/ date-time           ;An UTC value

byseclist = seconds / ( seconds *("," seconds) )

seconds   = 1DIGIT / 2DIGIT      ;0 to 59

byminlist = minutes / ( minutes *("," minutes) )

minutes   = 1DIGIT / 2DIGIT      ;0 to 59

byhrlist  = hour / ( hour *("," hour) )

hour      = 1DIGIT / 2DIGIT      ;0 to 23

byweekdaylist = weekdaynum / ( weekdaynum *("," weekdaynum) )

weekdaynum = ([plus] ordwk / minus ordwk) weekday

plus      = "+"

minus     = "-"

ordwk     = 1DIGIT / 2DIGIT      ;1 to 53

weekday   = "SU" / "MO" / "TU" / "WE" / "TH" / "FR" / "SA"
;Corresponding to SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY,
;FRIDAY, SATURDAY and SUNDAY days of the week.

bymodaylist = monthdaynum / ( monthdaynum *("," monthdaynum) )

monthdaynum = ([plus] ordmoday) / (minus ordmoday)

ordmoday   = 1DIGIT / 2DIGIT      ;1 to 31

byyrdaylist = yeardaynum / ( yeardaynum *("," yeardaynum) )

yeardaynum = ([plus] ordyrday) / (minus ordyrday)

ordyrday   = 1DIGIT / 2DIGIT / 3DIGIT      ;1 to 366

bywkno list = weeknum / ( weeknum *("," weeknum) )

```

```
weeknum      = ([plus] ordwk) / (minus ordwk)

bymolist      = monthnum / ( monthnum *("," monthnum) )

monthnum      = 1DIGIT / 2DIGIT          ;1 to 12

bysplist      = setposday / ( setposday *("," setposday) )

setposday     = yeardaynum
```

Description: If the property permits, multiple "recur" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values. The value type is a structured value consisting of a list of one or more recurrence grammar parts. Each rule part is defined by a NAME=VALUE pair. The rule parts are separated from each other by the SEMICOLON character (US-ASCII decimal 59). The rule parts are not ordered in any particular sequence. Individual rule parts MUST only be specified once.

The FREQ rule part identifies the type of recurrence rule. This rule part MUST be specified in the recurrence rule. Valid values include SECONDLY, to specify repeating events based on an interval of a second or more; MINUTELY, to specify repeating events based on an interval of a minute or more; HOURLY, to specify repeating events based on an interval of an hour or more; DAILY, to specify repeating events based on an interval of a day or more; WEEKLY, to specify repeating events based on an interval of a week or more; MONTHLY, to specify repeating events based on an interval of a month or more; and YEARLY, to specify repeating events based on an interval of a year or more.

The INTERVAL rule part contains a positive integer representing how often the recurrence rule repeats. The default value is "1", meaning every second for a SECONDLY rule, or every minute for a MINUTELY rule, every hour for an HOURLY rule, every day for a DAILY rule, every week for a WEEKLY rule, every month for a MONTHLY rule and every year for a YEARLY rule.

The UNTIL rule part defines a date-time value which bounds the recurrence rule in an inclusive manner. If the value specified by UNTIL is synchronized with the specified recurrence, this date or date-time becomes the last instance of the recurrence. If specified as a date-time value, then it MUST be specified in an UTC time format. If not present, and the COUNT rule part is also not present, the RRULE is considered to repeat forever.

The COUNT rule part defines the number of occurrences at which to range-bound the recurrence. The "DTSTART" property value, if

specified, counts as the first occurrence.

The BYSECOND rule part specifies a COMMA character (US-ASCII decimal 44) separated list of seconds within a minute. Valid values are 0 to 59. The BYMINUTE rule part specifies a COMMA character (US-ASCII decimal 44) separated list of minutes within an hour. Valid values are 0 to 59. The BYHOUR rule part specifies a COMMA character (US-ASCII decimal 44) separated list of hours of the day. Valid values are 0 to 23.

The BYDAY rule part specifies a COMMA character (US-ASCII decimal 44) separated list of days of the week; MO indicates Monday; TU indicates Tuesday; WE indicates Wednesday; TH indicates Thursday; FR indicates Friday; SA indicates Saturday; SU indicates Sunday.

Each BYDAY value can also be preceded by a positive (+n) or negative (-n) integer. If present, this indicates the nth occurrence of the specific day within the MONTHLY or YEARLY RRULE. For example, within a MONTHLY rule, +1MO (or simply 1MO) represents the first Monday within the month, whereas -1MO represents the last Monday of the month. If an integer modifier is not present, it means all days of this type within the specified frequency. For example, within a MONTHLY rule, MO represents all Mondays within the month.

The BYMONTHDAY rule part specifies a COMMA character (ASCII decimal 44) separated list of days of the month. Valid values are 1 to 31 or -31 to -1. For example, -10 represents the tenth to the last day of the month.

The BYYEARDAY rule part specifies a COMMA character (US-ASCII decimal 44) separated list of days of the year. Valid values are 1 to 366 or -366 to -1. For example, -1 represents the last day of the year (December 31st) and -306 represents the 306th to the last day of the year (March 1st).

The BYWEEKNO rule part specifies a COMMA character (US-ASCII decimal 44) separated list of ordinals specifying weeks of the year. Valid values are 1 to 53 or -53 to -1. This corresponds to weeks according to week numbering as defined in [ISO 8601]. A week is defined as a seven day period, starting on the day of the week defined to be the week start (see WKST). Week number one of the calendar year is the first week which contains at least four (4) days in that calendar year. This rule part is only valid for YEARLY rules. For example, 3 represents the third week of the year.

Note: Assuming a Monday week start, week 53 can only occur when Thursday is January 1 or if it is a leap year and Wednesday is January 1.

The BYMONTH rule part specifies a COMMA character (US-ASCII decimal 44) separated list of months of the year. Valid values are 1 to 12.

The WKST rule part specifies the day on which the workweek starts. Valid values are MO, TU, WE, TH, FR, SA and SU. This is significant when a WEEKLY RRULE has an interval greater than 1, and a BYDAY rule part is specified. This is also significant when in a YEARLY RRULE when a BYWEEKNO rule part is specified. The default value is MO.

The BYSETPOS rule part specifies a COMMA character (US-ASCII decimal 44) separated list of values which corresponds to the nth occurrence within the set of events specified by the rule. Valid values are 1 to 366 or -366 to -1. It MUST only be used in conjunction with another BYxxx rule part. For example "the last work day of the month" could be represented as:

```
RRULE:FREQ=MONTHLY;BYDAY=MO,TU,WE,TH,FR;BYSETPOS=-1
```

Each BYSETPOS value can include a positive (+n) or negative (-n) integer. If present, this indicates the nth occurrence of the specific occurrence within the set of events specified by the rule.

If BYxxx rule part values are found which are beyond the available scope (ie, BYMONTHDAY=30 in February), they are simply ignored.

Information, not contained in the rule, necessary to determine the various recurrence instance start time and dates are derived from the Start Time (DTSTART) entry attribute. For example, "FREQ=YEARLY;BYMONTH=1" doesn't specify a specific day within the month or a time. This information would be the same as what is specified for DTSTART.

BYxxx rule parts modify the recurrence in some manner. BYxxx rule parts for a period of time which is the same or greater than the frequency generally reduce or limit the number of occurrences of the recurrence generated. For example, "FREQ=DAILY;BYMONTH=1" reduces the number of recurrence instances from all days (if BYMONTH tag is not present) to all days in January. BYxxx rule parts for a period of time less than the frequency generally increase or expand the number of occurrences of the recurrence. For example, "FREQ=YEARLY;BYMONTH=1,2" increases the number of days within the yearly recurrence set from 1 (if BYMONTH tag is not present) to 2.

If multiple BYxxx rule parts are specified, then after evaluating the specified FREQ and INTERVAL rule parts, the BYxxx rule parts are applied to the current set of evaluated occurrences in the following order: BYMONTH, BYWEEKNO, BYYEARDAY, BYMONTHDAY, BYDAY, BYHOUR, BYMINUTE, BYSECOND and BYSETPOS; then COUNT and UNTIL are evaluated.

Here is an example of evaluating multiple BYxxx rule parts.

```
DTSTART;TZID=US-Eastern:19970105T083000
RRULE:FREQ=YEARLY;INTERVAL=2;BYMONTH=1;BYDAY=SU;BYHOUR=8,9;
BYMINUTE=30
```

First, the "INTERVAL=2" would be applied to "FREQ=YEARLY" to arrive at "every other year". Then, "BYMONTH=1" would be applied to arrive at "every January, every other year". Then, "BYDAY=SU" would be applied to arrive at "every Sunday in January, every other year". Then, "BYHOUR=8,9" would be applied to arrive at "every Sunday in January at 8 AM and 9 AM, every other year". Then, "BYMINUTE=30" would be applied to arrive at "every Sunday in January at 8:30 AM and 9:30 AM, every other year". Then, lacking information from RRULE, the second is derived from DTSTART, to end up in "every Sunday in January at 8:30:00 AM and 9:30:00 AM, every other year". Similarly, if the BYMINUTE, BYHOUR, BYDAY, BYMONTHDAY or BYMONTH rule part were missing, the appropriate minute, hour, day or month would have been retrieved from the "DTSTART" property.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following is a rule which specifies 10 meetings which occur every other day:

```
FREQ=DAILY;COUNT=10;INTERVAL=2
```

There are other examples specified in the "RRULE" specification.

4.3.11 Text

Value Name: TEXT

Purpose This value type is used to identify values that contain human readable text.

Formal Definition: The character sets supported by this revision of iCalendar are UTF-8 and US ASCII thereof. The applicability to other character sets is for future work. The value type is defined by the following notation.

```
text          = *(TSAFE-CHAR / ":" / DQUOTE / ESCAPED-CHAR)
; Folded according to description above

ESCAPED-CHAR = "\\\" / "\\;" / "\\," / "\\N" / "\\n"
; \\ encodes \, \N or \n encodes newline
; \; encodes ;, \, encodes ,
```

TSAFE-CHAR = %x20-21 / %x23-2B / %x2D-39 / %x3C-5B
 %x5D-7E / NON-US-ASCII
; Any character except CTLs not needed by the current
; character set, DQUOTE, ";", ":", "\", ",", "

Note: Certain other character sets may require modification of the above definitions, but this is beyond the scope of this document.

Description: If the property permits, multiple "text" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values.

The language in which the text is represented can be controlled by the "LANGUAGE" property parameter.

An intentional formatted text line break MUST only be included in a "TEXT" property value by representing the line break with the character sequence of BACKSLASH (US-ASCII decimal 92), followed by a LATIN SMALL LETTER N (US-ASCII decimal 110) or a LATIN CAPITAL LETTER N (US-ASCII decimal 78), that is "\n" or "\N".

The "TEXT" property values may also contain special characters that are used to signify delimiters, such as a COMMA character for lists of values or a SEMICOLON character for structured values. In order to support the inclusion of these special characters in "TEXT" property values, they MUST be escaped with a BACKSLASH character. A BACKSLASH character (US-ASCII decimal 92) in a "TEXT" property value MUST be escaped with another BACKSLASH character. A COMMA character in a "TEXT" property value MUST be escaped with a BACKSLASH character (US-ASCII decimal 92). A SEMICOLON character in a "TEXT" property value MUST be escaped with a BACKSLASH character (US-ASCII decimal 92). However, a COLON character in a "TEXT" property value SHALL NOT be escaped with a BACKSLASH character. Example: A multiple line value of:

Project XYZ Final Review
Conference Room - 3B
Come Prepared.

would be represented as:

Project XYZ Final Review\nConference Room - 3B\nCome Prepared.

4.3.12 Time

Value Name: TIME

Purpose: This value type is used to identify values that contain a time of day.

Formal Definition: The data type is defined by the following notation:

time = time-hour time-minute time-second [time-utc]

time-hour = 2DIGIT ;00-23

time-minute = 2DIGIT ;00-59

time-second = 2DIGIT ;00-60

;The "60" value is used to account for "leap" seconds.

time-utc = "Z"

Description: If the property permits, multiple "time" values are specified by a COMMA character (US-ASCII decimal 44) separated list of values. No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

The "TIME" data type is used to identify values that contain a time of day. The format is based on the [ISO 8601] complete representation, basic format for a time of day. The text format consists of a two-digit 24-hour of the day (i.e., values 0-23), two-digit minute in the hour (i.e., values 0-59), and two-digit seconds in the minute (i.e., values 0-60). The seconds value of 60 MUST only to be used to account for "leap" seconds. Fractions of a second are not supported by this format.

In parallel to the "DATE-TIME" definition above, the "TIME" data type expresses time values in three forms:

The form of time with UTC offset MUST NOT be used. For example, the following is NOT VALID for a time value:

230000-0800 ;Invalid time format

FORM #1 LOCAL TIME

The local time form is simply a time value that does not contain the UTC designator nor does it reference a time zone. For example, 11:00 PM:

230000

Time values of this type are said to be "floating" and are not bound to any time zone in particular. They are used to represent the same hour, minute, and second value regardless of which time zone is currently being observed. For example, an event can be defined that indicates that an individual will be busy from 11:00 AM to 1:00 PM every day, no matter which time zone the person is in. In these cases, a local time can be specified. The recipient of an iCalendar object with a property value consisting of a local time, without any relative time zone information, SHOULD interpret the value as being fixed to whatever time zone the ATTENDEE is in at any given moment. This means that two ATTENDEES may participate in the same event at different UTC times; floating time SHOULD only be used where that is reasonable behavior.

In most cases, a fixed time is desired. To properly communicate a fixed time in a property value, either UTC time or local time with time zone reference MUST be specified.

The use of local time in a TIME value without the TZID property parameter is to be interpreted as a local time value, regardless of the existence of "VTIMEZONE" calendar components in the iCalendar object.

FORM #2: UTC TIME

UTC time, or absolute time, is identified by a LATIN CAPITAL LETTER Z suffix character (US-ASCII decimal 90), the UTC designator, appended to the time value. For example, the following represents 07:00 AM UTC:

070000Z

The TZID property parameter MUST NOT be applied to TIME properties whose time values are specified in UTC.

FORM #3: LOCAL TIME AND TIME ZONE REFERENCE

The local time with reference to time zone information form is identified by the use the TZID property parameter to reference the appropriate time zone definition. TZID is discussed in detail in the section on Time Zone.

Example: The following represents 8:30 AM in New York in Winter, five hours behind UTC, in each of the three formats using the "X-TIMEOFDAY" non-standard property:

X-TIMEOFDAY:083000

X-TIMEOFDAY:133000Z

X-TIMEOFDAY;TZID=US-Eastern:083000

4.3.13 URI

Value Name: URI

Purpose: This value type is used to identify values that contain a uniform resource identifier (URI) type of reference to the property value.

Formal Definition: The data type is defined by the following notation:

uri = <As defined by any IETF RFC>

Description: This data type might be used to reference binary information, for values that are large, or otherwise undesirable to include directly in the iCalendar object.

The URI value formats in RFC 1738, RFC 2111 and any other IETF registered value format can be specified.

Any IANA registered URI format can be used. These include, but are not limited to, those defined in RFC 1738 and RFC 2111.

When a property parameter value is a URI value type, the URI MUST be specified as a quoted-string value.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following is a URI for a network file:

http://host1.com/my-report.txt

4.3.14 UTC Offset

Value Name: UTC-OFFSET

Purpose: This value type is used to identify properties that contain an offset from UTC to local time.

Formal Definition: The data type is defined by the following notation:

utc-offset = time-numzone ;As defined above in time data type

time-numzone = ("+" / "-") time-hour time-minute [time-second]

Description: The PLUS SIGN character MUST be specified for positive UTC offsets (i.e., ahead of UTC). The value of "-0000" and "-000000" are not allowed. The time-second, if present, may not be 60; if absent, it defaults to zero.

No additional content value encoding (i.e., BACKSLASH character encoding) is defined for this value type.

Example: The following UTC offsets are given for standard time for New York (five hours behind UTC) and Geneva (one hour ahead of UTC):

-0500

+0100

4.4 iCalendar Object

The Calendaring and Scheduling Core Object is a collection of calendaring and scheduling information. Typically, this information will consist of a single iCalendar object. However, multiple iCalendar objects can be sequentially grouped together. The first line and last line of the iCalendar object MUST contain a pair of iCalendar object delimiter strings. The syntax for an iCalendar object is as follows:

```
icalobject = 1*("BEGIN" ":" "VCALENDAR" CRLF
               icalbody
               "END" ":" "VCALENDAR" CRLF)
```

The following is a simple example of an iCalendar object:

```
BEGIN:VCALENDAR
VERSION:2.0
PRODID:-//hacksw/handcal//NONSGML v1.0//EN
BEGIN:VEVENT
DTSTART:19970714T170000Z
DTEND:19970715T035959Z
SUMMARY:Bastille Day Party
END:VEVENT
END:VCALENDAR
```

4.5 Property

A property is the definition of an individual attribute describing a calendar or a calendar component. A property takes the form defined by the "contentline" notation defined in section 4.1.1.

The following is an example of a property:

```
DTSTART:19960415T133000Z
```

This memo imposes no ordering of properties within an iCalendar object.

Property names, parameter names and enumerated parameter values are case insensitive. For example, the property name "DUE" is the same as "due" and "Due", DTSTART;TZID=US-Eastern:19980714T120000 is the same as DtStart;TzID=US-Eastern:19980714T120000.

4.6 Calendar Components

The body of the iCalendar object consists of a sequence of calendar properties and one or more calendar components. The calendar properties are attributes that apply to the calendar as a whole. The calendar components are collections of properties that express a particular calendar semantic. For example, the calendar component can specify an event, a to-do, a journal entry, time zone information, or free/busy time information, or an alarm.

The body of the iCalendar object is defined by the following notation:

```
icalbody    = calprops component

calprops    = 2*(
                ; 'prodid' and 'version' are both REQUIRED,
                ; but MUST NOT occur more than once

                prodid /version /

                ; 'calscale' and 'method' are optional,
                ; but MUST NOT occur more than once

                calscale      /
                method        /

                x-prop
            )
```

```

    )

    component = 1*(eventc / todoc / journalc / freebusyc /
        / timezonec / iana-comp / x-comp)

    iana-comp = "BEGIN" ":" iana-token CRLF

        1*contentline

        "END" ":" iana-token CRLF

    x-comp = "BEGIN" ":" x-name CRLF

        1*contentline

        "END" ":" x-name CRLF

```

An iCalendar object MUST include the "PRODID" and "VERSION" calendar properties. In addition, it MUST include at least one calendar component. Special forms of iCalendar objects are possible to publish just busy time (i.e., only a "VFREEBUSY" calendar component) or time zone (i.e., only a "VTIMEZONE" calendar component) information. In addition, a complex iCalendar object is possible that is used to capture a complete snapshot of the contents of a calendar (e.g., composite of many different calendar components). More commonly, an iCalendar object will consist of just a single "VEVENT", "VTODO" or "VJOURNAL" calendar component.

4.6.1 Event Component

Component Name: "VEVENT"

Purpose: Provide a grouping of component properties that describe an event.

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

