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Session Initiation Protocol Service Examples
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Abstract

This document gives examples of Session Initiation Protocol (SIP)

services. This covers most features offered in so-called IP Centrex offerings from local exchange carriers and PBX (Private Branch Exchange) features. Most of the services shown in this document are implemented in the SIP User Agents, although some require the assistance of a SIP Proxy. Some require some extensions to SIP including the REFER, SUBSCRIBE, and NOTIFY methods and the Replaces and Join headers. These features are not intended to be an exhaustive set, but rather show implementations of common features likely to be implemented on SIP IP telephones in a business environment.

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1. Overview

This document provides example call flows detailing a SIP implementation of the following traditional telephony services:

Call Hold	Music on Hold
Unattended Transfer	Consultation Hold
Unconditional Call Forwarding	Attended Transfer
No Answer Call Forwarding	Busy Call Forwarding
Single-Line Extension	3-way Call
Incoming Call Screening	Find-Me
Call Pickup	Call Park
Outgoing Call Screening	Automatic Redial
Click to Dial	

The call flows shown in this document were developed in the design of a SIP IP communications network. They represent an example set of so-called IP Centrex services or PBX services.

It is the hope of the authors that this document will be useful for SIP implementers, designers, and protocol researchers alike and will help further the goal of a standard implementation of [RFC 3261](#) [2]

These flows represent carefully checked and working group reviewed scenarios of SIP service examples as a companion to the specifications.

These call flows are based on the current version 2.0 of SIP in [RFC 3261](#) [2] with SDP usage described in [RFC 3264](#) [5] Other RFCs also comprise the SIP standard and are used and references in these call flows.

The SIP specification and the other referenced documents are definitive as far as protocol issues are concerned. Also, these flows do not represent the only way to implement these services - other approaches such as 3pcc (Third Party Call Control) [17] or Back-to-Back User Agents (B2BUA) may be more appropriate in some circumstances. The peer-to-peer design and principles of these service examples are described in the Multiparty Framework document [12].

These flows assume the functionality described in the SIP Call Flow Examples document [16], which explores basic SIP behavior. Some of the scenarios described herein make use of the SIP method extension REFER [3] and the SIP header extension Replaces [4], the SIP header extension Join [9], and some of the concepts in the 3pcc (third party call control) [17] document. The SIP Events document [6] describes the use of SUBSCRIBE and NOTIFY while the SIP Dialog Event Package

[8] document describes the dialog event package. Some examples make use the GRUU (Globally Routable User Agent URI) [20] extension.

These flows were prepared assuming a network of proxies, registrars, PSTN gateways, and other SIP servers. The use of Secure SIP URIs (sips) is shown throughout this document with assumed certificate validation for security. However, other security approaches such as Digest challenges can be used.

Each call flow is presented with a textual description of the scenario, a message flow diagram showing the messages exchanged between separate network elements, and the detailed contents of each message shown in the diagram.

1.1 Legend for Message Flows

Dashed lines (---) represent control messages that are mandatory to the call scenario. These control messages can be SIP signaling.

Double dashed lines (===) represent media paths between network elements.

Messages with parenthesis around name represent optional control messages.

Messages are identified in the Figures as F1, F2, etc. This references the message details in the table that follows the Figure. Comments in the message details are shown in the following form:

```
/* Comments. */
```

2. Service Examples

2.1 Call Hold

Alice	Proxy	Bob
INVITE F1		
----->		
	INVITE F2	
(100 Trying) F3	----->	
<-----		
	180 Ringing F4	
180 Ringing F5	<-----	
<-----		
	200 OK F6	
200 OK F7	<-----	
<-----		


```

|      ACK F8      |      | |
|----->|      ACK F9      |
|      |      |----->|
|      Both way RTP Established      |
|<=====>|
|      |      |INVITE(hold) F10      |
|INVITE(hold) F11|<-----|
|<-----|      |
|      200 OK F12      |      |
|----->|      200 OK F13      |
|      |      |----->|
|      |      |      ACK F14      |
|      ACK F15      |<-----|
|<-----|      |
|      |      |      No RTP Sent!      |
|      |      |      INVITE F16      |
|      INVITE F17      |<-----|
|<-----|      |
|      200 OK F18      |      |
|----->|      200 OK F19      |
|      |      |----->|
|      |      |      ACK F20      |
|      ACK F21      |<-----|
|<-----|      |
|      Both way RTP Established      |
|<=====>|
|      BYE F22      |      | |
|----->|      BYE F23      |
|      |      |----->|
|      |      |      200 OK F24      |
|      200 OK F25      |<-----|
|<-----|      |
|      |      |

```

In this scenario, Alice calls Bob, then Bob places the call on hold. Bob then takes call off hold. Alice hangs up call. Note that hold is unidirectional in nature. However, a UA that places the other party on hold will generally also stop sending media, resulting in no media exchange between the UAs. Older UAs may set the connection address to 0.0.0.0 when initiating hold. However, this behavior has been deprecated in favor of using the a=sendonly SDP attribute.

Message Details

F1 INVITE Alice -> Proxy 1

INVITE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 INVITE Proxy 1 -> Bob

INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F3 (100 Trying) Proxy 1 -> Alice

SIP/2.0 100 Trying

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>

Call-ID: 12345601@atlanta.example.com

CSeq: 1 INVITE

Content-Length: 0

F4 180 Ringing Bob -> Proxy 1

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345601@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Content Length:0

F5 180 Ringing Proxy 1 -> Alice

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345601@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Content Length: 0

F6 200 OK Bob -> Proxy 1

SIP/2.0 200 OK

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9


```
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F7 200 OK Proxy 1 -> Alice

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F8 ACK Alice -> Proxy 1


```
ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf92
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

F9 ACK Proxy 1 -> Bob

```
ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837492.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf92
    ;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

/* Bob places Alice on hold. Note that the version is

incremented in the o= field of the SDP */

F10 INVITE Bob -> Proxy 1

```
INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
```


Content-Length: ...

```
v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F11 INVITE Proxy 1 -> Alice

```
INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
    ;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

/* A replies to hold */

F12 200 OK Alice -> Proxy 1

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
```



```
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvnly
```

F13 200 OK Proxy 1 -> Bob

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvnly
```


F14 ACK Bob -> Proxy 1

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds72
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F15 ACK Proxy 1 -> Alice

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds72
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

/* Bob takes the call off hold */

F16 INVITE Bob -> Proxy 1

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds73
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp

Content-Length: ...

v=0
o=bob 2890844527 2890844529 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F17 INVITE Proxy 1 -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837493.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds73
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844529 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F18 200 OK Alice -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837493.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds73
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Call-ID: 12345601@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844528 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F19 200 OK Proxy 1 -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds73
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844528 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F20 ACK Bob -> Proxy 1

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds74
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F21 ACK Proxy 1 -> Alice

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837494.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds74
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

/* RTP Media stream re-established. Alice disconnects. */

F22 BYE Alice -> Proxy 1

BYE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf97
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F23 BYE Proxy 1 -> Bob

BYE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837497.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf97
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159
 Call-ID: 12345601@atlanta.example.com
 CSeq: 2 BYE
 Content-Length: 0

F24 200 OK Bob -> Proxy 1

SIP/2.0 200 OK

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837497.1
 ;received=192.0.2.54
 Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf97
 ;received=192.0.2.103
 From: Alice <sips:alice@atlanta.example.com>;tag=1234567
 To: Bob <sips:bob@biloxi.example.com>;tag=314159
 Call-ID: 12345601@atlanta.example.com
 CSeq: 2 BYE
 Content-Length: 0

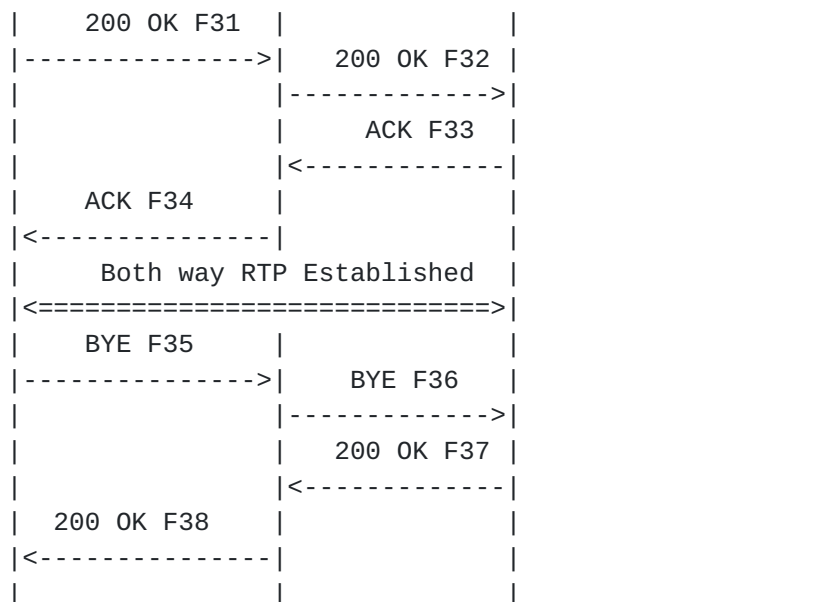
F25 200 OK Proxy 1 -> Alice

SIP/2.0 200 OK
 Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf97
 ;received=192.0.2.103
 From: Alice <sips:alice@atlanta.example.com>;tag=1234567
 To: Bob <sips:bob@biloxi.example.com>;tag=314159
 Call-ID: 12345601@atlanta.example.com
 CSeq: 2 BYE
 Content-Length: 0

[2.2](#) Consultation Hold

Alice	Proxy	Bob	Carol
INVITE F1			
----->	INVITE F2		
	----->		
(100 Trying) F3			
<-----	180 Ringing F4		
	<-----		
180 Ringing F5			
<-----	200 OK F6		
	<-----		
200 OK F7			

<-----		
ACK F8		
----->	ACK F9	
	----->	
Both way RTP Established		
=====		
	INVITE(hold) F10	
INVITE(hold) F11	<-----	
<-----		
200 OK F12		
----->	200 OK F13	
	----->	
	ACK F14	
	<-----	
ACK F15		
<-----		
No RTP Sent!		
	INVITE F16	
	<-----	
		INVITE F17
	----->	
	(100 Trying) F18	
	----->	
		180 Ringing F19
	<-----	
	180 Ringing F20	
	----->	
		200 OK F21
	<-----	
	200 OK F22	
	----->	
	ACK F23	
	<-----	
		ACK F24
	----->	
	Both way RTP Established	
	=====	
	BYE F25	
	<-----	
		BYE F26
	----->	
		200 OK F27
	<-----	
	200 OK F28	
	----->	
	INVITE F29	
INVITE F30	<-----	
<-----		



In this scenario, Alice calls Bob. Bob places call on hold. Bob calls Carol. Bob then disconnects with Carol, then takes the call with Alice off hold. The call ends when Alice hangs up.

Message Details

F1 INVITE Alice -> Proxy 1

```

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

```

```

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

```


F2 INVITE Proxy 1 -> Bob

```
INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3(100 Trying) Proxy 1 -> Alice

```
SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```

F4 180 Ringing Bob -> Proxy 1

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
```


To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content Length:0

F5 180 Ringing Proxy 1 -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content Length: 0

F6 200 OK Bob -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F7 200 OK Proxy 1 -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F8 ACK Alice -> Proxy 1

ACK sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf45

Route: <sips:ss1.example.com;lr>

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345600@atlanta.example.com

CSeq: 1 ACK

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Length: 0

F9 ACK Proxy 1 -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837494.1

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf45
;received=192.0.2.103

Max-Forwards: 69

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

/* Bob places Alice on hold. */

F10 INVITE Bob -> Proxy 1

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly

F11 INVITE Proxy 1 -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837497.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly

F12 200 OK Alice -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837497.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly

F13 200 OK Proxy 1 -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7


```
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvnly
```

F14 ACK Bob -> Proxy 1

```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdsg
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

F15 ACK Proxy 1 -> Alice

```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8374.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdsg
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
```


Content-Length: 0

F16 INVITE Bob -> Proxy 1

INVITE sips:carol@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0

o=bob 2890844834 2890844834 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 50170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F17 INVITE Proxy 1 -> Carol

INVITE sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749a.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0

o=bob 2890844834 2890844834 IN IP4 client.biloxi.example.com
s=Session SDP

c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 50170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F18 (100 Trying) Proxy 1 -> Bob

SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 INVITE

Content-Length: 0

F19 180 Ringing Carol -> Proxy 1

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749a.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:carol@client.chicago.example.com>
Content Length:0

F20 180 Ringing Proxy 1 -> Bob

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=client.chicago.example.com
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:carol@client.chicago.example.com>
Content Length: 0

F21 200 OK Carol -> Proxy 1

SIP/2.0 200 OK

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749a.1
;received=192.0.2.54

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=192.0.2.105

Record-Route: <sips:ss1.example.com;lr>

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>;tag=456654

Call-ID: 9876543210@biloxi.example.com

CSeq: 1 INVITE

Contact: <sips:carol@client.chicago.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com

s=Session SDP

c=IN IP4 client.chicago.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F22 200 OK Proxy 1 -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds22
;received=192.0.2.105

Record-Route: <sips:ss1.example.com;lr>

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>;tag=456654

Call-ID: 9876543210@biloxi.example.com

CSeq: 1 INVITE

Contact: <sips:carol@client.chicago.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com

s=Session SDP

c=IN IP4 client.chicago.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F23 ACK Bob -> Proxy 1

ACK sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds24
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F24 ACK Proxy 1 -> Carol

ACK sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749b.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds24
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F25 BYE Bob -> Proxy 1

BYE sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7j
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654

Call-ID: 9876543210@biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F26 BYE Proxy 1 -> Carol

BYE sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749k.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7j
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F27 200 OK Carol -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749k.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7j
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F28 200 OK Proxy 1 -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7j
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=456654
Call-ID: 9876543210@biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

/* Bob takes the call off hold */

F29 INVITE Bob -> Proxy 1

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7b
Route: <sips:ss1.example.com;lr>

Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844529 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F30 INVITE Proxy 1 -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749q.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7b
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844529 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F31 200 OK Alice -> Proxy 1

SIP/2.0 200 OK

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749q.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7b
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844528 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F32 200 OK Proxy 1 -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7b
;received=192.0.2.105
Record-Route: <sips:ss1.example.com;lr>
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844528 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F33 ACK Bob -> Proxy 1

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7d7
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F34 ACK Proxy 1 -> Alice

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8374.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7d7
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 2 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F35 BYE Alice -> Proxy 1

BYE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf10
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F36 BYE Proxy 1 -> Bob

BYE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8379.1


