

Network Working Group  
Internet-Draft  
Expires: April 14, 2008

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October 12, 2007

Multiple Reply to MESSAGE requests in the Session Initiation Protocol  
(SIP)  
draft-sun-sipping-multiple-reply-01

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## Abstract

This document defines a multiple target address extension to the Reply-To header field for the SIP MESSAGE method. The extension includes the use of a pointer to a Uniform Resource Identifier (URI)-list in the Reply-To header field.

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## 1. Introduction

[RFC 3261](#) [2] defines a Reply-To header field containing a logical return URI that may be different from the From header field. For example, the URI MAY be used to return missed calls or unestablished sessions.

[RFC 3428](#) [3] further defines the Reply-To as an optional header field that can be used and present in MESSAGE requests and responses. This allows a Reply-Issuer to provide the Reply-Recipient with one User Agent (UA) as the target of a reply MESSAGE request.

However, in some scenarios, the Reply-Issuer may want the Reply-Recipient to send reply MESSAGE requests to a list of UAs, as opposed to just one UA. For example, a manager sends a message to request a secretary to prepare meeting arrangements. In the message, the manager provides a list of meeting attendees. When the secretary schedules the meeting, the secretary sends the meeting information in a reply MESSAGE to the list of attendees. Another use case may be for an application to send a notification to a user to respond with certain information, such as a project report, to a list of users. As with the previous example, the original message itself is not meaningful for the intended recipients.

At present, there is no mechanism to convey a list of users to which a UAC can respond. This specification extends the Reply-To mechanism to fulfill the requirement by defining the use of a URI-List in the Reply-to header. With this specification, the Reply-Issuer sends to a Reply-Recipient a MESSAGE request with a Reply-To header pointing to a Uniform Resource List (URI-list) containing the targets of a reply MESSAGE request. Another possible solution is to define a new SIP header field e.g. "Additional-Reply-To" which is able to carry multiple reply targets. This seems much simpler, but can not indicate more elaborate intention e.g. "bcc".

The Reply-Recipient can create a reply MESSAGE request for each entry

in the URI-List and send them respectively, or can send a reply MESSAGE to a MESSAGE URI-list service [9] to distribute the reply MESSAGE requests. The Reply-Recipient may modify the provided list to add or remove recipients.

The requirements to support Multiple Reply to MESSAGE requests may be summarized as follows:

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REQ-1: It MUST be possible for a Reply-Issuer to specify multiple reply targets in a MESSAGE request, where the identities of the reply targets are carried in the request itself.

## [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 [RFC 2119](#) [[1](#)].

This document defines the following new terms:

**Reply-Issuer:** the user agent issuing the SIP request with Reply-To header field.

**Reply-Recipient:** the user agent receiving the SIP request with Reply-To header field.

### [3.](#) URI-List Document Format

As described in the Framework and Security Considerations for SIP URI-List Services [\[4\]](#) , specifications of individual URI-list services, need to specify a default format for 'recipient-list' bodies used within the particular service.

The default format for 'recipient-list' bodies for multiple reply is XML Resource Lists [\[7\]](#) extended with Copy Control Attribute [\[8\]](#) . Reply-Issuer and Reply-Recipient MUST support both these formats and MAY support other formats.

As described in Copy Control Attribute [\[8\]](#) , each URI can be tagged with a 'copyControl' attribute set to either "to", "cc", or "bcc", indicating the role in which the recipient will receive the reply

MESSAGE request. Additionally, URIs can be tagged with the 'anonymize' attribute to prevent that the Reply-Recipient (UAS) from disclosing the target URI in a URI-list.

In addition, the XML Resource Lists [7] defines a 'recipient-list-history' body that contains the list of recipients. The default format for 'recipient-list-history' bodies for UAs is also the XML Resource Lists [7] extended with the Copy Control Attribute [8]. If the Reply-Recipient sends reply MESSAGE requests to each entry in the URI-List, it may provide a 'recipient-list-history' body in the reply MESSAGE requests. In this case the Reply-Recipient MAY support these formats and MAY support others. If the Reply-Recipient sends a reply MESSAGE request to a MESSAGE URI-list service [9], it does not need to support these formats. UAs able to understand 'recipient-list-history' MUST support these formats and MAY support others.

The XML Resource Lists [7] provides features, such as hierarchical lists and the ability to include entries by reference relative to the XCAP root URI or by external reference; however, these are not needed by the reply mechanism defined in this specification. The reply mechanism defined herein only needs to transfer a flat list of URIs between the Reply-Issuer and the Reply-Recipient. Therefore, when using the default resource list document, UAs SHOULD use flat lists (i.e., no hierarchical lists) and SHOULD NOT use references. A Reply-Recipient receiving a URI-list with more information than what has just been described MAY discard the additional information.

