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## iCalendar Message-Based Interoperability Protocol (iMIP)

### Abstract

This document, "iCalendar Message-Based Interoperability Protocol (iMIP)", specifies a binding from the iCalendar Transport-independent Interoperability Protocol (iTIP) to Internet email-based transports. Calendaring entries defined by the iCalendar Object Model (iCalendar) are wrapped using constructs from RFC 5322 and MIME (RFC 2045, RFC 2046, RFC 2047, and RFC 2049), and then transported over SMTP.

### Status of This Memo

This is an Internet Standards Track document.

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## Table of Contents

1. Introduction .....	3
1.1. Related Memos .....	3
1.2. Formatting Conventions .....	3
1.3. Terminology .....	4
2. MIME Message Format Binding .....	4
2.1. MIME Media Type .....	4
2.2. Security .....	5
2.2.1. Authorization .....	5
2.2.2. Authentication .....	5
2.2.3. Confidentiality .....	5
2.3. Email Addresses .....	6
2.4. Content-Type Header Field .....	6
2.5. Content-Transfer-Encoding Header Field .....	7
2.6. Content-Disposition Header Field .....	8
3. Security Considerations .....	8
4. Examples .....	11
4.1. Single Component with an ATTACH Property .....	11
4.2. Using multipart/alternative for Low-Fidelity Clients .....	11
4.3. Single Component with an ATTACH Property and Inline Attachment .....	12
4.4. Multiple Similar Components .....	14
4.5. Multiple Mixed Components .....	15
4.6. Detailed Components with an ATTACH Property .....	16
5. Recommended Practices .....	18
5.1. Use of Content and Message IDs .....	18
6. IANA Considerations .....	18
7. References .....	19
7.1. Normative References .....	19
7.2. Informative References .....	20
Appendix A. Changes since RFC 2447 .....	21
Appendix B. Acknowledgements .....	22

## 1. Introduction

This document provides the transport-specific information ("binding") necessary to convey iCalendar Transport-independent Interoperability Protocol (iTIP) [iTIP] over Internet email (using MIME) as defined in [RFC5322] and [RFC2045]. Therefore, this document defines the iCalendar Message-Based Interoperability Protocol (iMIP).

### 1.1. 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 document specifies an Internet email binding for iTIP.

[iCAL] specifies a core specification of objects, data types, properties, and property parameters.

[iTIP] specifies an interoperability protocol for scheduling between different implementations.

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.

### 1.2. Formatting Conventions

The mechanisms defined in this memo are defined in prose. In order to refer to elements of the calendaring and scheduling model, core object, or interoperability protocol defined in [iCAL] and [iTIP], some formatting conventions have been used.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

Calendaring and scheduling roles are referred to in quoted strings of text with the first character of each word in uppercase. For example, "Organizer" refers to a role of a "Calendar User" within the scheduling protocol defined by [iTIP].

Calendar components defined by [iCAL] 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.

Properties defined by [iCAL] 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 [iCAL] 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.

### 1.3. Terminology

The email terms used in this memo are defined in [RFC5322] and [RFC2045]. The calendaring and scheduling terms used in this memo are defined in [iCAL] and [iTIP].

## 2. MIME Message Format Binding

This section defines the message binding to the MIME electronic mail transport.

The sections below refer to the "originator" and the "recipient" of an iMIP message. In the case of a "request" method, the originator is the "Organizer" and the recipient is an "Attendee" of the event. In the case of a "response" method, the originator is an "Attendee" and the recipient is the "Organizer" of the event.

The [RFC5322] "Reply-To" header field typically contains the email address of the originator of the scheduling message. However, this cannot be guaranteed because the sender of the iMIP message might not be the originator of the scheduling message and the sender's "Mail User Agent" (MUA) might not enforce iMIP semantics by translating the originator's address into the "Reply-To" email header field.

### 2.1. MIME Media Type

A MIME entity containing content information formatted according to this document will be referenced as a "text/calendar" content type [iCAL]. It is assumed that this content type will be transported through a MIME electronic mail transport.

