Refering to Multiple Resources in the Session Initiation Protocol (SIP)
draft-camarillo-sipping-multiple-refer-00.txt

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Abstract

This document defines extensions to the SIP REFER method so that this method can be used to refer to multiple resources. These extensions include the use of pointers to URI-lists in the Refer-To header field, the use of bodies to describe the requests to be sent by the server, and the use of a new event package to report the state of several transactions.
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1. Introduction

The need for exploders in SIP [2] is described in [6]. Mechanisms to invoke exploders in SIP need to meet the requirements listed there.

The SIP REFER method [4] allows a user agent to request a server to send a request to a third party. Still, a number of applications need to request a server to initiate transactions towards a set of destinations. We define several extensions to REFER so that REFER can be used to refer to multiple destinations (e.g., a user agent requesting a conferencing server to INVITE several new participants).

2. Terminology

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in BCP 14, RFC 2119 [1] and indicate requirement levels for compliant implementations.

We define the following three new terms:

REFER-Issuer: the UA issuing the REFER request.

REFER-Recipient: the UA receiving the REFER request.

REFER-Target: the UA designated in the Refer-To URI.

3. Carrying Multiple Destinations

We represent the multiple REFER-Targets of a REFER using a URI list. We use the Refer-To header field to carry a pointer to that URI-list.

draft-camarillo-sipping-uri-list provides rules to carry a pointer to a URI list in a URI parameter called list. Refer-To header fields carrying a pointer to a URI-list follow the same rules. That is, the Refer-To header field of REFER with multiple REFER-Targets MUST contain a URI that points to a URI list. The XCAP resource list format [5] MUST be supported; any other URI list formats MAY be supported.

The following is an example of a REFER with a Refer-To header field that points to a URI list which is carried in the message body. The option-tag "multiple-refer" in the Require header, which is defined in Section 5, ensures that the REFER-Recipient understands Refer-To header fields with pointers to URI lists.
REFER sip:b@atlanta.example.com SIP/2.0
Via: SIP/2.0/UDP agenta.atlanta.example.com;branch=z9hG4bK2293
To: <sip:b@atlanta.example.com>
From: <sip:a@atlanta.example.com>;tag=193402342
Call-ID: 898234234@agenta.atlanta.example.com
CSeq: 1 REFER
Max-Forwards: 70
Require: multiple-refer
Refer-To: cid:cn35t8jf02@example.com
Contact: sip:a@atlanta.example.com
Accept: application/sdp, message/sipfrag,
       application/transaction-info+xml
Content-Type: application/resource-lists+xml
Content-Length: xxx
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <list name="ad-hoc-1">
    <entry name="1" uri="sip:bill@example.com" />
    <entry name="2" uri="sip:joe@example.com" />
    <entry name="3" uri="sip:ted@example.com" />
    <entry name="4" uri="sip:bob@example.com" />
  </list>
</resource-lists>

Figure 1

4. The Transaction State Event Package

REFER requests establish an implicit subscription to the "refer" event package, defined in [4]. The data format used in this event package is message/sipfrag, which is defined in [3]. The REFER specification says the following about the NOTIFIES triggered by the REFER's implicit subscription:

Each NOTIFY MUST contain an Event header field with a value of refer and possibly an id parameter.

Each NOTIFY MUST contain a body of type "message/sipfrag".

We keep the first statement, but relax the second statement (about the body format) so that the refer event package is aligned with any other event package. That is, the notifier can choose any format that is applicable to the event package and that appears in the Accept header field of the request that created the subscription (the REFER, in our case). The resulting normative statement is the following:
The notifications generated by the server MUST be in one of the formats specified in the Accept header field in the REFER request.

The default format, which MUST be supported by all UAs that generate REFERs with the option-tag "multiple-refer" in a Require header field, is "application/transaction-info+xml", as defined in (draft-camarillo-sipping-transac-package).