```

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf10
    ;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

```

F37 200 OK Bob -> Proxy 1

```

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8379.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf10
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

```

F38 200 OK Proxy 1 -> Alice

```

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf10
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

```

[2.3](#) Music On Hold

Alice	Bob	Music Server
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		


```

|----->|
| RTP |
|<=====|
|
| Bob places Alice on hold with music
|
| INVITE no sdp F5
|----->|
| 200 OK sdpM F6|
|<-----|
| INVITE (hold) F7|
|<-----|
| 200 OK sdpA F8 |
|----->|
| ACK F9 |
|<-----|
| ACK sdpA F10 |
|----->|
| RTP |
|<=====|
|
| Bob Picks up the Call
| BYE F11
|----->|
| 200 OK F12
|<-----|
| INVITE F13
|<-----|
| 200 OK F14
|----->|
| ACK F15
|<-----|
| RTP
|<=====|

```

In this flow, Bob places Alice on hold with music. This is performed by Bob acting as a 3pcc (third party call controller) [17] to INVITE a Music Server into the session, which sends RTP music to Alice. Bob picks the call up from hold by sending a BYE to the music server and taking Alice off of hold.

Note that if Alice responds to the INVITE with hold SDP with hold SDP in the 200 OK, this call flow will not work properly.

Note also that Alice will receive RTP packets from two different IP addresses during this call flow. Alice could refuse the music by sending a re-INVITE changing the session to a=inactive.

Message Details

F1 INVITE Alice -> Bob

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F4 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfd
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

/* Bob places Alice on hold with music by acting as a 3pcc and
sending an INVITE to the Music Server */

F5 INVITE Bob -> Music Server

INVITE sips:music@server.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Music <sips:music@server.example.com>
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces

Content-Length: 0

F6 200 OK Carol -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Music <sips:music@server.example.com>;tag=90210

Call-ID: sdjfdjfskdf@biloxi.example.com

CSeq: 1 INVITE

Contact: <sips:music@server.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=MusicServer 2890844576 2890844577 IN IP4 music.server.example.com

s=Session SDP

c=IN IP4 music.server.example.com

t=3034423619 0

m=audio 49170 RTP/AVP 0

a=rtpmap:0 PCMU/8000

a=sendonly

/* Bob re-INVITES Alice on hold */

F7 INVITE Bob -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf5

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844528 IN IP4 client.atlanta.example.com

s=Session SDP

c=IN IP4 music.server.example.com


```
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F8 200 OK Alice -> Bob

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf5
    ;received=192.0.2.103
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
From: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly
```

F9 ACK Bob -> Alice

```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfy
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

```
/* Bob passes SDP of Alice to the Music Server to allow music to be sent
   from Bob to Alice */
```


F10 ACK Bob -> Music Server

ACK sips:music@server.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds3
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Music <sips:music@server.example.com>;tag=90210
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly

/* RTP music is now sent from the Music Server to Alice */

/* Bob picks up the call from the Music Server */

F11 BYE Bob -> Music Server

BYE sips:music@server.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds0
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Music <sips:music@server.example.com>;tag=90210
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F12 200 OK Music Server -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds0
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Music <sips:music@server.example.com>;tag=90210
Call-ID: sdjfdjfskdf@biloxi.example.com

CSeq: 2 BYE

Content-Length:0

/* B re-INVITES taking A off hold */

F13 INVITE Bob -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 2 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844529 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F14 200 OK Alice -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b
;received=192.0.2.103

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

From: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 2 INVITE

Contact: <sips:bob@client.atlanta.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=alice 2890844526 2890844528 IN IP4 client.atlanta.example.com


```
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F15 ACK Bob -> Alice

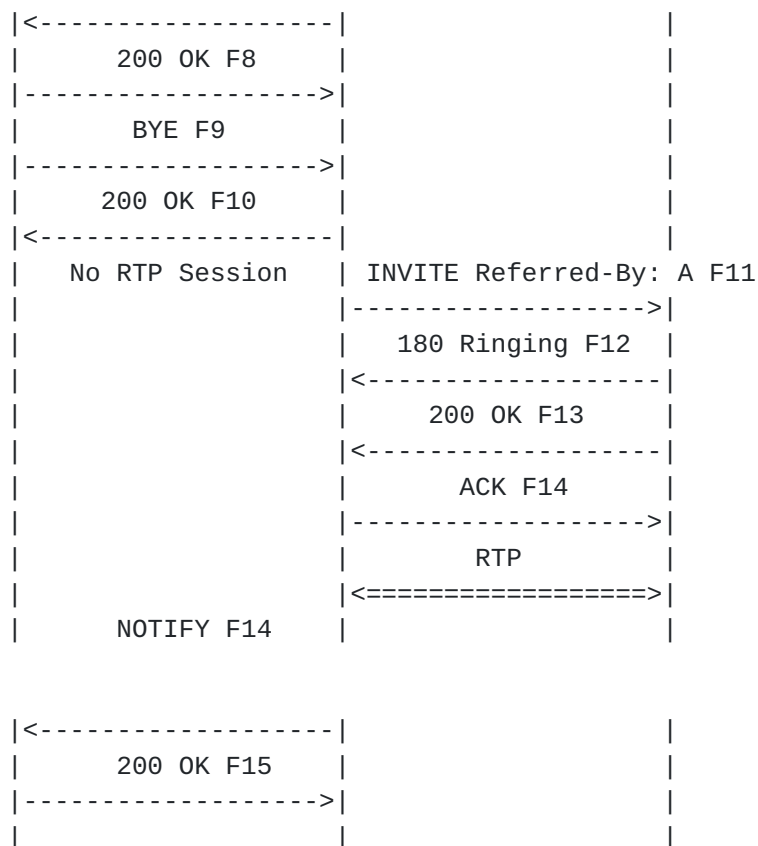
```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b5
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
```

```
CSeq: 2 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

/* Normal media session between A and B is resumed */

2.4 Transfer - Unattended

Alice	Bob	Carol
INVITE F1		
<-----		
180 Ringing F2		
----->		
200 OK F3		
----->		
ACK F4		
<-----		
RTP		
<=====		
Alice performs unattended transfer		
REFER Refer-To:C F5		
----->		
202 Accepted F6		
<-----		
NOTIFY F7		



In this scenario, Bob calls Alice. Alice then transfers Bob to Carol, then Alice disconnects with Bob. Bob establishes the session to Carol then reports the success back to Alice in the NOTIFY in F14. If the transfer fails, Bob can send a new INVITE back to Alice to re-establish the session.

Despite the BYE sent by Alice in F9, the dialog between Alice and Bob still exists until the subscription created by the REFER has terminated (either due to a NOTIFY containing a Subscription-State: terminated;reason=noresource header field, as in F14, or a 481 response to a NOTIFY).

For more about call transfer see the transfer [\[7\]](#) document.

Message Details

F1 INVITE Bob -> Alice

```

INVITE sips:alice@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
  
```


To: Alice <sips:alice@atlanta.example.com>
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Alice -> Bob

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Length: 0

F3 200 OK Alice -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com


```
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 ACK Bob -> Alice

```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds2
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0
```

/* Session is established between Alice and Bob. */

/* Alice performs unattended transfer of Bob to Carol */

F5 REFER Alice -> Bob

```
REFER sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds8
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 2 REFER
Refer-To: <sips:carol@chicago.example.com>
Referred-By: <alice@atlanta.example.com>
Contact: <sips:alice@client.atlanta.example.com>
Content-Length: 0
```

F6 202 Accepted Bob -> Alice

```
SIP/2.0 202 Accepted
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds8
;received=192.0.2.113
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
```


Call-ID: 12345601@atlanta.example.com
CSeq: 2 REFER
Content-Length: 0

F7 NOTIFY Bob -> Alice

NOTIFY sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds32
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 NOTIFY
Event: refer
Subscription-State: active;expires=60
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 100 Trying

F8 200 OK Alice -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds32
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 2 NOTIFY
Content-Length: 0

/* Alice now disconnects with Bob. */

F9 BYE Alice -> Bob

BYE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds43
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 3 BYE
Content-Length: 0

F10 200 OK Bob -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds43
;received=192.0.2.105

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345601@atlanta.example.com

CSeq: 3 BYE

Content-Length: 0

/* Bob attempts the transfer to Carol */

F11 INVITE Bob -> Carol

INVITE sips:carol@chicago.example.com SIP/2.0

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds1
Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>

Call-ID: 7436222@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Referred-By: <alice@atlanta.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844539 2890844539 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423821 0

m=audio 3458 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F12 180 Ringing Carol -> Bob

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds1
;received=192.0.2.113

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>;tag=928287

Call-ID: 7436222@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:carol@client.chicago.example.com>
Content-Length: 0

F13 200 OK Carol -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds1
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=928287
Call-ID: 7436222@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:carol@client.chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=carol 2890844527 2890844527 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F14 ACK Bob -> Carol

ACK sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds9
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=928287
Call-ID: 7436222@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

/* Bob and Carol now have established a session. Bob reports success to
Alice which Alice probably ignores. */

F15 NOTIFY Bob -> Alice

NOTIFY sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds67
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159

To: Alice <sips:alice@atlanta.example.com>;tag=1234567
 Call-ID: 12345601@atlanta.example.com
 CSeq: 3 NOTIFY
 Event: refer
 Subscription-State: terminated;reason=noresource
 Content-Type: message/sipfrag
 Content-Length: ...

SIP/2.0 200 OK
 Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds1
 ;received=192.0.2.113
 From: Bob <sips:bob@biloxi.example.com>;tag=8675309
 To: Carol <sips:carol@chicago.example.com>;tag=928287
 Call-ID: 7436222@atlanta.example.com
 CSeq: 1 INVITE
 Contact: <sips:carol@client.chicago.example.com>
 Content-Type: application/sdp
 Content-Length: ...

F16 200 OK Alice -> Bob

SIP/2.0 200 OK
 Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds6
 ;received=192.0.2.113
 From: Bob <sips:bob@biloxi.example.com>;tag=314159
 To: Alice <sips:alice@atlanta.example.com>;tag=1234567
 Call-ID: 12345601@atlanta.example.com
 CSeq: 3 NOTIFY
 Content-Length: 0

[2.5](#) Transfer - Attended

Alice	Bob	Carol
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		
----->		
RTP		
<=====>		
INVITE (hold) F5		

<-----		
200 OK F6		
----->		
ACK F7		
<-----		
No RTP		
	INVITE F8	
	----->	
	180 Ringing F9	
	<-----	
	200 OK F10	
	<-----	
	ACK F11	
	----->	
	RTP	
	<=====	
	INVITE (hold) F12	
	----->	
	200 OK F13	
	<-----	
	ACK F14	
	----->	
	No RTP	
REFER Refer-To: C F15		
<-----		
202 Accepted F16		
----->		
NOTIFY F17		
----->		
200 OK F18		
<-----		
INVITE Replaces: B F19		
----->		
200 OK F20		
<-----		
ACK F21		
----->		
RTP		
<=====		
	BYE F22	
	<-----	
	200 OK F23	
	----->	
NOTIFY F24		
----->		
200 OK F25		
<-----		
BYE F26		


```

|<-----|
| 200 OK F27 |
|----->|

```

In this scenario, Alice calls Bob. Bob puts Alice on hold then calls Carol to announce transfer, then places Carol on hold. Bob transfers Alice to Carol which replaces the session between Bob and Carol. Carol then disconnects session with Bob. Alice reports success of transfer to Bob, who then disconnects with Alice. In this example, the Replaces header field [4] is inserted into the Refer-To URI by Bob. Note that the Refer-To URI is the Contact URI returned by Carol in the 200 OK response F10. This ensures that only the correct instance of Carol is reached. The presence of the Supported: gruu header field in message F10 indicates that the Contact URI is, in fact, a GRUU [20] and will be globally routable outside of the dialog. Without knowing the Contact URI is a gruu, Bob must be prepared, if the triggered INVITE had fails, to retry the REFER with a Refer-To URI of the URI used to reach Carol but with a Require: replaces header escaped in the Refer-To header field, as discussed in the transfer [7] document.

Message Details

F1 INVITE Alice -> Bob

INVITE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:alice@client.atlanta.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com

s=Session SDP

c=IN IP4 client.atlanta.example.com

t=3034423619 0

m=audio 49170 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F4 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: 12345600@atlanta.example.com

CSeq: 1 ACK

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces
Content-Length: 0

/* Alice and Bob have established a session. Bob puts Alice on Hold */

F5 INVITE Bob -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Type: application/sdp
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: ...

v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly

F6 200 OK Alice -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com


```
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly
```

F7 ACK Bob -> Alice

```
ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds3
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 ACK
Content-Length: 0
```

/* Bob calls Carol */

F8 INVITE Bob -> Carol

```
INVITE sips:carol@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 28908445834 2890844834 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423645 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F9 180 Ringing Carol -> Bob

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE
Contact: <sips:39itp34klkd@chicago.example.com>
Content-Length: 0

F10 200 OK Carol -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE
Contact: <sips:39itp34klkd@chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F11 ACK Bob -> Carol

ACK sips:39itp34klkd@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashd5
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 ACK
Content-Length: 0

/* Bob puts Carol on hold */

F12 INVITE Bob -> Carol

```
INVITE sips:39itp34klkd@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds0
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 43 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 289084834 2890844835 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423645 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F13 200 OK Carol -> Bob

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds0
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 43 INVITE
Contact: <sips:39itp34klkd@chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=carol 2890844922 2890844923 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly
```


F14 ACK Bob -> Carol

ACK sips:39itp34klkd@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash334
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 43 ACK
Content-Length: 0

/* Bob Transfers Alice to Carol. */

F15 REFER Bob -> Alice

REFER sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds2g
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1025 REFER
Refer-To: <sips:39itp34klkd@chicago.example.com?Replaces=
sdjfdjfskdf%40biloxi.example.com%3Bto-tag%3D5f35a3%3Bfrom-tag%3D8675309>
Referred-By: <sips:bob@biloxi.example.com>
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F16 202 Accepted Alice -> Bob

SIP/2.0 202 Accepted
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds2g
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=1234567
To: Alice <sips:alice@atlanta.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1025 REFER
Content-Length: 0

F17 NOTIFY Alice -> Bob

NOTIFY sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfK
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 2 NOTIFY
Contact: <sips:bob@client.biloxi.example.com>
Event: refer
Subscription-State: active;expires=60
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 100 Trying