## 2.2. Security

This section addresses several aspects of security including authentication, authorization, and confidentiality. Authentication and confidentiality can be achieved using Secure/MIME (S/MIME) [RFC5750] [RFC5751], which uses the Security Multiparts framework for MIME [RFC1847].

### 2.2.1. Authorization

In iTIP messages [iTIP], only the "Organizer" is authorized to modify or cancel calendar entries she organizes. That is, spoof@xyz.example.net is not allowed to modify or cancel a meeting that was organized by a@example.com. Furthermore, only the respondent has the authorization to indicate their status to the "Organizer". That is, the "Organizer" MUST ignore an iTIP message from spoof@xyz.example.net that declines a meeting invitation for b@example.com.

Implementations of iMIP SHOULD verify the authenticity of the creator of an iCalendar object before taking any action. Methods for doing this are presented later in this document.

[RFC1847] message flow in iTIP supports someone working on behalf of a "Calendar User" through use of the "sent-by" parameter that is associated with the "ATTENDEE" and "ORGANIZER" properties. However, there is no mechanism to verify whether or not a "Calendar User" has authorized someone to work on their behalf. It is left to implementations to provide mechanisms for the "Calendar Users" to make that decision.

### 2.2.2. Authentication

Authentication MUST be performed using S/MIME [RFC5750] [RFC5751]. Authentication is possible only on messages that have been signed. Unauthenticated messages (i.e., unsigned messages) may not be trusted.

### 2.2.3. Confidentiality

To ensure confidentiality using iMIP, implementations SHOULD utilize encryption specified in S/MIME [RFC5750] [RFC5751]. iMIP does not restrict a "Calendar User Agent" (CUA) from forwarding iCalendar objects to other users or agents.

### 2.3. Email Addresses

The calendar address specified within the "ORGANIZER" and "ATTENDEE" properties in an iCalendar object sent using iMIP MUST be a proper "mailto:" [MAILTO] URI specification for the corresponding "Organizer" or "Attendee" of the "VEVENT" or "VTODO".

Because [iTIP] does not preclude "Attendees" from forwarding "VEVENT"s or "VTODO"s to others, the [RFC5322] "Sender" value may not equal that of the "Organizer". Additionally, the "Organizer" or "Attendee" cannot be reliably inferred by the [RFC5322] "Sender" or "Reply-To" header field values of an iMIP message. The relevant address MUST be ascertained by opening the "text/calendar" MIME body part and examining the "ATTENDEE" and "ORGANIZER" properties.

### 2.4. Content-Type Header Field

A MIME body part containing content information that conforms to this document MUST have an [RFC2045] "Content-Type" value of "text/calendar". The [RFC2045] "Content-Type" header field MUST also include the MIME parameter "method". The value MUST be the same (ignoring case) as the value of the "METHOD" property within the iCalendar object.

Note 1: A MIME message containing multiple iCalendar objects with different "method" values MUST be further encapsulated with a "multipart/mixed" MIME entity [RFC2046]. This will allow each of the iCalendar objects to be encapsulated within their own "text/calendar" MIME entity.

Note 2: A MIME body part with a "Content-Type" value of "text/calendar" that lacks the "method" parameter is not considered to be an iMIP body part and thus is not subject to the requirements specified in this document.

Note that according to [iCAL] the default character set for iCalendar objects is UTF-8 [UTF-8]. However, the default character set for a "text/\*" MIME entity according to [RFC2046] is US-ASCII. Thus, a "charset" MIME parameter MUST be present if the iCalendar object contains characters that can't be represented in the US-ASCII character set and, as specified in [iCAL], it MUST have the value "UTF-8".

The optional "component" MIME parameter defines the iCalendar component type contained within the iCalendar object.

The following is an example of this header field with a value that indicates an event message.

```
Content-Type: text/calendar; method=REQUEST; charset=UTF-8;
             component=vevent
```

The "text/calendar" content type allows for the scheduling message type to be included in a MIME message with other content information (i.e., "multipart/mixed") or included in a MIME message with a clear-text, human-readable form of the scheduling message (i.e., "multipart/alternative" [RFC2046]).

