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Content-ID header field in Session Initiation Protocol (SIP)
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Abstract

This document specifies the Content-ID header field for usage in the Session Initiation Protocol (SIP). The document also updates RFC 5621, which only allows a Content-ID URL to reference a body part that is part of a multipart message-body. This update enables a Content-ID URL to reference a complete message-body and metadata provided by some additional SIP header fields.

This document updates RFC 5368 and RFC 6442, by clarifying their usage of the SIP Content-ID header field.

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1. Introduction

1.1. Identifying a body part

A SIP message consists of a start-line, one or more header fields, an empty line indicating the end of the header fields, and an optional message-body, as specified in [RFC3261].

The message-body can be a non-multipart message-body or a multipart message-body as specified in [RFC3261].

[RFC5621] defines generic handling of a multipart message-body in a SIP message.

A multipart message-body contains zero, one or several body parts, encoded using [RFC2045] format.

A body part in the multipart message-body is described using header fields such as Content-Disposition, Content-Encoding, and Content-Type, which provide information on the content of the body part, as specified in [RFC5621]. A body part in the multipart message-body can also contain a Content-ID header field with an ID value uniquely identifying the body part, as specified in [RFC2045].

1.2. Referencing a body part

A SIP header field can reference a body part using a Content-ID URL, as specified in [RFC5621].

The Content-ID URL is specified in [RFC2392]. [RFC2392] specifies how to identify the body part referenced by a Content-ID URL. The Content-ID URL value is included in the Content-ID header field of the body part.

Examples of SIP header fields referencing a body part using a Content-ID URL are:

- [RFC6442] specifies how a Geolocation header field references a body part using a Content-ID URL, for providing location information.
- [RFC5368] specifies how a Refer-To header field references a body part using a Content-ID URL, to provide a list of targets.

1.3. Problem statement

It is currently not specified how to uniquely identify a complete message-body of a SIP message using a Content-ID header field, and how to reference a complete message-body using a Content-ID URL.

NOTE: In [RFC5621], the Content-ID URL references a specific body part only.

Some existing specifications, for example [RFC5368], contain examples that show usage of a SIP Content-ID header field referencing a complete message-body, eventhough such usage has never been specified.

1.4. Consequences

The examples below shows the consequences of the problem described above.

1.4.1. Example 1

If a User Agent Client (UAC) sends an INVITE request conveying location as specified in [RFC6442], if the UAC decides not to include an SDP offer, and if the location is conveyed by value, then the UAC needs to include only one MIME entity in the INVITE request. This MIME entity can be, for example, of the application/pidf+xml MIME type.

However, due to [RFC6442] requiring inclusion of a Geolocation header field referencing the body part with the location information, the UAC includes a multipart message-body with single body part in the INVITE request, and includes the location information of application/pidf+xml MIME type and an associated Content-ID header field in the body part.

```
Example message (SIP INVITE):

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIPS/2.0/TLS pc33.atlanta.example.com;branch=z9hG4bK74bf9
Max-Forwards: 70
To: Bob <sips:bob@biloxi.example.com>
From: Alice <sips:alice@atlanta.example.com>;tag=9fxced76sl
Call-ID: 3848276298220188511@atlanta.example.com
Geolocation: <cid:target123@atlanta.example.com>
Geolocation-Routing: no
Accept: application/sdp, application/pidf+xml
CSeq: 31862 INVITE
Contact: <sips:alice@atlanta.example.com>
Content-Type: multipart/mixed; boundary=boundary1
Content-Length: ...

--boundary1
Content-Type: application/pidf+xml
Content-ID: <target123@atlanta.example.com>

<?xml version="1.0" encoding="UTF-8"?>
<presence
  xmlns="urn:ietf:params:xml:ns:pidf"
  xmlns:gp="urn:ietf:params:xml:ns:pidf:geopriv10"
  xmlns:gbp="urn:ietf:params:xml:ns:pidf:geopriv10:basicPolicy"
  xmlns:cl="urn:ietf:params:xml:ns:pidf:geopriv10:civicAddr"
```

```
      xmlns:gml="http://www.opengis.net/gml"
      xmlns:dm="urn:ietf:params:xml:ns:pidf:data-model"
      entity="pres:alice@atlanta.example.com"
      >
      <dm:device id="target123-1">
        <gp:geopriv>
          <gp:location-info>
            <gml:location>
              <gml:Point srsName="urn:ogc:def:crs:EPSG::4326">
                <gml:pos>32.86726 -97.16054</gml:pos>
              </gml:Point>
            </gml:location>
          </gp:location-info>
          <gp:usage-rules>
            <gbp:retransmission-allowed>false
            </gbp:retransmission-allowed>
            <gbp:retention-expiry>2010-11-14T20:00:00Z
            </gbp:retention-expiry>
          </gp:usage-rules>
          <gp:method>802.11</gp:method>
        </gp:geopriv>
        <dm:deviceID>mac:1234567890ab</dm:deviceID>
        <dm:timestamp>2010-11-04T20:57:29Z</dm:timestamp>
      </dm:device>
    </presence>
    --boundary1--
```

