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G. Camarillo
Ericsson
A. Johnston
Avaya

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Conference Establishment Using Request-Contained Lists in the Session Initiation Protocol (SIP)

Status of This Memo

Abstract

This document describes how to create a conference using SIP URI-list services. In particular, it describes a mechanism that allows a User Agent Client to provide a conference server with the initial list of participants using an INVITE-contained URI list.

Table of Contents

1. Introduction

Section 5.4 of [RFC4579] describes how to create a conference using ad hoc SIP [RFC3261] methods. The client sends an INVITE request to a conference factory URI and receives the actual conference URI, which contains the "isfocus" feature tag, in the Contact header field of a response -- typically a 200 (OK) response.

Once the UAC (User Agent Client) obtains the conference URI, it can add participants to the newly created conference in several ways, which are described in [RFC4579].

Some environments have tough requirements regarding conference establishment time. They require the UAC to be able to request the creation of an ad hoc conference and to provide the conference server with the initial set of participants in a single operation. This document describes how to meet this requirement using the mechanism to transport URI lists in SIP messages described in [RFC5363].

2. Terminology

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. User Agent Client Procedures

A UAC that wants to include the set of initial participants in its initial INVITE request to create an ad hoc conference adds a body whose disposition type is 'recipient-list', as defined in [RFC5363], with a URI list that contains the participants that the UAC wants the conference server to invite. Additionally, the UAC MUST include the 'recipient-list-invite' option-tag (which is registered with the IANA in Section 8) in a Require header field. The UAC sends this INVITE request to the conference factory URI.

The INVITE transaction is also part of an offer/answer exchange that will establish a session between the UAC and the conference server, as specified in [RFC4579]. Therefore, the INVITE request may need to carry a multipart body: a session description and a URI list.

3.1. Response Handling

The status code in the response to the INVITE request does not provide any information about whether or not the conference server was able to bring the users in the URI list into the conference. That is, a 200 (OK) response means that the conference was created successfully, that the UAC that generated the INVITE request is in

the conference, and that the server understood the URI list. If the UAC wishes to obtain information about the status of other users in the conference, it SHOULD use general conference mechanisms, such as the conference package, which is defined in [RFC4575].

3.2. Re-INVITE Request Generation

The previous sections have specified how to include a URI list in an initial INVITE request to a conference server. Once the INVITE-initiated dialog between the UAC and the conference server has been established, the UAC can send subsequent INVITE requests (typically referred to as re-INVITE requests) to the conference server to, for example, modify the characteristics of the media exchanged with the server.

At this point, there are no semantics associated with 'recipient-list' bodies in re-INVITE requests (although future extensions may define them). Therefore, UACs SHOULD NOT include 'recipient-list' bodies in re-INVITE requests sent to a conference server.

> Note that a difference between an initial INVITE request and a re-INVITE request is that while the initial INVITE request is sent to the conference factory URI, the re-INVITE request is sent to the URI provided by the server in a Contact header field when the dialog was established. Therefore, from the UAC's point of view, the resource identified by the former URI supports 'recipient-list' bodies, while the resource identified by the latter does not support them.

4. URI-List Document Format

As described in [RFC5363], specifications of individual URI-list services, like the conferencing service described here, need to specify a default format for 'recipient-list' bodies used within the particular service.

The default format for 'recipient-list' bodies for conferencing UAs (User Agents) is the XML resource list format (which is specified in [RFC4826]) extended with the "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists" [RFC5364]. Consequently, conferencing UACs generating 'recipient-list' bodies MUST support both of these formats and MAY support other formats. Conferencing servers able to handle 'recipient-list' bodies MUST support both of these formats and MAY support other formats.

As described in "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists" [RFC5364], each URI can be tagged with a 'copyControl' attribute set

to either "to", "cc", or "bcc", indicating the role in which the recipient will get the INVITE request. Additionally, URIs can be tagged with the 'anonymize' attribute to prevent the conference server from disclosing the target URI in a URI list.

In addition, "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists" [RFC5364] defines a 'recipient-list-history' body that contains the list of recipients. The default format for 'recipient-list-history' bodies for conferencing UAs is also the XML resource list document format specified in [RFC4826] extended with "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists" [RFC5364]. Consequently, conferencing UACs able to generate 'recipient-list-history' bodies MUST support these formats and MAY support others. Conferencing UAs able to understand 'recipient-list-history' MUST support these formats and MAY support others. Conferencing servers able to handle 'recipient-list-history' bodies MUST support these formats and MAY support others.