In order to permit the information in the scheduling message to be understood by MIME User Agents (UAs) that do not support the "text/calendar" content type, scheduling messages SHOULD be sent with an alternative, human-readable form of the information.

Note that "multipart/alternative" MUST NOT be used to represent two slightly different iCalendar objects, for example, two "VEVENT"s with alternative starting times.

CUAs can use other MIME parameters of the "Content-Type" header field, as well as a language specified in the Content-Language header field [RFC3282], to pick a "text/calendar" part for processing if a "multipart/alternative" MIME message contains more than one "text/calendar" part.

Any receiving UA compliant with this specification MUST be able to process "text/calendar" body parts enclosed within "multipart/\*". Note that a "multipart/mixed" MIME message can include multiple "text/calendar" components. The receiving UA MUST be able to process all of them.

## 2.5. Content-Transfer-Encoding Header Field

Unless an iMIP message is transported over 8-bit clean transport (such as SMTP [8BITMIME]), a transfer encoding such as quoted-printable or base64 [RFC2045] MUST be used for iCalendar objects containing any characters that can't be represented in the US-ASCII character set. For example:

From: user1@example.com  
To: user2@example.com  
Subject: Phone Conference  
Mime-Version: 1.0  
Date: Wed, 07 May 2008 21:30:25 +0400  
Message-ID: <4821E731.5040506@laptop1.example.com>  
Content-Type: text/calendar; method=REQUEST; charset=UTF-8  
Content-Transfer-Encoding: quoted-printable

BEGIN:VCALENDAR  
PRODID:-//Example/ExampleCalendarClient//EN  
METHOD:REQUEST  
VERSION:2.0  
BEGIN:VEVENT  
ORGANIZER:mailto:user1@example.com  
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:user1@example.com  
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:user2@example.com  
DTSTAMP:20080507T170000Z  
DTSTART:20080701T160000Z  
DTEND:20080701T163000Z  
SUMMARY:Phone call to discuss your last visit  
DESCRIPTION:=D1=82=D1=8B =D0=BA=D0=B0=D0=BA - =D0=B4=D0=BE=D0=  
=B2=D0=BE=D0=BB=D0=B5=D0=BD =D0=BF=D0=BE=D0=B5=D0=B7=D0=B4=D0=BA=D0  
=BE=D0=B9?  
UID:calsvr.example.com-8739701987387998  
SEQUENCE:0  
STATUS:TENTATIVE  
END:VEVENT  
END:VCALENDAR

## 2.6. Content-Disposition Header Field

Implementations MAY include a "Content-Disposition" header field to define a file name for an iCalendar object. However, the handling of a MIME part MUST be based on its [RFC2045] "Content-Type" and not on the extension specified in the "Content-Disposition", as different email malware is known to trick User Agents into misinterpreting content of messages by specifying a file extension in the Content-Disposition header field that doesn't correspond to the value of the "Content-Type" header field.

## 3. Security Considerations

The security threats that applications must address when implementing iTIP are detailed in [iTIP]. In particular, two spoofing threats are identified in Section 6.1 of [iTIP]: spoofing the "Organizer", and spoofing an "Attendee". To address these threats, the originator of an iCalendar object must be authenticated by a recipient. Once



authenticated, a determination can be made as to whether or not the originator is authorized to perform the requested operation. Compliant applications MUST support signing and encrypting "text/calendar" body parts using a mechanism based on S/MIME [RFC5750] [RFC5751] in order to facilitate the authentication of the originator of the iCalendar object (see Sections 2.2.2 and 2.2.3). The steps for processing a signed iMIP message are described below:

1. Using S/MIME, determine who signed the "text/calendar" body part containing the iCalendar object. This is the "signer". (Note that the email address of the signer MUST be specified in the rfc822Name field of the "subject alternative name" extension of the signer certificate, as specified in [RFC5280], Section 4.1.2.6.) Note that the signer is not necessarily the person sending an e-mail message, since an e-mail message can be forwarded.
2. Correlate the signer to either an "ATTENDEE" property or to the "ORGANIZER" property in the iCalendar object, based on the method and the calendar component specified in the iCalendar object, as defined in Section 1.4 of [iTIP]. If the signer cannot be correlated to an "ATTENDEE"/"ORGANIZER" property, then actively warn the user controlling the "Calendar User Agent" that the iCalendar object is untrusted, and encourage the user to ignore the message, but give advanced users the option to (a) view the certificate of the signer and the entire certificate chain (if any) in order to help decide if the signer should be trusted to send the message, and then (b) allow the CUA to accept and process the iCalendar object.
3. Determine whether or not the "ATTENDEE"/"ORGANIZER" is authorized to perform the operation as defined by [iTIP]. If the conditions are not met, ignore the message.
4. If all the above conditions are met, the message can be processed.

S/MIME signing also protects against malicious changes to messages in transit.

If calendar confidentiality is required by the sender, signed iMIP messages SHOULD be encrypted by a mechanism based on S/MIME [RFC5750] [RFC5751]. If iMIP is used within a single Administrative Management Domain (ADMD) [RFC5598], SMTP STARTTLS [SMTP-TLS] (together with STARTTLS in IMAP/POP [IMAP-POP-TLS]) MAY alternatively be used to provide calendar confidentiality.

Once a signed and/or encrypted iMIP message is received and successfully verified (as detailed above) by a CUA, the CUA SHOULD remember whether the sender of the message is using signing and/or encrypting. If an unsigned iMIP message is received from the same sender later on, the receiving CUA SHOULD warn the receiving user about a possible man-in-the-middle attack and SHOULD ignore the message, unless explicitly overridden by the user.

Implementations MAY provide means for users to disable signing and encrypting.

It is possible to receive iMIP messages sent by someone working on behalf of another "Calendar User". This is determined by examining the "sent-by" parameter in the relevant "ORGANIZER" or "ATTENDEE" property. [iCAL] and [iTIP] provide no mechanism to verify that a "Calendar User" has authorized someone else to work on their behalf. To address this security issue, implementations MUST provide mechanisms for the "Calendar Users" to make that decision before applying changes from someone working on behalf of a "Calendar User". One way to achieve this is to reject iMIP messages sent by users other than the "ORGANIZER" or the "ATTENDEE"s. Alternatively, the receiver could have a list of trusted <sent-by, organizer> proxies in its local security policy. And yet another way is to prompt the user for confirmation.

iMIP-based calendaring is frequently deployed within a single ADMD, with boundary filtering employed to restrict email calendaring flows to be inside the ADMD. This can help in minimizing malicious changes to calendaring messages in transit, as well as in making authorization decisions less risky.

A security consideration associated with the use of the Content-Disposition header field is described in Section 2.6.

Use of S/MIME makes the security considerations discussed in [RFC5750] [RFC5751] relevant to this document. For additional security considerations regarding certificate and Certificate Revocation List (CRL) verification, please see [RFC5280].

## 4. Examples

### 4.1. Single Component with an ATTACH Property

This minimal message shows how an iCalendar object references an attachment. The attachment is accessible via its URL.

```
From: sman@netscape.example.com
To: stevesil@microsoft.example.com
Subject: Phone Conference
Mime-Version: 1.0
Content-Type: text/calendar; method=REQUEST; charset=US-ASCII
Content-Transfer-Encoding: 7bit

BEGIN:VCALENDAR
PRODID:-//Example/ExampleCalendarClient//EN
METHOD:REQUEST
VERSION:2.0
BEGIN:VEVENT
ORGANIZER:mailto:man@netscape.example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:man@netscape.example.com
ATTENDEE;RSVP=YES:mailto:stevesil@microsoft.example.com
DTSTAMP:19970611T190000Z
DTSTART:19970701T210000Z
DTEND:19970701T230000Z
SUMMARY:Phone Conference
DESCRIPTION:Please review the attached document.
UID:calsvr.example.com-873970198738777
ATTACH:ftp://ftp.bar.example.com/pub/docs/foo.doc
STATUS:CONFIRMED
END:VEVENT
END:VCALENDAR
```

### 4.2. Using multipart/alternative for Low-Fidelity Clients

This example shows how a client can emit a multipart message that includes both a plain text version and the full iCalendar object. Clients that do not support "text/calendar" will still be capable of rendering the plain text representation.