F18 200 OK Bob -> Carol

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfK
;received=192.0.2.103
To: Bob <sips:bob@biloxi.example.com>;tag=1234567
From: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: 12345600@atlanta.example.com
CSeq: 2 NOTIFY
Content-Length: 0

/* Alice establishes session with Carol which replaces the session
between Bob and Carol */

F19 INVITE Alice -> Carol

INVITE sips:39itp34klkd@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKadfe4ko
To: Carol <sips:39itp34klkd@chicago.example.com>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=3461
Call-ID: 9435674543@atlanta.example.com
CSeq: 1 INVITE
Referred-By: <sips:bob@biloxi.example.com>
Replaces: sdjfdjfskdf@biloxi.example.com;to-tag=5f35a3;from-tag=8675309
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0

o=alice 2890844989 2890844989 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com

t=3034423643 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F20 200 OK Carol -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKadfe4ko
;received=192.0.2.123
To: Carol <sips:39itp34klkd@chicago.example.com>;tag=ff3a
From: Alice <sips:alice@atlanta.example.com>;tag=3461
Call-ID: 9435674543@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:39itp34klkd@chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844221 2890844221 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423452 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F21 ACK Alice -> Carol

ACK sips:39itp34klkd@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKadfe4kU3
To: Carol <sips:39itp34klkd@chicago.example.com>;tag=ff3a
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=3461
Call-ID: 9435674543@atlanta.example.com
CSeq: 1 INVITE
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

/* Carol then disconnects from Bob */

F22 BYE Carol -> Bob

BYE sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfE
To: Bob <sips:bob@biloxi.example.com>;tag=8675309
Max-Forwards: 70
From: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 1 BYE
Content-Length: 0

F23 200 OK Bob -> Carol

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfE
;received=192.0.2.103
To: Bob <sips:bob@biloxi.example.com>;tag=8675309
From: Carol <sips:carol@chicago.example.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 1 BYE
Content-Length: 0

/* Alice tells Bob that the call has been successfully transferred */

F24 NOTIFY Alice -> Bob

NOTIFY sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf2N
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 3 NOTIFY
Event: refer
Subscription-State: terminated;reason=noresource
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 200 OK
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKadfe4ko
;received=192.0.2.123
From: Carol <sips:carol@chicago.example.com>;tag=ff3a
To: Alice <sips:alice@atlanta.example.com>;tag=3461
Call-ID: 9435674543@chicago.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>

F25 200 OK Bob -> Carol

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

To: Bob <sips:bob@biloxi.example.com>;tag=1234567

From: Carol <sips:carol@chicago.example.com>;tag=5f35a3

Call-ID: 12345600@atlanta.example.com

CSeq: 3 NOTIFY

Content-Length: 0

/* Bob disconnects with Alice */

F26 BYE Bob -> Alice

BYE sips:alice@client.atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7P
Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=23431

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Call-ID: 12345600@atlanta.example.com

CSeq: 1026 BYE

Content-Length: 0

F27 200 OK Alice -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7P
;received=192.0.2.113

From: Bob <sips:bob@biloxi.example.com>;tag=23431

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Call-ID: 12345600@atlanta.example.com

CSeq: 1026 BYE

Content-Length: 0

2.6 Transfer - Instant Messaging

Alice	Bob	Carol
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		
----->		
Both way RTP Established		
<=====>		
	MESSAGE F5	
	----->	
	200 OK F6	
	<-----	
INVITE Replaces:A-B F7		
<-----		
	200 OK F8	
----->		
ACK F9		
<-----		
Both way RTP Established		
<=====>		
BYE F10		
----->		
200 OK F11		
<-----		

In this scenario, Alice and Bob establish a session between them. Bob wants Carol to take the call so sends an Instant Message (IM) to Carol containing Alice's URI and an embedded Replaces header field. If Carol clicks on the URI, Carol's SIP UA sends an INVITE to Alice which replaces the session with Bob.

This scenario shows the use of the SIP MESSAGE [\[15\]](#) method to pass the URI. However, another IM protocol or other method could have been used to pass the URI from Bob to Carol.

Message Details

F1 INVITE Alice -> Bob

INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@client.biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
Contact: <sips:bob@client.biloxi.example.com>
CSeq: 1 INVITE
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY, MESSAGE
Supported: replaces
Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F4 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74r

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=3145678

Call-ID: 12345600@atlanta.example.com

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces

CSeq: 1 ACK

Content-Length: 0

/* Bob IMs Carol */

F5 MESSAGE Bob -> Carol

MESSAGE sips:carol@chicago.example.com SIP/2.0

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash

Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>

Call-ID: sdjfdjfskdf@biloxi.example.com

CSeq: 42 MESSAGE

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY, MESSAGE

Supported: replaces

Content-Type: text/html

Content-Length: ...

<HTML>Do you want to take this call from

<A HREF="sips:a8342043f@atlanta.example.com?Replaces=

12345600@atlanta.example.com%3Bfrom-tag%3D314159%3Bto-tag%3D1234567">

Alice? </HTML>

F6 200 OK Carol -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash
;received=192.0.2.113

From: Bob <sips:bob@biloxi.example.com>;tag=8675309

To: Carol <sips:carol@chicago.example.com>;tag=5f35a3

Call-ID: sdjfdjfskdf@biloxi.example.com

CSeq: 42 MESSAGE

Contact: <sips:carol@client.chicago.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY, MESSAGE

Supported: replaces

Content-Length: 0

/* Carol takes the call from Bob */

F7 INVITE Carol -> Alice

INVITE sips:a8342043f@atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74HH

Max-Forwards: 70

From: Carol <sips:carol@chicago.example.com>;tag=8675309

To: Alice <sips:a8342043f@atlanta.example.com>

Call-ID: 563456212@b2.biloxi.example.com

CSeq: 1 INVITE

Replaces: 12345600@atlanta.example.com;to-tag=314578;from-tag=1234567

Contact: <sips:carol@client.chicago.example.com>

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY, MESSAGE

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890843122 2890843122 IN IP4 client.chicago.example.com

s=Session SDP

c=IN IP4 client.chicago.example.com

t=3034423619 0

m=audio 5342 RTP/AVP 0

a=rtpmap:0 PCMU/8000

/* Alice matches the dialog information in the Replaces header and
accepts

the INVITE */

F8 200 OK Alice -> Carol

SIP/2.0 200 OK
Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74HH
;received=192.0.2.114
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Alice <sips:a8342043f@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 289084543 289084543 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F9 ACK Carol -> Alice

ACK sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS b2.biloxi.example.com:5061;branch=z9hG4bK7435
Max-Forwards: 70
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Alice <sips:a8342043f@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 1 ACK
Content-Length: 0

/* RTP streams are established between Alice and Carol.
Alice Hangs Up with Bob due to the Replaces header field. */

F10 BYE Alice -> Bob

BYE sips:carol@client.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
Max-Forwards: 70
To: Bob <sips:bob@biloxi.example.com>;tag=8675309
From: Alice <sips:alice@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F11 200 OK Bob -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
;received=192.0.2.103

To: Bob <sips:bob@biloxi.example.com>;tag=8675309

From: Alice <sips:alice@atlanta.example.com>;tag=131256

Call-ID: 563456212@b2.biloxi.example.com

CSeq: 2 BYE

Content-Length: 0

2.7 Call Forwarding Unconditional

Alice	Proxy	Gateway
INVITE F1		
----->		
(100 Trying) F2		
<-----		
(181 Call Is Being Forwarded) F3		
<-----	INVITE F4	
	----->	
	180 Ringing F5	
180 Ringing F6	<-----	
<-----	200 OK F7	
200 OK F8	<-----	
<-----		
ACK F9		
----->	ACK F10	
	----->	
Both way RTP Established		
<=====		
BYE F11		
----->	BYE F12	
	----->	
	200 OK F13	
200 OK F14	<-----	
<-----		

Bob wants all calls forwarded to the PSTN (which is just another URI to the proxy server). Alice calls Bob. The proxy server rewrites

the Request URI, and forwards the INVITE to a Gateway. Details of messaging behind the Gateway are not shown.

Note that the 181 Call is Being Forwarded response does not have a To tag added as the proxy does not wish to establish an early dialog with Alice.

Note also that forwarding could be accomplished using a redirect (302 Moved Temporarily response).

Message Details

F1 INVITE Alice -> Proxy

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 (100 Trying) Proxy -> Alice

```
SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```

F3 (181 Call is Being Forwarded) Proxy -> Alice

SIP/2.0 181 Call is Being Forwarded

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Content-Length: 0

/* Proxy forwards call by rewriting Request-URI */

F4 INVITE Proxy -> Gateway

INVITE sips:+19727293660@gw1.example.com;user=phone SIP/2.0

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

Max-Forwards: 69

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:alice@client.atlanta.example.com>

Content-Type: application/sdp

Content-Length: ...

v=0

o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com

s=Session SDP

c=IN IP4 client.atlanta.example.com

t=3034423619

m=audio 49170 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F5 180 Ringing Gateway -> Proxy

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:+19727293660@gw1.example.com;user=phone>
Content Length:0

F6 180 Ringing Proxy -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:+19727293660@gw1.example.com;user=phone>
Content Length: 0

F7 200 OK Gateway -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:+19727293660@gw1.example.com;user=phone>
Content-Type: application/sdp
Content-Length: ...

v=0
o=GATEWAY1 2890844527 2890844527 IN IP4 gatewayone.example.com
s=Session SDP
c=IN IP4 gatewayone.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:+19727293660@gw1.example.com;user=phone>
Content-Type: application/sdp
Content-Length: ...

v=0
o=GATEWAY1 2890844527 2890844527 IN IP4 gatewayone.example.com
s=Session SDP
c=IN IP4 gatewayone.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F9 ACK Alice -> Proxy

ACK sips:+19727293660@gw1.example.com;user=phone SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf31
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F10 ACK Proxy -> Gateway

ACK sips:+19727293660@gw1.example.com;user=phone SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749ws.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf31
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F11 BYE Alice -> Proxy 1

BYE sips:+19727293660@gw1.example.com;user=phone SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfJe
Route: <sips:+19727293660@gw1.example.com;user=phone>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F12 BYE Proxy 1 -> Gateway

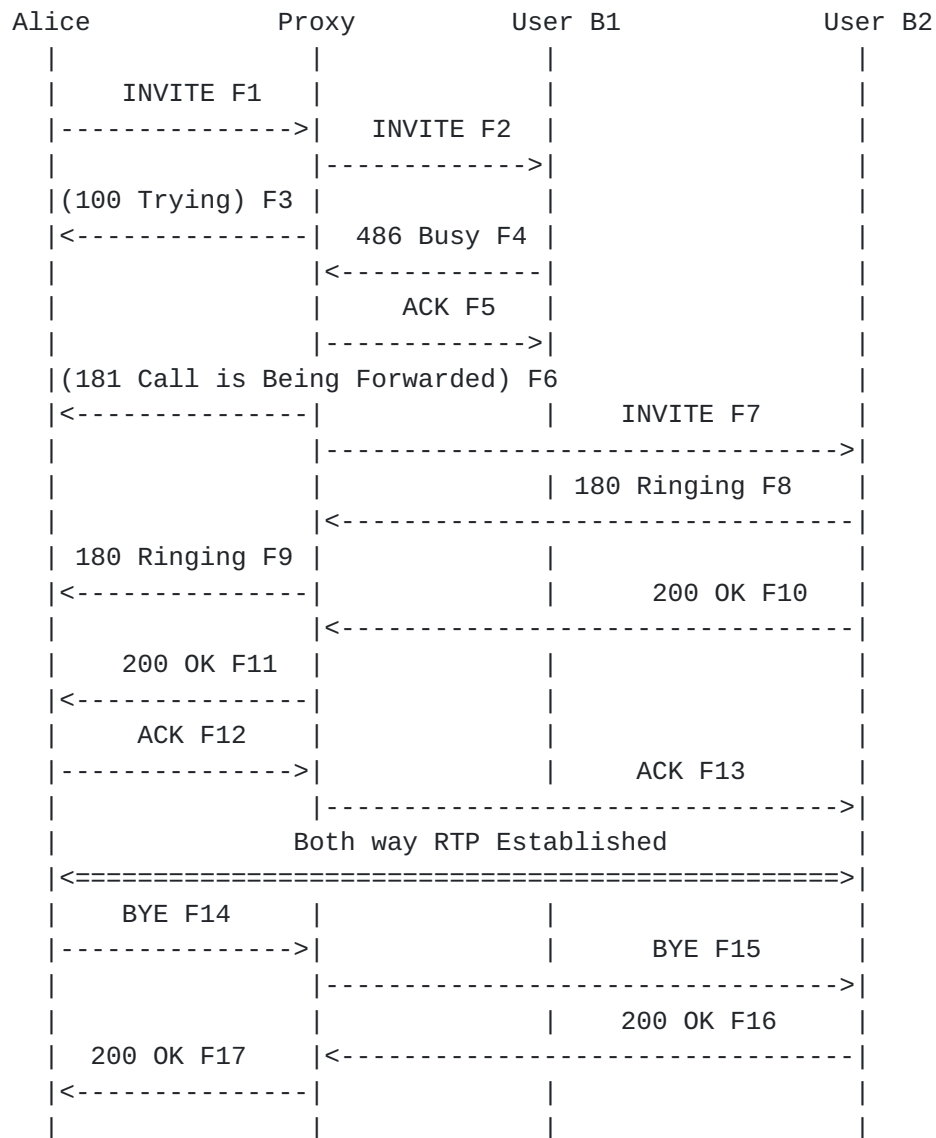
BYE sips:+19727293660@gw1.example.com;user=phone SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749G1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfJe
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F13 200 OK Gateway -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749G
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfJe
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F14 200 OK Proxy 1 -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfJe
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

2.8 Call Forwarding - Busy

Bob wants calls to B1 forwarded to B2 if B1 is busy (this information is known to the proxy). Alice calls B1, B1 is busy, the proxy server places call to B2.

Message Details

F1 INVITE Alice -> Proxy

INVITE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 INVITE Proxy -> B1

INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F3 (100 Trying) Proxy -> Alice

SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F4 486 Busy Here B1 -> Proxy

SIP/2.0 486 Busy Here
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F5 ACK Proxy -> B1

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F6 (181 Call is Being Forwarded) Proxy -> Alice

SIP/2.0 181 Call is Being Forwarded
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

/* The proxy now forwards the call to B2 */

F7 INVITE Proxy -> B2


```
INVITE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F8 180 Ringing B2 -> Proxy