Nevertheless, the XML resource list document specified in [RFC4826] provides features, such as hierarchical lists and the ability to include entries by reference relative to the XML Configuration Access Protocol (XCAP) root URI, that are not needed by the conferencing service defined in this document, which only needs to transfer a flat list of URIs between a UA (User Agent) and the conference server. Therefore, when using the default resource list document, conferencing UAs SHOULD use flat lists (i.e., no hierarchical lists) and SHOULD NOT use <entry-ref> elements. A conference factory application receiving a URI list with more information than what has just been described MAY discard all the extra information.

Figure 1 shows an example of a flat list that follows the XML resource list document (specified in [RFC4826]) extended with "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists" [RFC5364].

```
<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
          xmlns:cp="urn:ietf:params:xml:ns:copycontrol">
  <list>
    <entry uri="sip:bill@example.com" cp:copyControl="to"  />
    <entry uri="sip:joe@example.org" cp:copyControl="cc" />
    <entry uri="sip:ted@example.net" cp:copyControl="bcc" />
  </list>
</resource-lists>
```

Figure 1: URI list

5. Conference Server Procedures

Conference servers that are able to receive and process INVITE requests with a 'recipient-list' body SHOULD include a 'recipient-list-invite' option-tag in a Supported header field when responding to OPTIONS requests.

On reception of an INVITE request containing a 'recipient-list' body as described in Section 3, a conference server MUST follow the rules described in [RFC4579] to create ad hoc conferences. Once the ad hoc conference is created, the conference server SHOULD attempt to add the participants in the URI list to the conference as if their addition had been requested using any of the methods described in [RFC4579].

The INVITE transaction is also part of an offer/answer exchange that will establish a session between the UAC and the conference server, as specified in [RFC4579]. Therefore, the INVITE request may carry a multipart body: a session description and a URI list.

Once the conference server has created the ad hoc conference and has attempted to add the initial set of participants, the conference server behaves as a regular conference server and MUST follow the rules in [RFC4579].

The incoming INVITE request will contain a URI-list body or reference (as specified in [RFC5363]) with the actual list of recipients. If this URI list includes resources tagged with the 'copyControl' attribute set to a value of "to" or "cc", the conference server SHOULD include a URI list in each of the outgoing INVITE requests. This list SHOULD be formatted according to the XML format for representing resource lists (specified in [RFC4826]) and the copyControl extension specified in [RFC5364].

The URI-list service MUST follow the procedures specified in [RFC5364] with respect to the handling of the 'anonymize', 'count', and 'copyControl' attributes.

If the conference server includes a URI list in an outgoing INVITE request, it MUST include a Content-Disposition header field (which is specified in [RFC2183]) with the value set to 'recipient-list-history' and a 'handling' parameter (as specified in [RFC3204]) set to "optional".

5.1. Re-INVITE Request Handling

At this point, there are no semantics associated with 'recipient-list' bodies in re-INVITE requests (although future extensions may define them). Therefore, a conference server receiving a re-INVITE request with a 'recipient-list' body and, consequently, a 'recipient-list-invite' option-tag, following standard SIP procedures, rejects it with a 420 (Bad Extension), which carries an Unsupported header field listing the 'recipient-list-invite' option-tag.

> This is because the resource identified by the conference URI does not actually support this extension. On the other hand, the resource identified by the conference factory URI does support this extension and, consequently, would include the 'recipient-list-invite' option-tag in, for example, responses to OPTIONS requests.

6. Example

Figure 2 shows an example of operation. A UAC sends an INVITE request (F1) that contains an SDP body and a URI list to the conference server. The conference server answers with a 200 (OK) response and generates an INVITE request to each of the UASs (User Agent Servers) identified by the URIs included in the URI list. The conference server includes SDP and a manipulated URI list in each of the outgoing INVITE requests.