From: fool@example.com  
To: foo2@example.com  
Subject: Phone Conference  
Mime-Version: 1.0  
Content-Type: multipart/alternative; boundary="01BD3665.3AF0D360"

--01BD3665.3AF0D360  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

This is an alternative representation of a "text/calendar"  
MIME object.

When: 7/1/1997 10:00AM PDT - 7/1/97 10:30AM PDT  
Where:  
Organizer: fool@example.com  
Summary: Phone Conference

--01BD3665.3AF0D360  
Content-Type: text/calendar; method=REQUEST; charset=US-ASCII  
Content-Transfer-Encoding: 7bit

BEGIN:VCALENDAR  
PRODID:-//Example/ExampleCalendarClient//EN  
METHOD:REQUEST  
VERSION:2.0  
BEGIN:VEVENT  
ORGANIZER:mailto:fool@example.com  
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:fool@example.com  
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:foo2@example.com  
DTSTAMP:19970611T190000Z  
DTSTART:19970701T170000Z  
DTEND:19970701T173000Z  
SUMMARY:Phone Conference  
UID:calsvr.example.com-8739701987387771  
SEQUENCE:0  
STATUS:CONFIRMED  
END:VEVENT  
END:VCALENDAR

--01BD3665.3AF0D360

#### 4.3. Single Component with an ATTACH Property and Inline Attachment

This example shows how a message containing an iCalendar object references an attached document. The reference is made using a Content-ID (CID). Thus, the iCalendar object and the document are packaged in a "multipart/related" encapsulation.

From: fool@example.com  
To: foo2@example.com  
Subject: Phone Conference  
Mime-Version: 1.0  
Content-Type: multipart/related; boundary="boundary-example-1"

--boundary-example-1

Content-Type: text/calendar; method=REQUEST; charset=US-ASCII  
Content-Transfer-Encoding: 7bit  
Content-Disposition: attachment; filename="event.ics"

BEGIN:VCALENDAR  
PRODID:-//Example/ExampleCalendarClient//EN  
METHOD:REQUEST  
VERSION:2.0  
BEGIN:VEVENT  
ORGANIZER:mailto:fool@example.com  
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:fool@example.com  
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:foo2@example.com  
DTSTAMP:19970611T190000Z  
DTSTART:19970701T180000Z  
DTEND:19970701T183000Z  
SUMMARY:Phone Conference  
UID:calsvr.example.com-8739701987387771  
ATTACH:cid:123456789@example.com  
SEQUENCE:0  
STATUS:CONFIRMED  
END:VEVENT  
END:VCALENDAR

--boundary-example-1

Content-Type: application/msword; name="FieldReport.doc"  
Content-Transfer-Encoding: base64  
Content-Disposition: inline; filename="FieldReport.doc"  
Content-ID: <123456789@example.com>

0M8R4KGxGuEAAAAAAAAAAAAAAAAAAAPgADAP7/CQAGAAAAAAAAAAAAABAAAAAAAAAAAA  
AAAAEAAAQAAAAEAAAD+////AAAAEUAAAD//  
...

