The SIP Replaces Header

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Abstract

This document describes an extension to the Session Initiation Protocol (SIP) [2]. The purpose of this extension is to allow an active call-leg to be replaced by an incoming call-leg for the purposes of call transfer.

1 Overview

This document defines a SIP [2] extension to help provide attended
transfer capabilities. This header has its roots in [3], however both the syntax and semantics are changed.

An attended call transfer occurs when a SIP user agent which is involved in a 3-way call conference wishes to silently leave the call by requesting the two remote parties to establish a direct signalling relationship. The Replaces header augments the transfer functionality provided by REFER [4] to allow the transfer target to associate the incoming call with the active one.

Replaces is intended to provide a simple and backwards compatible method of allowing this association to occur. We also define a simple signature scheme which allows the replacement request to be authenticated by the target user agent.

2 Rationale

Use of a new header for attended transfer leg matching was chosen over making associations based on call-id or other fields for the following reasons:

1. Using a Replaces header in the request makes the intent obvious.

2. A unique call-id may be given to the replacement call. This avoids call-leg matching problems in any of the clients.

3. No adverse effects if the header is unsupported.

3 The Replaces Header

The Replaces header indicates that the call leg identified by the header is to be shut down and logically replaced by the incoming INVITE in which it is contained. It is a request header only, and defined here only for INVITE requests. The syntax is:

Replaces = "Replaces" ":" 1#replaces-values
replaces-values = callid *( ";" replaces-param )
callid = token [ ";@" token ]
replaces-param = to-tag | from-tag | rep-signature
              | extension-param
          to-tag = "to-tag=" UUID
          from-tag = "from-tag=" UUID
rep-signature = signature-scheme *( ";" sig-scheme-params )
signature-scheme = "scheme" "=" token
sig-scheme-params = token "=" ( token | quoted-string )
The to-tag and from-tag parameters MUST be included in the Replaces header, as they are required for unique call-leg matching. Since we rely on the tags for matching purposes, implementations which support Replaces MUST support at least the SIP bis [5] standard which requires tags.

3.1 Examples

Replaces: 98732@sip.billybiggs.com
;from-tag=r33th4x0r
;to-tag=ff87ff

Replaces: 12345@149.112.118.3;to-tag=12345;from-tag=54321

3.2 A PGP based signature-scheme

One signature-scheme for Replaces headers uses PGP as follows:

signature-scheme = "scheme" "=" "pgp"
nig-scheme-parms = pgp-version | signed-by | pgp-signature

pgp-version, signed-by and pgp-signature are defined in section 15.1 of RFC2543, with the modification that the signature is computed across the concatenation of the callid, to-tag, and from-tag in that order.

4 Behavior of SIP User Agents

The Replaces header contains matching information for a call-leg, identified by the call-id and tags. Upon receiving an INVITE with a Replaces header, the user agent will attempt to match the information with any active call legs. If no match is found, the Replaces header MUST be ignored. The to tag and from tag should be matched as if they were present in an incoming request, that is, the to tag should match the local tag for the call leg, and the from tag should match the remote tag.

If the Replaces header matches more than one call-leg, the user agent MAY use the Referred-By header if present to attempt to match the call with an appropriate call-leg, but should otherwise ignore the header.

If the Replaces header matches an unestablished call leg, that it, the INVITE request for the call has not received or been sent a final response, the Replaces header MUST be ignored.
If a matching call-leg is found and the signature checked, the user agent SHOULD silently accept the new call, replacing the old call in the user interface. The user agent SHOULD also shut down the replaced call leg by sending a BYE.

5 Attended Call Transfer to a Supporting Target

In these examples, the names of the actors are taken from [4].

In this scenario, the transferor is in a 3-way call with both the transferee and the transfer target and wishes to leave the call. The transferor REFERs the transferee to the transfer target, using the Replaces header to signify to the target that the incoming call should replace its current call to the transferor. The Replaces header is placed as a header parameter in the SIP URI used in the Refer-To header.

After accepting the call, the target’s BYE is received by the transferor before it has a chance to send its own BYE.

Tags are omitted in this example for brevity.

```
<table>
<thead>
<tr>
<th>Transferor</th>
<th>Transferee</th>
<th>Transfer Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call-ID:1</td>
<td>INVITE/200 OK/ACK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>Call-ID:2</td>
<td>INVITE/200 OK/ACK</td>
<td></td>
</tr>
<tr>
<td>REFER target?Replaces=1</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>100 Trying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INVITE Replaces:1</td>
<td>200 OK/ACK</td>
<td>Immediate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acceptance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BYE/200 OK</td>
</tr>
<tr>
<td>200 OK (to the REFER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BYE/200 OK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
6 Attended Call Transfer to an Unsupporting Target

In this scenario, the transfer target ignores the Replaces header. In this case, the transferor sends a BYE to confirm shutdown of the replaced call.

Tags are omitted in this example for brevity.

<table>
<thead>
<tr>
<th>Transferor</th>
<th>Transferee</th>
<th>Transfer Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call-ID:1</td>
<td>INVITE/200 OK/ACK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>Call-ID:2</td>
<td>INVITE/200 OK/ACK</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>REFER target?Replaces=1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>100 Trying</td>
<td>INVITE Replaces:1</td>
<td>User Accepts Call</td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>INVITE Replaces:1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>200 OK (to the REFER)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
<tr>
<td>BYE/200 OK</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;----------------------&gt;</td>
<td></td>
</tr>
</tbody>
</table>

7 Author’s Addresses

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8 Open Issues

1. There is currently a proposal to make call leg matching based
solely on the call-id, to-tag and from-tag. If this is not accepted, Replaces may be updated to include the full to and from as parameters.

8 References