```

    eventc      = "BEGIN" ":" "VEVENT" CRLF
                  eventprop *alarmc
                  "END" ":" "VEVENT" CRLF

    eventprop   = *(
        ; the following are optional,
        ; but MUST NOT occur more than once

        class / created / description / dtstart / geo /

```

```

last-mod / location / organizer / priority /
dtstamp / seq / status / summary / transp /
uid / url / recurid /

; either 'dtend' or 'duration' may appear in
; a 'eventprop', but 'dtend' and 'duration'
; MUST NOT occur in the same 'eventprop'

dtend / duration /

; the following are optional,
; and MAY occur more than once

attach / attendee / categories / comment /
contact / exdate / exrule / rstatus / related /
resources / rdate / rrule / x-prop

)

```

Description: A "VEVENT" calendar component is a grouping of component properties, and possibly including "VALARM" calendar components, that represents a scheduled amount of time on a calendar. For example, it can be an activity; such as a one-hour long, department meeting from 8:00 AM to 9:00 AM, tomorrow. Generally, an event will take up time on an individual calendar. Hence, the event will appear as an opaque interval in a search for busy time. Alternately, the event can have its Time Transparency set to "TRANSPARENT" in order to prevent blocking of the event in searches for busy time.

The "VEVENT" is also the calendar component used to specify an anniversary or daily reminder within a calendar. These events have a DATE value type for the "DTSTART" property instead of the default data type of DATE-TIME. If such a "VEVENT" has a "DTEND" property, it MUST be specified as a DATE value also. The anniversary type of "VEVENT" can span more than one date (i.e., "DTEND" property value is set to a calendar date after the "DTSTART" property value).

The "DTSTART" property for a "VEVENT" specifies the inclusive start of the event. For recurring events, it also specifies the very first instance in the recurrence set. The "DTEND" property for a "VEVENT" calendar component specifies the non-inclusive end of the event. For cases where a "VEVENT" calendar component specifies a "DTSTART" property with a DATE data type but no "DTEND" property, the events non-inclusive end is the end of the calendar date specified by the "DTSTART" property. For cases where a "VEVENT" calendar component specifies a "DTSTART" property with a DATE-TIME data type but no "DTEND" property, the event ends on the same calendar date and time of day specified by the "DTSTART" property.

The "VEVENT" calendar component cannot be nested within another calendar component. However, "VEVENT" calendar components can be related to each other or to a "VTODO" or to a "VJOURNAL" calendar component with the "RELATED-TO" property.

Example: The following is an example of the "VEVENT" calendar component used to represent a meeting that will also be opaque to searches for busy time:

```
BEGIN:VEVENT
UID:19970901T130000Z-123401@host.com
DTSTAMP:19970901T1300Z
DTSTART:19970903T163000Z
DTEND:19970903T190000Z
SUMMARY:Annual Employee Review
CLASS:PRIVATE
CATEGORIES:BUSINESS,HUMAN RESOURCES
END:VEVENT
```

The following is an example of the "VEVENT" calendar component used to represent a reminder that will not be opaque, but rather transparent, to searches for busy time:

```
BEGIN:VEVENT
UID:19970901T130000Z-123402@host.com
DTSTAMP:19970901T1300Z
DTSTART:19970401T163000Z
DTEND:19970402T010000Z
SUMMARY:Laurel is in sensitivity awareness class.
CLASS:PUBLIC
CATEGORIES:BUSINESS,HUMAN RESOURCES
TRANSP:TRANSPARENT
END:VEVENT
```

The following is an example of the "VEVENT" calendar component used to represent an anniversary that will occur annually. Since it takes up no time, it will not appear as opaque in a search for busy time; no matter what the value of the "TRANSP" property indicates:

```
BEGIN:VEVENT
UID:19970901T130000Z-123403@host.com
DTSTAMP:19970901T1300Z
DTSTART:19971102
SUMMARY:Our Blissful Anniversary
CLASS:CONFIDENTIAL
CATEGORIES:ANNIVERSARY,PERSONAL,SPECIAL OCCASION
RRULE:FREQ=YEARLY
END:VEVENT
```

4.6.2 To-do Component

Component Name: VTODO

Purpose: Provide a grouping of calendar properties that describe a to-do.

Formal Definition: A "VTODO" calendar component is defined by the following notation:

```

todoc      = "BEGIN" ":" "VTODO" CRLF
              todoprop *alarmc
              "END" ":" "VTODO" CRLF

todoprop    = *(
              ; the following are optional,
              ; but MUST NOT occur more than once

              class / completed / created / description / dtstamp /
              dtstart / geo / last-mod / location / organizer /
              percent / priority / recurid / seq / status /
              summary / uid / url /

              ; either 'due' or 'duration' may appear in
              ; a 'todoprop', but 'due' and 'duration'
              ; MUST NOT occur in the same 'todoprop'

              due / duration /

              ; the following are optional,
              ; and MAY occur more than once
              attach / attendee / categories / comment / contact /
              exdate / exrule / rstatus / related / resources /
              rdate / rrule / x-prop

              )

```

Description: A "VTODO" calendar component is a grouping of component properties and possibly "VALARM" calendar components that represent an action-item or assignment. For example, it can be used to represent an item of work assigned to an individual; such as "turn in travel expense today".

The "VTODO" calendar component cannot be nested within another calendar component. However, "VTODO" calendar components can be related to each other or to a "VTODO" or to a "VJOURNAL" calendar component with the "RELATED-TO" property.

A "VTODO" calendar component without the "DTSTART" and "DUE" (or "DURATION") properties specifies a to-do that will be associated with each successive calendar date, until it is completed.

Example: The following is an example of a "VTODO" calendar component:

```
BEGIN:VTODO
UID:19970901T130000Z-123404@host.com
DTSTAMP:19970901T1300Z
DTSTART:19970415T133000Z
DUE:19970416T045959Z
SUMMARY:1996 Income Tax Preparation
CLASS:CONFIDENTIAL
CATEGORIES:FAMILY,FINANCE
PRIORITY:1
STATUS:NEEDS-ACTION
END:VTODO
```

4.6.3 Journal Component

Component Name: VJOURNAL

Purpose: Provide a grouping of component properties that describe a journal entry.

Formal Definition: A "VJOURNAL" calendar component is defined by the following notation:

```
journalc  = "BEGIN" ":" "VJOURNAL" CRLF
           jourprop
           "END" ":" "VJOURNAL" CRLF

jourprop  = *(
           ; the following are optional,
           ; but MUST NOT occur more than once

           class / created / description / dtstart / dtstamp /
           last-mod / organizer / recurid / seq / status /
           summary / uid / url /

           ; the following are optional,
           ; and MAY occur more than once

           attach / attendee / categories / comment /
           contact / exdate / exrule / related / rdate /
           rrule / rstatus / x-prop
```


)

Description: A "VJOURNAL" calendar component is a grouping of component properties that represent one or more descriptive text notes associated with a particular calendar date. The "DTSTART" property is used to specify the calendar date that the journal entry is associated with. Generally, it will have a DATE value data type, but it can also be used to specify a DATE-TIME value data type. Examples of a journal entry include a daily record of a legislative body or a journal entry of individual telephone contacts for the day or an ordered list of accomplishments for the day. The "VJOURNAL" calendar component can also be used to associate a document with a calendar date.

The "VJOURNAL" calendar component does not take up time on a calendar. Hence, it does not play a role in free or busy time searches - - it is as though it has a time transparency value of TRANSPARENT. It is transparent to any such searches.

The "VJOURNAL" calendar component cannot be nested within another calendar component. However, "VJOURNAL" calendar components can be related to each other or to a "VEVENT" or to a "VTODO" calendar component, with the "RELATED-TO" property.

Example: The following is an example of the "VJOURNAL" calendar component:

```
BEGIN:VJOURNAL
UID:19970901T130000Z-123405@host.com
DTSTAMP:19970901T1300Z
DTSTART;VALUE=DATE:19970317
SUMMARY:Staff meeting minutes
DESCRIPTION:1. Staff meeting: Participants include Joe\, Lisa
  and Bob. Aurora project plans were reviewed. There is currently
  no budget reserves for this project. Lisa will escalate to
  management. Next meeting on Tuesday.\n
  2. Telephone Conference: ABC Corp. sales representative called
  to discuss new printer. Promised to get us a demo by Friday.\n
  3. Henry Miller (Handsoff Insurance): Car was totaled by tree.
  Is looking into a loaner car. 654-2323 (tel).
END:VJOURNAL
```

4.6.4 Free/Busy Component

Component Name: VFREEBUSY

Purpose: Provide a grouping of component properties that describe either a request for free/busy time, describe a response to a request for free/busy time or describe a published set of busy time.

Formal Definition: A "VFREEBUSY" calendar component is defined by the following notation:

```

freebusyc  = "BEGIN" ":" "VFREEBUSY" CRLF
             fbprop
             "END" ":" "VFREEBUSY" CRLF

fbprop     = *(
             ; the following are optional,
             ; but MUST NOT occur more than once

             contact / dtstart / dtend / duration / dtstamp /
             organizer / uid / url /

             ; the following are optional,
             ; and MAY occur more than once

             attendee / comment / freebusy / rstatus / x-prop
             )

```

Description: A "VFREEBUSY" calendar component is a grouping of component properties that represents either a request for, a reply to a request for free or busy time information or a published set of busy time information.

When used to request free/busy time information, the "ATTENDEE" property specifies the calendar users whose free/busy time is being requested; the "ORGANIZER" property specifies the calendar user who is requesting the free/busy time; the "DTSTART" and "DTEND" properties specify the window of time for which the free/busy time is being requested; the "UID" and "DTSTAMP" properties are specified to assist in proper sequencing of multiple free/busy time requests.

When used to reply to a request for free/busy time, the "ATTENDEE" property specifies the calendar user responding to the free/busy time request; the "ORGANIZER" property specifies the calendar user that originally requested the free/busy time; the "FREEBUSY" property specifies the free/busy time information (if it exists); and the

"UID" and "DTSTAMP" properties are specified to assist in proper sequencing of multiple free/busy time replies.

When used to publish busy time, the "ORGANIZER" property specifies the calendar user associated with the published busy time; the "DTSTART" and "DTEND" properties specify an inclusive time window that surrounds the busy time information; the "FREEBUSY" property specifies the published busy time information; and the "DTSTAMP" property specifies the date/time that iCalendar object was created.

The "VFREEBUSY" calendar component cannot be nested within another calendar component. Multiple "VFREEBUSY" calendar components can be specified within an iCalendar object. This permits the grouping of Free/Busy information into logical collections, such as monthly groups of busy time information.

The "VFREEBUSY" calendar component is intended for use in iCalendar object methods involving requests for free time, requests for busy time, requests for both free and busy, and the associated replies.

Free/Busy information is represented with the "FREEBUSY" property. This property provides a terse representation of time periods. One or more "FREEBUSY" properties can be specified in the "VFREEBUSY" calendar component.

When present in a "VFREEBUSY" calendar component, the "DTSTART" and "DTEND" properties SHOULD be specified prior to any "FREEBUSY" properties. In a free time request, these properties can be used in combination with the "DURATION" property to represent a request for a duration of free time within a specified window of time.

The recurrence properties ("RRULE", "EXRULE", "RDATE", "EXDATE") are not permitted within a "VFREEBUSY" calendar component. Any recurring events are resolved into their individual busy time periods using the "FREEBUSY" property.

Example: The following is an example of a "VFREEBUSY" calendar component used to request free or busy time information:

```
BEGIN:VFREEBUSY
ORGANIZER:MAILTO:jane_doe@host1.com
ATTENDEE:MAILTO:john_public@host2.com
DTSTART:19971015T050000Z
DTEND:19971016T050000Z
DTSTAMP:19970901T083000Z
END:VFREEBUSY
```

The following is an example of a "VFREEBUSY" calendar component used to reply to the request with busy time information:

```
BEGIN:VFREEBUSY
ORGANIZER:MAILTO:jane_doe@host1.com
ATTENDEE:MAILTO:john_public@host2.com
DTSTAMP:19970901T100000Z
FREEBUSY:VALUE=PERIOD:19971015T050000Z/PT8H30M,
  19971015T160000Z/PT5H30M,19971015T223000Z/PT6H30M
URL:http://host2.com/pub/busy/jpublic-01.ifb
COMMENT:This iCalendar file contains busy time information for
  the next three months.
END:VFREEBUSY
```

The following is an example of a "VFREEBUSY" calendar component used to publish busy time information.

```
BEGIN:VFREEBUSY
ORGANIZER:jsmith@host.com
DTSTART:19980313T141711Z
DTEND:19980410T141711Z
FREEBUSY:19980314T233000Z/19980315T003000Z
FREEBUSY:19980316T153000Z/19980316T163000Z
FREEBUSY:19980318T030000Z/19980318T040000Z
URL:http://www.host.com/calendar/busytime/jsmith.ifb
END:VFREEBUSY
```

4.6.5 Time Zone Component

Component Name: VTIMEZONE

Purpose: Provide a grouping of component properties that defines a time zone.

Formal Definition: A "VTIMEZONE" calendar component is defined by the following notation:

```
timezonec  = "BEGIN" ":" "VTIMEZONE" CRLF
            2*(
              ; 'tzid' is required, but MUST NOT occur more
              ; than once

              tzid /

              ; 'last-mod' and 'tzurl' are optional,
              but MUST NOT occur more than once
```

```

last-mod / tzurl /

    ; one of 'standardc' or 'daylightc' MUST occur
    ..; and each MAY occur more than once.

standardc / daylightc /

    ; the following is optional,
    ; and MAY occur more than once

    x-prop

    )

    "END" ":" "VTIMEZONE" CRLF

standardc = "BEGIN" ":" "STANDARD" CRLF

    tzprop

    "END" ":" "STANDARD" CRLF

daylightc = "BEGIN" ":" "DAYLIGHT" CRLF

    tzprop

    "END" ":" "DAYLIGHT" CRLF

tzprop = 3*(

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

    dtstart / tzoffsetto / tzoffsetfrom /

    ; the following are optional,
    ; and MAY occur more than once

    comment / rdate / rrule / tzname / x-prop

    )

```

Description: A time zone is unambiguously defined by the set of time measurement rules determined by the governing body for a given geographic area. These rules describe at a minimum the base offset from UTC for the time zone, often referred to as the Standard Time offset. Many locations adjust their Standard Time forward or backward by one hour, in order to accommodate seasonal changes in number of

daylight hours, often referred to as Daylight Saving Time. Some locations adjust their time by a fraction of an hour. Standard Time is also known as Winter Time. Daylight Saving Time is also known as Advanced Time, Summer Time, or Legal Time in certain countries. The following table shows the changes in time zone rules in effect for New York City starting from 1967. Each line represents a description or rule for a particular observance.

Effective Observance Rule

Date	(Date/Time)	Offset	Abbreviation
1967-*	last Sun in Oct, 02:00	-0500	EST
1967-1973	last Sun in Apr, 02:00	-0400	EDT
1974-1974	Jan 6, 02:00	-0400	EDT
1975-1975	Feb 23, 02:00	-0400	EDT
1976-1986	last Sun in Apr, 02:00	-0400	EDT
1987-*	first Sun in Apr, 02:00	-0400	EDT

Note: The specification of a global time zone registry is not addressed by this document and is left for future study. However, implementers may find the Olson time zone database [TZ] a useful reference. It is an informal, public-domain collection of time zone information, which is currently being maintained by volunteer Internet participants, and is used in several operating systems. This database contains current and historical time zone information for a wide variety of locations around the globe; it provides a time zone identifier for every unique time zone rule set in actual use since 1970, with historical data going back to the introduction of standard time.

Interoperability between two calendaring and scheduling applications, especially for recurring events, to-dos or journal entries, is dependent on the ability to capture and convey date and time information in an unambiguous format. The specification of current time zone information is integral to this behavior.

If present, the "VTIMEZONE" calendar component defines the set of Standard Time and Daylight Saving Time observances (or rules) for a particular time zone for a given interval of time. The "VTIMEZONE" calendar component cannot be nested within other calendar components. Multiple "VTIMEZONE" calendar components can exist in an iCalendar object. In this situation, each "VTIMEZONE" MUST represent a unique

time zone definition. This is necessary for some classes of events, such as airline flights, that start in one time zone and end in another.

The "VTIMEZONE" calendar component MUST be present if the iCalendar object contains an RRULE that generates dates on both sides of a time zone shift (e.g. both in Standard Time and Daylight Saving Time) unless the iCalendar object intends to convey a floating time (See the section "4.1.10.11 Time" for proper interpretation of floating time). It can be present if the iCalendar object does not contain such a RRULE. In addition, if a RRULE is present, there MUST be valid time zone information for all recurrence instances.

The "VTIMEZONE" calendar component MUST include the "TZID" property and at least one definition of a standard or daylight component. The standard or daylight component MUST include the "DTSTART", "TZOFFSETFROM" and "TZOFFSETTO" properties.

An individual "VTIMEZONE" calendar component MUST be specified for each unique "TZID" parameter value specified in the iCalendar object.

Each "VTIMEZONE" calendar component consists of a collection of one or more sub-components that describe the rule for a particular observance (either a Standard Time or a Daylight Saving Time observance). The "STANDARD" sub-component consists of a collection of properties that describe Standard Time. The "DAYLIGHT" sub-component consists of a collection of properties that describe Daylight Saving Time. In general this collection of properties consists of:

- the first onset date-time for the observance
- the last onset date-time for the observance, if a last onset is known.
- the offset to be applied for the observance
- a rule that describes the day and time when the observance takes effect
- an optional name for the observance

For a given time zone, there may be multiple unique definitions of the observances over a period of time. Each observance is described using either a "STANDARD" or "DAYLIGHT" sub-component. The collection of these sub-components is used to describe the time zone for a given period of time. The offset to apply at any given time is found by locating the observance that has the last onset date and time before the time in question, and using the offset value from that

observance.

The top-level properties in a "VTIMEZONE" calendar component are:

The mandatory "TZID" property is a text value that uniquely identifies the VTIMZONE calendar component within the scope of an iCalendar object.

The optional "LAST-MODIFIED" property is a UTC value that specifies the date and time that this time zone definition was last updated.

The optional "TZURL" property is url value that points to a published VTIMEZONE definition. TZURL SHOULD refer to a resource that is accessible by anyone who might need to interpret the object. This SHOULD NOT normally be a file: URL or other URL that is not widely-accessible.

The collection of properties that are used to define the STANDARD and DAYLIGHT sub-components include:

The mandatory "DTSTART" property gives the effective onset date and local time for the time zone sub-component definition. "DTSTART" in this usage MUST be specified as a local DATE-TIME value.

The mandatory "TZOFFSETFROM" property gives the UTC offset which is in use when the onset of this time zone observance begins.

"TZOFFSETFROM" is combined with "DTSTART" to define the effective onset for the time zone sub-component definition. For example, the following represents the time at which the observance of Standard Time took effect in Fall 1967 for New York City:

```
DTSTART:19671029T020000
```

```
TZOFFSETFROM:-0400
```

The mandatory "TZOFFSETTO" property gives the UTC offset for the time zone sub-component (Standard Time or Daylight Saving Time) when this observance is in use.

The optional "TZNAME" property is the customary name for the time zone. It may be specified multiple times, to allow for specifying multiple language variants of the time zone names. This could be used for displaying dates.

If specified, the onset for the observance defined by the time zone sub-component is defined by either the "RRULE" or "RDATE" property. If neither is specified, only one sub-component can be specified in the "VTIMEZONE" calendar component and it is assumed that the single

observance specified is always in effect.

The "RRULE" property defines the recurrence rule for the onset of the observance defined by this time zone sub-component. Some specific requirements for the usage of RRULE for this purpose include:

- If observance is known to have an effective end date, the "UNTIL" recurrence rule parameter MUST be used to specify the last valid onset of this observance (i.e., the UNTIL date-time will be equal to the last instance generated by the recurrence pattern). It MUST be specified in UTC time.
- The "DTSTART" and the "TZOFFSETTO" properties MUST be used when generating the onset date-time values (instances) from the RRULE.

Alternatively, the "RDATE" property can be used to define the onset of the observance by giving the individual onset date and times. "RDATE" in this usage MUST be specified as a local DATE-TIME value in UTC time.

The optional "COMMENT" property is also allowed for descriptive explanatory text.

Example: The following are examples of the "VTIMEZONE" calendar component:

This is an example showing time zone information for the Eastern United States using "RDATE" property. Note that this is only suitable for a recurring event that starts on or later than April 6, 1997 at 03:00:00 EDT (i.e., the earliest effective transition date and time) and ends no later than April 7, 1998 02:00:00 EST (i.e., latest valid date and time for EST in this scenario). For example, this can be used for a recurring event that occurs every Friday, 8am-9:00 AM, starting June 1, 1997, ending December 31, 1997.