--boundary-example-1--

#### 4.4. Multiple Similar Components

Multiple iCalendar components of the same type can be included in the iCalendar object when the "METHOD" is the same for each component.

```
From: fool@example.com
To: foo2@example.com
Subject: Summer Company Holidays
Mime-Version: 1.0
Content-Type: text/calendar; method=PUBLISH; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Disposition: attachment; filename="event.ics"
```

```
BEGIN:VCALENDAR
PRODID:-//Example/ExampleCalendarClient//EN
METHOD:PUBLISH
VERSION:2.0
BEGIN:VEVENT
ORGANIZER:mailto:fool@example.com
DTSTAMP:19970611T150000Z
DTSTART:19970701T150000Z
DTEND:19970701T230000Z
SUMMARY:Company Picnic
DESCRIPTION:Food and drink will be provided
UID:calsvr.example.com-873970198738777-1
SEQUENCE:0
STATUS:CONFIRMED
END:VEVENT
BEGIN:VEVENT
ORGANIZER:mailto:fool@example.com
DTSTAMP:19970611T190000Z
DTSTART:19970715T150000Z
DTEND:19970715T230000Z
SUMMARY:Company Bowling Tournament
DESCRIPTION:We have 10 lanes reserved
UID:calsvr.example.com-873970198738777-2
SEQUENCE:0
STATUS:CONFIRMED
END:VEVENT
END:VCALENDAR
```

#### 4.5. Multiple Mixed Components

Different component types must be encapsulated in separate iCalendar objects.

```
From: fool@example.com
To: foo2@example.com
Subject: Phone Conference
Mime-Version: 1.0
Content-Type: multipart/mixed;
              boundary="--FEE3790DC7E35189CA67CE2C"
```

This is a multi-part message in MIME format.

```
-----FEE3790DC7E35189CA67CE2C
Content-Type: text/calendar; method=REQUEST; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Disposition: attachment; filename="event1.ics"
```

```
BEGIN:VCALENDAR
PRODID:-//Example/ExampleCalendarClient//EN
METHOD:REQUEST
VERSION:2.0
BEGIN:VEVENT
ORGANIZER:mailto:fool@example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:fool@example.com
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:foo2@example.com
DTSTAMP:19970611T190000Z
DTSTART:19970701T210000Z
DTEND:19970701T230000Z
SUMMARY:Phone Conference
DESCRIPTION:Discuss what happened at the last meeting
UID:calsvr.example.com-8739701987387772
SEQUENCE:0
STATUS:CONFIRMED
END:VEVENT
END:VCALENDAR
```

```
-----FEE3790DC7E35189CA67CE2C
Content-Type: text/calendar; method=REQUEST; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Disposition: attachment; filename="todo1.ics"
```

```
BEGIN:VCALENDAR
PRODID:-//Example/ExampleCalendarClient//EN
METHOD:REQUEST
VERSION:2.0
BEGIN:VTODO
DUE:19970701T160000Z
ORGANIZER:mailto:fool@example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:fool@example.com
ATTENDEE;RSVP=YES:mailto:foo2@example.com
SUMMARY:Phone Conference
DESCRIPTION:Discuss a new location for the company picnic
UID:calsvr.example.com-td-8739701987387773
SEQUENCE:0
STATUS:NEEDS-ACTION
END:VEVENT
END:VCALENDAR
```

```
-----FEE3790DC7E35189CA67CE2C
```