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Length: 0
```

F9 180 Ringing Proxy -> Alice

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
```


CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Length: 0

F10 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F11 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP


```
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F12 ACK Alice -> Proxy

```
ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfX
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
```

F13 ACK Proxy -> B2

```
ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83731
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfX
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0
```

/* RTP streams are established between A and B2 */

/* Alice eventually hangs up with User B2. */

F14 BYE Alice -> Proxy

```
BYE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bw4
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0
```


F15 BYE Proxy -> B2

BYE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837493
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bW4
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F16 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837493
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bW4
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F17 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bW4
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

[2.9](#) Call Forwarding - No Answer

Alice	Proxy	User B1	User B2
INVITE F1			
----->	INVITE F2		
(100 Trying) F3	----->		
<-----	180 Ringing F4		
180 Ringing F5	<-----		
<-----			
	Request Timeout		
	CANCEL F6		
	----->		
	200 OK F7		
	<-----		
	487 F8		
	<-----		
	ACK F9		
	----->		
(181 Call is Being Forwarded) F10			
<-----		INVITE F11	
	----->		
		180 Ringing F12	
180 Ringing F13	<-----		
<-----		200 OK F14	
	<-----		
200 OK F15			
<-----			
ACK F16			
----->		ACK F17	
	----->		
	Both way RTP Established		
<=====			
BYE F18			
----->		BYE F19	
	----->		
		200 OK F20	
200 OK F21	<-----		
<-----			

Bob wants calls to B1 forwarded to B2 if B1 is not answered (information is known to the proxy server). Alice calls B1 and no one answers. The proxy server then places the call to B2.

Message Details

F1 INVITE Alice -> Proxy


```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy -> B1

```
INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 (100 Trying) Proxy -> Alice

SIP/2.0 100 Trying

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F4 180 Ringing B1 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F5 180 Ringing Proxy -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

/* B1 rings until a configurable timer expires in the Proxy. The
Proxy sends Cancel and proceeds down the list of routes. */

F6 CANCEL Proxy -> B1

CANCEL sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0

F7 200 OK B1 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
From: Alice <sips:alice@atlanta.example.com>
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0

F8 487 Request Terminated B1 -> Proxy

SIP/2.0 487 Request Terminated
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F9 ACK Proxy -> B1

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F10 (181 Call is Being Forwarded) Proxy -> Alice

SIP/2.0 181 Call is Being Forwarded
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9


```
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```

F11 INVITE Proxy -> B2

```
INVITE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F12 180 Ringing B2 -> Proxy

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Length: 0
```


F13 180 Proxy -> Alice

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=765432

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client2.biloxi.example.com>

Content-Length: 0

F14 200 OK B2 -> Proxy

SIP/2.0 200 OK

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=765432

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client2.biloxi.example.com>

Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com

s=Session SDP

c=IN IP4 client2.biloxi.example.com

t=0 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F15 200 OK Proxy -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

Record-Route: <sips:ss1.example.com;lr>

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=765432

Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F16 ACK Alice -> Proxy

ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf3
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F17 ACK Proxy -> B2

ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8374.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf3
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

/* RTP streams are established between A and B2. Alice Hangs Up with
User B2. */

F18 BYE Alice -> Proxy

BYE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b3f

Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F19 BYE Proxy -> B2

BYE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b3f
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F20 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK837.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b3f
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

F21 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b3f
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

2.10 3-way Conference - Third Party is Added

Alice	Bob	Carol
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		
----->		
RTP		
<=====		
INVITE F5		
<-----		
200 OK F6		
----->		
ACK F7		
<-----	INVITE F8	
	----->	
	180 F9	
	<-----	
	200 OK F10	
	<-----	
	ACK F11	
	----->	
	RTP	
	<=====	

In this scenario, Alice and Bob are in a 2-party call (session) when Bob wishes to add Carol into the conversation. Bob is capable of media mixing in a 3-party call. Bob first sends a re-INVITE to Alice changing Contact URIs to one that indicates Alice's mixer and acts like a focus. As a result, Bob includes the "isfocus" feature tag [10] as described in [11]. Bob then INVITEs Carol using the same Contact URI.

Message Details

F1 INVITE Alice -> Bob

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
```


Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:b54gh42f5@biloxi.example.com>
Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:b54gh42f5@biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP


```
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 ACK Alice -> Bob

```
ACK sips:b54gh42f5@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfl
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0
```

```
/* Alice and Bob have established a session. Bob re-INVITES changing
   Contact URIs */
```

F5 INVITE Bob -> Alice

```
INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE
Contact: <sips:bob-Mixer@client.biloxi.example.com>;isfocus
Content-Type: application/sdp
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F6 200 OK Alice -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvonly

F7 ACK Bob -> Alice

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash3G
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 ACK
Content-Length: 0

/* Bob calls Carol */

F8 INVITE Bob -> Carol

INVITE sips:carol@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashJfd
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE

Contact: <sips:bob-Mixer@client.biloxi.example.com>;isfocus
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 28908445834 2890844834 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423645 0
m=audio 48174 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F9 180 Ringing Carol -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashJfd
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=341313
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE
Contact: <sips:carol@client.chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F10 200 OK Carol -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashJfd
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=341313
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 INVITE
Contact: <sips:carol@client.chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com
s=Session SDP


```
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F11 ACK Bob -> Carol

```
ACK sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash431
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=341313
Call-ID: sdjfdjfskdf@biloxi.example.com
CSeq: 42 ACK
Content-Length: 0
```

```
/* User B's mixer know mixes media from both A and C to create the 3-way
conference. */
```


2.11 3-way Conference - Third Party Joins

Alice	Bob	Carol
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		
----->		
RTP		
<=====	INVITE Join:A-B F5	
	<-----	
	180 F6	
	----->	
INVITE F7		
<-----		
200 OK F8		
----->		
ACK F9		
<-----		
	200 OK F10	
	----->	
	ACK F11	
	<-----	
	RTP	
	<=====	

In this scenario, Alice and Bob are in a 2 party call and Carol wishes to join resulting in a three party call. Carol could have learned Bobs conference URI using some non-SIP means, or possibly from a NOTIFY with the dialog package sent by Bob. Carol sends an INVITE to Bob containing a Join header identifying the dialog between Alice and Bob. Bob re-INVITES Alice to switch to focus mode and includes the "isfocus" feature tag [10] as described in [11]. Bob then accepts the INVITE from Carol, resulting in the 3-way call.

Message Details

F1 INVITE Alice -> Bob

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
```


From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0

o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:b54gh42f5@biloxi.example.com>
Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:b54gh42f5@biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, join, gruu
Content-Type: application/sdp
Content-Length: ...


```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 ACK Alice -> Bob

```
ACK sips:b54gh42f5@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf6
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0
```

/* Alice and Bob have established a session. Carol requests to join the session */

F5 INVITE Carol -> Bob

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 452k499sk@chicago.example.com
CSeq: 99 INVITE
Contact: <sips:carol@client.chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, join
Join: 12345600@atlanta.example.com;from-tag=1234567;to-tag=23431
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```


F6 180 Ringing Carol -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKnashds7
;received=120.
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Bob <sips:bob@biloxi.example.com>;tag=0982
Call-ID: 452k499sk@chicago.example.com
CSeq: 99 INVITE
Contact: <sips:bob-Mixer@client.biloxi.example.com>;isfocus
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Length: 0

F7 INVITE Bob -> Alice

INVITE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdyKL
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE
Contact: <sips:bob-Mixer@client.biloxi.example.com>;isfocus
Content-Type: application/sdp
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, join, gruu
Content-Length: ...

v=0
o=bob 2890844527 2890844528 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 200 OK Alice -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdyKL
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 INVITE

Contact: <sips:alice@client.atlanta.example.com>;isfocus
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY

Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F9 ACK Bob -> Alice

ACK sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnash3g
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=23431
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1024 ACK
Content-Length: 0

F10 200 OK Bob -> Carol

SIP/2.0 200 OK
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKnashds7
;received=120.
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Bob <sips:bob@biloxi.example.com>;tag=0982
Call-ID: 452k499sk@chicago.example.com
CSeq: 99 INVITE
Contact: <sips:bob-Mixer@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, join, gruu
Content-Type: application/sdp
Content-Length: ...

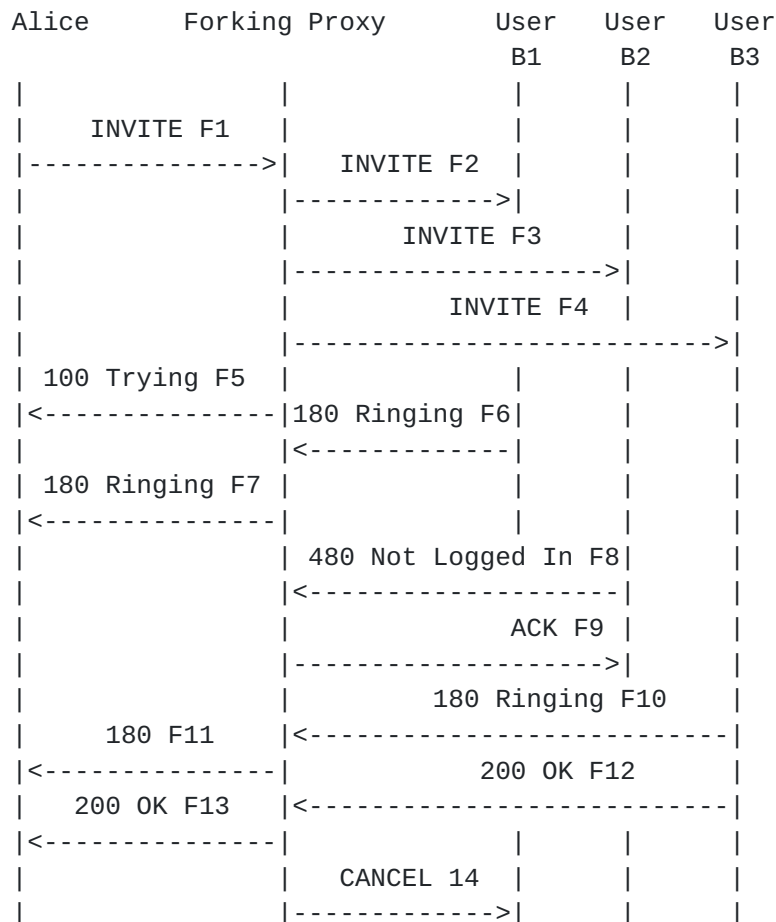
v=0
o=bob 28908445834 2890844834 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423645 0

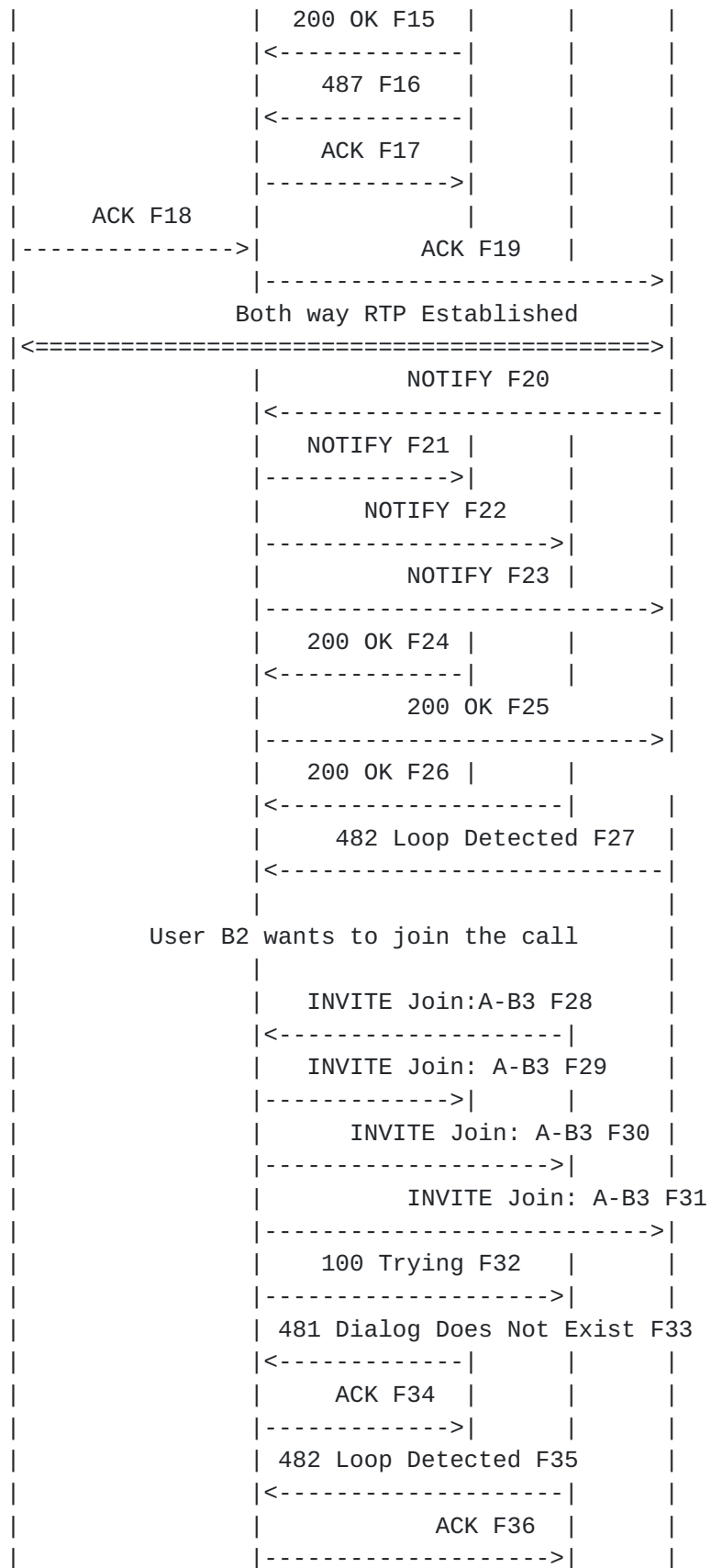
m=audio 48174 RTP/AVP 0
a=rtpmap:0 PCMU/8000

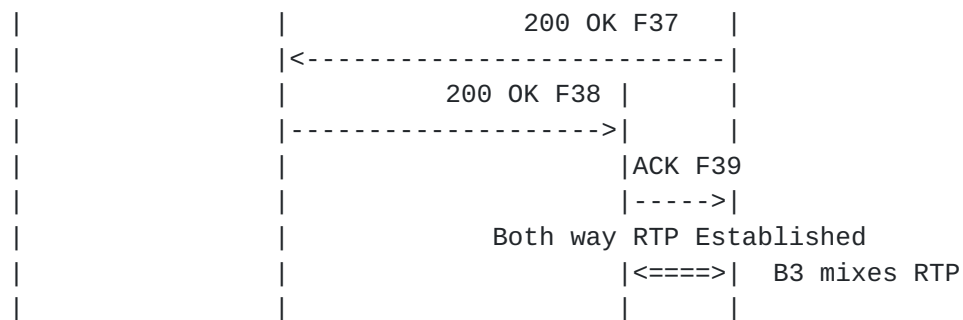
F11 ACK OK Bob -> Carol

ACK sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bKnash4Gf
Max-Forwards: 70
From: Carol <sips:carol@chicago.example.com>;tag=8675309
To: Bob <sips:bob@biloxi.example.com>;tag=0982
Call-ID: 452k499sk@chicago.example.com
CSeq: 99 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, join
Content-Length:0

2.12 Single Line Extension







In Single Line Extension a call will ring several extensions at the same time (forking). The first extension to answer the call becomes the active set. If other extensions pick up, the call becomes a conference call.