```
BEGIN:VTIMEZONE
TZID:US-Eastern
LAST-MODIFIED:19870101T000000Z
BEGIN:STANDARD
DTSTART:19971026T020000
RDATE:19971026T020000
TZOFFSETFROM:-0400
TZOFFSETTO:-0500
TZNAME:EST
END:STANDARD
BEGIN:DAYLIGHT
DTSTART:19971026T020000
```

```
RDATE:19970406T020000
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
END:VTIMEZONE
```

This is a simple example showing the current time zone rules for the Eastern United States using a RRULE recurrence pattern. Note that there is no effective end date to either of the Standard Time or Daylight Time rules. This information would be valid for a recurring event starting today and continuing indefinitely.

```
BEGIN:VTIMEZONE
TZID:US-Eastern
LAST-MODIFIED:19870101T000000Z
TZURL:http://zones.stds_r_us.net/tz/US-Eastern
BEGIN:STANDARD
DTSTART:19671029T020000
RRULE:FREQ=YEARLY;BYDAY=-1SU;BYMONTH=10
TZOFFSETFROM:-0400
TZOFFSETTO:-0500
TZNAME:EST
END:STANDARD
BEGIN:DAYLIGHT
DTSTART:19870405T020000
RRULE:FREQ=YEARLY;BYDAY=1SU;BYMONTH=4
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
END:VTIMEZONE
```

This is an example showing a fictitious set of rules for the Eastern United States, where the Daylight Time rule has an effective end date (i.e., after that date, Daylight Time is no longer observed).

```
BEGIN:VTIMEZONE
TZID:US--Fictitious-Eastern
LAST-MODIFIED:19870101T000000Z
BEGIN:STANDARD
DTSTART:19671029T020000
RRULE:FREQ=YEARLY;BYDAY=-1SU;BYMONTH=10
TZOFFSETFROM:-0400
TZOFFSETTO:-0500
TZNAME:EST
END:STANDARD
```

```
BEGIN:DAYLIGHT
DTSTART:19870405T020000
RRULE:FREQ=YEARLY;BYDAY=1SU;BYMONTH=4;UNTIL=19980404T070000Z
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
END:VTIMEZONE
```

This is an example showing a fictitious set of rules for the Eastern United States, where the first Daylight Time rule has an effective end date. There is a second Daylight Time rule that picks up where the other left off.

```
BEGIN:VTIMEZONE
TZID:US--Fictitious-Eastern
LAST-MODIFIED:19870101T000000Z
BEGIN:STANDARD
DTSTART:19671029T020000
RRULE:FREQ=YEARLY;BYDAY=-1SU;BYMONTH=10
TZOFFSETFROM:-0400
TZOFFSETTO:-0500
TZNAME:EST
END:STANDARD
BEGIN:DAYLIGHT
DTSTART:19870405T020000
RRULE:FREQ=YEARLY;BYDAY=1SU;BYMONTH=4;UNTIL=19980404T070000Z
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
BEGIN:DAYLIGHT
DTSTART:19990424T020000
RRULE:FREQ=YEARLY;BYDAY=-1SU;BYMONTH=4
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
END:VTIMEZONE
```

4.6.6 Alarm Component

Component Name: VALARM

Purpose: Provide a grouping of component properties that define an alarm.

Formal Definition: A "VALARM" calendar component is defined by the following notation:

```
alarmc      = "BEGIN" ":" "VALARM" CRLF
              (audioprop / dispprop / emailprop / procprop)
              "END" ":" "VALARM" CRLF

audioprop   = 2*(
              ; 'action' and 'trigger' are both REQUIRED,
              ; but MUST NOT occur more than once

              action / trigger /

              ; '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 /

              ; the following is optional,
              ; and MAY occur more than once

              x-prop

              )

dispprop     = 3*(
              ; the following are all REQUIRED,
              ; but MUST NOT occur more than once

              action / description / trigger /

              ; '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,
```

; and MAY occur more than once

*x-prop

)

emailprop = 5*(

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

action / description / trigger / 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 /

; the following are optional,
; and MAY occur more than once

attach / x-prop

)

procprop = 3*(

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

action / attach / trigger /

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

duration / repeat /

```
    ; 'description' is optional,  
    ; and MUST NOT occur more than once  
  
    description /  
  
    ; the following is optional,  
    ; and MAY occur more than once  
  
    x-prop  
  
    )
```

Description: A "VALARM" calendar component is a grouping of component properties that is a reminder or alarm for an event or a to-do. For example, it may be used to define a reminder for a pending event or an overdue to-do.

The "VALARM" calendar component MUST include the "ACTION" and "TRIGGER" properties. The "ACTION" property further constrains the "VALARM" calendar component in the following ways:

When the action is "AUDIO", the alarm can also include one and only one "ATTACH" property, which MUST point to a sound resource, which is rendered when the alarm is triggered.

When the action is "DISPLAY", the alarm MUST also include a "DESCRIPTION" property, which contains the text to be displayed when the alarm is triggered.

When the action is "EMAIL", the alarm MUST include a "DESCRIPTION" property, which contains the text to be used as the message body, a "SUMMARY" property, which contains the text to be used as the message subject, and one or more "ATTENDEE" properties, which contain the email address of attendees to receive the message. It can also include one or more "ATTACH" properties, which are intended to be sent as message attachments. When the alarm is triggered, the email message is sent.

When the action is "PROCEDURE", the alarm MUST include one and only one "ATTACH" property, which MUST point to a procedure resource, which is invoked when the alarm is triggered.

The "VALARM" calendar component MUST only appear within either a "VEVENT" or "VTODO" calendar component. "VALARM" calendar components cannot be nested. Multiple mutually independent "VALARM" calendar components can be specified for a single "VEVENT" or "VTODO" calendar component.

The "TRIGGER" property specifies when the alarm will be triggered. The "TRIGGER" property specifies a duration prior to the start of an event or a to-do. The "TRIGGER" edge may be explicitly set to be relative to the "START" or "END" of the event or to-do with the "RELATED" parameter of the "TRIGGER" property. The "TRIGGER" property value type can alternatively be set to an absolute calendar date and time of day value.

In an alarm set to trigger on the "START" of an event or to-do, the "DTSTART" property MUST be present in the associated event or to-do. In an alarm in a "VEVENT" calendar component set to trigger on the "END" of the event, either the "DTEND" property MUST be present, or the "DTSTART" and "DURATION" properties MUST both be present. In an alarm in a "VTODO" calendar component set to trigger on the "END" of the to-do, either the "DUE" property MUST be present, or the "DTSTART" and "DURATION" properties MUST both be present.

The alarm can be defined such that it triggers repeatedly. A definition of an alarm with a repeating trigger MUST include both the "DURATION" and "REPEAT" properties. The "DURATION" property specifies the delay period, after which the alarm will repeat. The "REPEAT" property specifies the number of additional repetitions that the alarm will trigger. This repetition count is in addition to the initial triggering of the alarm. Both of these properties MUST be present in order to specify a repeating alarm. If one of these two properties is absent, then the alarm will not repeat beyond the initial trigger.

The "ACTION" property is used within the "VALARM" calendar component to specify the type of action invoked when the alarm is triggered. The "VALARM" properties provide enough information for a specific action to be invoked. It is typically the responsibility of a "Calendar User Agent" (CUA) to deliver the alarm in the specified fashion. An "ACTION" property value of AUDIO specifies an alarm that causes a sound to be played to alert the user; DISPLAY specifies an alarm that causes a text message to be displayed to the user; EMAIL specifies an alarm that causes an electronic email message to be delivered to one or more email addresses; and PROCEDURE specifies an alarm that causes a procedure to be executed. The "ACTION" property MUST specify one and only one of these values.

In an AUDIO alarm, if the optional "ATTACH" property is included, it MUST specify an audio sound resource. The intention is that the sound will be played as the alarm effect. If an "ATTACH" property is specified that does not refer to a sound resource, or if the specified sound resource cannot be rendered (because its format is unsupported, or because it cannot be retrieved), then the CUA or other entity responsible for playing the sound may choose a fallback

action, such as playing a built-in default sound, or playing no sound at all.

In a DISPLAY alarm, the intended alarm effect is for the text value of the "DESCRIPTION" property to be displayed to the user.

In an EMAIL alarm, the intended alarm effect is for an email message to be composed and delivered to all the addresses specified by the "ATTENDEE" properties in the "VALARM" calendar component. The "DESCRIPTION" property of the "VALARM" calendar component MUST be used as the body text of the message, and the "SUMMARY" property MUST be used as the subject text. Any "ATTACH" properties in the "VALARM" calendar component SHOULD be sent as attachments to the message.

In a PROCEDURE alarm, the "ATTACH" property in the "VALARM" calendar component MUST specify a procedure or program that is intended to be invoked as the alarm effect. If the procedure or program is in a format that cannot be rendered, then no procedure alarm will be invoked. If the "DESCRIPTION" property is present, its value specifies the argument string to be passed to the procedure or program. "Calendar User Agents" that receive an iCalendar object with this category of alarm, can disable or allow the "Calendar User" to disable, or otherwise ignore this type of alarm. While a very useful alarm capability, the PROCEDURE type of alarm SHOULD be treated by the "Calendar User Agent" as a potential security risk.

Example: The following example is for a "VALARM" calendar component that specifies an audio alarm that will sound at a precise time and repeat 4 more times at 15 minute intervals:

```
BEGIN:VALARM
TRIGGER;VALUE=DATE-TIME:19970317T133000Z
REPEAT:4
DURATION:PT15M
ACTION:AUDIO
ATTACH;FMTTYPE=audio/basic:ftp://host.com/pub/sounds/bell-01.aud
END:VALARM
```

The following example is for a "VALARM" calendar component that specifies a display alarm that will trigger 30 minutes before the scheduled start of the event or the due date/time of the to-do it is associated with and will repeat 2 more times at 15 minute intervals:

```
BEGIN:VALARM
TRIGGER:-PT30M
REPEAT:2
DURATION:PT15M
ACTION:DISPLAY
```



```
DESCRIPTION:Breakfast meeting with executive\n
team at 8:30 AM EST.
END:VALARM
```

The following example is for a "VALARM" calendar component that specifies an email alarm that will trigger 2 days before the scheduled due date/time of a to-do it is associated with. It does not repeat. The email has a subject, body and attachment link.

```
BEGIN:VALARM
TRIGGER:-P2D
ACTION:EMAIL
ATTENDEE:MAILTO:john_doe@host.com
SUMMARY:*** REMINDER: SEND AGENDA FOR WEEKLY STAFF MEETING ***
DESCRIPTION:A draft agenda needs to be sent out to the attendees
to the weekly managers meeting (MGR-LIST). Attached is a
pointer the document template for the agenda file.
ATTACH;FMTTYPE=application/binary:http://host.com/templates/agen
da.doc
END:VALARM
```

The following example is for a "VALARM" calendar component that specifies a procedural alarm that will trigger at a precise date/time and will repeat 23 more times at one hour intervals. The alarm will invoke a procedure file.

```
BEGIN:VALARM
TRIGGER;VALUE=DATE-TIME:19980101T050000Z
REPEAT:23
DURATION:PT1H
ACTION:PROCEDURE
ATTACH;FMTTYPE=application/binary:ftp://host.com/novo-
procs/felizano.exe
END:VALARM
```

4.7 Calendar Properties

The Calendar Properties are attributes that apply to the iCalendar object, as a whole. These properties do not appear within a calendar component. They SHOULD be specified after the "BEGIN:VCALENDAR" property and prior to any calendar component.

4.7.1 Calendar Scale

Property Name: CALSCALE

Purpose: This property defines the calendar scale used for the calendar information specified in the iCalendar object.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: Property can be specified in an iCalendar object. The default value is "GREGORIAN".

Description: This memo is based on the Gregorian calendar scale. The Gregorian calendar scale is assumed if this property is not specified in the iCalendar object. It is expected that other calendar scales will be defined in other specifications or by future versions of this memo.

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

calscale = "CALSCALE" calparam ":" calvalue CRLF

calparam = *(";" xparam)

calvalue = "GREGORIAN" / iana-token

Example: The following is an example of this property:

CALSCALE:GREGORIAN

4.7.2 Method

Property Name: METHOD

Purpose: This property defines the iCalendar object method associated with the calendar object.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified in an iCalendar object.

Description: When used in a MIME message entity, the value of this property MUST be the same as the Content-Type "method" parameter value. This property can only appear once within the iCalendar object. If either the "METHOD" property or the Content-Type "method" parameter is specified, then the other MUST also be specified.

No methods are defined by this specification. This is the subject of other specifications, such as the iCalendar Transport-independent

Interoperability Protocol (iTIP) defined by [ITIP].

If this property is not present in the iCalendar object, then a scheduling transaction MUST NOT be assumed. In such cases, the iCalendar object is merely being used to transport a snapshot of some calendar information; without the intention of conveying a scheduling semantic.

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

method = "METHOD" metparam ":" metvalue CRLF

metparam = *(";" xparam)

metvalue = iana-token

Example: The following is a hypothetical example of this property to convey that the iCalendar object is a request for a meeting:

METHOD:REQUEST

4.7.3 Product Identifier

Property Name: PRODID

Purpose: This property specifies the identifier for the product that created the iCalendar object.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property MUST be specified once in an iCalendar object.

Description: The vendor of the implementation SHOULD assure that this is a globally unique identifier; using some technique such as an FPI value, as defined in [ISO 9070].

This property SHOULD not be used to alter the interpretation of an iCalendar object beyond the semantics specified in this memo. For example, it is not to be used to further the understanding of non-standard properties.

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

prodid = "PRODID" pidparam ":" pidvalue CRLF

```
pidparam    = *(";" xparam)
```

```
pidvalue    = text
```

```
;Any text that describes the product and version  
;and that is generally assured of being unique.
```

Example: The following is an example of this property. It does not imply that English is the default language.

```
PRODID:-//ABC Corporation//NONSGML My Product//EN
```

4.7.4 Version

Property Name: VERSION

Purpose: This property specifies the identifier corresponding to the highest version number or the minimum and maximum range of the iCalendar specification that is required in order to interpret the iCalendar object.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be specified by an iCalendar object, but MUST only be specified once.

Description: A value of "2.0" corresponds to this memo.

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

```
version      = "VERSION" verparam ":" vervalue CRLF
```

```
verparam     = *(";" xparam)
```

```
vervalue     = "2.0"           ;This memo  
              / maxver  
              / (minver ";" maxver)
```

```
minver       = <A IANA registered iCalendar version identifier>  
              ;Minimum iCalendar version needed to parse the iCalendar object
```

```
maxver       = <A IANA registered iCalendar version identifier>  
              ;Maximum iCalendar version needed to parse the iCalendar object
```

Example: The following is an example of this property:

VERSION:2.0

4.8 Component Properties

The following properties can appear within calendar components, as specified by each component property definition.

4.8.1 Descriptive Component Properties

The following properties specify descriptive information about calendar components.

4.8.1.1 Attachment

Property Name: ATTACH

Purpose: The property provides the capability to associate a document object with a calendar component.

Value Type: The default value type for this property is URI. The value type can also be set to BINARY to indicate inline binary encoded content information.

Property Parameters: Non-standard, inline encoding, format type and value data type property parameters can be specified on this property.

Conformance: The property can be specified in a "VEVENT", "VTODO", "VJOURNAL" or "VALARM" calendar components.

Description: The property can be specified within "VEVENT", "VTODO", "VJOURNAL", or "VALARM" calendar components. This property can be specified multiple times within an iCalendar object.

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

```
attach      = "ATTACH" attparam ":" uri CRLF

attach      =/ "ATTACH" attparam ";" "ENCODING" "=" "BASE64"
              ";" "VALUE" "=" "BINARY" ":" binary

attparam    = *(
              ; the following is optional,
              ; but MUST NOT occur more than once

              (";" fmttypeparam) /
```

```

; the following is optional,
; and MAY occur more than once

("; " xparam)

)

```

Example: The following are examples of this property:

```
ATTACH:CID:jsmith.part3.960817T083000.xyzMail@host1.com
```

```
ATTACH;FMTTYPE=application/postscript:ftp://xyzCorp.com/pub/
reports/r-960812.ps
```

4.8.1.2 Categories

Property Name: CATEGORIES

Purpose: This property defines the categories for a calendar component.

Value Type: TEXT

Property Parameters: Non-standard and language property parameters can be specified on this property.

Conformance: The property can be specified within "VEVENT", "VTOD" or "VJOURNAL" calendar components.

Description: This property is used to specify categories or subtypes of the calendar component. The categories are useful in searching for a calendar component of a particular type and category. Within the "VEVENT", "VTOD" or "VJOURNAL" calendar components, more than one category can be specified as a list of categories separated by the COMMA character (US-ASCII decimal 44).

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

```
categories = "CATEGORIES" catparam ":" text *("," text)
CRLF
```

```
catparam   = *(
; the following is optional,
; but MUST NOT occur more than once

("; " languageparam ) /

```

```
    ; the following is optional,  
    ; and MAY occur more than once  
  
    (";" xparam)  
  
    )
```

Example: The following are examples of this property:

```
CATEGORIES:APPOINTMENT,EDUCATION
```

```
CATEGORIES:MEETING
```

4.8.1.3 Classification

Property Name: CLASS

Purpose: This property defines the access classification for a calendar component.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified once in a "VEVENT", "VTODO" or "VJOURNAL" calendar components.

Description: An access classification is only one component of the general security system within a calendar application. It provides a method of capturing the scope of the access the calendar owner intends for information within an individual calendar entry. The access classification of an individual iCalendar component is useful when measured along with the other security components of a calendar system (e.g., calendar user authentication, authorization, access rights, access role, etc.). Hence, the semantics of the individual access classifications cannot be completely defined by this memo alone. Additionally, due to the "blind" nature of most exchange processes using this memo, these access classifications cannot serve as an enforcement statement for a system receiving an iCalendar object. Rather, they provide a method for capturing the intention of the calendar owner for the access to the calendar component.

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

```
class      = "CLASS" classparam ":" classvalue CRLF  
  
classparam = *(";" xparam)
```

```

classvalue = "PUBLIC" / "PRIVATE" / "CONFIDENTIAL" / iana-token
            / x-name
;Default is PUBLIC

```

Example: The following is an example of this property:

```
CLASS:PUBLIC
```

4.8.1.4 Comment

Property Name: COMMENT

Purpose: This property specifies non-processing information intended to provide a comment to the calendar user.

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT", "VTODO", "VJOURNAL", "VTIMEZONE" or "VFREEBUSY" calendar components.

Description: The property can be specified multiple times.

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

```

comment      = "COMMENT" commparam ":" text CRLF
commparam    = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                (";" altrepparam) / (";" languageparam) /

                ; the following is optional,
                ; and MAY occur more than once

                (";" xparam)
              )

```

Example: The following is an example of this property:

```

COMMENT:The meeting really needs to include both ourselves
        and the customer. We can't hold this meeting without them.
        As a matter of fact\, the venue for the meeting ought to be at

```


their site. - - John

The data type for this property is TEXT.

4.8.1.5 Description

Property Name: DESCRIPTION

Purpose: This property provides a more complete description of the calendar component, than that provided by the "SUMMARY" property.

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: The property can be specified in the "VEVENT", "VTODO", "VJOURNAL" or "VALARM" calendar components. The property can be specified multiple times only within a "VJOURNAL" calendar component.

Description: This property is used in the "VEVENT" and "VTODO" to capture lengthy textual descriptions associated with the activity.

This property is used in the "VJOURNAL" calendar component to capture one more textual journal entries.

This property is used in the "VALARM" calendar component to capture the display text for a DISPLAY category of alarm, to capture the body text for an EMAIL category of alarm and to capture the argument string for a PROCEDURE category of alarm.

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

```
description          = "DESCRIPTION" descparam ":" text CRLF
descparam  = *(
    ; the following are optional,
    ; but MUST NOT occur more than once

    (";" altrepparam) / (";" languageparam) /

    ; the following is optional,
    ; and MAY occur more than once

    (";" xparam)

    )
```

Example: The following is an example of the property with formatted line breaks in the property value:

DESCRIPTION:Meeting to provide technical review for "Phoenix" design.\n Happy Face Conference Room. Phoenix design team MUST attend this meeting.\n RSVP to team leader.

The following is an example of the property with folding of long lines:

DESCRIPTION:Last draft of the new novel is to be completed for the editor's proof today.

4.8.1.6 Geographic Position

Property Name: GEO

Purpose: This property specifies information related to the global position for the activity specified by a calendar component.

Value Type: FLOAT. The value MUST be two SEMICOLON separated FLOAT values.

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT" or "VTODO" calendar components.

Description: The property value specifies latitude and longitude, in that order (i.e., "LAT LON" ordering). The longitude represents the location east or west of the prime meridian as a positive or negative real number, respectively. The longitude and latitude values MAY be specified up to six decimal places, which will allow for accuracy to within one meter of geographical position. Receiving applications MUST accept values of this precision and MAY truncate values of greater precision.

Values for latitude and longitude shall be expressed as decimal fractions of degrees. Whole degrees of latitude shall be represented by a two-digit decimal number ranging from 0 through 90. Whole degrees of longitude shall be represented by a decimal number ranging from 0 through 180. When a decimal fraction of a degree is specified, it shall be separated from the whole number of degrees by a decimal point.

Latitudes north of the equator shall be specified by a plus sign (+), or by the absence of a minus sign (-), preceding the digits designating degrees. Latitudes south of the Equator shall be designated by a minus sign (-) preceding the digits designating degrees. A point on the Equator shall be assigned to the Northern Hemisphere.

Longitudes east of the prime meridian shall be specified by a plus sign (+), or by the absence of a minus sign (-), preceding the digits designating degrees. Longitudes west of the meridian shall be designated by minus sign (-) preceding the digits designating degrees. A point on the prime meridian shall be assigned to the Eastern Hemisphere. A point on the 180th meridian shall be assigned to the Western Hemisphere. One exception to this last convention is permitted. For the special condition of describing a band of latitude around the earth, the East Bounding Coordinate data element shall be assigned the value +180 (180) degrees.

Any spatial address with a latitude of +90 (90) or -90 degrees will specify the position at the North or South Pole, respectively. The component for longitude may have any legal value.

With the exception of the special condition described above, this form is specified in Department of Commerce, 1986, Representation of geographic point locations for information interchange (Federal Information Processing Standard 70-1): Washington, Department of Commerce, National Institute of Standards and Technology.

The simple formula for converting degrees-minutes-seconds into decimal degrees is:

$$\text{decimal} = \text{degrees} + \text{minutes}/60 + \text{seconds}/3600.$$

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

geo = "GEO" geoparam ":" geovalue CRLF

geoparam = *(";" xparam)

geovalue = float ";" float
;Latitude and Longitude components

Example: The following is an example of this property:

GEO:37.386013;-122.082932

4.8.1.7 Location

Property Name: LOCATION

Purpose: The property defines the intended venue for the activity defined by a calendar component.

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT" or "VTODO" calendar component.

Description: Specific venues such as conference or meeting rooms may be explicitly specified using this property. An alternate representation may be specified that is a URI that points to directory information with more structured specification of the location. For example, the alternate representation may specify either an LDAP URI pointing to an LDAP server entry or a CID URI pointing to a MIME body part containing a vCard [RFC 2426] for the location.

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

```
location    = "LOCATION locparam ":" text CRLF
locparam    = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                (";" altrepparam) / (";" languageparam) /

                ; the following is optional,
                ; and MAY occur more than once

                (";" xparam)
            )
```

Example: The following are some examples of this property:

```
LOCATION:Conference Room - F123, Bldg. 002
```

```
LOCATION;ALTREP="http://xyzcorp.com/conf-rooms/f123.vcf":
Conference Room - F123, Bldg. 002
```

4.8.1.8 Percent Complete

Property Name: PERCENT-COMPLETE

Purpose: This property is used by an assignee or delegatee of a to-do to convey the percent completion of a to-do to the Organizer.

Value Type: INTEGER

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in a "VTODO" calendar component.

Description: The property value is a positive integer between zero and one hundred. A value of "0" indicates the to-do has not yet been started. A value of "100" indicates that the to-do has been completed. Integer values in between indicate the percent partially complete.

When a to-do is assigned to multiple individuals, the property value indicates the percent complete for that portion of the to-do assigned to the assignee or delegatee. For example, if a to-do is assigned to both individuals "A" and "B". A reply from "A" with a percent complete of "70" indicates that "A" has completed 70% of the to-do assigned to them. A reply from "B" with a percent complete of "50" indicates "B" has completed 50% of the to-do assigned to them.

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

```
percent = "PERCENT-COMPLETE" pctparam ":" integer CRLF
```

```
pctparam = *(";" xparam)
```

Example: The following is an example of this property to show 39% completion:

```
PERCENT-COMPLETE:39
```

4.8.1.9 Priority

Property Name: PRIORITY

Purpose: The property defines the relative priority for a calendar component.

Value Type: INTEGER

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified in a "VEVENT" or "VTODO" calendar component.

Description: The priority is specified as an integer in the range zero to nine. A value of zero (US-ASCII decimal 48) specifies an undefined priority. A value of one (US-ASCII decimal 49) is the highest priority. A value of two (US-ASCII decimal 50) is the second highest priority. Subsequent numbers specify a decreasing ordinal priority. A value of nine (US-ASCII decimal 58) is the lowest priority.

A CUA with a three-level priority scheme of "HIGH", "MEDIUM" and "LOW" is mapped into this property such that a property value in the range of one (US-ASCII decimal 49) to four (US-ASCII decimal 52) specifies "HIGH" priority. A value of five (US-ASCII decimal 53) is the normal or "MEDIUM" priority. A value in the range of six (US-ASCII decimal 54) to nine (US-ASCII decimal 58) is "LOW" priority.

A CUA with a priority schema of "A1", "A2", "A3", "B1", "B2", ..., "C3" is mapped into this property such that a property value of one (US-ASCII decimal 49) specifies "A1", a property value of two (US-ASCII decimal 50) specifies "A2", a property value of three (US-ASCII decimal 51) specifies "A3", and so forth up to a property value of 9 (US-ASCII decimal 58) specifies "C3".

Other integer values are reserved for future use.

Within a "VEVENT" calendar component, this property specifies a priority for the event. This property may be useful when more than one event is scheduled for a given time period.

Within a "VTODO" calendar component, this property specifies a priority for the to-do. This property is useful in prioritizing multiple action items for a given time period.

Format Definition: The property is specified by the following notation:

```
priority    = "PRIORITY" prioparam ":" privalue CRLF
              ;Default is zero

prioparam   = *(";" xparam)

privalue    = integer          ;Must be in the range [0..9]
              ; All other values are reserved for future use
```

The following is an example of a property with the highest priority:

PRIORITY:1

The following is an example of a property with a next highest priority:

PRIORITY:2

Example: The following is an example of a property with no priority. This is equivalent to not specifying the "PRIORITY" property:

PRIORITY:0

4.8.1.10 Resources

Property Name: RESOURCES

Purpose: This property defines the equipment or resources anticipated for an activity specified by a calendar entity..

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT" or "VTODO" calendar component.

Description: The property value is an arbitrary text. More than one resource can be specified as a list of resources separated by the COMMA character (US-ASCII decimal 44).

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

```
resources = "RESOURCES" resrcparam ":" text *("," text) CRLF
```

```
resrcparam = *(
```

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

```
(";" altrepparam) / (";" languageparam) /
```

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

```
( ";" xparam)
)
```

Example: The following is an example of this property:

```
RESOURCES:EASEL,PROJECTOR,VCR
```

```
RESOURCES;LANGUAGE=fr:1 raton-laveur
```

4.8.1.11 Status

Property Name: STATUS

Purpose: This property defines the overall status or confirmation for the calendar component.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT", "VTODO" or "VJOURNAL" calendar components.

Description: In a group scheduled calendar component, the property is used by the "Organizer" to provide a confirmation of the event to the "Attendees". For example in a "VEVENT" calendar component, the "Organizer" can indicate that a meeting is tentative, confirmed or cancelled. In a "VTODO" calendar component, the "Organizer" can indicate that an action item needs action, is completed, is in process or being worked on, or has been cancelled. In a "VJOURNAL" calendar component, the "Organizer" can indicate that a journal entry is draft, final or has been cancelled or removed.

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

```
status      = "STATUS" statparam] ":" statvalue CRLF
statparam   = *(";" xparam)

statvalue   = "TENTATIVE"           ;Indicates event is
                                   ;tentative.
              / "CONFIRMED"         ;Indicates event is
                                   ;definite.
              / "CANCELLED"         ;Indicates event was
                                   ;cancelled.

              ;Status values for a "VEVENT"
```



```

statvalue =/ "NEEDS-ACTION"      ;Indicates to-do needs action.
          / "COMPLETED"         ;Indicates to-do completed.
          / "IN-PROCESS"         ;Indicates to-do in process of
          / "CANCELLED"          ;Indicates to-do was cancelled.
;Status values for "VTODO".

statvalue =/ "DRAFT"             ;Indicates journal is draft.
          / "FINAL"              ;Indicates journal is final.
          / "CANCELLED"          ;Indicates journal is removed.
;Status values for "VJOURNAL".

```

Example: The following is an example of this property for a "VEVENT" calendar component:

```
STATUS:TENTATIVE
```

The following is an example of this property for a "VTODO" calendar component:

```
STATUS:NEEDS-ACTION
```

The following is an example of this property for a "VJOURNAL" calendar component:

```
STATUS:DRAFT
```

4.8.1.12 Summary

Property Name: SUMMARY

Purpose: This property defines a short summary or subject for the calendar component.

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: The property can be specified in "VEVENT", "VTODO", "VJOURNAL" or "VALARM" calendar components.

Description: This property is used in the "VEVENT", "VTODO" and "VJOURNAL" calendar components to capture a short, one line summary about the activity or journal entry.

This property is used in the "VALARM" calendar component to capture the subject of an EMAIL category of alarm.

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

```
summary      = "SUMMARY" summparam ":" text CRLF
summparam    = *(
                ; the following are optional,
                ; but MUST NOT occur more than once
                (";" altrepparam) / (";" languageparam) /
                ; the following is optional,
                ; and MAY occur more than once
                (";" xparam)
                )
```

Example: The following is an example of this property:

```
SUMMARY:Department Party
```

4.8.2 Date and Time Component Properties

The following properties specify date and time related information in calendar components.

4.8.2.1 Date/Time Completed

Property Name: COMPLETED

Purpose: This property defines the date and time that a to-do was actually completed.

Value Type: DATE-TIME

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified in a "VTODO" calendar component.

Description: The date and time MUST be in a UTC format.

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

```
completed    = "COMPLETED" compparam ":" date-time CRLF
```

```
compparam = *("; " xparam)
```

Example: The following is an example of this property:

```
COMPLETED:19960401T235959Z
```

4.8.2.2 Date/Time End

Property Name: DTEND

Purpose: This property specifies the date and time that a calendar component ends.

Value Type: The default value type is DATE-TIME. The value type can be set to a DATE value type.

Property Parameters: Non-standard, value data type, time zone identifier property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT" or "VFREEBUSY" calendar components.

Description: Within the "VEVENT" calendar component, this property defines the date and time by which the event ends. The value MUST be later in time than the value of the "DTSTART" property.

Within the "VFREEBUSY" calendar component, this property defines the end date and time for the free or busy time information. The time MUST be specified in the UTC time format. The value MUST be later in time than the value of the "DTSTART" property.

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

```
dtend      = "DTEND" dtendparam ":" dtendval CRLF
dtendparam = *(
    ; the following are optional,
    ; but MUST NOT occur more than once

    (";" "VALUE" "=" ("DATE-TIME" / "DATE")) /
    (";" tzidparam) /

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

```
( ";" xparam)
)
```

```
dtendval    = date-time / date
;Value MUST match value type
```

Example: The following is an example of this property:

```
DTEND:19960401T235959Z
```

```
DTEND;VALUE=DATE:19980704
```

4.8.2.3 Date/Time Due

Property Name: DUE

Purpose: This property defines the date and time that a to-do is expected to be completed.

Value Type: The default value type is DATE-TIME. The value type can be set to a DATE value type.

Property Parameters: Non-standard, value data type, time zone identifier property parameters can be specified on this property.

Conformance: The property can be specified once in a "VTODO" calendar component.

Description: The value MUST be a date/time equal to or after the DTSTART value, if specified.

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

```
due          = "DUE" dueparam ":" dueval CRLF
dueparam     = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                ( ";" "VALUE" "=" ( "DATE-TIME" / "DATE" ) ) /
                ( ";" tzidparam ) /

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

```

        *(";" xparam)
    )

```

dueval = date-time / date
;Value MUST match value type

Example: The following is an example of this property:

DUE:19980430T235959Z

4.8.2.4 Date/Time Start

Property Name: DTSTART

Purpose: This property specifies when the calendar component begins.

Value Type: The default value type is DATE-TIME. The time value MUST be one of the forms defined for the DATE-TIME value type. The value type can be set to a DATE value type.

Property Parameters: Non-standard, value data type, time zone identifier property parameters can be specified on this property.

Conformance: This property can be specified in the "VEVENT", "VTODO", "VFREEBUSY", or "VTIMEZONE" calendar components.

Description: Within the "VEVENT" calendar component, this property defines the start date and time for the event. The property is REQUIRED in "VEVENT" calendar components. Events can have a start date/time but no end date/time. In that case, the event does not take up any time.

Within the "VFREEBUSY" calendar component, this property defines the start date and time for the free or busy time information. The time MUST be specified in UTC time.

Within the "VTIMEZONE" calendar component, this property defines the effective start date and time for a time zone specification. This property is REQUIRED within each STANDARD and DAYLIGHT part included in "VTIMEZONE" calendar components and MUST be specified as a local DATE-TIME without the "TZID" property parameter.

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

dtstart = "DTSTART" dtstparam ":" dtstval CRLF

```
dtstparam = *(  
    ; the following are optional,  
    ; but MUST NOT occur more than once  
  
    (";" "VALUE" "=" ("DATE-TIME" / "DATE")) /  
    (";" tzidparam) /  
  
    ; the following is optional,  
    ; and MAY occur more than once  
  
    *(";" xparam)  
)
```

```
dtstval    = date-time / date  
;Value MUST match value type
```

Example: The following is an example of this property:

```
DTSTART:19980118T073000Z
```

4.8.2.5 Duration

Property Name: DURATION

Purpose: The property specifies a positive duration of time.

Value Type: DURATION

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified in "VEVENT", "VTODO", "VFREEBUSY" or "VALARM" calendar components.

Description: In a "VEVENT" calendar component the property may be used to specify a duration of the event, instead of an explicit end date/time. In a "VTODO" calendar component the property may be used to specify a duration for the to-do, instead of an explicit due date/time. In a "VFREEBUSY" calendar component the property may be used to specify the interval of free time being requested. In a "VALARM" calendar component the property may be used to specify the delay period prior to repeating an alarm.

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

duration = "DURATION" durparam ":" dur-value CRLF
;consisting of a positive duration of time.

durparam = *(";" xparam)

Example: The following is an example of this property that specifies an interval of time of 1 hour and zero minutes and zero seconds:

DURATION:PT1H0M0S

The following is an example of this property that specifies an interval of time of 15 minutes.

DURATION:PT15M

4.8.2.6 Free/Busy Time

Property Name: FREEBUSY

Purpose: The property defines one or more free or busy time intervals.

Value Type: PERIOD. The date and time values MUST be in an UTC time format.

Property Parameters: Non-standard or free/busy time type property parameters can be specified on this property.

Conformance: The property can be specified in a "VFREEBUSY" calendar component.

Property Parameter: "FBTYPE" and non-standard parameters can be specified on this property.

Description: These time periods can be specified as either a start and end date-time or a start date-time and duration. The date and time MUST be a UTC time format.

"FREEBUSY" properties within the "VFREEBUSY" calendar component SHOULD be sorted in ascending order, based on start time and then end time, with the earliest periods first.

The "FREEBUSY" property can specify more than one value, separated by the COMMA character (US-ASCII decimal 44). In such cases, the "FREEBUSY" property values SHOULD all be of the same "FBTYPE" property parameter type (e.g., all values of a particular "FBTYPE" listed together in a single property).

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