Figure 1 shows an example of a flat URI-List that follows XML Resource Lists [7] extended with Copy Control Attribute [8].

```
<?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: Example for XML Resource List Document

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#### [4.](#) Procedures at the Reply-Issuer



A Reply-Issuer that wants to specify multiple reply addresses MUST use formatting according to [Section 4 of RFC 3428](#) [3] . The Reply-Issuer populates the Request-URI of the MESSAGE request with the SIP or SIPS URI of the Reply-Recipient. In addition to the regular MESSAGE request body, the Reply-Issuer adds a recipient-list body whose Content-Disposition type is 'recipient-list' as defined in Framework and Security Considerations for SIP URI-List Services [4] . This body contains a URI-list with the recipients of the reply MESSAGE request from the Reply-Recipient. Target URIs in this body MAY also be tagged with the 'copyControl' and 'anonymize' attributes specified in the Copy Control Attribute [8] . The Reply-Issuer MUST provide an appropriate Content-ID for the recipient-list body and populates the Reply-To with the value of Content-ID that identifies the list of intended recipient of the reply MESSAGE requests.

The Reply-Issuer MAY use the "?" mechanism described in [Section 19.1.1 of RFC 3261](#) [2] to encode extra information in any URI of the list. The following is an example of a URI that uses the "?" mechanism:

```
sip:bob@example.com?Accept-Contact=*&mobility%3d%22mobile%22
```

The previous URI requests the Reply-Recipient to add the following header field to a reply MESSAGE request to be sent to bob@example.com: Accept-Contact: \*;mobility="mobile"

## 5. Procedures at the Reply-Recipient

A Reply-Recipient that receives a MESSAGE request with a Reply-To header field and 'recipient-list' body processes it and responds following the procedure in [section 7 of RFC 3428](#) [3]

There are two possibilities for a Reply-Recipient to send reply MESSAGE requests to intended recipients:

- o The Reply-Recipient creates a reply MESSAGE request for each entry in the URI-List and sends them respectively. If it supports the 'recipient-list-history' Content-Disposition type, it MAY provide a 'recipient-list-history' body in the reply MESSAGE requests for each intended recipient following the procedure defined in Copy Control Attribute [8] .
- o The Reply-Recipient sends a reply MESSAGE request that includes the payload along with the URI-list to a MESSAGE URI-list service [9] to distribute similar reply MESSAGE requests to each of the URIs included in the list. The Reply-Recipient MAY modify the URI-list from the Reply-Issuer so as to add or remove recipients.

## 6. Examples

### 6.1. Reply-Recipient uses MESSAGE URI-List service to send reply MESSAGE requests

Figure 1 shows an example flow where a Reply-Issuer sends a MESSAGE request with Reply-To header field pointing to a URI list to a Reply-Recipient. The Reply-Recipient sends a reply MESSAGE with the URI list to MESSAGE URI-list service.

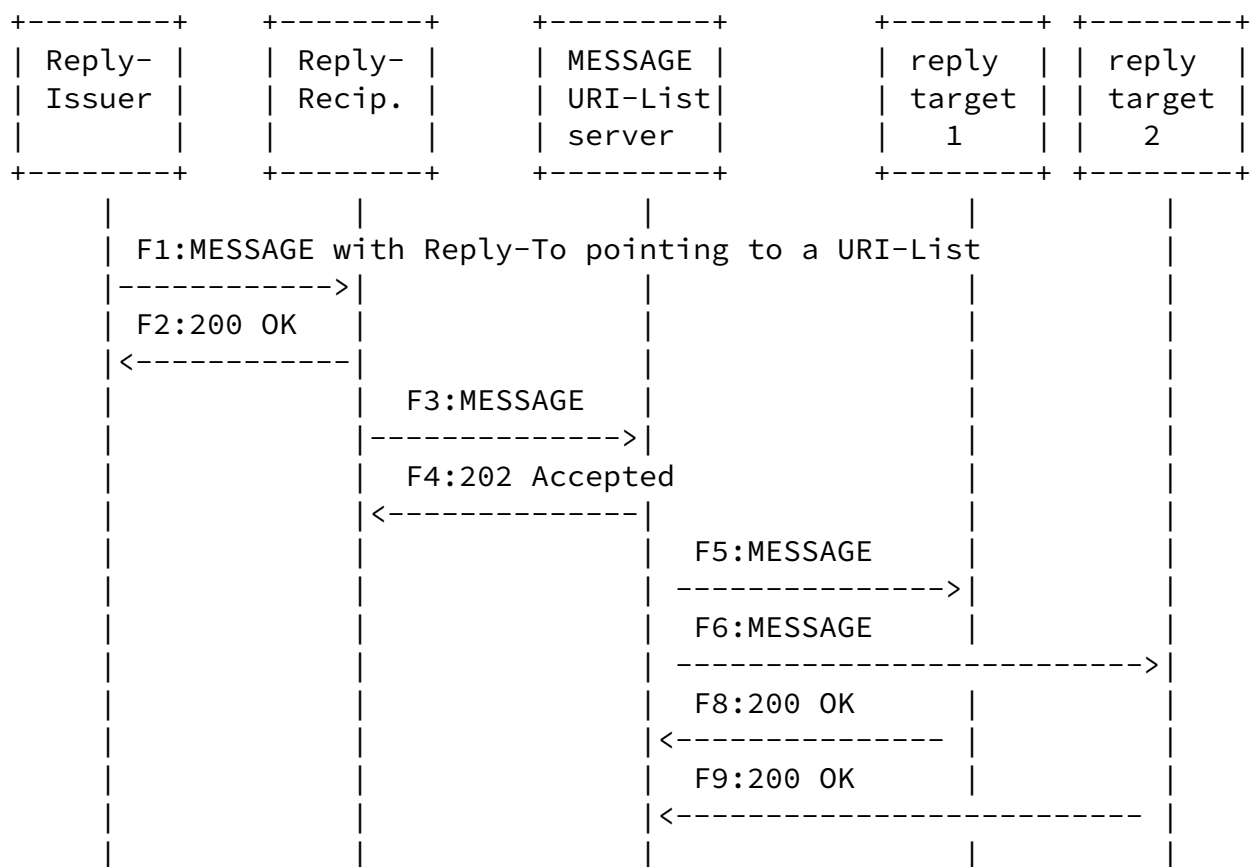


Figure 1: Example flow for Reply-To pointing to multiple addresses

Figure 2 shows an example of the MESSAGE request F1, which carries a 'multipart/mixed' body composed of two other bodies:

- o 'text/plain' body: contains the instant message payload;
- o 'application/resource-lists+xml' body: contains the intended recipients receiving the reply MESSAGE request from Reply-Recipient.

The Reply-To header field has the same value of Content-ID pointing to the URI-List which contains the intended recipients.

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```
MESSAGE sip:tom@example.com SIP/2.0
Via: SIP/2.0/TCP uac1.example.com
    ;branch=z9hG4bKhjhs8as34sc
Max-Forwards: 70
To: <sip:tom@example.com>
From: Alice <sip:alice@example.com>;tag=210342
Call-ID: 39s02sdsl20d9sj2l
CSeq: 1 MESSAGE
Reply-To: <cid:cn35t8jf02@example.com>
Content-Type: multipart/mixed;boundary="boundary1"
Content-Length: xxx
```

```
--boundary1
Content-Type: text/plain
```

