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.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6047.

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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: foo1@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: foo1@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:foo1@example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:foo1@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: foo1@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:foo1@example.com
ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:foo1@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>

0M8R4KGxGuEAAAAAAAAAAAAAAAAAAAAPgADAP7/CQAGAAAAAAAAAABAAAARAAAAAAA
AAAAEAAAQAAAAAEAAAD+////AAAAAEUAAAD/////////////////////////////////
  ...

--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: foo1@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:foo1@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:foo1@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: foo1@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:foo1@example.com
   ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:foo1@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:foo1@example.com
     ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:mailto:foo1@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: foo1@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: foo1@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:foo1@example.com
  ATTENDEE;ROLE=CHAIR;PARTSTAT=ACCEPTED:foo1@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:199706211T173000Z
  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/5yPOSLhD6OctNqLs94Xq
AG4kiW5omm6sq27gvH8kzX9o1y+s73/g8MCofEovGITCoxKMbyCR16cNSq9YrNarfcrvd
riIH5LL5jE6rxc3G+v2cguf0uv2Oz+v38L7/DxgoOKjURnjIIbe3yNjo+AgZWYVIWWl5i
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

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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.

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