The grouping of multiple UAs with a single URI is possible in SIP by registering multiple Contact URIs against a single address of record. For the group of UAs to learn the dialog state of each other to enable a Join request to be formulated, a full mesh of dialog package subscriptions could be used. A new UA being added to the group would register with the group AOR then subscribe to the registration package [19] to find out the other registered members. However, when the Nth UA joins the group, it will cause an additional $2(N-1)$ new subscriptions to be created. An INVITE forked to all N group members will result in $N(N-1)$ NOTIFYs being sent among the group. To avoid this scaling issue, this flow uses an implicit subscription between each of the group members and a simple forking proxy.

In this flow, Alice calls Bob using his AOR URI which results in the INVITE being forked to three devices, B1, B2, and B3. In this example, B3 answers the call and is connected to Alice. B3 sends a NOTIFY containing the dialog information to the AOR for Bob, which is forked to B1 and B2. (The service-unaware forking proxy actually forks it back to B3 as well, but B3 simply discards with a 482 Loop Detected response.) Later in the example, B2 wishes to join the call and sends an INVITE with a Join header field to Bob's AOR URI to request this. This INVITE is forked and is accepted by B3 who then performs the mixing function. The INVITE is rejected by both B1 and B2.

Note that this call flow requires B1, B2, and B3 have an implicit subscription with Bob's AOR.

Note that if B3 is not capable of mixing the media, B3 would transfer both Alice and B2 to a conferencing bridge which would perform the mixing.

This flow requires reliable transport such as TCP since the forking

proxy only guarantees that one UA receives each NOTIFY, not every UA. (This is because it only waits for one final response, not N, before completing the transaction.

The use of SUBSCRIBE and NOTIFY is defined in [6] while the dialog Event package is defined in [8].

Message Details

F1 INVITE Alice -> Proxy

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t= 0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy -> B1

```
INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
```



```
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t= 0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 INVITE Proxy -> B2

```
INVITE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 INVITE Proxy -> B3

```
INVITE sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.3
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
```



```
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F5 100 Trying Proxy -> Alice

```
SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```

F6 180 Ringing B1 -> Proxy

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0
```

F7 180 Ringing Proxy -> Alice

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0
```


F8 480 Not Logged In B2 -> Proxy

SIP/2.0 480 Not Logged In

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314756

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Content-Length: 0

F9 ACK Proxy -> B2

ACK sips:bob@client2.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=314756

Call-ID: 12345600@atlanta.example.com

CSeq: 1 ACK

Content-Length: 0

F10 180 Ringing B3 -> Proxy

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS ss1.example.com:5061;branch=83749.3
;received=192.0.2.54

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=7137136

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client3.biloxi.example.com>

Content-Length: 0

F11 180 Ringing B3 -> Proxy

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=7137136

Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client3.biloxi.example.com>
Content-Length: 0

F12 200 OK B3 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=83749.3
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client3.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client3.biloxi.example.com
s=Session SDP
c=IN IP4 client3.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F13 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com.115>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...


```
v=0
o=bob 2890844527 2890844527 IN IP4 client3.biloxi.example.com
s=Session SDP
c=IN IP4 client3.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
/* Forking Proxy cancels pending branch B1 */
```

```
F14 CANCEL Proxy -> B1
```

```
CANCEL sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0
```

```
F15 200 OK B1 -> Proxy
```

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
From: Alice <sips:alice@atlanta.example.com>
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0
```

```
F16 487 Request Terminated B1 -> Proxy
```

```
SIP/2.0 487 Request Terminated
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```


F17 ACK Proxy -> B1

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F18 ACK Alice -> Proxy

ACK sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf3
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK

Content-Length: 0

F19 ACK Proxy -> B3

ACK sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83742
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf3
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com

CSeq: 1 ACK
Content-Length: 0

/* RTP streams are established between A and B3*/

/* User B3 sends a NOTIFY to the group with established dialog
information. */

F20 NOTIFY B3 -> Proxy

NOTIFY sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="0" state="partial" entity="sips:bob@biloxi.example.com">
  <dialog id="2393lds3204" call-id="12345600@atlanta.example.com"
    local-tag="7137136" remote-tag="1234567" direction="recipient">
    <state event="2xx">confirmed</state>
  </dialog>
</dialog-info>
```

F21 NOTIFY Proxy -> B1

NOTIFY sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
;received=192.0.2.115
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="0" state="partial" entity="sips:bob@biloxi.example.com">
  <dialog id="2393lds3204" call-id="12345600@atlanta.example.com"
    local-tag="7137136" remote-tag="1234567" direction="recipient">
    <state event="2xx">confirmed</state>
  </dialog>
</dialog-info>
```

F22 Proxy -> B2


```
NOTIFY sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.2
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
    ;received=192.0.2.115
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...
```

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
    version="0" state="partial" entity="sips:bob@biloxi.example.com">
<dialog id="2393lds3204" call-id="12345600@atlanta.example.com"
    local-tag="7137136" remote-tag="1234567" direction="recipient">

<state event="2xx">confirmed</state>
</dialog>
</dialog-info>
```

F23 NOTIFY Proxy-> B3

```
NOTIFY sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.3
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
    ;received=192.0.2.115
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
```

```
CSeq: 1 NOTIFY
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...
```

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
    version="0" state="partial" entity="sips:bob@biloxi.example.com">
<dialog id="2393lds3204" call-id="12345600@atlanta.example.com"
    local-tag="7137136" remote-tag="1234567" direction="recipient">
```



```
<state event="2xx">confirmed</state>
</dialog>
</dialog-info>
```

F24 200 OK B1 -> Proxy

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
    ;received=192.0.2.115
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Content-Length: 0
```

F25 200 OK Proxy -> B3

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
    ;received=192.0.2.115
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Content-Length: 0
```

F26 200 OK B2 -> Proxy

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.2
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
    ;received=192.0.2.115
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Content-Length: 0
```

F27 200 OK B3 -> Proxy

SIP/2.0 482 Loop Detected


```
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558a.3
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewlk
;received=192.0.2.115
From: Bob <sips:bob@biloxi.example.com>;tag=w2Hu8sj
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 8458999275@biloxi.example.com
CSeq: 1 NOTIFY
Content-Length: 0
```

```
/* User B2 decided to join the call. */
```

```
F28 INVITE B2 -> Proxy
```

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Join: 12345600@atlanta.example.com;to-tag=765432;from-tag=1234567
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
F29 INVITE Proxy -> B1
```

```
INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.1
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
;received=192.0.2.114
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>
```


Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Join: 12345600@atlanta.example.com;to-tag=765432;from-tag=1234567
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F30 INVITE Proxy -> B2

INVITE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.2
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ew1
;received=192.0.2.114
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Join: 12345600@atlanta.example.com;to-tag=765432;from-tag=1234567
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F31 INVITE Proxy -> B3

```
INVITE sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.3
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
    ;received=192.0.2.114
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client2.biloxi.example.com>
Join: 12345600@atlanta.example.com;to-tag=765432;from-tag=1234567
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890844527 2890844527 IN IP4 client2.biloxi.example.com
s=Session SDP
c=IN IP4 client2.biloxi.example.com
t=0 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F32 100 Trying Proxy -> B2

```
SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
    ;received=192.0.2.114
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Content-Length: 0
```

/* B1 does not have an established dialog, so it returns a 481 */

F33 481 Dialog Does Not Exist B1 -> Proxy

```
SIP/2.0 481 Dialog Does Not Exist
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.1
    ;received=192.0.2.54
```


Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
;received=192.0.2.114
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=68324lk42jd
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Content-Length: 0

F34 ACK Proxy -> B1

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.1
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=68324lk42jd
Call-ID: 524251233@biloxi.example.com
CSeq: 1 ACK
Content-Length: 0

F35 482 Loop Detected B2 -> Proxy

SIP/2.0 482 Loop Detected
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.2
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
;received=192.0.2.114
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=134lkwe
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Content-Length: 0

F36 ACK Proxy -> B2

ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.2
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=134lkwe
Call-ID: 524251233@biloxi.example.com
CSeq: 1 ACK
Content-Length: 0

/* B3 has an existing dialog and agrees to mix B2 into the session. */

F37 200 OK User B3 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK4558ab.3
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
;received=192.0.2.114
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=3891908734
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client3.biloxi.example.com>;isfocus
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client3.biloxi.example.com
s=Session SDP
c=IN IP4 client3.biloxi.example.com
t=0 0
m=audio 3460 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F38 200 OK User B3 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ewl
;received=192.0.2.114
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=3891908734
Call-ID: 524251233@biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client3.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Allow-Event: dialog
Supported: replaces, join
Content-Type: application/sdp
Content-Length: ...

v=0

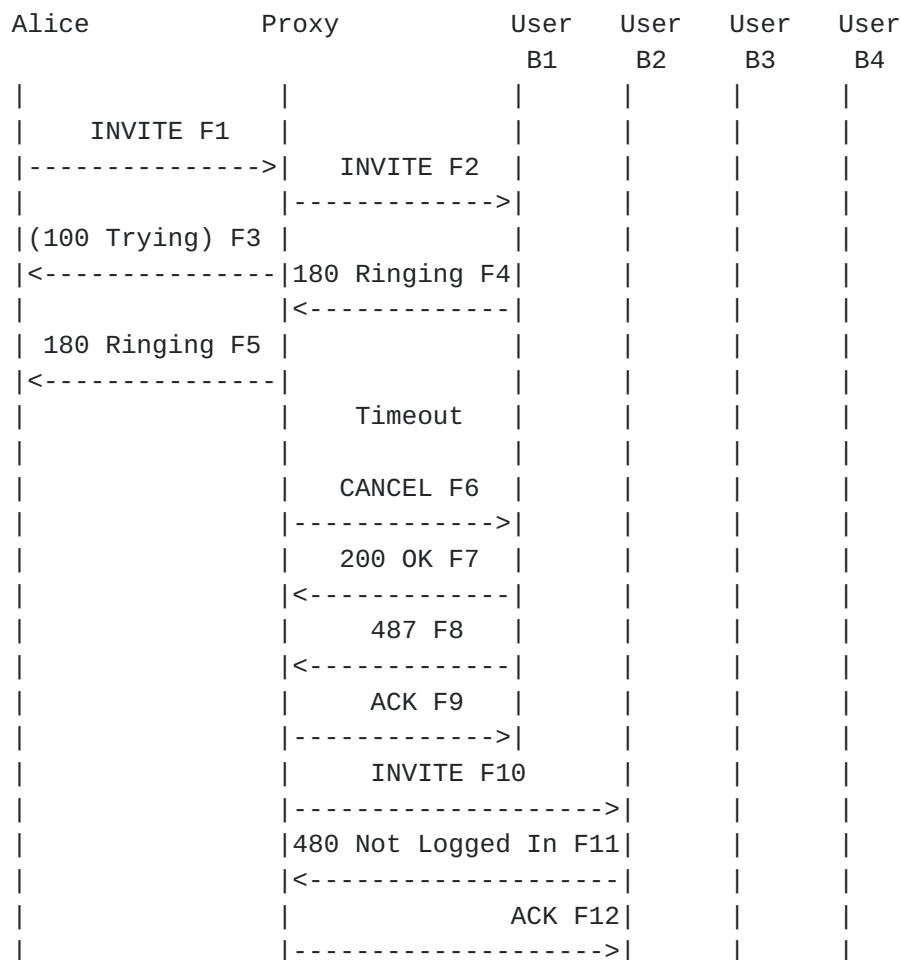
o=bob 2890844527 2890844527 IN IP4 client3.biloxi.example.com
s=Session SDP
c=IN IP4 client3.biloxi.example.com

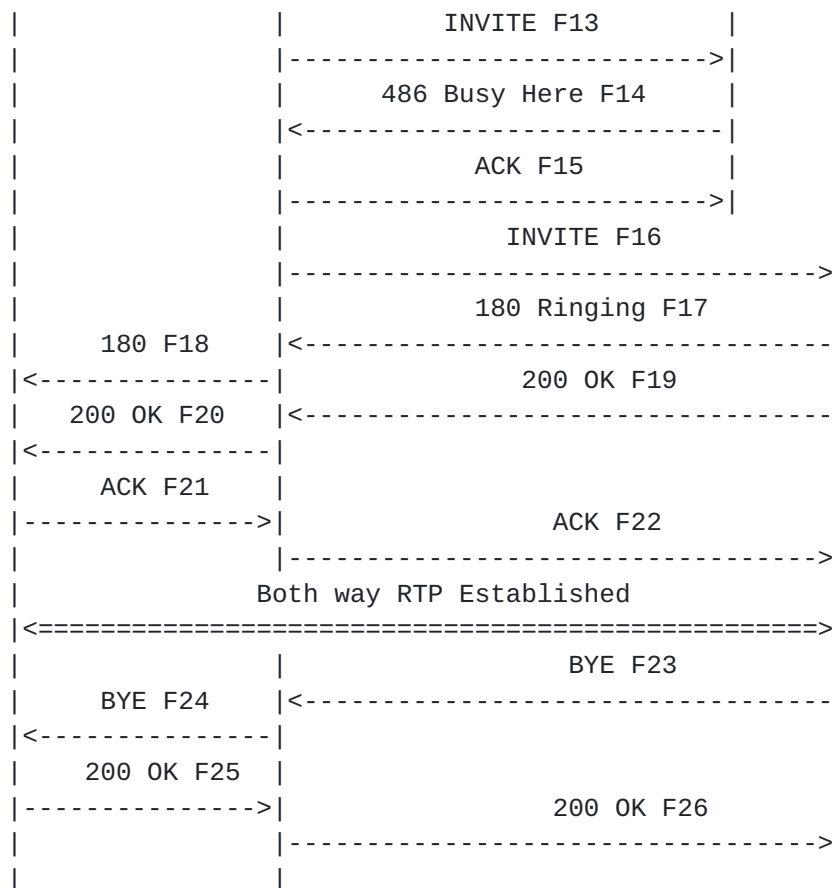

```
t=0 0
m=audio 3460 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F39 ACK B2 -> B3

```
ACK sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKq0qwli6ew4
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=4524524312
To: Bob <sips:bob@biloxi.example.com>;tag=3891908734
Call-ID: 524251233@biloxi.example.com
CSeq: 1 ACK
Content-Length: 0
```

[2.13](#) Find-Me





Alice's call to Bob will result in an attempt to locate that user by calling locations from a list of contacts. The location to answer the call becomes the active set, no other sets may join the call.