The following is an example of the body of a NOTIFY generated by the REFER-Recipient of the REFER in Figure 1.

```xml
<?xml version="1.0"?>
<transaction-info xmlns="urn:ietf:params:xml:ns:transaction-info"
                 version="0"
                 state="full"
                 entity="sip:b@atlanta.example.com">
    <transaction id="frgd870th87" r-uri="sip:bill@example.com">
        <state code="200">complete</state>
    </transaction>
    <transaction id="234f12345" r-uri="sip:joe@example.com">
        <state code="404">complete</state>
    </transaction>
    <transaction id="fghd2345" r-uri="sip:ted@example.com">
        <state code="200">complete</state>
    </transaction>
    <transaction id="12dvg2345" r-uri="sip:bob@example.com">
        <state code="200">complete</state>
    </transaction>
</transaction-info>
```

Figure 2

5. The Multiple-Refer SIP Option-Tag

We define a new SIP option-tag for the Require and Supported header fields: multiple-refer.

A UA including the multiple-refer option-tag in a Supported header understands Refer-To header fields that point to URI lists and understands the "application/transaction-info+xml" body type.

A UA generating a REFER with a pointer to a URI-list in its Refer-To header field MUST include the multiple-refer option-tag in the Require header field of the REFER.
6. The Template Disposition-Type

When using REFER, the new request to be sent is described using URI parameters. For example, the following Refer-To header field contains the values of the Accept-Contact and Call-ID header fields of the new request.

Refer-To: <sip:bob@biloxi.example.net?Accept-Contact=sip:bobsdesk.biloxi.example.net&Call-ID%3D55432%40alicepc.atlanta.example.com>

REFERs with multiple REFER-Targets usually request that the REFER-Recipient sends a set of similar requests. Describing a set of similar requests by adding the same URI parameters to all the URIs in the definition of the URI list is not an efficient way to encode that information.

We define a new disposition-type: template. Bodies of this disposition-type (typically sipfrag bodies as defined in RFC 3420 [3]) provide the server with a template for the messages to be sent.

The following example shows a body whose disposition-type is template. It indicates that the requests to be sent should be MESSAGEs carrying the text "Hello world."

Content-Disposition: template;handling=required
Content-type: message/sipfrag
Content-Length: xxx

MESSAGE sip:whoever.invalid SIP/2.0
Content-Type: text/plain
Content-Length: 12
Hello World.

If any of the URIs defining the REFER-Targets has a URI parameter indicating a different value for a header field than the one indicated in the template, the exploder MUST use the value in the URI parameter.

Note that in order to include the method in a sipfrag body, it is necessary to include the Request-URI as well (the whole Request-line needs to be included as specified in RFC 3420 [3]. If the REFER request contains a single REFER-Target, the URI of the Request-Target SHOULD be placed in the Request-URI of the template body. Otherwise, it is RECOMMENDED that the Request-URI in the template body is an invalid URI.
7. Example

We need to add the whole call flow.

REFER sip:b@atlanta.example.com SIP/2.0
Via: SIP/2.0/UDP agenta.atlanta.example.com;branch=z9hG4bK2293
To: <sip:b@atlanta.example.com>
From: <sip:a@atlanta.example.com>;tag=193402342
Call-ID: 898234234@agenta.atlanta.example.com
CSeq: 1 REFER
Max-Forwards: 70
Require: multiple-refer
Refer-To: cid:cn35t8jf02@example.com
Contact: sip:a@atlanta.example.com
Accept: application/sdp, message/sipfrag,
        application/transaction-info+xml
Content-Type: multipart/mixed;boundary="boundary1"
Content-Length: xxx

--boundary1
Content-Disposition: template;handing=required
Content-type: message/sipfrag
Content-Length: xxx

MESSAGE sip:whoever.invalid SIP/2.0
Content-Type: text/plain
Content-Length: 12

Hello World.

--boundary1
Content-Type: application/resource-lists+xml
Content-Length: xxx
Content-ID: <cn35t8jf02@example.com>

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <list name="ad-hoc-1">
    <entry name="1" uri="sip:bill@example.com" />
    <entry name="2" uri="sip:joe@example.com" />
    <entry name="3" uri="sip:ted@example.com" />
    <entry name="4" uri="sip:bob@example.com" />
  </list>
</resource-lists>
8. Security Considerations

TBD

9. IANA Considerations

TBD: we need to register the multiple-refer option-tag and the template disposition type.

Normative References


Informational References

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