```

freebusy    = "FREEBUSY" fbparam ":" fbvalue
              CRLF

fbparam      = *(
              ; the following is optional,
              ; but MUST NOT occur more than once

              (";" fbtypeparam) /

              ; the following is optional,
              ; and MAY occur more than once

              (";" xparam)

              )

fbvalue      = period *["," period]
              ;Time value MUST be in the UTC time format.

```

Example: The following are some examples of this property:

```

FREEBUSY;FBTYPE=BUSY-UNAVAILABLE:19970308T160000Z/PT8H30M

FREEBUSY;FBTYPE=FREE:19970308T160000Z/PT3H,19970308T200000Z/PT1H

FREEBUSY;FBTYPE=FREE:19970308T160000Z/PT3H,19970308T200000Z/PT1H,
19970308T230000Z/19970309T000000Z

```

4.8.2.7 Time Transparency

Property Name: TRANSP

Purpose: This property defines whether an event is transparent or not to busy time searches.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified once in a "VEVENT" calendar component.

Description: Time Transparency is the characteristic of an event that determines whether it appears to consume time on a calendar. Events that consume actual time for the individual or resource associated

with the calendar SHOULD be recorded as OPAQUE, allowing them to be detected by free-busy time searches. Other events, which do not take up the individual's (or resource's) time SHOULD be recorded as TRANSPARENT, making them invisible to free-busy time searches.

Format Definition: The property is specified by the following notation:

```
transp      = "TRANSP" tranparam ":" transvalue CRLF
tranparam   = *(";" xparam)

transvalue  = "OPAQUE"           ;Blocks or opaque on busy time searches.
              / "TRANSPARENT"   ;Transparent on busy time searches.
              ;Default value is OPAQUE
```

Example: The following is an example of this property for an event that is transparent or does not block on free/busy time searches:

```
TRANSP:TRANSPARENT
```

The following is an example of this property for an event that is opaque or blocks on free/busy time searches:

```
TRANSP:OPAQUE
```

4.8.3 Time Zone Component Properties

The following properties specify time zone information in calendar components.

4.8.3.1 Time Zone Identifier

Property Name: TZID

Purpose: This property specifies the text value that uniquely identifies the "VTIMEZONE" calendar component.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be specified in a "VTIMEZONE" calendar component.

Description: This is the label by which a time zone calendar component is referenced by any iCalendar properties whose data type is either DATE-TIME or TIME and not intended to specify a UTC or a "floating" time. The presence of the SOLIDUS character (US-ASCII decimal 47) as a prefix, indicates that this TZID represents an unique ID in a globally defined time zone registry (when such registry is defined).

Note: This document does not define a naming convention for time zone identifiers. Implementers may want to use the naming conventions defined in existing time zone specifications such as the public-domain Olson database [TZ]. The specification of globally unique time zone identifiers is not addressed by this document and is left for future study.

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

```
tzid          = "TZID" tzidpropparam ":" [tzidprefix] text CRLF
tzidpropparam  = *(";" xparam)
;tzidprefix    = "/"
; Defined previously. Just listed here for reader convenience.
```

Example: The following are examples of non-globally unique time zone identifiers:

TZID:US-Eastern

TZID:California-Los_Angeles

The following is an example of a fictitious globally unique time zone identifier:

TZID:/US-New_York-New_York

4.8.3.2 Time Zone Name

Property Name: TZNAME

Purpose: This property specifies the customary designation for a time zone description.

Value Type: TEXT

Property Parameters: Non-standard and language property parameters can be specified on this property.

Conformance: This property can be specified in a "VTIMEZONE" calendar component.

Description: This property may be specified in multiple languages; in order to provide for different language requirements.

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

```
tzname      = "TZNAME" tznparam ":" text CRLF
tznparam    = *(
                ; the following is optional,
                ; but MUST NOT occur more than once

                (";" languageparam) /

                ; the following is optional,
                ; and MAY occur more than once

                (";" xparam)
            )
```

Example: The following are example of this property:

```
TZNAME:EST
```

The following is an example of this property when two different languages for the time zone name are specified:

```
TZNAME;LANGUAGE=en:EST
TZNAME;LANGUAGE=fr-CA:HNE
```

4.8.3.3 Time Zone Offset From

Property Name: TZOFFSETFROM

Purpose: This property specifies the offset which is in use prior to this time zone observance.

Value Type: UTC-OFFSET

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be specified in a "VTIMEZONE" calendar component.

Description: This property specifies the offset which is in use prior to this time observance. It is used to calculate the absolute time at which the transition to a given observance takes place. This property MUST only be specified in a "VTIMEZONE" calendar component. A "VTIMEZONE" calendar component MUST include this property. The property value is a signed numeric indicating the number of hours and possibly minutes from UTC. Positive numbers represent time zones east of the prime meridian, or ahead of UTC. Negative numbers represent time zones west of the prime meridian, or behind UTC.

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

```
tzoffsetfrom      = "TZOFFSETFROM" frmparam ":" utc-offset
                  CRLF
```

```
frmparam          = *(";" xparam)
```

Example: The following are examples of this property:

```
TZOFFSETFROM:-0500
```

```
TZOFFSETFROM:+1345
```

4.8.3.4 Time Zone Offset To

Property Name: TZOFFSETTO

Purpose: This property specifies the offset which is in use in this time zone observance.

Value Type: UTC-OFFSET

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be specified in a "VTIMEZONE" calendar component.

Description: This property specifies the offset which is in use in this time zone observance. It is used to calculate the absolute time for the new observance. The property value is a signed numeric indicating the number of hours and possibly minutes from UTC. Positive numbers represent time zones east of the prime meridian, or ahead of UTC. Negative numbers represent time zones west of the prime meridian, or behind UTC.

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

```
tzoffsetto = "TZOFFSETTO" toparam ":" utc-offset CRLF
```

```
toparam    = *(";" xparam)
```

Example: The following are examples of this property:

```
TZOFFSETTO:-0400
```

```
TZOFFSETTO:+1245
```

4.8.3.5 Time Zone URL

Property Name: TZURL

Purpose: The TZURL provides a means for a VTIMEZONE component to point to a network location that can be used to retrieve an up-to-date version of itself.

Value Type: URI

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in a "VTIMEZONE" calendar component.

Description: The TZURL provides a means for a VTIMEZONE component to point to a network location that can be used to retrieve an up-to-date version of itself. This provides a hook to handle changes government bodies impose upon time zone definitions. Retrieval of this resource results in an iCalendar object containing a single VTIMEZONE component and a METHOD property set to PUBLISH.

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

```
tzurl      = "TZURL" tzurlparam ":" uri CRLF
```

```
tzurlparam = *(";" xparam)
```

Example: The following is an example of this property:

```
TZURL:http://timezones.r.us.net/tz/US-California-Los_Angeles
```

4.8.4 Relationship Component Properties

The following properties specify relationship information in calendar components.

4.8.4.1 Attendee

Property Name: ATTENDEE

Purpose: The property defines an "Attendee" within a calendar component.

Value Type: CAL-ADDRESS

Property Parameters: Non-standard, language, calendar user type, group or list membership, participation role, participation status, RSVP expectation, delegatee, delegator, sent by, common name or directory entry reference property parameters can be specified on this property.

Conformance: This property MUST be specified in an iCalendar object that specifies a group scheduled calendar entity. This property MUST NOT be specified in an iCalendar object when publishing the calendar information (e.g., NOT in an iCalendar object that specifies the publication of a calendar user's busy time, event, to-do or journal). This property is not specified in an iCalendar object that specifies only a time zone definition or that defines calendar entities that are not group scheduled entities, but are entities only on a single user's calendar.

Description: The property MUST only be specified within calendar components to specify participants, non-participants and the chair of a group scheduled calendar entity. The property is specified within an "EMAIL" category of the "VALARM" calendar component to specify an email address that is to receive the email type of iCalendar alarm.

The property parameter CN is for the common or displayable name associated with the calendar address; ROLE, for the intended role that the attendee will have in the calendar component; PARTSTAT, for the status of the attendee's participation; RSVP, for indicating whether the favor of a reply is requested; CUTYPE, to indicate the type of calendar user; MEMBER, to indicate the groups that the attendee belongs to; DELEGATED-TO, to indicate the calendar users that the original request was delegated to; and DELEGATED-FROM, to indicate whom the request was delegated from; SENT-BY, to indicate whom is acting on behalf of the ATTENDEE; and DIR, to indicate the URI that points to the directory information corresponding to the attendee. These property parameters can be specified on an "ATTENDEE"

property in either a "VEVENT", "VTODO" or "VJOURNAL" calendar component. They MUST not be specified in an "ATTENDEE" property in a "VFREEBUSY" or "VALARM" calendar component. If the LANGUAGE property parameter is specified, the identified language applies to the CN parameter.

A recipient delegated a request MUST inherit the RSVP and ROLE values from the attendee that delegated the request to them.

Multiple attendees can be specified by including multiple "ATTENDEE" properties within the calendar component.

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

```
attendee    = "ATTENDEE" attparam ":" cal-address CRLF
attparam    = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                (";" cutypeparam) / (";" memberparam) /
                (";" roleparam) / (";" partstatparam) /
                (";" rsvpparam) / (";" delparam) /
                (";" delfromparam) / (";" sentbyparam) /
                (";" cnparam) / (";" dirparam) /
                (";" languageparam) /

                ; the following is optional,
                ; and MAY occur more than once

                (";" xparam)

            )
```

Example: The following are examples of this property's use for a to-do:

```
ORGANIZER:MAILTO:jsmith@host1.com
ATTENDEE;MEMBER="MAILTO:DEV-GROUP@host2.com":
  MAILTO:joecool@host2.com
ATTENDEE;DELEGATED-FROM="MAILTO:immud@host3.com":
  MAILTO:ildoit@host1.com
```

The following is an example of this property used for specifying multiple attendees to an event:

```

ORGANIZER:MAILTO:jsmith@host1.com
ATTENDEE;ROLE=REQ-PARTICIPANT;PARTSTAT=TENTATIVE;CN=Henry Cabot
:MAILTO:hcabot@host2.com
ATTENDEE;ROLE=REQ-PARTICIPANT;DELEGATED-FROM="MAILTO:bob@host.com"
;PARTSTAT=ACCEPTED;CN=Jane Doe:MAILTO:jdoe@host1.com

```

The following is an example of this property with a URI to the directory information associated with the attendee:

```

ATTENDEE;CN=John Smith;DIR="ldap://host.com:6666/o=eDABC%
20Industries,c=3DUS??(cn=3DBJim%20Dolittle)":MAILTO:jimdo@
host1.com

```

The following is an example of this property with "delegatee" and "delegator" information for an event:

```

ORGANIZER;CN=John Smith:MAILTO:jsmith@host.com
ATTENDEE;ROLE=REQ-PARTICIPANT;PARTSTAT=TENTATIVE;DELEGATED-FROM=
"MAILTO:iamboss@host2.com";CN=Henry Cabot:MAILTO:hcabot@
host2.com
ATTENDEE;ROLE=NON-PARTICIPANT;PARTSTAT=DELEGATED;DELEGATED-TO=
"MAILTO:hcabot@host2.com";CN=The Big Cheese:MAILTO:iamboss
@host2.com
ATTENDEE;ROLE=REQ-PARTICIPANT;PARTSTAT=ACCEPTED;CN=Jane Doe
:MAILTO:jdoe@host1.com

```

Example: The following is an example of this property's use when another calendar user is acting on behalf of the "Attendee":

```

ATTENDEE;SENT-BY=MAILTO:jan_doe@host1.com;CN=John Smith:MAILTO:
jsmith@host1.com

```

4.8.4.2 Contact

Property Name: CONTACT

Purpose: The property is used to represent contact information or alternately a reference to contact information associated with the calendar component.

Value Type: TEXT

Property Parameters: Non-standard, alternate text representation and language property parameters can be specified on this property.

Conformance: The property can be specified in a "VEVENT", "VTODO", "VJOURNAL" or "VFREEBUSY" calendar component.

Description: The property value consists of textual contact information. An alternative representation for the property value can also be specified that refers to a URI pointing to an alternate form, such as a vCard [RFC 2426], for the contact information.

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

```
contact      = "CONTACT" contparam ":" text CRLF

contparam    = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                (";" altrepparam) / (";" languageparam) /

                ; the following is optional,
                ; and MAY occur more than once

                (";" xparam)

                )
```

Example: The following is an example of this property referencing textual contact information:

```
CONTACT:Jim Dolittle\, ABC Industries\, +1-919-555-1234
```

The following is an example of this property with an alternate representation of a LDAP URI to a directory entry containing the contact information:

```
CONTACT;ALTREP="ldap://host.com:6666/o=3DABC%20Industries\,
c=3DUS??(cn=3DBJim%20Dolittle)":Jim Dolittle\, ABC Industries\,
+1-919-555-1234
```

The following is an example of this property with an alternate representation of a MIME body part containing the contact information, such as a vCard [RFC 2426] embedded in a [MIME-DIR] content-type:

```
CONTACT;ALTREP="CID=<part3.msg970930T083000SILVER@host.com>":Jim
Dolittle\, ABC Industries\, +1-919-555-1234
```

The following is an example of this property referencing a network resource, such as a vCard [RFC 2426] object containing the contact information:

```
CONTACT;ALTREP="http://host.com/pdi/jdoe.vcf":Jim
  Dolittle\, ABC Industries\, +1-919-555-1234
```

4.8.4.3 Organizer

Property Name: ORGANIZER

Purpose: The property defines the organizer for a calendar component.

Value Type: CAL-ADDRESS

Property Parameters: Non-standard, language, common name, directory entry reference, sent by property parameters can be specified on this property.

Conformance: This property MUST be specified in an iCalendar object that specifies a group scheduled calendar entity. This property MUST be specified in an iCalendar object that specifies the publication of a calendar user's busy time. This property MUST NOT be specified in an iCalendar object that specifies only a time zone definition or that defines calendar entities that are not group scheduled entities, but are entities only on a single user's calendar.

Description: The property is specified within the "VEVENT", "VTODO", "VJOURNAL" calendar components to specify the organizer of a group scheduled calendar entity. The property is specified within the "VFREEBUSY" calendar component to specify the calendar user requesting the free or busy time. When publishing a "VFREEBUSY" calendar component, the property is used to specify the calendar that the published busy time came from.

The property has the property parameters CN, for specifying the common or display name associated with the "Organizer", DIR, for specifying a pointer to the directory information associated with the "Organizer", SENT-BY, for specifying another calendar user that is acting on behalf of the "Organizer". The non-standard parameters may also be specified on this property. If the LANGUAGE property parameter is specified, the identified language applies to the CN parameter value.

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

```
organizer  = "ORGANIZER" orgparam ":"
            cal-address CRLF

orgparam   = *(
            ; the following are optional,
```

```

; but MUST NOT occur more than once

("; cnparam) / ("; dirparam) / ("; sentbyparam) /
("; languageparam) /

; the following is optional,
; and MAY occur more than once

("; xparam)

)

```

Example: The following is an example of this property:

```
ORGANIZER;CN=John Smith:MAILTO:jsmith@host1.com
```

The following is an example of this property with a pointer to the directory information associated with the organizer:

```
ORGANIZER;CN=JohnSmith;DIR="ldap://host.com:6666/o=3DDC%20Associ
ates,c=3DUS??(cn=3DJohn%20Smith)":MAILTO:jsmith@host1.com
```

The following is an example of this property used by another calendar user who is acting on behalf of the organizer, with responses intended to be sent back to the organizer, not the other calendar user:

```
ORGANIZER;SENT-BY="MAILTO:jane_doe@host.com":
MAILTO:jsmith@host1.com
```

4.8.4.4 Recurrence ID

Property Name: RECURRENCE-ID

Purpose: This property is used in conjunction with the "UID" and "SEQUENCE" property to identify a specific instance of a recurring "VEVENT", "VTODO" or "VJOURNAL" calendar component. The property value is the effective value of the "DTSTART" property of the recurrence instance.

Value Type: The default value type for this property is DATE-TIME. The time format can be any of the valid forms defined for a DATE-TIME value type. See DATE-TIME value type definition for specific interpretations of the various forms. The value type can be set to DATE.

Property Parameters: Non-standard property, value data type, time zone identifier and recurrence identifier range parameters can be specified on this property.

Conformance: This property can be specified in an iCalendar object containing a recurring calendar component.

Description: The full range of calendar components specified by a recurrence set is referenced by referring to just the "UID" property value corresponding to the calendar component. The "RECURRENCE-ID" property allows the reference to an individual instance within the recurrence set.

If the value of the "DTSTART" property is a DATE type value, then the value MUST be the calendar date for the recurrence instance.

The date/time value is set to the time when the original recurrence instance would occur; meaning that if the intent is to change a Friday meeting to Thursday, the date/time is still set to the original Friday meeting.

The "RECURRENCE-ID" property is used in conjunction with the "UID" and "SEQUENCE" property to identify a particular instance of a recurring event, to-do or journal. For a given pair of "UID" and "SEQUENCE" property values, the "RECURRENCE-ID" value for a recurrence instance is fixed. When the definition of the recurrence set for a calendar component changes, and hence the "SEQUENCE" property value changes, the "RECURRENCE-ID" for a given recurrence instance might also change. The "RANGE" parameter is used to specify the effective range of recurrence instances from the instance specified by the "RECURRENCE-ID" property value. The default value for the range parameter is the single recurrence instance only. The value can also be "THISANDPRIOR" to indicate a range defined by the given recurrence instance and all prior instances or the value can be "THISANDFUTURE" to indicate a range defined by the given recurrence instance and all subsequent instances.

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

```
recurid      = "RECURRENCE-ID" ridparam ":" ridval CRLF
ridparam     = *(
    ; the following are optional,
    ; but MUST NOT occur more than once

    (";" "VALUE" "=" ("DATE-TIME" / "DATE")) /
    (";" tzidparam) / (";" rangeparam) /
```

```
    ; the following is optional,  
    ; and MAY occur more than once  
  
    (";" xparam)  
  
    )
```

```
ridval      = date-time / date  
;Value MUST match value type
```

Example: The following are examples of this property:

```
RECURRENCE-ID;VALUE=DATE:19960401
```

```
RECURRENCE-ID;RANGE=THISANDFUTURE:19960120T120000Z
```

4.8.4.5 Related To

Property Name: RELATED-TO

Purpose: The property is used to represent a relationship or reference between one calendar component and another.

Value Type: TEXT

Property Parameters: Non-standard and relationship type property parameters can be specified on this property.

Conformance: The property can be specified one or more times in the "VEVENT", "VTODO" or "VJOURNAL" calendar components.

Description: The property value consists of the persistent, globally unique identifier of another calendar component. This value would be represented in a calendar component by the "UID" property.

By default, the property value points to another calendar component that has a PARENT relationship to the referencing object. The "RELTYPE" property parameter is used to either explicitly state the default PARENT relationship type to the referenced calendar component or to override the default PARENT relationship type and specify either a CHILD or SIBLING relationship. The PARENT relationship indicates that the calendar component is a subordinate of the referenced calendar component. The CHILD relationship indicates that the calendar component is a superior of the referenced calendar component. The SIBLING relationship indicates that the calendar component is a peer of the referenced calendar component.

Changes to a calendar component referenced by this property can have an implicit impact on the related calendar component. For example, if a group event changes its start or end date or time, then the related, dependent events will need to have their start and end dates changed in a corresponding way. Similarly, if a PARENT calendar component is canceled or deleted, then there is an implied impact to the related CHILD calendar components. This property is intended only to provide information on the relationship of calendar components. It is up to the target calendar system to maintain any property implications of this relationship.

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

```
related      = "RELATED-TO" [relparam] ":" text CRLF
relparam     = *(
                ; the following is optional,
                ; but MUST NOT occur more than once
                (";" reltypeparam) /
                ; the following is optional,
                ; and MAY occur more than once
                (";" xparam)
                )
```

The following is an example of this property:

```
RELATED-TO:<jsmith.part7.19960817T083000.xyzMail@host3.com>
RELATED-TO:<19960401-080045-4000F192713-0052@host1.com>
```

4.8.4.6 Uniform Resource Locator

Property Name: URL

Purpose: This property defines a Uniform Resource Locator (URL) associated with the iCalendar object.

Value Type: URI

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified once in the "VEVENT", "VTODO", "VJOURNAL" or "VFREEBUSY" calendar components.

Description: This property may be used in a calendar component to convey a location where a more dynamic rendition of the calendar information associated with the calendar component can be found. This memo does not attempt to standardize the form of the URI, nor the format of the resource pointed to by the property value. If the URL property and Content-Location MIME header are both specified, they MUST point to the same resource.

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

url = "URL" urlparam ":" uri CRLF

urlparam = *(";" xparam)

Example: The following is an example of this property:

URL:http://abc.com/pub/calendars/jsmith/mytime.ics

4.8.4.7 Unique Identifier

Property Name: UID

Purpose: This property defines the persistent, globally unique identifier for the calendar component.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property MUST be specified in the "VEVENT", "VTODO", "VJOURNAL" or "VFREEBUSY" calendar components.

Description: The UID itself MUST be a globally unique identifier. The generator of the identifier MUST guarantee that the identifier is unique. There are several algorithms that can be used to accomplish this. The identifier is RECOMMENDED to be the identical syntax to the [RFC 822] addr-spec. A good method to assure uniqueness is to put the domain name or a domain literal IP address of the host on which the identifier was created on the right hand side of the "@", and on the left hand side, put a combination of the current calendar date and time of day (i.e., formatted in as a DATE-TIME value) along with some other currently unique (perhaps sequential) identifier available on the system (for example, a process id number). Using a date/time value on the left hand side and a domain name or domain literal on

the right hand side makes it possible to guarantee uniqueness since no two hosts should be using the same domain name or IP address at the same time. Though other algorithms will work, it is RECOMMENDED that the right hand side contain some domain identifier (either of the host itself or otherwise) such that the generator of the message identifier can guarantee the uniqueness of the left hand side within the scope of that domain.

This is the method for correlating scheduling messages with the referenced "VEVENT", "VTODO", or "VJOURNAL" calendar component.

The full range of calendar components specified by a recurrence set is referenced by referring to just the "UID" property value corresponding to the calendar component. The "RECURRENCE-ID" property allows the reference to an individual instance within the recurrence set.

This property is an important method for group scheduling applications to match requests with later replies, modifications or deletion requests. Calendaring and scheduling applications MUST generate this property in "VEVENT", "VTODO" and "VJOURNAL" calendar components to assure interoperability with other group scheduling applications. This identifier is created by the calendar system that generates an iCalendar object.

Implementations MUST be able to receive and persist values of at least 255 characters for this property.

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

uid = "UID" uidparam ":" text CRLF

uidparam = *(";" xparam)

Example: The following is an example of this property:

UID:19960401T080045Z-4000F192713-0052@host1.com

4.8.5 Recurrence Component Properties

The following properties specify recurrence information in calendar components.

4.8.5.1 Exception Date/Times

Property Name: EXDATE

Purpose: This property defines the list of date/time exceptions for a recurring calendar component.

Value Type: The default value type for this property is DATE-TIME. The value type can be set to DATE.

Property Parameters: Non-standard, value data type and time zone identifier property parameters can be specified on this property.

Conformance: This property can be specified in an iCalendar object that includes a recurring calendar component.

Description: The exception dates, if specified, are used in computing the recurrence set. The recurrence set is the complete set of recurrence instances for a calendar component. The recurrence set is generated by considering the initial "DTSTART" property along with the "RRULE", "RDATE", "EXDATE" and "EXRULE" properties contained within the iCalendar object. The "DTSTART" property defines the first instance in the recurrence set. Multiple instances of the "RRULE" and "EXRULE" properties can also be specified to define more sophisticated recurrence sets. The final recurrence set is generated by gathering all of the start date-times generated by any of the specified "RRULE" and "RDATE" properties, and then excluding any start date and times which fall within the union of start date and times generated by any specified "EXRULE" and "EXDATE" properties. This implies that start date and times within exclusion related properties (i.e., "EXDATE" and "EXRULE") take precedence over those specified by inclusion properties (i.e., "RDATE" and "RRULE"). Where duplicate instances are generated by the "RRULE" and "RDATE" properties, only one recurrence is considered. Duplicate instances are ignored.

The "EXDATE" property can be used to exclude the value specified in "DTSTART". However, in such cases the original "DTSTART" date MUST still be maintained by the calendaring and scheduling system because the original "DTSTART" value has inherent usage dependencies by other properties such as the "RECURRENCE-ID".

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

```
exdate      = "EXDATE" exdtparam ":" exdtval *("," exdtval) CRLF
exdtparam   = *(
    ; the following are optional,
    ; but MUST NOT occur more than once

    (";" "VALUE" "=" ("DATE-TIME" / "DATE"))) /
```

```
(;" tzidparam) /  
  
; the following is optional,  
; and MAY occur more than once  
  
(;" xparam)  
  
)  
  
exdtval    = date-time / date  
;Value MUST match value type
```

Example: The following is an example of this property:

```
EXDATE:19960402T010000Z,19960403T010000Z,19960404T010000Z
```

4.8.5.2 Exception Rule

Property Name: EXRULE

Purpose: This property defines a rule or repeating pattern for an exception to a recurrence set.

Value Type: RECUR

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in "VEVENT", "VTODO" or "VJOURNAL" calendar components.

Description: The exception rule, if specified, is used in computing the recurrence set. The recurrence set is the complete set of recurrence instances for a calendar component. The recurrence set is generated by considering the initial "DTSTART" property along with the "RRULE", "RDATE", "EXDATE" and "EXRULE" properties contained within the iCalendar object. The "DTSTART" defines the first instance in the recurrence set. Multiple instances of the "RRULE" and "EXRULE" properties can also be specified to define more sophisticated recurrence sets. The final recurrence set is generated by gathering all of the start date-times generated by any of the specified "RRULE" and "RDATE" properties, and excluding any start date and times which fall within the union of start date and times generated by any specified "EXRULE" and "EXDATE" properties. This implies that start date and times within exclusion related properties (i.e., "EXDATE" and "EXRULE") take precedence over those specified by inclusion

properties (i.e., "RDATE" and "RRULE"). Where duplicate instances are generated by the "RRULE" and "RDATE" properties, only one recurrence is considered. Duplicate instances are ignored.

The "EXRULE" property can be used to exclude the value specified in "DTSTART". However, in such cases the original "DTSTART" date MUST still be maintained by the calendaring and scheduling system because the original "DTSTART" value has inherent usage dependencies by other properties such as the "RECURRENCE-ID".

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

```
exrule      = "EXRULE" exrparam ":" recur CRLF
```

```
exrparam    = *(";" xparam)
```

Example: The following are examples of this property. Except every other week, on Tuesday and Thursday for 4 occurrences:

```
EXRULE:FREQ=WEEKLY;COUNT=4;INTERVAL=2;BYDAY=TU,TH
```

Except daily for 10 occurrences:

```
EXRULE:FREQ=DAILY;COUNT=10
```

Except yearly in June and July for 8 occurrences:

```
EXRULE:FREQ=YEARLY;COUNT=8;BYMONTH=6,7
```

4.8.5.3 Recurrence Date/Times

Property Name: RDATE

Purpose: This property defines the list of date/times for a recurrence set.

Value Type: The default value type for this property is DATE-TIME. The value type can be set to DATE or PERIOD.

Property Parameters: Non-standard, value data type and time zone identifier property parameters can be specified on this property.

Conformance: The property can be specified in "VEVENT", "VTODO", "VJOURNAL" or "VTIMEZONE" calendar components.

Description: This property can appear along with the "RRULE" property to define an aggregate set of repeating occurrences. When they both appear in an iCalendar object, the recurring events are defined by the union of occurrences defined by both the "RDATE" and "RRULE".

The recurrence dates, if specified, are used in computing the recurrence set. The recurrence set is the complete set of recurrence instances for a calendar component. The recurrence set is generated by considering the initial "DTSTART" property along with the "RRULE", "RDATE", "EXDATE" and "EXRULE" properties contained within the iCalendar object. The "DTSTART" property defines the first instance in the recurrence set. Multiple instances of the "RRULE" and "EXRULE" properties can also be specified to define more sophisticated recurrence sets. The final recurrence set is generated by gathering all of the start date/times generated by any of the specified "RRULE" and "RDATE" properties, and excluding any start date/times which fall within the union of start date/times generated by any specified "EXRULE" and "EXDATE" properties. This implies that start date/times within exclusion related properties (i.e., "EXDATE" and "EXRULE") take precedence over those specified by inclusion properties (i.e., "RDATE" and "RRULE"). Where duplicate instances are generated by the "RRULE" and "RDATE" properties, only one recurrence is considered. Duplicate instances are ignored.

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

```

rdate      = "RDATE" rdtparam ":" rdtval *("," rdtval) CRLF

rdtparam   = *(
    ; the following are optional,
    ; but MUST NOT occur more than once

    (";" "VALUE" "=" ("DATE-TIME" / "DATE" / "PERIOD")) /
    (";" tzidparam) /

    ; the following is optional,
    ; and MAY occur more than once

    (";" xparam)

)

rdtval     = date-time / date / period
;Value MUST match value type

```

Example: The following are examples of this property:

RDATE:19970714T123000Z

RDATE;TZID=US-EASTERN:19970714T083000

RDATE;VALUE=PERIOD:19960403T020000Z/19960403T040000Z,
19960404T010000Z/PT3H

RDATE;VALUE=DATE:19970101,19970120,19970217,19970421
19970526,19970704,19970901,19971014,19971128,19971129,19971225

4.8.5.4 Recurrence Rule

Property Name: RRULE

Purpose: This property defines a rule or repeating pattern for recurring events, to-dos, or time zone definitions.

Value Type: RECUR

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified one or more times in recurring "VEVENT", "VTODO" and "VJOURNAL" calendar components. It can also be specified once in each STANDARD or DAYLIGHT sub-component of the "VTIMEZONE" calendar component.

Description: The recurrence rule, if specified, is used in computing the recurrence set. The recurrence set is the complete set of recurrence instances for a calendar component. The recurrence set is generated by considering the initial "DTSTART" property along with the "RRULE", "RDATE", "EXDATE" and "EXRULE" properties contained within the iCalendar object. The "DTSTART" property defines the first instance in the recurrence set. Multiple instances of the "RRULE" and "EXRULE" properties can also be specified to define more sophisticated recurrence sets. The final recurrence set is generated by gathering all of the start date/times generated by any of the specified "RRULE" and "RDATE" properties, and excluding any start date/times which fall within the union of start date/times generated by any specified "EXRULE" and "EXDATE" properties. This implies that start date/times within exclusion related properties (i.e., "EXDATE" and "EXRULE") take precedence over those specified by inclusion properties (i.e., "RDATE" and "RRULE"). Where duplicate instances are generated by the "RRULE" and "RDATE" properties, only one recurrence is considered. Duplicate instances are ignored.

The "DTSTART" and "DTEND" property pair or "DTSTART" and "DURATION" property pair, specified within the iCalendar object defines the first instance of the recurrence. When used with a recurrence rule, the "DTSTART" and "DTEND" properties MUST be specified in local time and the appropriate set of "VTIMEZONE" calendar components MUST be included. For detail on the usage of the "VTIMEZONE" calendar component, see the "VTIMEZONE" calendar component definition.

Any duration associated with the iCalendar object applies to all members of the generated recurrence set. Any modified duration for specific recurrences MUST be explicitly specified using the "RDATE" property.

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

```
rrule          = "RRULE" rrulparam ":" recur CRLF
```

```
rrulparam      = *(";" xparam)
```

Example: All examples assume the Eastern United States time zone.

Daily for 10 occurrences:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=DAILY;COUNT=10
```

```
==> (1997 9:00 AM EDT)September 2-11
```

Daily until December 24, 1997:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=DAILY;UNTIL=19971224T000000Z
```

```
==> (1997 9:00 AM EDT)September 2-30;October 1-25
    (1997 9:00 AM EST)October 26-31;November 1-30;December 1-23
```

Every other day - forever:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=DAILY;INTERVAL=2
==> (1997 9:00 AM EDT)September 2,4,6,8...24,26,28,30;
    October 2,4,6...20,22,24
    (1997 9:00 AM EST)October 26,28,30;November 1,3,5,7...25,27,29;
    Dec 1,3,...
```

Every 10 days, 5 occurrences:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=DAILY;INTERVAL=10;COUNT=5
```

```
==> (1997 9:00 AM EDT)September 2,12,22;October 2,12
```

Everyday in January, for 3 years:

```
DTSTART;TZID=US-Eastern:19980101T090000
RRULE:FREQ=YEARLY;UNTIL=20000131T090000Z;
  BYMONTH=1;BYDAY=SU,MO,TU,WE,TH,FR,SA
or
RRULE:FREQ=DAILY;UNTIL=20000131T090000Z;BYMONTH=1
```

```
==> (1998 9:00 AM EDT)January 1-31
     (1999 9:00 AM EDT)January 1-31
     (2000 9:00 AM EDT)January 1-31
```

Weekly for 10 occurrences

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=WEEKLY;COUNT=10
```

```
==> (1997 9:00 AM EDT)September 2,9,16,23,30;October 7,14,21
     (1997 9:00 AM EST)October 28;November 4
```

Weekly until December 24, 1997

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=WEEKLY;UNTIL=19971224T000000Z
```

```
==> (1997 9:00 AM EDT)September 2,9,16,23,30;October 7,14,21
     (1997 9:00 AM EST)October 28;November 4,11,18,25;
     December 2,9,16,23
```

Every other week - forever:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=WEEKLY;INTERVAL=2;WKST=SU
```

```
==> (1997 9:00 AM EDT)September 2,16,30;October 14
     (1997 9:00 AM EST)October 28;November 11,25;December 9,23
     (1998 9:00 AM EST)January 6,20;February
     ...
```

Weekly on Tuesday and Thursday for 5 weeks:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=WEEKLY;UNTIL=19971007T000000Z;WKST=SU;BYDAY=TU,TH
or
```

RRULE:FREQ=WEEKLY;COUNT=10;WKST=SU;BYDAY=TU,TH

==> (1997 9:00 AM EDT)September 2,4,9,11,16,18,23,25,30;October 2

Every other week on Monday, Wednesday and Friday until December 24, 1997, but starting on Tuesday, September 2, 1997:

DTSTART;TZID=US-Eastern:19970902T090000

RRULE:FREQ=WEEKLY;INTERVAL=2;UNTIL=19971224T000000Z;WKST=SU;
BYDAY=MO,WE,FR

==> (1997 9:00 AM EDT)September 2,3,5,15,17,19,29;October
1,3,13,15,17

(1997 9:00 AM EST)October 27,29,31;November 10,12,14,24,26,28;
December 8,10,12,22

Every other week on Tuesday and Thursday, for 8 occurrences:

DTSTART;TZID=US-Eastern:19970902T090000

RRULE:FREQ=WEEKLY;INTERVAL=2;COUNT=8;WKST=SU;BYDAY=TU,TH

==> (1997 9:00 AM EDT)September 2,4,16,18,30;October 2,14,16

Monthly on the 1st Friday for ten occurrences:

DTSTART;TZID=US-Eastern:19970905T090000

RRULE:FREQ=MONTHLY;COUNT=10;BYDAY=1FR

==> (1997 9:00 AM EDT)September 5;October 3

(1997 9:00 AM EST)November 7;Dec 5

(1998 9:00 AM EST)January 2;February 6;March 6;April 3

(1998 9:00 AM EDT)May 1;June 5

Monthly on the 1st Friday until December 24, 1997:

DTSTART;TZID=US-Eastern:19970905T090000

RRULE:FREQ=MONTHLY;UNTIL=19971224T000000Z;BYDAY=1FR

==> (1997 9:00 AM EDT)September 5;October 3

(1997 9:00 AM EST)November 7;December 5

Every other month on the 1st and last Sunday of the month for 10 occurrences:

DTSTART;TZID=US-Eastern:19970907T090000

RRULE:FREQ=MONTHLY;INTERVAL=2;COUNT=10;BYDAY=1SU,-1SU

==> (1997 9:00 AM EDT)September 7,28

(1997 9:00 AM EST)November 2,30

(1998 9:00 AM EST)January 4,25;March 1,29
(1998 9:00 AM EDT)May 3,31

Monthly on the second to last Monday of the month for 6 months:

DTSTART;TZID=US-Eastern:19970922T090000
RRULE:FREQ=MONTHLY;COUNT=6;BYDAY=-2MO

==> (1997 9:00 AM EDT)September 22;October 20
(1997 9:00 AM EST)November 17;December 22
(1998 9:00 AM EST)January 19;February 16

Monthly on the third to the last day of the month, forever:

DTSTART;TZID=US-Eastern:19970928T090000
RRULE:FREQ=MONTHLY;BYMONTHDAY=-3

==> (1997 9:00 AM EDT)September 28
(1997 9:00 AM EST)October 29;November 28;December 29
(1998 9:00 AM EST)January 29;February 26
...

Monthly on the 2nd and 15th of the month for 10 occurrences:

DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=MONTHLY;COUNT=10;BYMONTHDAY=2,15

==> (1997 9:00 AM EDT)September 2,15;October 2,15
(1997 9:00 AM EST)November 2,15;December 2,15
(1998 9:00 AM EST)January 2,15

Monthly on the first and last day of the month for 10 occurrences:

DTSTART;TZID=US-Eastern:19970930T090000
RRULE:FREQ=MONTHLY;COUNT=10;BYMONTHDAY=1,-1

==> (1997 9:00 AM EDT)September 30;October 1
(1997 9:00 AM EST)October 31;November 1,30;December 1,31
(1998 9:00 AM EST)January 1,31;February 1

Every 18 months on the 10th thru 15th of the month for 10 occurrences:

DTSTART;TZID=US-Eastern:19970910T090000
RRULE:FREQ=MONTHLY;INTERVAL=18;COUNT=10;BYMONTHDAY=10,11,12,13,14,15

==> (1997 9:00 AM EDT)September 10,11,12,13,14,15

(1999 9:00 AM EST)March 10,11,12,13

Every Tuesday, every other month:

DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=MONTHLY;INTERVAL=2;BYDAY=TU

==> (1997 9:00 AM EDT)September 2,9,16,23,30
(1997 9:00 AM EST)November 4,11,18,25
(1998 9:00 AM EST)January 6,13,20,27;March 3,10,17,24,31
...

Yearly in June and July for 10 occurrences:

DTSTART;TZID=US-Eastern:19970610T090000
RRULE:FREQ=YEARLY;COUNT=10;BYMONTH=6,7

==> (1997 9:00 AM EDT)June 10;July 10
(1998 9:00 AM EDT)June 10;July 10
(1999 9:00 AM EDT)June 10;July 10
(2000 9:00 AM EDT)June 10;July 10
(2001 9:00 AM EDT)June 10;July 10

Note: Since none of the BYDAY, BYMONTHDAY or BYYEARDAY components are specified, the day is gotten from DTSTART

Every other year on January, February, and March for 10 occurrences:

DTSTART;TZID=US-Eastern:19970310T090000
RRULE:FREQ=YEARLY;INTERVAL=2;COUNT=10;BYMONTH=1,2,3

==> (1997 9:00 AM EST)March 10
(1999 9:00 AM EST)January 10;February 10;March 10
(2001 9:00 AM EST)January 10;February 10;March 10
(2003 9:00 AM EST)January 10;February 10;March 10

Every 3rd year on the 1st, 100th and 200th day for 10 occurrences:

DTSTART;TZID=US-Eastern:19970101T090000
RRULE:FREQ=YEARLY;INTERVAL=3;COUNT=10;BYYEARDAY=1,100,200

==> (1997 9:00 AM EST)January 1
(1997 9:00 AM EDT)April 10;July 19
(2000 9:00 AM EST)January 1
(2000 9:00 AM EDT)April 9;July 18
(2003 9:00 AM EST)January 1
(2003 9:00 AM EDT)April 10;July 19
(2006 9:00 AM EST)January 1

Every 20th Monday of the year, forever:

```
DTSTART;TZID=US-Eastern:19970519T090000
RRULE:FREQ=YEARLY;BYDAY=20MO
```

```
==> (1997 9:00 AM EDT)May 19
      (1998 9:00 AM EDT)May 18
      (1999 9:00 AM EDT)May 17
```

...

Monday of week number 20 (where the default start of the week is Monday), forever:

```
DTSTART;TZID=US-Eastern:19970512T090000
RRULE:FREQ=YEARLY;BYWEEKNO=20;BYDAY=MO
```

```
==> (1997 9:00 AM EDT)May 12
      (1998 9:00 AM EDT)May 11
      (1999 9:00 AM EDT)May 17
```

...

Every Thursday in March, forever:

```
DTSTART;TZID=US-Eastern:19970313T090000
RRULE:FREQ=YEARLY;BYMONTH=3;BYDAY=TH
```

```
==> (1997 9:00 AM EST)March 13,20,27
      (1998 9:00 AM EST)March 5,12,19,26
      (1999 9:00 AM EST)March 4,11,18,25
```

...

Every Thursday, but only during June, July, and August, forever:

```
DTSTART;TZID=US-Eastern:19970605T090000
RRULE:FREQ=YEARLY;BYDAY=TH;BYMONTH=6,7,8
```

```
==> (1997 9:00 AM EDT)June 5,12,19,26;July 3,10,17,24,31;
      August 7,14,21,28
      (1998 9:00 AM EDT)June 4,11,18,25;July 2,9,16,23,30;
      August 6,13,20,27
      (1999 9:00 AM EDT)June 3,10,17,24;July 1,8,15,22,29;
      August 5,12,19,26
```

...

Every Friday the 13th, forever:

```
DTSTART;TZID=US-Eastern:19970902T090000
EXDATE;TZID=US-Eastern:19970902T090000
RRULE:FREQ=MONTHLY;BYDAY=FR;BYMONTHDAY=13
```

```
==> (1998 9:00 AM EST)February 13;March 13;November 13
      (1999 9:00 AM EDT)August 13
      (2000 9:00 AM EDT)October 13
...

```

The first Saturday that follows the first Sunday of the month,
forever:

```
DTSTART;TZID=US-Eastern:19970913T090000
RRULE:FREQ=MONTHLY;BYDAY=SA;BYMONTHDAY=7,8,9,10,11,12,13

==> (1997 9:00 AM EDT)September 13;October 11
      (1997 9:00 AM EST)November 8;December 13
      (1998 9:00 AM EST)January 10;February 7;March 7
      (1998 9:00 AM EDT)April 11;May 9;June 13...
...

```

Every four years, the first Tuesday after a Monday in November,
forever (U.S. Presidential Election day):

```
DTSTART;TZID=US-Eastern:19961105T090000
RRULE:FREQ=YEARLY;INTERVAL=4;BYMONTH=11;BYDAY=TU;BYMONTHDAY=2,3,4,
      5,6,7,8

==> (1996 9:00 AM EST)November 5
      (2000 9:00 AM EST)November 7
      (2004 9:00 AM EST)November 2
...

```

The 3rd instance into the month of one of Tuesday, Wednesday or
Thursday, for the next 3 months:

```
DTSTART;TZID=US-Eastern:19970904T090000
RRULE:FREQ=MONTHLY;COUNT=3;BYDAY=TU,WE,TH;BYSETPOS=3

==> (1997 9:00 AM EDT)September 4;October 7
      (1997 9:00 AM EST)November 6

```

The 2nd to last weekday of the month:

```
DTSTART;TZID=US-Eastern:19970929T090000
RRULE:FREQ=MONTHLY;BYDAY=MO,TU,WE,TH,FR;BYSETPOS=-2

==> (1997 9:00 AM EDT)September 29
      (1997 9:00 AM EST)October 30;November 27;December 30
      (1998 9:00 AM EST)January 29;February 26;March 30
...

```

Every 3 hours from 9:00 AM to 5:00 PM on a specific day:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=HOURLY;INTERVAL=3;UNTIL=19970902T170000Z
```

```
==> (September 2, 1997 EDT)09:00,12:00,15:00
```

Every 15 minutes for 6 occurrences:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=MINUTELY;INTERVAL=15;COUNT=6
```

```
==> (September 2, 1997 EDT)09:00,09:15,09:30,09:45,10:00,10:15
```

Every hour and a half for 4 occurrences:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=MINUTELY;INTERVAL=90;COUNT=4
```

```
==> (September 2, 1997 EDT)09:00,10:30;12:00;13:30
```

Every 20 minutes from 9:00 AM to 4:40 PM every day:

```
DTSTART;TZID=US-Eastern:19970902T090000
RRULE:FREQ=DAILY;BYHOUR=9,10,11,12,13,14,15,16;BYMINUTE=0,20,40
or
RRULE:FREQ=MINUTELY;INTERVAL=20;BYHOUR=9,10,11,12,13,14,15,16
```

```
==> (September 2, 1997 EDT)9:00,9:20,9:40,10:00,10:20,
    ... 16:00,16:20,16:40
    (September 3, 1997 EDT)9:00,9:20,9:40,10:00,10:20,
    ...16:00,16:20,16:40
    ...
```

An example where the days generated makes a difference because of WKST:

```
DTSTART;TZID=US-Eastern:19970805T090000
RRULE:FREQ=WEEKLY;INTERVAL=2;COUNT=4;BYDAY=TU,SU;WKST=MO
```

```
==> (1997 EDT)Aug 5,10,19,24
```

changing only WKST from MO to SU, yields different results...

```
DTSTART;TZID=US-Eastern:19970805T090000
RRULE:FREQ=WEEKLY;INTERVAL=2;COUNT=4;BYDAY=TU,SU;WKST=SU
==> (1997 EDT)August 5,17,19,31
```

4.8.6 Alarm Component Properties

The following properties specify alarm information in calendar components.

4.8.6.1 Action

Property Name: ACTION

Purpose: This property defines the action to be invoked when an alarm is triggered.

Value Type: TEXT

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be specified once in a "VALARM" calendar component.

Description: Each "VALARM" calendar component has a particular type of action associated with it. This property specifies the type of action

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

```
action      = "ACTION" actionparam ":" actionvalue CRLF
actionparam = *(";" xparam)
actionvalue = "AUDIO" / "DISPLAY" / "EMAIL" / "PROCEDURE"
              / iana-token / x-name
```

Example: The following are examples of this property in a "VALARM" calendar component:

ACTION:AUDIO

ACTION:DISPLAY

ACTION:PROCEDURE

4.8.6.2 Repeat Count

Property Name: REPEAT

Purpose: This property defines the number of time the alarm should be repeated, after the initial trigger.

Value Type: INTEGER

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in a "VALARM" calendar component.

Description: If the alarm triggers more than once, then this property MUST be specified along with the "DURATION" property.

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

```
repeatcnt = "REPEAT" repparam ":" integer CRLF
;Default is "0", zero.

repparam  = *(";" xparam)
```

Example: The following is an example of this property for an alarm that repeats 4 additional times with a 5 minute delay after the initial triggering of the alarm:

```
REPEAT:4
DURATION:PT5M
```

4.8.6.3 Trigger

Property Name: TRIGGER

Purpose: This property specifies when an alarm will trigger.

Value Type: The default value type is DURATION. The value type can be set to a DATE-TIME value type, in which case the value MUST specify a UTC formatted DATE-TIME value.

Property Parameters: Non-standard, value data type, time zone identifier or trigger relationship property parameters can be specified on this property. The trigger relationship property parameter MUST only be specified when the value type is DURATION.

Conformance: This property MUST be specified in the "VALARM" calendar component.

Description: Within the "VALARM" calendar component, this property defines when the alarm will trigger. The default value type is DURATION, specifying a relative time for the trigger of the alarm. The default duration is relative to the start of an event or to-do that the alarm is associated with. The duration can be explicitly set

to trigger from either the end or the start of the associated event or to-do with the "RELATED" parameter. A value of START will set the alarm to trigger off the start of the associated event or to-do. A value of END will set the alarm to trigger off the end of the associated event or to-do.

Either a positive or negative duration may be specified for the "TRIGGER" property. An alarm with a positive duration is triggered after the associated start or end of the event or to-do. An alarm with a negative duration is triggered before the associated start or end of the event or to-do.

The "RELATED" property parameter is not valid if the value type of the property is set to DATE-TIME (i.e., for an absolute date and time alarm trigger). If a value type of DATE-TIME is specified, then the property value MUST be specified in the UTC time format. If an absolute trigger is specified on an alarm for a recurring event or to-do, then the alarm will only trigger for the specified absolute date/time, along with any specified repeating instances.

If the trigger is set relative to START, then the "DTSTART" property MUST be present in the associated "VEVENT" or "VTODO" calendar component. If an alarm is specified for an event with the trigger set relative to the END, then the "DTEND" property or the "DSTART" and "DURATION" properties MUST be present in the associated "VEVENT" calendar component. If the alarm is specified for a to-do with a trigger set relative to the END, then either the "DUE" property or the "DSTART" and "DURATION" properties MUST be present in the associated "VTODO" calendar component.

Alarms specified in an event or to-do which is defined in terms of a DATE value type will be triggered relative to 00:00:00 UTC on the specified date. For example, if "DTSTART:19980205", then the duration trigger will be relative to 19980205T000000Z.

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

```
trigger      = "TRIGGER" (trigrel / trigabs)

trigrel      = *(
                ; the following are optional,
                ; but MUST NOT occur more than once

                (";" "VALUE" "=" "DURATION") /
                (";" trigrelparam) /

                ; the following is optional,
```



```

; and MAY occur more than once

(";" xparam)
) ":" dur-value

trigabs    = 1*(
; the following is REQUIRED,
; but MUST NOT occur more than once

(";" "VALUE" "=" "DATE-TIME") /

; the following is optional,
; and MAY occur more than once

(";" xparam)

) ":" date-time

```

Example: A trigger set 15 minutes prior to the start of the event or to-do.

```
TRIGGER:-P15M
```

A trigger set 5 minutes after the end of the event or to-do.

```
TRIGGER;RELATED=END:P5M
```

A trigger set to an absolute date/time.

```
TRIGGER;VALUE=DATE-TIME:19980101T050000Z
```

4.8.7 Change Management Component Properties

The following properties specify change management information in calendar components.

4.8.7.1 Date/Time Created

Property Name: CREATED

Purpose: This property specifies the date and time that the calendar information was created by the calendar user agent in the calendar store.

Note: This is analogous to the creation date and time for a file in the file system.

Value Type: DATE-TIME

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified once in "VEVENT", "VTODO" or "VJOURNAL" calendar components.

Description: The date and time is a UTC value.

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

```
created      = "CREATED" creaparam ":" date-time CRLF
```

```
creaparam    = *(";" xparam)
```

Example: The following is an example of this property:

```
CREATED:19960329T133000Z
```

4.8.7.2 Date/Time Stamp

Property Name: DTSTAMP

Purpose: The property indicates the date/time that the instance of the iCalendar object was created.

Value Type: DATE-TIME

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property MUST be included in the "VEVENT", "VTODO", "VJOURNAL" or "VFREEBUSY" calendar components.

Description: The value MUST be specified in the UTC time format.

This property is also useful to protocols such as [IMIP] that have inherent latency issues with the delivery of content. This property will assist in the proper sequencing of messages containing iCalendar objects.

This property is different than the "CREATED" and "LAST-MODIFIED" properties. These two properties are used to specify when the particular calendar data in the calendar store was created and last modified. This is different than when the iCalendar object representation of the calendar service information was created or last modified.

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

dtstamp = "DTSTAMP" stmparam ":" date-time CRLF

stmparam = *(";" xparam)

Example:

DTSTAMP:19971210T080000Z

4.8.7.3 Last Modified

Property Name: LAST-MODIFIED

Purpose: The property specifies the date and time that the information associated with the calendar component was last revised in the calendar store.

Note: This is analogous to the modification date and time for a file in the file system.

Value Type: DATE-TIME

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: This property can be specified in the "EVENT", "VTODO", "VJOURNAL" or "VTIMEZONE" calendar components.

Description: The property value MUST be specified in the UTC time format.

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

last-mod = "LAST-MODIFIED" lstparam ":" date-time CRLF

lstparam = *(";" xparam)

Example: The following is are examples of this property:

LAST-MODIFIED:19960817T133000Z

4.8.7.4 Sequence Number

Property Name: SEQUENCE

Purpose: This property defines the revision sequence number of the calendar component within a sequence of revisions.

Value Type: integer

Property Parameters: Non-standard property parameters can be specified on this property.

Conformance: The property can be specified in "VEVENT", "VTODO" or "VJOURNAL" calendar component.

Description: When a calendar component is created, its sequence number is zero (US-ASCII decimal 48). It is monotonically incremented by the "Organizer's" CUA each time the "Organizer" makes a significant revision to the calendar component. When the "Organizer" makes changes to one of the following properties, the sequence number MUST be incremented:

- . "DTSTART"
- . "DTEND"
- . "DUE"
- . "RDATE"
- . "RRULE"
- . "EXDATE"
- . "EXRULE"
- . "STATUS"

In addition, changes made by the "Organizer" to other properties can also force the sequence number to be incremented. The "Organizer" CUA MUST increment the sequence number when ever it makes changes to properties in the calendar component that the "Organizer" deems will jeopardize the validity of the participation status of the "Attendees". For example, changing the location of a meeting from one locale to another distant locale could effectively impact the participation status of the "Attendees".

The "Organizer" includes this property in an iCalendar object that it sends to an "Attendee" to specify the current version of the calendar component.

The "Attendee" includes this property in an iCalendar object that it sends to the "Organizer" to specify the version of the calendar component that the "Attendee" is referring to.

A change to the sequence number is not the mechanism that an "Organizer" uses to request a response from the "Attendees". The "RSVP" parameter on the "ATTENDEE" property is used by the "Organizer" to indicate that a response from the "Attendees" is requested.

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

```
seq = "SEQUENCE" seqparam ":" integer CRLF
; Default is "0"
```

```
seqparam = *(";" xparam)
```

Example: The following is an example of this property for a calendar component that was just created by the "Organizer".

```
SEQUENCE:0
```

The following is an example of this property for a calendar component that has been revised two different times by the "Organizer".

```
SEQUENCE:2
```

4.8.8 Miscellaneous Component Properties

The following properties specify information about a number of miscellaneous features of calendar components.

4.8.8.1 Non-standard Properties

Property Name: Any property name with a "X-" prefix

Purpose: This class of property provides a framework for defining non-standard properties.

Value Type: TEXT

Property Parameters: Non-standard and language property parameters can be specified on this property.

Conformance: This property can be specified in any calendar component.

Description: The MIME Calendaring and Scheduling Content Type provides a "standard mechanism for doing non-standard things". This extension support is provided for implementers to "push the envelope" on the existing version of the memo. Extension properties are

specified by property and/or property parameter names that have the prefix text of "X-" (the two character sequence: LATIN CAPITAL LETTER X character followed by the HYPHEN-MINUS character). It is recommended that vendors concatenate onto this sentinel another short prefix text to identify the vendor. This will facilitate readability of the extensions and minimize possible collision of names between different vendors. User agents that support this content type are expected to be able to parse the extension properties and property parameters but can ignore them.

At present, there is no registration authority for names of extension properties and property parameters. The data type for this property is TEXT. Optionally, the data type can be any of the other valid data types.

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

```
x-prop      = x-name *(";" xparam) [;" languageparam] ":" text CRLF
              ; Lines longer than 75 octets should be folded
```

Example: The following might be the ABC vendor's extension for an audio-clip form of subject property:

```
X-ABC-MMSUBJ;X-ABC-MMSUBJTYPE=wave:http://load.noise.org/mysubj.wav
```

4.8.8.2 Request Status

Property Name: REQUEST-STATUS

Purpose: This property defines the status code returned for a scheduling request.

Value Type: TEXT

Property Parameters: Non-standard and language property parameters can be specified on this property.

Conformance: The property can be specified in "VEVENT", "VTODO", "VJOURNAL" or "VFREEBUSY" calendar component.

Description: This property is used to return status code information related to the processing of an associated iCalendar object. The data type for this property is TEXT.

The value consists of a short return status component, a longer return status description component, and optionally a status-specific data component. The components of the value are separated by the SEMICOLON character (US-ASCII decimal 59).