1.4.2. Example 2

If a UAC sends an REFER request including a list of targets as specified in [RFC5368], then the UAC needs to include only one MIME entity in the REFER request. This MIME entity is of the application/resource-lists+xml MIME type.

However, due to [RFC5368] requiring inclusion of a Refer-To header field referencing the body part containing the list of targets, the UAC includes a multipart message-body with single body part in the REFER request, and includes the list of targets of application/resource-lists+xml MIME type and an associated Content-ID header field in the body part.

Example message (SIP REFER):

```
REFER sip:conf-123@example.com;gruu;opaque=hha9s8d-999a  SIP/2.0
Via: SIP/2.0/TCP client.chicago.example.com;branch=z9hG4bKhjhs8ass83
Max-Forwards: 70
To: "Conference 123" <sip:conf-123@example.com>
From: Carol <sip:carol@chicago.example.com>;tag=32331
Call-ID: d432fa84b4c76e66710
CSeq: 2 REFER
Contact: <sip:carol@client.chicago.example.com>
Refer-To: <cid:cn35t8jf02@example.com>
Refer-Sub: false
Require: multiple-refer, norefersub
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Events: dialog
Accept: application/sdp, message/sipfrag
Content-Type: multipart/mixed; boundary=boundary1
Content-Length: ...

--boundary1
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists
  xmlns="urn:ietf:params:xml:ns:resource-lists"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  >
  <list>
    <entry uri="sip:bill@example.com?method=BYE"/>
    <entry uri="sip:joe@example.org?method=BYE"/>
    <entry uri="sip:ted@example.net?method=BYE"/>
  </list>
</resource-lists>
--boundary1--
```

1.5. Solution

In order to solve the problems described above, this document:

- o Specifies and registers the Content-ID header field as a SIP header field; and
- o Specifies that, when used as a SIP header field, the Content-ID header field identifies the complete message-body, and metadata provided by some additional SIP header fields, of the SIP message; and

- o Updates [RFC5621], to enable a Content-ID URL to reference a complete message-body and metadata provided by some additional SIP header fields.
- o Updates [RFC5368] and [RFC6442] by adding explicit text saying that a SIP Content-ID header field can be used.

1.6. Backward compatibility

If an existing specification explicitly defines the usage of a multipart message-body for carrying a single body part, that specification MUST be updated in order to allow usage of a non-multipart message-body for carrying the MIME entity, and for referencing the whole message-body using a Content-ID URL.

2. Conventions

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 [RFC2119].

3. Content-ID header field

3.1. Introduction

This section defines the usage of the Content-ID header field for SIP.

3.2. Syntax

The ABNF [RFC5234] for the Content-ID header field is:

```
Content-ID = "Content-ID" HCOLON msg-id

msg-id     = "<" id-left "@" id-right ">"
```

NOTE: id-left and id-right are specified in [RFC5322]. HCOLON is defined in [RFC3261].

NOTE: When used in a SIP header field, the msg-id syntax has been simplified, compared to the syntax in [RFC5322], to disallow the use of comments and to adopt to the SIP usage of leading white space.