While this flow shows a sequential search, the search could be accomplished using parallel forking, as in the previous example.

Message Details

F1 INVITE Alice -> Proxy

```

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
  
```



```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t= 0 0
m=audio 49170 RTP/AVP 0

a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy -> B1

```
INVITE sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t= 0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 (100 Trying) Proxy -> Alice

```
SIP/2.0 100 Trying
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0
```

F4 180 Ringing B1 -> Proxy


```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
    ;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0
```

F5 180 Ringing Proxy -> Alice

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
    ;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0
```

/* B1 rings for until a configurable timer in the Proxy expires. The Proxy then sends Cancel and proceeds down the list of routes. */

F6 CANCEL Proxy -> B1

```
CANCEL sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0
```

F7 200 OK B1 -> Proxy

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
    ;received=192.0.2.54
```


From: Alice <sips:alice@atlanta.example.com>
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0

F8 487 Request Terminated B1 -> Proxy

SIP/2.0 487 Request Terminated
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F9 ACK Proxy -> B1

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F10 INVITE Proxy -> B2

INVITE sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9

;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE

Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F11 480 Not Logged In B2 -> Proxy

SIP/2.0 480 Not Logged In
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
;received=192.0.2.54
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314756
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F12 ACK Proxy -> B2

ACK sips:bob@client2.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.2
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314756
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F13 INVITE Proxy -> B3

INVITE sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.3
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F14 486 Busy Here B3 -> Proxy

SIP/2.0 486 Busy Here
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.3
;received=192.0.2.54
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F15 ACK Proxy -> B3

ACK sips:bob@client3.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.3
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7654321
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F16 INVITE Proxy -> B4

INVITE sips:bob@client4.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=83749.4
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
Max-Forwards: 69

From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F17 180 Ringing B4 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS ss1.example.com:5061;branch=83749.4
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client4.biloxi.example.com>
Content-Length: 0

F18 180 Ringing B4 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client4.biloxi.example.com>
Content-Length: 0

F19 200 OK B4 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=83749.4
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client4.biloxi.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client4.biloxi.example.com
s=Session SDP
c=IN IP4 client4.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F20 200 OK Proxy -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
Record-Route: <sips:ss1.example.com;lr>
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com.116>
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client4.biloxi.example.com
s=Session SDP
c=IN IP4 client4.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F21 ACK Alice -> Proxy

ACK sips:bob@client4.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F22 ACK Proxy -> B4

ACK sips:bob@client4.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK8374
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7137136
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

/* RTP streams are established between A and B4*/

/* User B4 Hangs Up with User A. */

F23 BYE B4 -> Proxy

BYE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Route: <sips:ss1.example.com;lr>
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=7137136
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 BYE
Content-Length: 0

F24 BYE Proxy -> Alice

BYE sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83754
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7


```
;received=192.0.2.105
Max-Forwards: 69
From: Bob <sips:bob@biloxi.example.com>;tag=7137136
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 BYE
Content-Length: 0
```

F25 200 OK Alice -> Proxy

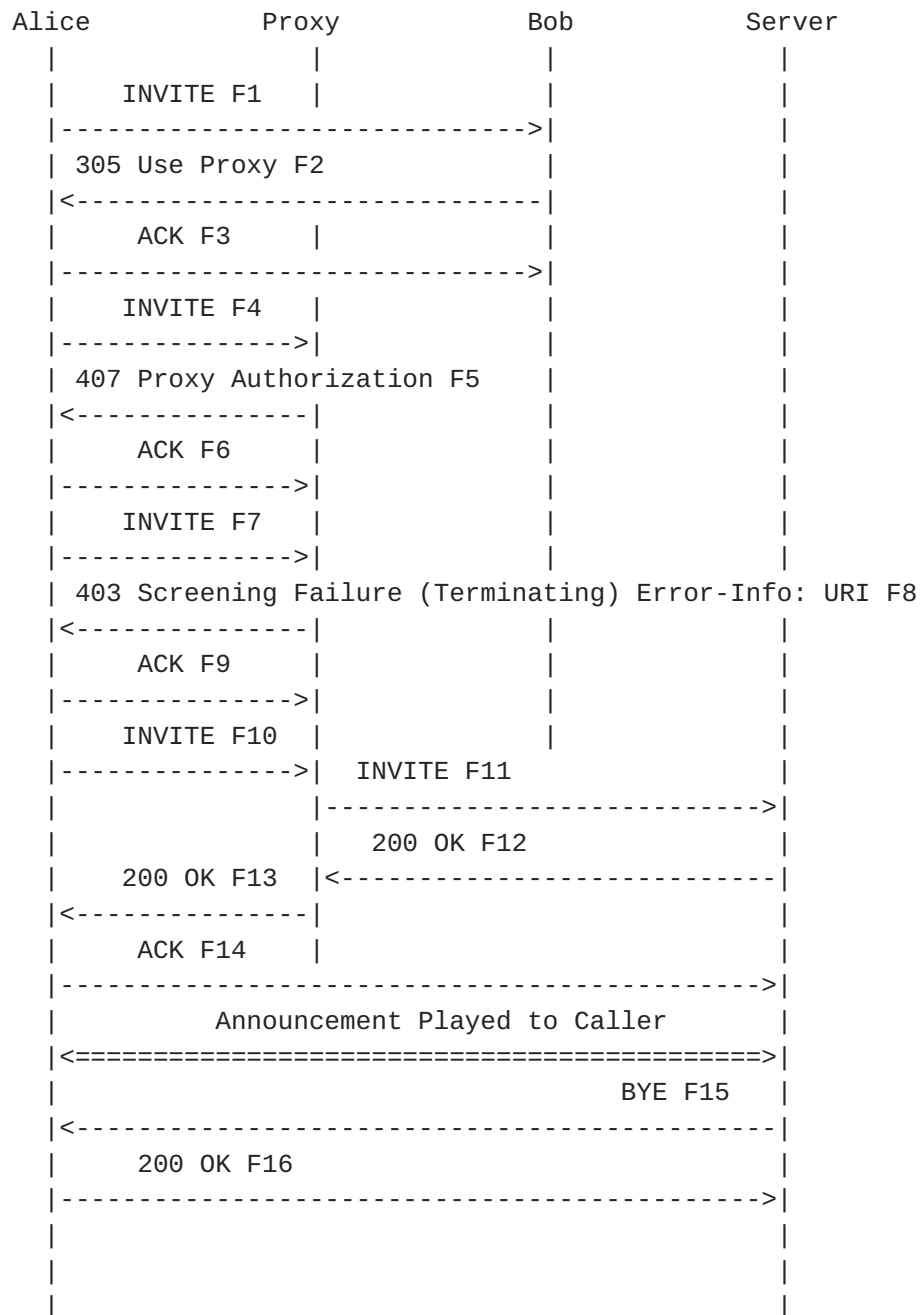
```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83754
;received=192.0.2.54
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=7137136
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 BYE
Content-Length: 0
```

F26 200 OK Proxy -> B4

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=7137136
To: Alice <sips:alice@atlanta.example.com>;tag=1234567
Call-ID: 12345600@atlanta.example.com
CSeq: 1 BYE
Content-Length: 0
```

[2.14](#) Call Management (Incoming Call Screening)

Announcement



Bob has an incoming call screening list, Alice is included on the list of addresses Bob will not accept calls from. Alice attempts to call user B. Messages F1, F2, and F3 are included to show that Bob does not accept INVITEs that have not been screened by the proxy.

Note that call screening can not be done using the From header - instead some form of authentication credentials must be used.

The screening proxy inserts an announcement URI in an Error-Info

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header field which Alice accesses by sending an INVITE to listen to the Announcement.

Message Details

F1 INVITE Alice -> Bob

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

/* Bob only accepts INVITEs that have been screened by the proxy */

F2 305 Use Proxy Bob -> Alice

```
SIP/2.0 305 Use Proxy
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=342123
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:ss1.example.com>
Content-Length: 0
```

F3 ACK Alice -> Bob

```
ACK sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
```



```
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=342123
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0
```

```
/* A retries the call through the proxy */
```

```
F4 INVITE Alice -> Proxy 1
```

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf0
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
/* Proxy 1 challenges Alice for authentication */
```

```
F5 407 Proxy Authorization Required Proxy 1 -> Alice
```

```
SIP/2.0 407 Proxy Authorization Required
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf0
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7886765
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Proxy-Authenticate: Digest realm="example.com",
    domain="sips:ss1.example.com", nonce="ea9c8e88df84f1cec4341ae6cbe5a359",
    opaque="", stale=FALSE, algorithm=MD5
Content-Length: 0
```


F6 ACK Alice -> Proxy 1

ACK sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf0
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=7886765
Call-ID: 12345600@atlanta.example.com
CSeq: 2 ACK
Content-Length: 0

/* Alice responds by sending an INVITE with authentication
credentials in it. */

F7 INVITE Alice -> Proxy 1

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf2
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 3 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Proxy-Authorization: Digest username="alice",
realm="example.com", nonce="ae9137be1c87d175c2dd63302a0d6e0a",
opaque="", uri="sips:bob@biloxi.example.com",
response="bbaec39f943bdc3620d90afc548a45c"
Content-Type: application/sdp
Content-Length: ...

v=0

o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 403 Screening Failure (Terminating) Proxy 1 -> Alice

SIP/2.0 403 Screening Failure (Terminating)
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf2
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=ffe254
Call-ID: 12345600@atlanta.example.com
CSeq: 3 INVITE
Error-Info: <sips:screen-failure-term-ann@annoucement.example.com>
Content-Length: 0

F9 ACK Alice -> Proxy 1

ACK sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf2
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=ffe254
Call-ID: 12345600@atlanta.example.com
Proxy-Authorization: Digest username="alice",
 realm="example.com", nonce="ae9137be1c87d175c2dd63302a0d6e0a",
 opaque="", uri="sips:bob@biloxi.example.com",
 response="bbaec39f943bdc3620d90afc548a45c"
CSeq: 3 ACK
Content-Length: 0

/* To hear the recording, Alice connects to the Error-Info URI */

F10 INVITE Alice -> Proxy 1

INVITE sips:screen-failure-term-ann@annoucement.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfj
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 4 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F11 INVITE Proxy 1 -> Announcement Server

```
INVITE sips:screen-failure-term-ann@annoucement.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83743
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfj
    ;received=192.0.2.103
Max-Forwards: 69
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 4 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F12 200 OK Announcement Server -> Proxy 1

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83743
    ;received=192.0.2.100
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfj
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=234934
Call-ID: 12345600@atlanta.example.com
CSeq: 4 INVITE
Contact: <sips:announce.example.com>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=annc 2890844543 2890844543 IN IP4 announcement.example.com
s=Session SDP
c=IN IP4 announcement.example.com
t=0 0
m=audio 49174 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```


F13 200 OK Proxy 1 -> Alice

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfj
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=234934

Call-ID: 12345600@atlanta.example.com

CSeq: 4 INVITE

Contact: <sips:announce.example.com>

Content-Type: application/sdp

Content-Length: ...

v=0

o=annc 2890844543 2890844543 IN IP4 announcement.example.com

s=Session SDP

c=IN IP4 announcement.example.com

t=0 0

m=audio 49174 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F14 ACK Alice -> Announcement Server

ACK sips:announcement.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b32

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=234934

Call-ID: 12345600@atlanta.example.com

CSeq: 4 ACK

Content-Length: 0

/* Announcement Server plays announcement then disconnects */

F15 BYE Announcement Server -> Alice

BYE sips:alice@client.Atlanta.com SIP/2.0

Via: SIP/2.0/TLS announcement.example.com:5061;branch=z9hG4bK74bKS

Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=234934

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Call-ID: 12345600@atlanta.example.com

CSeq: 2334 BYE

Content-Length: 0

F16 200 OK Alice -> Announcement Server

SIP/2.0 200 OK

Via: SIP/2.0/TLS announcement.example.com:5061;branch=z9hG4bK74bKS
;received=192.0.2.103

From: Bob <sips:bob@biloxi.example.com>;tag=234934

To: Alice <sips:alice@atlanta.example.com>;tag=1234567

Call-ID: 12345600@atlanta.example.com

CSeq: 2334 BYE

Content-Length: 0

[2.15](#) Call Management (Outgoing Call Screening)

Alice	Proxy	Bob
INVITE F1		
----->		
407 Proxy Authorization F2		
<-----		
ACK F3		
----->		
INVITE F4		
----->		
403 Screening Failure (Originating) F5		
<-----		
ACK F6		
----->		

Alice has an outgoing call screening list, Bob is included on the list of addresses Alice will not be able to place a call to. Alice attempts to call Bob.

Alice could establish a session to listen to the announcement in the Error-Info header field.

Message Details

F1 INVITE Alice -> Proxy 1

INVITE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

/* Proxy 1 challenges Alice for authentication */

F2 407 Proxy Authorization Required Proxy 1 -> Alice

SIP/2.0 407 Proxy Authorization Required
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=90210
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Proxy-Authenticate: Digest realm="example.com",
domain="sips:ss1.example.com", nonce="ea9c8e88df84f1cec4341ae6cbe5a359",
opaque="", stale=FALSE, algorithm=MD5
Content-Length: 0

F3 ACK Alice -> Proxy 1

ACK sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=90210
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

/* Alice responds by sending an INVITE with authentication
credentials in it. */

F4 INVITE Alice -> Proxy 1

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b4
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Proxy-Authorization: Digest username="alice", realm="example.com",
  nonce="cb360afc54bbaec39f943bd820d9a45c", opaque="",
  uri="sips:bob@biloxi.example.com",
  response="b9d2e5bcdec9f69ab2a9b44f270285a6"
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F5 403 Screening Failure (Originating) Proxy 1 -> Alice