Please reply the team with the deadline!

```
--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: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 2: MESSAGE with Reply-To header field pointing to a URI list

Figure 3 shows an example of the MESSAGE request F3, which carries a 'multipart/mixed' body composed of two other bodies:

- o 'text/plain' body: contains the instant message payload;

- o 'application/resource-lists+xml' body: contains the list of recipients. This list is the same with F1.

```

MESSAGE sip:list-service.example.com SIP/2.0
Via: SIP/2.0/TCP uac1.example.com
    ;branch=z9hG4bKhjhs8as34sc
Max-Forwards: 70
To: MESSAGE URI-list Service <sip:list-service.example.com>
From: Alice <sip:alice@example.com>;tag=32331
Call-ID: d432fa84b4c76e66710
CSeq: 1 MESSAGE
Content-Type: multipart/mixed;boundary="boundary1"
Content-Length: xxx

```

```

--boundary1
Content-Type: text/plain

```

The deadline is 14:00 GMT October 10, 2007.

```

--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: MESSAGE request received at the MESSAGE URI-list server

## 7. Security Considerations

URI-lists may contain private information, such as SIP URIs. It is, therefore, not desirable that these URI-lists are known by third parties. Eavesdroppers are able to watch URI-lists contained in SIP MESSAGE requests unless the MESSAGE requests are sent over a secured channel, by using any of the available SIP mechanisms, such as Transport Layer Security (TLS) [5], or unless the URI-list body itself is encrypted with, e.g., S/MIME [6]. Therefore, it is RECOMMENDED that URI-list bodies are encrypted with S/MIME [6] or that the SIP request is encrypted with TLS [5] or any other suitable encryption mechanism.

## [8.](#) IANA Considerations

There are no IANA considerations.

## [9.](#) Acknowledgements

The authors would like to thank Tom Hiller, Henning Schulzrinne, Jonathan Rosenberg and Spencer Dawkins for their valuable comments



and contributions.

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- [3] Campbell, B., Rosenberg, J., Schulzrinne, H., Huitema, C., and D. Gurle, "Session Initiation Protocol (SIP) Extension for Instant Messaging", [RFC 3428](#), December 2002.
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- [8] Garcia-Martin, M. and G. Camarillo, "Extensible Markup Language (XML) Format Extension for Representing Copy Control Attributes in Resource Lists", [draft-ietf-sipping-capacity-attribute-04.txt](#) (work in progress), March 2007.

### [10.2.](#) Informative References

- [9] Garcia-Martin, M. and G. Camarillo, "Multiple-Recipient MESSAGE Requests in the Session Initiation Protocol (SIP)", [draft-ietf-sip-uri-list-message-01.txt](#) (work in progress), January 2007.

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#### Acknowledgment

Funding for the RFC Editor function is provided by the IETF Administrative Support Activity (IASA).