#### 4.6. Detailed Components with an ATTACH Property

This example shows the format of a message containing a group meeting between three individuals. The "multipart/related" encapsulation is used because the iCalendar object contains an ATTACH property that uses a CID to reference the attachment.

```
From: fool@example.com
MIME-Version: 1.0
To: foo2@example.com,foo3@example.com
Subject: REQUEST - Phone Conference
Content-Type: multipart/related;
            boundary="--FEE3790DC7E35189CA67CE2C"
```

```
-----FEE3790DC7E35189CA67CE2C
Content-Type: multipart/alternative;
            boundary="--00FEE3790DC7E35189CA67CE2C00"
```



```
-----00FEE3790DC7E35189CA67CE2C00
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

When: 7/1/1997 10:00PM PDT - 7/1/97 10:30 PM PDT
Where:
Organizer: fool@example.com
Summary: Let's discuss the attached document

-----00FEE3790DC7E35189CA67CE2C00

Content-Type: text/calendar; method=REQUEST; charset=US-ASCII;
          Component=vevent
Content-Transfer-Encoding: 7bit
Content-Disposition: attachment; filename="event.ics"

BEGIN:VCALENDAR
PRODID:-//Example/ExampleCalendarClient//EN
METHOD:REQUEST
VERSION:2.0
BEGIN:VEVENT
ORGANIZER:fool@example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:fool@example.com
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:foo2@example.com
ATTENDEE;RSVP=YES;CUTYPE=INDIVIDUAL:mailto:foo3@example.com
DTSTAMP:19970611T190000Z
DTSTART:19970621T170000Z
DTEND:19970621T173000Z
SUMMARY:Let's discuss the attached document
UID:calsvr.example.com-873970198738777-8aa
ATTACH:cid:calsvr.example.com-12345aaa
SEQUENCE:0
STATUS:CONFIRMED
END:VEVENT
END:VCALENDAR

-----00FEE3790DC7E35189CA67CE2C00
```

```
-----FEE3790DC7E35189CA67CE2C
Content-Type: application/msword; name="FieldReport.doc"
Content-Transfer-Encoding: base64
Content-Disposition: inline; filename="FieldReport.doc"
Content-ID: <calsvr.example.com-12345aaa>

R0lGODdhTAQZAJEAAFVVvd3d3e4AAP///ywAAAAATAQZAAAC/5yPOSld6OctNqLs94Xq
AG4kiW5omm6sq27gvH8kzX9oly+s73/g8MCofEovGITCoxKMbyCR16cNSq9YrNarfcrvd
riIH5LL5jE6rxc3G+v2cguf0uv2Oz+v38L7/DxgoOKjURnjIIBE3yNjo+AgZWYVIWW15i
ZnJY6J
...

-----FEE3790DC7E35189CA67CE2C
```

## 5. Recommended Practices

This section outlines a series of recommended practices when using a messaging transport to exchange iCalendar objects.

### 5.1. Use of Content and Message IDs

The [iCAL] specification makes frequent use of the URI for data types in properties such as "DESCRIPTION", "ATTACH", "CONTACT", and others. Two forms of URIs are the Message ID (MID) and the Content-ID (CID). These are defined in [RFC2392]. Although [RFC2392] allows referencing messages or MIME body parts in other MIME entities or stores, it is strongly RECOMMENDED that iMIP implementations include all referenced messages and body parts in a single MIME entity. Simply put, if an iCalendar object contains CID or MID references to other messages or body parts, implementations should ensure that these messages and/or body parts are transmitted with the iCalendar object. If they are not, there is no guarantee that the receiving CUA will have the access or the authorization to view those objects.

## 6. IANA Considerations

The "text/calendar" MIME media type was registered in [iCAL].

## 7. References

### 7.1. Normative References

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## 7.2. Informative References

- [8BITMIME] Klensin, J., Freed, N., Rose, M., Stefferud, E., and D. Crocker, "SMTP Service Extension for 8bit-MIMEtransport", RFC 1652, July 1994.
- [RFC5598] Crocker, D., "Internet Mail Architecture", RFC 5598, July 2009.
- [RFC3282] Alvestrand, H., "Content Language Headers", RFC 3282, May 2002.

## Appendix A. Changes since RFC 2447

Updated references. Split them into Normative and Informative.

Updated examples to use example.com/example.net domains.

Corrected usage of RFC 2119 language.

Clarified that charset=UTF-8 is required, unless the calendar can be entirely represented in US-ASCII.

Clarified that 7-bit content transfer encodings should be used unless the calendar object is known to be transferred over 8-bit clean transport.

Clarified that file extension specified in the Content-Disposition header field is not to be used to override the "Content-Type" MIME type.

Disallowed use of "multipart/alternative" for slightly different representations of the same calendar.

Clarified handling of the "method" MIME parameter of the "Content-Type" header field.

Clarified that in an iMIP message an ORGANIZER/ATTENDEE property contains a mailto: URI.

Fixed examples with ATTENDEE property to use "CUTYPE=" instead of "TYPE=".

Clarified that message integrity/confidentiality should be achieved using S/MIME.

Provided additional examples.

Improved the Security Considerations section.

Made multiple editorial changes to different sections of the document.

## Appendix B. Acknowledgements

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