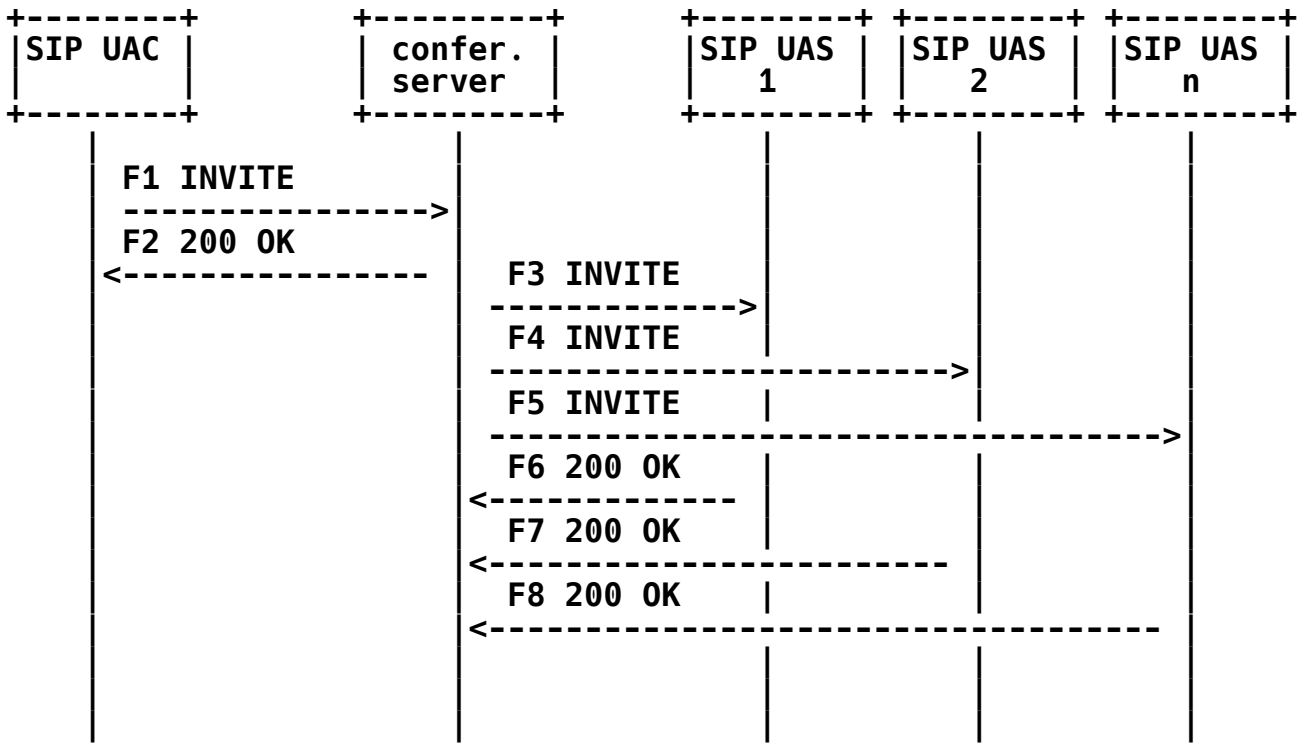

Figure 2: Example of operation

Figure 3 shows an example of the INVITE request F1, which carries a multipart/mixed body composed of two other bodies: an application/sdp body that describes the session and an application/resource-lists+xml body that contains the list of target URIs.

```
INVITE sip:conf-fact@example.com SIP/2.0
Via: SIP/2.0/TCP atlanta.example.com
    ;branch=z9hG4bKhjhs8ass83
Max-Forwards: 70
To: "Conf Factory" <sip:conf-fact@example.com>
From: Alice <sip:alice@example.com>;tag=32331
Call-ID: d432fa84b4c76e66710
CSeq: 1 INVITE
Contact: <sip:alice@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, BYE, REFER
Allow-Events: dialog
Accept: application/sdp, message/sipfrag
Require: recipient-list-invite
Content-Type: multipart/mixed;boundary="boundary1"
Content-Length: 690
```

```
--boundary1
Content-Type: application/sdp

v=0
o=alice 2890844526 2890842807 IN IP4 atlanta.example.com
s=-
c=IN IP4 192.0.2.1
t=0 0
m=audio 20000 RTP/AVP 0
a=rtpmap:0 PCMU/8000
m=video 20002 RTP/AVP 31
a=rtpmap:31 H261/90000

--boundary1
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
          xmlns:cp="urn:ietf:params:xml:ns:copyControl">
  <list>
    <entry uri="sip:bill@example.com" cp:copyControl="to" />
    <entry uri="sip:randy@example.net" cp:copyControl="to"
                                       cp:anonymize="true"/>
    <entry uri="sip:eddy@example.com" cp:copyControl="to"
                                      cp:anonymize="true"/>
    <entry uri="sip:joe@example.org" cp:copyControl="cc" />
    <entry uri="sip:carol@example.net" cp:copyControl="cc"
                                       cp:anonymize="true"/>
    <entry uri="sip:ted@example.net" cp:copyControl="bcc" />
    <entry uri="sip:andy@example.com" cp:copyControl="bcc" />
  </list>
</resource-lists>
--boundary1--
```