The value of Content-Id header field value must be unique in the context of a given SIP message, including any embedded MIME Content-Id header field values. Note that the SIP Content-ID header field value is not expected to be unique among all SIP messages; it has no meaning outside of the message in which it is included.

3.3. Semantics

The Content-ID header field included in the header fields of a SIP message identifies the message-body of the SIP message, and the metadata provided by:

- o a MIME-Version header field, if included in the header fields of the SIP message; and
- o any 'Content-' prefixed header fields (including the Content-ID header field itself) included in the header fields of the SIP message.

The Content-ID header field can be included in any SIP message which is allowed to contain a message-body.

NOTE: The message-body identified by the Content-ID header field can be a non-multipart message-body or a multipart message-body.

3.4. Procedures

3.4.1. User Agent (UA) procedures

A UA MAY include a Content-ID header field in any SIP message that is allowed to contain a message-body.

A UA MUST NOT include a Content-ID header field in any SIP message that is not allowed to contain a message-body.

The UA MUST set the value of the Content-ID header field to a value that is unique in the context of the SIP message.

3.4.2. Proxy procedures

A proxy MUST NOT add a Content-ID header field in a SIP message.

A proxy MUST NOT modify a Content-ID header field included in a SIP message.

A proxy MUST NOT delete a Content-ID header field from a SIP message.

3.4.3. Example

The figure shows an example from [RFC5368], where the SIP Content-ID header field is used to reference the message-body (non-multipart) of a SIP message.

```
REFER sip:conf-123@example.com;gruu;opaque=hha9s8d-999a  SIP/2.0
Via: SIP/2.0/TCP client.chicago.example.com
        ;branch=z9hG4bKhjhs8ass83
Max-Forwards: 70
To: "Conference 123" <sip:conf-123@example.com>
From: Carol <sip:carol@chicago.example.com>;tag=32331
Call-ID: d432fa84b4c76e66710
CSeq: 2 REFER
Contact: <sip:carol@client.chicago.example.com>
Refer-To: <cid:cn35t8jf02@example.com>
Refer-Sub: false
Require: multiple-refer, norefersub
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Events: dialog
Accept: application/sdp, message/sipfrag
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list
Content-Length: 362
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <list>
    <entry uri="sip:bill@example.com?method=BYE" />
    <entry uri="sip:joe@example.org?method=BYE" />
    <entry uri="sip:ted@example.net?method=BYE" />
  </list>
</resource-lists>
```

4. Update to RFC 5368

This section updates the second paragraph in section 7 of [RFC5368], by allowing usage of either a MIME Content-ID header field or a SIP Content-ID header field to label the body part or the message-body carrying the URI list.

OLD TEXT:

The Refer-To header field of a REFER request with multiple REFER-Targets MUST contain a pointer (i.e., a Content-ID Uniform Resource Locator (URL) as per RFC 2392 [RFC2392]) that points to the body part that carries the URI list. The REFER-Issuer SHOULD NOT include any particular URI more than once in the URI list.

NEW TEXT:

The Refer-To header field of a REFER request with multiple REFER-Targets MUST contain a pointer (i.e., a Content-ID Uniform Resource Locator (URL) as per RFC 2392 [RFC2392]) that points to the body part or message-body that carries the URI list. The REFER-Issuer SHOULD NOT include any particular URI more than once in the URI list. The REFER request can use either a MIME Content-ID header field [RFC4483] or a SIP Content-ID header field [RFCXXXX] to label the body part or the message-body.

5. Update to RFC 5621

This section updates section 9.1 of [RFC5621], by allowing a Content-ID URL to reference a message-body and the related metadata (Section 3.3), in addition to allowing a reference to a body part.

OLD TEXT:

> Content-ID URLs allow creating references to body parts. A given Content-ID URL [RFC2392], which can appear in a header field or within a body part (e.g., in an SDP attribute), points to a particular body part.

NEW TEXT:

> Content-ID URLs allow the creation of references to body parts or message-bodies (and the header fields describing the message-bodies). A given Content-ID URL [RFC2392], which can appear in a header field or within a body part (e.g., in an SDP attribute), points to a particular body part or the message-body (and the header fields describing the message-body).