```
SIP/2.0 403 Screening Failure (Originating)
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b4
  ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=18017
Call-ID: 12345600@atlanta.example.com
CSeq: 2 INVITE
Error-Info: <sips:screen-failure-orig-ann@annoucement.example.com>
Content-Length: 0
```

F6 ACK Alice -> Proxy 1

ACK sips:bob@biloxi.example.com SIP/2.0

```
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b4
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=18017
```

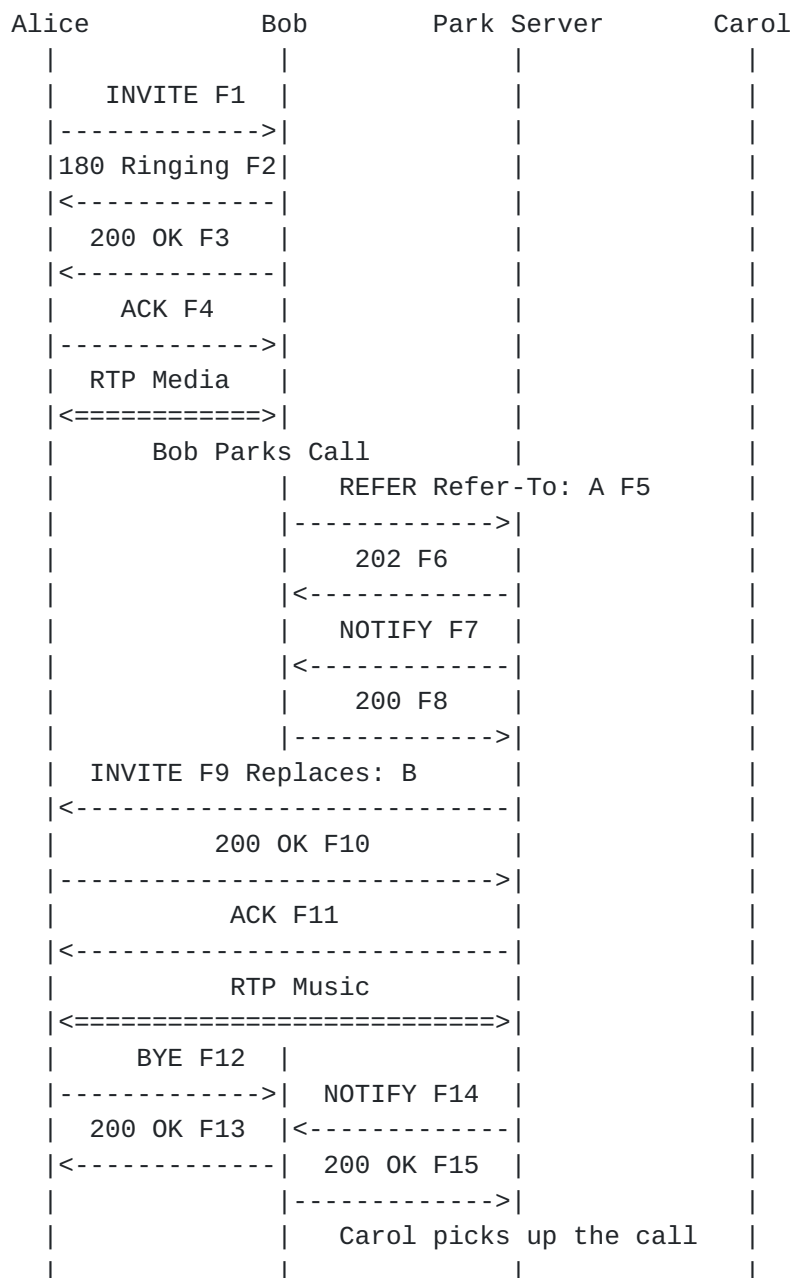

Call-ID: 12345600@atlanta.example.com

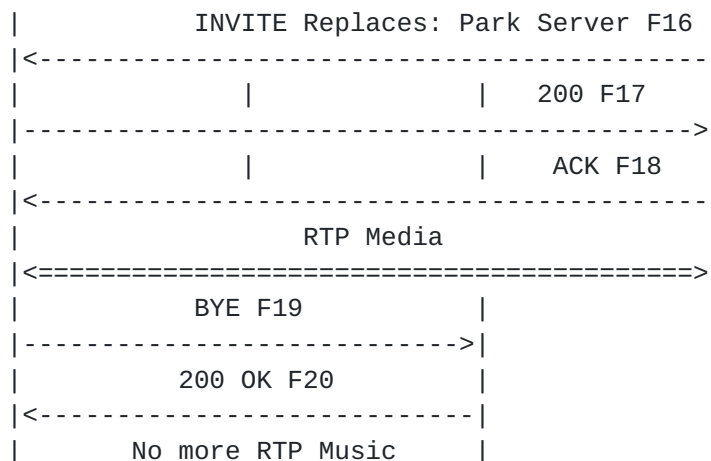
CSeq: 2 ACK

Proxy-Authorization: Digest username="alice", realm="example.com",
 nonce="cb360afc54bbaec39f943bd820d9a45c", opaque="",
 uri="sips:bob@biloxi.example.com",
 response="b9d2e5bcdec9f69ab2a9b44f270285a6"

Content-Length: 0

2.16 Call Park





In this example, Alice calls Bob. Bob then parks the call at the Park Server by sending a REFER to the Park Server. The server sends an INVITE to Alice which replaces the session between Alice and Bob. The call is accepted by Alice and causes Alice to send a BYE to Bob. Bob receives notification of the successful park, and also receives the dialog identifiers in the application/sip body of the NOTIFY response. Carol wishes to retrieve the call, a new INVITE is sent to Alice which replaces the session with the Park Server. Alice accepts the call and sends a BYE to the Park Server. Note that if the Park Server did not return the dialog identifiers (Call-ID, To and From tags) in the NOTIFY, Carol could send a SUBSCRIBE to retrieve this information.

Note that this call is a special case of call transfer.

Note also that this flow could also be used for Music on Hold.

Message Details.

F1 INVITE Alice -> Bob

```
INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...
```


v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F3 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F4 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 1 ACK
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Length: 0

/* Bob REFERS Park Server to establish session with A which replaces the established session between A and B. Note that there is no session established between B and the Park Server. */

F5 REFER Bob -> Park Server

REFER sips:park@server.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds9
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=02134
To: Park Server <sips:park@server.example.com>
Call-ID: 4802029847@biloxi.example.com
CSeq: 1 REFER
Refer-To: <sips:a8342043f@atlanta.example.com?Replaces=12345601%40atlanta.example.com%3Bfrom-tag%3D314159%3Bto-tag%3D1234567>
Referred-By: <sips:bob@biloxi.example.com>
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F6 202 Accepted Park Server -> Bob

SIP/2.0 202 Accepted
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds9
;received=192.0.2.105
From: Bob <sips:bob@biloxi.example.com>;tag=02134
To: Park Server <sips:park@server.example.com>;tag=56323
Call-ID: 4802029847@biloxi.example.com
CSeq: 1 REFER
Content-Length: 0

F7 NOTIFY Park Server -> Bob

NOTIFY sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bT6
To: Bob <sips:bob@biloxi.example.com>;tag=02134

Max-Forwards: 70

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From: Park Server <sips:park@server.example.com>;tag=56323
Call-ID: 4802029847@biloxi.example.com
CSeq: 1 NOTIFY
Event: refer
Subscription-State: active;expires=60
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 100 Trying

F8 200 OK Bob -> Park Server

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bT6
;received=192.0.2.103
To: Bob <sips:bob@biloxi.example.com>;tag=02134
From: Park Server <sips:park@server.example.com>;tag=56323
Call-ID: 4802029847@biloxi.example.com
CSeq: 1 NOTIFY
Content-Length: 0

/* Park Server places call to Alice to replace session between Alice and
Bob */

F9 INVITE Park Server -> Alice

INVITE sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS server.example.com:5061;branch=z9hG4bK74rf
Max-Forwards: 70
From: <sips:park@server.example.com>;tag=0111

To: <sips:a8342043f@atlanta.example.com>
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 1 INVITE
Referred-By: <sips:bob@biloxi.example.com>
Contact: <sips:park@server.example.com>
Replaces: 12345601@atlanta.example.com;from-tag=314159;to-tag=1234567
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0

o=ParkServer 2890844576 2890844576 IN IP4 Park.server.example.com
s=Session SDP
c=IN IP4 music.server.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F10 200 OK Alice -> Park Server

SIP/2.0 200 OK
Via: SIP/2.0/TLS music.server.example.com:5061;branch=z9hG4bK74rf
From: <sips:park@server.example.com>;tag=0111
To: Alice <sips:a8342043f@atlanta.example.com>;tag=098594
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvnly

F11 ACK Park Server -> Alice

ACK sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS music.server.example.com:5061;branch=z9hG4bK7rfF
Max-Forwards: 70
From: <sips:park@server.example.com>;tag=0111
To: Alice <sips:a8342043f@atlanta.example.com>;tag=098594
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 1 ACK
Content-Length: 0

F12 BYE Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7

Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159

Call-ID: 12345601@atlanta.example.com
CSeq: 2 BYE

Content-Length: 0

F13 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.105
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
CSeq: 2 BYE
Content-Length: 0

/* Park Server reports success back to B by returning all the SIP
headers in 200 OK response */

F14 NOTIFY Park Server -> Bob

NOTIFY sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
To: Bob <sips:bob@biloxi.example.com>;tag=02134
Max-Forwards: 70
From: Park Server <sips:park@server.example.com>;tag=56323
Call-ID: 4802029847@biloxi.example.com
CSeq: 1 NOTIFY
Event: refer
Subscription-State: terminated;reason=noresource
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 200 OK
Via: SIP/2.0/TLS music.server.example.com:5061
From: <sips:park@server.example.com>;tag=0111
To: Alice <sips:a8342043f@atlanta.example.com>;tag=098594
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 2 INVITE
Contact: <sips:a8342043f@atlanta.example.com>

F15 200 OK Bob -> Park Server

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

To: Bob <sips:bob@biloxi.example.com>;tag=02134

From: Park Server <sips:park@server.example.com>;tag=56323

Call-ID: 4802029847@biloxi.example.com

CSeq: 2 NOTIFY

Content-Length: 0

/* Alice is now parked at the Park Server */

/* Carol picks up the call by sending an INVITE to A which replaces
the existing session with the Park/Park Server. Carol needs to know
the dialog information to construct the Replaces header. */

F16 INVITE Carol -> Alice

INVITE sips:alice@atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS chicago.example.com:5061;branch=z9hG4bK74bQ2

Max-Forwards: 70

From: Carol <sips:carol@chicago.example.com>;tag=5893461

To: Alice <sips:alice@atlanta.example.com>

Call-ID: 6485356@chicago.example.com

CSeq: 1 INVITE

Contact: <sips:carol@client.chicago.example.com>

Replaces: a5-75-34-12-76@server.example.com;from-tag=098594;to-tag=0111

Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY

Supported: replaces

Content-Type: application/sdp

Content-Length: ...

v=0

o=carol 2890844922 2890844922 IN IP4 client.chicago.example.com

s=Session SDP

c=IN IP4 client.chicago.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F17 200 OK Alice -> Carol

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bQ2
;received=192.0.2.105

From: Carol <sips:carol@chicago.example.com>;tag=5893461
To: Alice <sips:alice@atlanta.example.com>;tag=222
Call-ID: 6485356@chicago.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844527 2890844527 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F18 ACK Carol -> Alice

ACK sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bJ0
Max-Forwards: 70
From: Carol <sips:carol@chicago.example.com>;tag=5893461
To: Alice <sips:alice@atlanta.example.com>;tag=222
Call-ID: 6485356@chicago.example.com
CSeq: 1 ACK
Content-Length: 0

/* A replaces the session to the Park Server with the new session with C
and generates a BYE to disconnect the Park Server */

F19 BYE Alice -> Park Server

BYE sips:park@server.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b4N
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=098594
To: <sips:park@server.example.com>;tag=0111
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 1 BYE
Content-Length: 0

F20 200 OK Park Server -> Alice


```

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b4N
    ;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=098594
To: <sips:park@server.example.com>;tag=0111
Call-ID: a5-75-34-12-76@server.example.com
CSeq: 1 BYE
Content-Length: 0

```

[2.17](#) Call Pickup

Alice	Bob	Bill
INVITE F1		
----->		
180 Ringing F2		
<-----		
	SUBSCRIBE F3	
	<-----	
	200 OK F4	
	----->	
	NOTIFY F5	
	----->	
	200 OK F6	
	<-----	
	INVITE Replaces:Bob F7	
<-----		
	200 OK F8	
----->		
CANCEL F9		
----->		
200 OK F10		
<-----		
487 F11		
<-----		
ACK F12		
----->		
	ACK F13	
<-----		
	NOTIFY F14	
	----->	
	481 F15	
	<-----	
Both way RTP Established		
<=====>		


```

|                               BYE F16                               |
|----->|
|                               200 OK F17                           |
|<-----|
|                               |
|                               |

```

Bob and Bill are part of a work group at example.com that can pick up each others calls. Alice calls Bob who does not answer. Bill wishes to pick up the call and sends a SUBSCRIBE to Bob to retrieve the dialog information. Bill then generates an INVITE with a Replaces to Alice. Alice answers the INVITE and sends a CANCEL to stop Bob's phone ringing. Note that the order of the CANCEL/ACK sequence in F11 through F20 is not significant.

This call flow shows the use of the "early-only" parameter [4] in the Replaces header field of F7. This parameter prevents Alice from accepting the INVITE if Bob has already accepted the INVITE. If Bill had wished to "take" the call from Bob regardless of whether he had answered, the parameter would not have been present in F7.

Also note that the subscription between Bob and Carol could have been established prior to Alice's call.

Message Details

F1 INVITE Alice -> Bob