Figure 3: INVITE request received at the conference server

The INVITE requests F3, F4, and F5 are similar in nature. All those INVITE requests contain a multipart/mixed body that is composed of two other bodies: an application/sdp body describing the session and an application/resource-lists+xml containing the list of recipients. The application/resource-lists+xml bodies are not equal to the application/resource-lists+xml included in the received INVITE request F1, because the conference server has anonymized those URIs tagged with the 'anonymize' attribute and has removed those URIs tagged with a "bcc" 'copyControl' attribute. Figure 4 shows an example of the message F3.

```
INVITE sip:bill@example.com SIP/2.0
Via: SIP/2.0/TCP conference.example.com
    ;branch=z9hG4bKhjhs8as454
Max-Forwards: 70
To: <sip:bill@example.com>
From: Conference Server <sip:conf34@example.com>;tag=234332
Call-ID: 389sn189dasdf
CSeq: 1 INVITE
Contact: <sip:conf34@conference.example.com>;isfocus
Allow: INVITE, ACK, CANCEL, BYE, REFER
Allow-Events: dialog, conference
Accept: application/sdp, message/sipfrag
Content-Type: multipart/mixed;boundary="boundary1"
Content-Length: 690

--boundary1
Content-Type: application/sdp

v=0
o=conf 2890844343 2890844343 IN IP4 conference.example.com
s=-
c=IN IP4 192.0.2.5
t=0 0
m=audio 40000 RTP/AVP 0
a=rtpmap:0 PCMU/8000
m=video 40002 RTP/AVP 31
a=rtpmap:31 H261/90000

--boundary1
Content-Type: application/resource-lists+xml
Content-Disposition: recipient-list-history; handling=optional

<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
          xmlns:cp="urn:ietf:params:xml:ns:copycontrol">
  <list>
    <entry uri="sip:bill@example.com" cp:copyControl="to" />
    <entry uri="sip:anonymous@anonymous.invalid" cp:copyControl="to"
                                                 cp:count="2"/>
    <entry uri="sip:joe@example.org" cp:copyControl="cc" />
    <entry uri="sip:anonymous@anonymous.invalid" cp:copyControl="cc"
                                                 cp:count="1"/>
  </list>
</resource-lists>
--boundary1--
```

Figure 4: INVITE request sent by the conference server

7. Security Considerations

This document discusses setup of SIP conferences using a request-contained URI list. Both conferencing and URI-list services have specific security requirements, which are summarized here. Conferences generally have authorization rules about who can or cannot join a conference, what type of media can or cannot be used, etc. This information is used by the focus to admit or deny participation in a conference. It is RECOMMENDED that these types of authorization rules be used to provide security for a SIP conference.

For this authorization information to be used, the focus needs to be able to authenticate potential participants. Normal SIP mechanisms, including Digest authentication and certificates, can be used. These conference-specific security requirements are discussed further in the requirements and framework documents -- [RFC4245] and [RFC4353].

For conference creation using a list, there are some additional security considerations. "Framework and Security Considerations for Session Initiation Protocol (SIP) URI-List Services" [RFC5363] discusses issues related to SIP URI-list services. Given that a conference server sending INVITE requests to a set of users acts as a URI-list service, implementations of conference servers that handle lists MUST follow the security-related rules in [RFC5363]. These rules include opt-in lists and mandatory authentication and authorization of clients.

8. IANA Considerations

This document defines the 'recipient-list-invite' SIP option-tag. It has been registered in the Option Tags subregistry under the SIP parameter registry. The following is the description used in the registration:

Name	Description	Reference
recipient-list-invite	The body contains a list of URIs that indicates the recipients of the SIP INVITE request	[RFC5366]

Table 1: Registration of the 'recipient-list-invite' option-tag in SIP

9. Acknowledgments

Cullen Jennings, Hisham Khartabil, Jonathan Rosenberg, and Keith Drage provided useful comments on this document. Miguel Garcia-Martin assembled the dependencies to the 'copyControl' attribute extension.

10. References

10.1. Normative References

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10.2. Informative References

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Authors' Addresses

Gonzalo Camarillo
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

EMail: Gonzalo.Camarillo@ericsson.com

Alan Johnston
Avaya
St. Louis, MO 63124
USA

EMail: alan@sipstation.com

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