The short return status is a PERIOD character (US-ASCII decimal 46) separated 3-tuple of integers. For example, "3.1.1". The successive levels of integers provide for a successive level of status code granularity.

The following are initial classes for the return status code. Individual iCalendar object methods will define specific return status codes for these classes. In addition, other classes for the return status code may be defined using the registration process defined later in this memo.

Short Return Status Code	Longer Return Status Description
1.xx	Preliminary success. This class of status of status code indicates that the request has request has been initially processed but that completion is pending.
2.xx	Successful. This class of status code indicates that the request was completed successfully. However, the exact status code can indicate that a fallback has been taken.
3.xx	Client Error. This class of status code indicates that the request was not successful. The error is the result of either a syntax or a semantic error in the client formatted request. Request should not be retried until the condition in the request is corrected.
4.xx	Scheduling Error. This class of status code indicates that the request was not successful. Some sort of error occurred within the calendaring and scheduling service, not directly related to the request itself.

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

```

rstatus      = "REQUEST-STATUS" rstatparam ":"
               statcode ";" statdesc [";" extdata]

rstatparam = *(
               ; the following is optional,
               ; but MUST NOT occur more than once

```

```

        (";" languageparm) /

        ; the following is optional,
        ; and MAY occur more than once

        (";" xparam)

    )

statcode    = 1*DIGIT *("." 1*DIGIT)
;Hierarchical, numeric return status code

statdesc    = text
;Textual status description

extdata     = text
;Textual exception data. For example, the offending property
;name and value or complete property line.

```

Example: The following are some possible examples of this property. The COMMA and SEMICOLON separator characters in the property value are BACKSLASH character escaped because they appear in a text value.

```
REQUEST-STATUS:2.0;Success
```

```
REQUEST-STATUS:3.1;Invalid property value;DTSTART:96-Apr-01
```

```
REQUEST-STATUS:2.8; Success\, repeating event ignored. Scheduled
as a single event.;RRULE:FREQ=WEEKLY\;INTERVAL=2
```

```
REQUEST-STATUS:4.1;Event conflict. Date/time is busy.
```

```
REQUEST-STATUS:3.7;Invalid calendar user;ATTENDEE:
MAILTO:jsmith@host.com
```

5 iCalendar Object Examples

The following examples are provided as an informational source of illustrative iCalendar objects consistent with this content type.

The following example specifies a three-day conference that begins at 8:00 AM EDT, September 18, 1996 and end at 6:00 PM EDT, September 20, 1996.

```

BEGIN:VCALENDAR PRODID:-//xyz Corp//NONSGML PDA Calendar Verson
1.0//EN VERSION:2.0 BEGIN:VEVENT DTSTAMP:19960704T120000Z
UID:uid1@host.com ORGANIZER:MAILTO:jsmith@host.com
DTSTART:19960918T143000Z DTEND:19960920T220000Z STATUS:CONFIRMED

```



```
CATEGORIES:CONFERENCE SUMMARY:Networld+Interop Conference
DESCRIPTION:Networld+Interop Conference
  and Exhibit\nAtlanta World Congress Center\n
  Atlanta, Georgia END:VEVENT END:VCALENDAR
```

The following example specifies a group scheduled meeting that begin at 8:30 AM EST on March 12, 1998 and end at 9:30 AM EST on March 12, 1998. The "Organizer" has scheduled the meeting with one or more calendar users in a group. A time zone specification for Eastern United States has been specified.

```
BEGIN:VCALENDAR
PRODID:-//RDU Software//NONSGML HandCal//EN
VERSION:2.0
BEGIN:VTIMEZONE
TZID:US-Eastern
BEGIN:STANDARD
DTSTART:19981025T020000
RDATE:19981025T020000
TZOFFSETFROM:-0400
TZOFFSETTO:-0500
TZNAME:EST
END:STANDARD
BEGIN:DAYLIGHT
DTSTART:19990404T020000
RDATE:19990404T020000
TZOFFSETFROM:-0500
TZOFFSETTO:-0400
TZNAME:EDT
END:DAYLIGHT
END:VTIMEZONE
BEGIN:VEVENT
DTSTAMP:19980309T231000Z
UID:guid-1.host1.com
ORGANIZER;ROLE=CHAIR:MAILTO:mrbig@host.com
ATTENDEE;RSVP=TRUE;ROLE=REQ-PARTICIPANT;CUTYPE=GROUP:
  MAILTO:employee-A@host.com
DESCRIPTION:Project XYZ Review Meeting
CATEGORIES:MEETING
CLASS:PUBLIC
CREATED:19980309T130000Z
SUMMARY:XYZ Project Review
DTSTART;TZID=US-Eastern:19980312T083000
DTEND;TZID=US-Eastern:19980312T093000
LOCATION:1CP Conference Room 4350
END:VEVENT
END:VCALENDAR
```

The following is an example of an iCalendar object passed in a MIME message with a single body part consisting of a "text/calendar" Content Type.

```
TO:jsmith@host1.com
FROM:jdoe@host1.com
MIME-VERSION:1.0
MESSAGE-ID:<id3@host1.com>
CONTENT-TYPE:text/calendar

BEGIN:VCALENDAR
METHOD:xyz
VERSION:2.0
PRODID:-//ABC Corporation//NONSGML My Product//EN
BEGIN:VEVENT
DTSTAMP:19970324T1200Z
SEQUENCE:0
UID:uid3@host1.com
ORGANIZER:MAILTO:jdoe@host1.com
ATTENDEE;RSVP=TRUE:MAILTO:jsmith@host1.com
DTSTART:19970324T123000Z
DTEND:19970324T210000Z
CATEGORIES:MEETING,PROJECT
CLASS:PUBLIC
SUMMARY:Calendar Interoperability Planning Meeting
DESCRIPTION:Discuss how we can test c&s interoperability\n
  using iCalendar and other IETF standards.
LOCATION:LDB Lobby
ATTACH;FMTTYPE=application/postscript:ftp://xyzCorp.com/pub/
  conf/bkgrnd.ps
END:VEVENT
END:VCALENDAR
```

The following is an example of a to-do due on April 15, 1998. An audio alarm has been specified to remind the calendar user at noon, the day before the to-do is expected to be completed and repeat hourly, four additional times. The to-do definition has been modified twice since it was initially created.

```
BEGIN:VCALENDAR
VERSION:2.0
PRODID:-//ABC Corporation//NONSGML My Product//EN
BEGIN:VTODO
DTSTAMP:19980130T134500Z
SEQUENCE:2
UID:uid4@host1.com
ORGANIZER:MAILTO:unclesam@us.gov
ATTENDEE;PARTSTAT=ACCEPTED:MAILTO:jpublic@host.com
```

```
DUE:19980415T235959
STATUS:NEEDS-ACTION
SUMMARY:Submit Income Taxes
BEGIN:VALARM
ACTION:AUDIO
TRIGGER:19980403T120000
ATTACH;FMTTYPE=audio/basic:http://host.com/pub/audio-
files/ssbanner.aud
REPEAT:4
DURATION:PT1H
END:VALARM
END:VTODO
END:VCALENDAR
```

The following is an example of a journal entry.

```
BEGIN:VCALENDAR
VERSION:2.0
PRODID:-//ABC Corporation//NONSGML My Product//EN
BEGIN:VJOURNAL
DTSTAMP:19970324T120000Z
UID:uid5@host1.com
ORGANIZER:MAILTO:jsmith@host.com
STATUS:DRAFT
CLASS:PUBLIC
CATEGORY:Project Report, XYZ, Weekly Meeting
DESCRIPTION:Project xyz Review Meeting Minutes\n
Agenda\n1. Review of project version 1.0 requirements.\n2.
Definition
of project processes.\n3. Review of project schedule.\n
Participants: John Smith, Jane Doe, Jim Dandy\n-It was
decided that the requirements need to be signed off by
product marketing.\n-Project processes were accepted.\n
-Project schedule needs to account for scheduled holidays
and employee vacation time. Check with HR for specific
dates.\n-New schedule will be distributed by Friday.\n-
Next weeks meeting is cancelled. No meeting until 3/23.
END:VJOURNAL
END:VCALENDAR
```

The following is an example of published busy time information. The iCalendar object might be placed in the network resource www.host.com/calendar/busytime/jsmith.ifb.

```
BEGIN:VCALENDAR
VERSION:2.0
PRODID:-//RDU Software//NONSGML HandCal//EN
BEGIN:VFREEBUSY
```

```
ORGANIZER:MAILTO:jsmith@host.com
DTSTART:19980313T141711Z
DTEND:19980410T141711Z
FREEBUSY:19980314T233000Z/19980315T003000Z
FREEBUSY:19980316T153000Z/19980316T163000Z
FREEBUSY:19980318T030000Z/19980318T040000Z
URL:http://www.host.com/calendar/busytime/jsmith.ifb
END:VFREEBUSY
END:VCALENDAR
```

6 Recommended Practices

These recommended practices should be followed in order to assure consistent handling of the following cases for an iCalendar object.

1. Content lines longer than 75 octets SHOULD be folded.
2. A calendar entry with a "DTSTART" property but no "DTEND" property does not take up any time. It is intended to represent an event that is associated with a given calendar date and time of day, such as an anniversary. Since the event does not take up any time, it MUST NOT be used to record busy time no matter what the value for the "TRANSP" property.
3. When the "DTSTART" and "DTEND", for "VEVENT", "VJOURNAL" and "VFREEBUSY" calendar components, and "DTSTART" and "DUE", for "VTODO" calendar components, have the same value data type (e.g., DATE-TIME), they SHOULD specify values in the same time format (e.g., UTC time format).
4. When the combination of the "RRULE" and "RDATE" properties on an iCalendar object produces multiple instances having the same start date/time, they should be collapsed to, and considered as, a single instance.
5. When a calendar user receives multiple requests for the same calendar component (e.g., REQUEST for a "VEVENT" calendar component) as a result of being on multiple mailing lists specified by "ATTENDEE" properties in the request, they SHOULD respond to only one of the requests. The calendar user SHOULD also specify (using the "MEMBER" parameter of the "ATTENDEE" property) which mailing list they are a member of.
6. An implementation can truncate a "SUMMARY" property value to 255 characters.

7. If seconds of the minute are not supported by an implementation, then a value of "00" SHOULD be specified for the seconds component in a time value.
8. If the value type parameter (VALUE=) contains an unknown value type, it SHOULD be treated as TEXT.
9. TZURL values SHOULD NOT be specified as a FILE URI type. This URI form can be useful within an organization, but is problematic in the Internet.
10. Some possible English values for CATEGORIES property include "ANNIVERSARY", "APPOINTMENT", "BUSINESS", "EDUCATION", "HOLIDAY", "MEETING", "MISCELLANEOUS", "NON-WORKING HOURS", "NOT IN OFFICE", "PERSONAL", "PHONE CALL", "SICK DAY", "SPECIAL OCCASION", "TRAVEL", "VACATION". Categories can be specified in any registered language.
11. Some possible English values for RESOURCES property include "CATERING", "CHAIRS", "COMPUTER PROJECTOR", "EASEL", "OVERHEAD PROJECTOR", "SPEAKER PHONE", "TABLE", "TV", "VCR", "VIDEO PHONE", "VEHICLE". Resources can be specified in any registered language.

7 Registration of Content Type Elements

This section provides the process for registration of MIME Calendaring and Scheduling Content Type iCalendar object methods and new or modified properties.

7.1 Registration of New and Modified iCalendar Object Methods

New MIME Calendaring and Scheduling Content Type iCalendar object methods are registered by the publication of an IETF Request for Comments (RFC). Changes to an iCalendar object method are registered by the publication of a revision of the RFC defining the method.

7.2 Registration of New Properties

This section defines procedures by which new properties or enumerated property values for the MIME Calendaring and Scheduling Content Type can be registered with the IANA. Non-IANA properties can be used by bilateral agreement, provided the associated properties names follow the "X-" convention.

The procedures defined here are designed to allow public comment and review of new properties, while posing only a small impediment to the definition of new properties.

Registration of a new property is accomplished by the following steps.

7.2.1 Define the property

A property is defined by completing the following template.

To: ietf-calendar@imc.org

Subject: Registration of text/calendar MIME property XXX

Property name:

Property purpose:

Property value type(s):

Property parameter (s):

Conformance:

Description:

Format definition:

Examples:

The meaning of each field in the template is as follows.

Property name: The name of the property, as it will appear in the body of an text/calendar MIME Content-Type "property: value" line to the left of the colon ":".

Property purpose: The purpose of the property (e.g., to indicate a delegate for the event or to-do, etc.). Give a short but clear description.

Property value type (s): Any of the valid value types for the property value needs to be specified. The default value type also needs to be specified. If a new value type is specified, it needs to be declared in this section.

Property parameter (s): Any of the valid property parameters for the property needs to be specified.

Conformance: The calendar components that the property can appear in needs to be specified.

Description: Any special notes about the property, how it is to be used, etc.

Format definition: The ABNF for the property definition needs to be specified.

Examples: One or more examples of instances of the property needs to be specified.

7.2.2 Post the Property definition

The property description MUST be posted to the new property discussion list, ietf-calendar@imc.org.

7.2.3 Allow a comment period

Discussion on the new property MUST be allowed to take place on the list for a minimum of two weeks. Consensus MUST be reached on the property before proceeding to the next step.

7.2.4 Submit the property for approval

Once the two-week comment period has elapsed, and the proposer is convinced consensus has been reached on the property, the registration application should be submitted to the Method Reviewer for approval. The Method Reviewer is appointed to the Application Area Directors and can either accept or reject the property registration. An accepted registration should be passed on by the Method Reviewer to the IANA for inclusion in the official IANA method registry. The registration can be rejected for any of the following reasons. 1) Insufficient comment period; 2) Consensus not reached; 3) Technical deficiencies raised on the list or elsewhere have not been addressed. The Method Reviewer's decision to reject a property can be appealed by the proposer to the IESG, or the objections raised can be addressed by the proposer and the property resubmitted.

7.3 Property Change Control

Existing properties can be changed using the same process by which they were registered.

1. Define the change
2. Post the change
3. Allow a comment period
4. Submit the property for approval

Note that the original author or any other interested party can propose a change to an existing property, but that such changes should only be proposed when there are serious omissions or errors in the published memo. The Method Reviewer can object to a change if it is not backward compatible, but is not required to do so.

Property definitions can never be deleted from the IANA registry, but properties which are no longer believed to be useful can be declared OBSOLETE by a change to their "intended use" field.

8 References

- [IMIP] Dawson, F., Mansour, S. and S. Silverberg, "iCalendar Message-based Interoperability Protocol (IMIP)", RFC 2447, November 1998.
- [ITIP] Silverberg, S., Mansour, S., Dawson, F. and R. Hopson, "iCalendar Transport-Independent Interoperability Protocol (iTIP) : Scheduling Events, Busy Time, To-dos and Journal Entries", RFC 2446, November 1998.
- [ISO 8601] ISO 8601, "Data elements and interchange formats--Information interchange--Representation of dates and times", International Organization for Standardization, June, 1988.
- [ISO 9070] ISO/IEC 9070, "Information Technology_SGML Support Facilities--Registration Procedures for Public Text Owner Identifiers", Second Edition, International Organization for Standardization, April 1991.
- [RFC 822] Crocker, D., "Standard for the Format of ARPA Internet Text Messages", STD 11, RFC 822, August 1982.
- [RFC 1738] Berners-Lee, T., Masinter, L. and M. McCahill, "Uniform Resource Locators (URL)", RFC 1738, December 1994.
- [RFC 1766] Alvestrand, H., "Tags for the Identification of Languages", RFC 1766, March 1995.
- [RFC 2045] Freed, N. and N. Borenstein, " Multipurpose Internet Mail Extensions (MIME) - Part One: Format of Internet Message Bodies", RFC 2045, November 1996.
- [RFC 2046] Freed, N. and N. Borenstein, " Multipurpose Internet Mail Extensions (MIME) - Part Two: Media Types", RFC 2046, November 1996.

- [RFC 2048] Freed, N., Klensin, J. and J. Postel, "Multipurpose Internet Mail Extensions (MIME) - Part Four: Registration Procedures", RFC 2048, January 1997.
- [RFC 2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC 2234] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 2234, November 1997.
- [RFC 2279] Yergeau, F., "UTF-8, a transformation format of ISO 10646", RFC 2279, January 1998.
- [RFC 2425] Howes, T., Smith, M. and F. Dawson, "A MIME Content-Type for Directory Information", RFC 2425, September 1998.
- [RFC 2426] Dawson, F. and T. Howes, "vCard MIME Directory Profile", RFC 2426, September 1998.
- [TZ] Olson, A.D., et al, Time zone code and data, <ftp://elsie.nci.nih.gov/pub/>, updated periodically.
- [VCAL] Internet Mail Consortium, "vCalendar - The Electronic Calendaring and Scheduling Exchange Format", <http://www.imc.org/pdi/vcal-10.txt>, September 18, 1996.

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10 Authors' and Chairs' Addresses

The following address information is provided in a MIME-VCARD, Electronic Business Card, format.

The authors of this memo are:

```
BEGIN:VCARD
VERSION:3.0
N:Dawson;Frank
FN:Frank Dawson
ORG:Lotus Development Corporation
ADR;TYPE=WORK,POSTAL,PARCEL;;;6544 Battleford Drive;
  Raleigh;NC;27613-3502;USA
TEL;TYPE=WORK,MSG:+1-919-676-9515
TEL;TYPE=WORK,FAX:+1-919-676-9564
EMAIL;TYPE=PREF,INTERNET:Frank_Dawson@Lotus.com
EMAIL;TYPE=INTERNET:fdawson@earthlink.net
URL:http://home.earthlink.net/~fdawson
END:VCARD
```

```
BEGIN:VCARD
VERSION:3.0
N:Stenerson;Derik
FN:Derik Stenerson
ORG:Microsoft Corporation
ADR;TYPE=WORK,POSTAL,PARCEL;;;One Microsoft Way;
  Redmond;WA;98052-6399;USA
TEL;TYPE=WORK,MSG:+1-425-936-5522
TEL;TYPE=WORK,FAX:+1-425-936-7329
EMAIL;TYPE=INTERNET:deriks@Microsoft.com
END:VCARD
```

The iCalendar object is a result of the work of the Internet Engineering Task Force Calendaring and Scheduling Working Group. The chairmen of that working group are:

```
BEGIN:VCARD
VERSION:3.0
N:Ganguly;Anik
FN:Anik Ganguly
ORG: Open Text Inc.
ADR;TYPE=WORK,POSTAL,PARCEL;;;Suite 101;38777 West Six Mile Road;
  Livonia;MI;48152;USA
TEL;TYPE=WORK,MSG:+1-734-542-5955
EMAIL;TYPE=INTERNET:ganguly@acm.org
END:VCARD
```

The co-chairman of that working group is:

```
BEGIN:VCARD
VERSION:3.0
N:Moskowitz;Robert
FN:Robert Moskowitz
EMAIL;TYPE=INTERNET:rgm-ietf@htt-consult.com
END:VCARD
```

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