6. Update to RFC 6442

This section updates the second paragraph in section 3.1 of [RFC6442], by allowing usage of either a MIME Content-ID header field or a SIP Content-ID header field to label the body part or the message-body carrying the location data.

OLD TEXT:

In Figure 1, Alice is both the Target and the LS that is conveying her location directly to Bob, who acts as an LR. This conveyance is point-to-point: it does not pass through any SIP-layer intermediary. A Location Object appears by-value in the initial SIP request as a MIME body, and Bob responds to that SIP request as appropriate. There is a 'Bad Location Information' response code introduced within this document to specifically inform Alice if she conveys bad location to Bob (e.g., Bob "cannot parse the location provided", or "there is not enough location information to determine where Alice is").

NEW TEXT:

In Figure 1, Alice is both the Target and the LS that is conveying her location directly to Bob, who acts as an LR. This conveyance is point-to-point: it does not pass through any SIP-layer intermediary. A Location Object appears by-value in the initial SIP request as a MIME body, and Bob responds to that SIP request as appropriate. Either a MIME Content-ID header field [RFC4483] or the SIP Content-ID header field [RFCXXXX] MUST be used to label the location information. There is a 'Bad Location Information' response code introduced within this document to specifically inform Alice if she conveys bad location to Bob (e.g., Bob "cannot parse the location provided", or "there is not enough location information to determine where Alice is").

7. Security considerations

The Content-ID header field value MUST NOT reveal sensitive user information.

If the message-body associated with the Content-ID header field is an encrypted body, it MUST NOT be possible to derive a key that can be used to decrypt the body from the Content-ID header field value.

8. IANA considerations

This specification registers a new SIP header field according to the procedures in [RFC3261].

8.1. Header field

The header field described in Section 3 has been registered in the "Header Fields" sub-registry of the "Session Initiation Protocol (SIP) Parameters" registry by adding a row with these values:

[RFC EDITOR NOTE: Please replace XXXX with the RFC number of this document when publishing]

Header Name: Content-ID

compact:

Reference: RFCXXXX

9. Change log

[RFC EDITOR NOTE: Please remove this section when publishing]

Changes from draft-ietf-sipcore-content-id-07

o Updates to affected RFCs.
o Editorial changes and clarifications based on IESG review.

Changes from draft-ietf-sipcore-content-id-06

o Editorial changes and clarifications based on Gen-ART review from Elwyn Davies.

Changes from draft-ietf-sipcore-content-id-05

o Changes based on AD comments from Ben Campell:
o - Clarifying that Content-ID header field value is unique within the scope of a SIP message.

Changes from draft-ietf-sipcore-content-id-04

o Minor editorial fix.

Changes from draft-ietf-sipcore-content-id-03

o Changes based on doc shepard review:
o - Reference to RFC 5234 added.
o - SIP message example added.
o - Editorial changes.

Changes from draft-ietf-sipcore-content-id-02

- o Editorial changes based on comments from Paul Kyzivat.

Changes from draft-ietf-sipcore-content-id-01

- o Update to RFC 5621 added.
- o Editorial changes.

10. References

10.1. Normative references

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[RFC5621] Camarillo, G., "Message Body Handling in the Session Initiation Protocol (SIP)", RFC 5621, DOI 10.17487/RFC5621, September 2009, <https://www.rfc-editor.org/info/rfc5621>.

10.2. Informative references

[RFC5368] Camarillo, G., Niemi, A., Isomaki, M., Garcia-Martin, M., and H. Khartabil, "Referring to Multiple Resources in the Session Initiation Protocol (SIP)", RFC 5368, DOI 10.17487/RFC5368, October 2008, <https://www.rfc-editor.org/info/rfc5368>.

[RFC6442] Polk, J., Rosen, B., and J. Peterson, "Location Conveyance for the Session Initiation Protocol", RFC 6442, DOI 10.17487/RFC6442, December 2011, <https://www.rfc-editor.org/info/rfc6442>.

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