```

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...

```

```

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49170 RTP/AVP 0

```


a=rtpmap:0 PCMU/8000

F2 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103

From: Alice <sips:alice@atlanta.example.com>;tag=1234567

To: Bob <sips:bob@biloxi.example.com>;tag=3145678

Call-ID: 12345600@atlanta.example.com

CSeq: 1 INVITE

Contact: <sips:bob@client.biloxi.example.com>

Content-Length: 0

/* Bill decides to pick up the call */

F3 SUBSCRIBE Bill -> Bob

SUBSCRIBE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74bf
Max-Forwards: 70

From: Bill <sips:bill@biloxi.example.com>;tag=8675309

To: Bob <sips:bob@biloxi.example.com>

Call-ID: rt4353gs2egg@pc.biloxi.example.com

CSeq: 1 SUBSCRIBE

Contact: <sips:bill@pc.biloxi.example.com>

Event: dialog

Subscription-State: active;expires=3600

Accept: application/dialog-info+xml

Content-Length: 0

F4 200 OK Bob -> Bill

SIP/2.0 200 OK

Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74bf
;received=192.0.2.114

Max-Forwards: 70

From: Bill <sips:bill@biloxi.example.com>;tag=8675309

To: Bob <sips:bob@biloxi.example.com>;tag=31451098

Call-ID: rt4353gs2egg@pc.biloxi.example.com

CSeq: 1 SUBSCRIBE

Content-Length: 0

F5 NOTIFY Bob -> Bill

NOTIFY sips:bill@pc.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bK74br
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=31451098
To: Bill <sips:bill@biloxi.example.com>;tag=8675309
Call-ID: rt4353gs2egg@pc.biloxi.example.com
CSeq: 1 NOTIFY
Contact: <sips:bob@client.biloxi.example.com>
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="0" state="full" entity="sips:bob@biloxi.example.com">
<dialog id="94992014524" call-id="12345600@atlanta.example.com"
  local-tag="3145678" remote-tag="1234567" direction="recipient"
  remote-uri="alice@atlanta.example.com"
  remote-target="alice@client.atlanta.example.com">
<state>early</state>
</dialog>
</dialog-info>
```

F6 200 OK Bill -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bK74br
From: Bob <sips:bob@biloxi.example.com>;tag=31451098
To: Bill <sips:bill@biloxi.example.com>;tag=8675309
Call-ID: rt4353gs2egg@pc.biloxi.example.com
CSeq: 1 NOTIFY
Contact: <sips:bill@pc.biloxi.example.com>
Content-Length: 0

F7 INVITE Bill -> Alice

INVITE sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74HH
Max-Forwards: 70
From: Bill <sips:bill@biloxi.example.com>;tag=8675309
To: Alice <sips:alice@atlanta.example.com>
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 1 INVITE


```
Replaces: 12345600@atlanta.example.com;to-tag=314578;from-tag=1234567
;early-only
Contact: <sips:bill@pc.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=bob 2890843122 2890843122 IN IP4 pc.biloxi.example.com
s=Session SDP
c=IN IP4 pc.biloxi.example.com
t=3034423619 0
m=audio 5342 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
/* Alice matches the dialog information in the Replaces header and
accepts
    the INVITE */
```

```
F8 200 OK Alice -> Bill
```

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bK74HH
;received=192.0.2.114
From: Bill <sips:bill@biloxi.example.com>;tag=8675309
To: Alice <sips:alice@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 1 INVITE
Contact: <sips:a8342043f@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces, gruu
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=alice 289084543 289084543 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=0 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
/* Alice stops Bob's phone from ringing by sending a CANCEL */
```

```
F9 CANCEL Alice -> Bob
```


CANCEL sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0

F10 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 CANCEL
Content-Length: 0

F11 487 Request Terminated Bob -> Alice

SIP/2.0 487 Request Terminated
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F12 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS ss1.example.com:5061;branch=z9hG4bK83749.1
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=3145678
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F13 ACK Bill -> Alice

ACK sips:a8342043f@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS b2.biloxi.example.com:5061;branch=z9hG4bK7435
Max-Forwards: 70
From: Bill <sips:bill@biloxi.example.com>;tag=8675309
To: Alice <sips:alice@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 1 ACK
Content-Length: 0

F14 NOTIFY Bob -> Bill

NOTIFY sips:bill@pc.biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bK749X
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=31451098
To: Bill <sips:bill@biloxi.example.com>;tag=8675309
Call-ID: rt4353gs2egg@pc.biloxi.example.com
CSeq: 2 NOTIFY
Contact: <sips:bob@client.biloxi.example.com>
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="1" state="partial" entity="sips:bob@biloxi.example.com">
  <dialog id="94992014524" call-id="12345600@atlanta.example.com"
    local-tag="3145678" remote-tag="1234567" direction="recipient">
    <state>terminated</state>
  </dialog>
</dialog-info>
```

F15 481 Dialog Does Not Exist Bill -> Bob

SIP/2.0 481 Dialog Does Not Exist
Via: SIP/2.0/TLS bob.biloxi.example.com:5061;branch=z9hG4bK749X
From: Bob <sips:bob@biloxi.example.com>;tag=31451098
To: Bill <sips:bill@biloxi.example.com>;tag=8675309
Call-ID: rt4353gs2egg@pc.biloxi.example.com
CSeq: 2 NOTIFY
Content-Length: 0

/* RTP streams are established between Alice and Bill.

Alice Hangs Up with Bob. */

F16 BYE Alice -> Bob

BYE sips:carol@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
Max-Forwards: 70
To: Bob <sips:bob@biloxi.example.com>;tag=8675309
From: Alice <sips:alice@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

F17 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf
;received=192.0.2.103
To: Bob <sips:bob@biloxi.example.com>;tag=8675309
From: Alice <sips:alice@atlanta.example.com>;tag=131256
Call-ID: 563456212@b2.biloxi.example.com
CSeq: 2 BYE
Content-Length: 0

2.18 Automatic Redial

Alice	Bob
INVITE F1	
----->	
486 Busy Here F2	
<-----	Bob is busy
ACK F3	
----->	
SUBSCRIBE F4	
----->	
200 OK F5	
<-----	
NOTIFY F6	
<-----	
200 OK F7	
----->	
NOTIFY F8	Bob is now available
<-----	
200 OK F9	
----->	
INVITE F10	
----->	Session setup successfully
180 Ringing F11	
<-----	
200 OK F12	
<-----	
ACK F13	
----->	
Media Session	
<=====	

Bob is initially busy when Alice calls. Alice subscribes to User B's call state using a SUBSCRIBE F4. Bob sends a NOTIFY F8 when Bob is available. A is alerted, then Alice sends an INVITE to B to establish the session.

Message Details

F1 INVITE Alice -> Bob

INVITE sips:bob@biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 486 Busy Here

SIP/2.0 486 Busy Here
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=982039i4
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Content-Length: 0

F3 ACK Alice -> Bob

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bf9
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=982039i4
Call-ID: 12345600@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0

F4 SUBSCRIBE Alice -> Bob


```
SUBSCRIBE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b8G
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=837348234
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 4524526232@atlanta.example.com
CSeq: 1 SUBSCRIBE
Contact: alice@client.atlanta.example.com
Event: dialog
Accept: application/dialog-info+xml
Content-Length: 0
```

F5 200 OK Bob -> Alice

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74b8G
From: Alice <sips:alice@atlanta.example.com>;tag=837348234
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 4524526232@atlanta.example.com
CSeq: 1 SUBSCRIBE
Contact: alice@client.biloxi.example.com
Content-Length: 0
```

F6 NOTIFY Bob -> Alice

```
NOTIFY sips:alice@atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bn2
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=341123
To: Alice <sips:alice@atlanta.example.com>;tag=837348234
Call-ID: 4524526232@atlanta.example.com
CSeq: 1 NOTIFY
Event: dialog
Subscription-State: active;expires=3600
Content-Type: application/dialog-info+xml
Content-Length: ...
```

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="0" state="full" entity="sips:bob@biloxi.example.com">
  <dialog id="562623442g3">
    <state>confirmed</state>
  </dialog>
</dialog-info>
```


F7 200 OK Alice -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bn2

From: Bob <sips:bob@biloxi.example.com>;tag=341123

To: Alice <sips:alice@atlanta.example.com>;tag=837348234

Call-ID: 4524526232@atlanta.example.com

CSeq: 1 NOTIFY

Content-Length: 0

/* Bob is now available */

F8 NOTIFY Bob -> Alice

NOTIFY sips:alice@atlanta.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bVi

Max-Forwards: 70

From: Bob <sips:bob@biloxi.example.com>;tag=341123

To: Alice <sips:alice@atlanta.example.com>;tag=837348234

Call-ID: 4524526232@atlanta.example.com

CSeq: 2 NOTIFY

Event: dialog

Subscription-State: active;expires=3600

Content-Type: application/dialog-info+xml

Content-Length: ...

```
<?xml version="1.0"?>
<dialog-info xmlns="urn:ietf:params:xml:ns:dialog-info"
  version="0" state="full" entity="sips:bob@biloxi.example.com">
  <dialog id="562623442g3">
    <state>terminated</state>
  </dialog>
</dialog-info>
```

F9 200 OK Alice -> Bob

SIP/2.0 200 OK

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bVi

From: Bob <sips:bob@biloxi.example.com>;tag=341123

To: Alice <sips:alice@atlanta.example.com>;tag=837348234

Call-ID: 4524526232@atlanta.example.com

CSeq: 2 NOTIFY

Content-Length: 0

F10 INVITE Alice -> Bob

INVITE sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfq
Max-Forwards: 70
From: Alice <sips:alice@atlanta.example.com>;tag=f23fkg14k
To: Bob <sips:bob@biloxi.example.com>
Call-ID: aoij4i9okit@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:alice@client.atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...

v=0
o=alice 2890844526 2890844526 IN IP4 client.atlanta.example.com
s=Session SDP
c=IN IP4 client.atlanta.example.com
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F11 180 Ringing Bob -> Alice

SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfq
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=f23fkg14k
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: aoij4i9okit@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Content-Length: 0

F12 200 OK Bob -> Alice

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bfq
;received=192.0.2.103
From: Alice <sips:alice@atlanta.example.com>;tag=f23fkg14k
To: Bob <sips:bob@biloxi.example.com>;tag=23431
Call-ID: aoij4i9okit@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, SUBSCRIBE, NOTIFY
Supported: replaces
Content-Type: application/sdp

Content-Length: ...

v=0

o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com

s=Session SDP

c=IN IP4 client.biloxi.example.com

t=3034423619 0

m=audio 3456 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F13 ACK Alice -> Bob

ACK sips:bob@client.biloxi.example.com SIP/2.0

Via: SIP/2.0/TLS client.atlanta.example.com:5061;branch=z9hG4bK74bLBJ

Max-Forwards: 70

From: Alice <sips:alice@atlanta.example.com>;tag=f23fkg14k

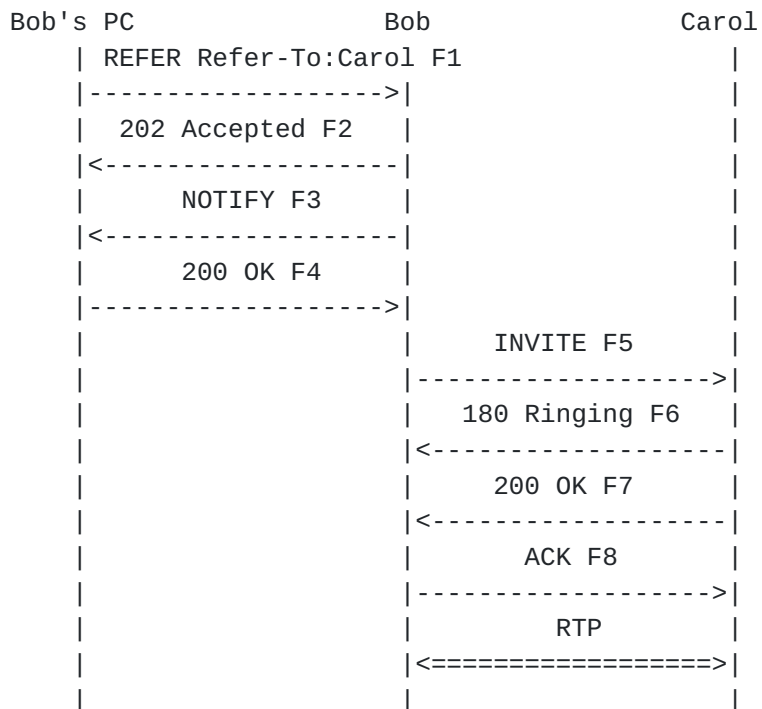
To: Bob <sips:bob@biloxi.example.com>;tag=23431

Call-ID: aoij4i9okit@atlanta.example.com

CSeq: 1 ACK

Content-Length: 0

[2.19](#) Click to Dial



In this example, while browsing the web on his PC, Bob clicks on Carol's SIP URI intending to establish a session with Carol. Bob's web browser passes the SIP URI to the SIP client on Bob's PC. The PC client is configured with the URI of Bob's SIP phone. A REFER is sent to the SIP phone which results in the establishment of the session between Bob and Carol.

Note that Bob's SIP phone immediately terminates the dialog by indicating in the NOTIFY (F3) that the subscription is terminated.

This flow is preferable to the 3pcc flow because the end-to-end SIP signaling is not interrupted by the 3pcc controller, and because Bob's experience of the call will not be marred by the lack of ringback tone or possible clipping. Suitable authorization of the REFER and explicit authorization of the triggered INVITE by Bob is necessary.

Message Details

/* Bob's PC SIP Client sends a REFER to Bob's SIP phone */

F1 REFER PC -> Bob

```
REFER sips:bob@biloxi.example.com SIP/2.0
Via: SIP/2.0/TLS pc.biloxi.example.com:5061;branch=z9hG4bKnashds7
Max-Forwards: 70
From: <sips:pc.biloxi.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>
Call-ID: 12345601@atlanta.example.com
CSeq: 1 REFER
Refer-To: <sips:carol@chicago.example.com>
Contact: <sips:pc.client.atlanta.example.com>
Content-Length: 0
```

F2 202 Accepted Bob -> PC

```
SIP/2.0 202 Accepted
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds7
;received=192.0.2.113
From: <sips:pc.biloxi.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=314159
Call-ID: 12345601@atlanta.example.com
```


CSeq: 1 REFER
Content-Length: 0

F3 NOTIFY Bob -> Alice

NOTIFY sips:alice@client.atlanta.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds9
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: <sips:pc.biloxi.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 NOTIFY
Event: refer
Subscription-State: terminated;reason=noresource
Content-Type: message/sipfrag
Content-Length: ...

SIP/2.0 100 Trying

F4 200 OK Alice -> Bob

SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashds9
;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=314159
To: <sips:pc.biloxi.example.com>;tag=1234567
Call-ID: 12345601@atlanta.example.com
CSeq: 1 NOTIFY
Content-Length: 0

F5 INVITE Bob -> Carol

INVITE sips:carol@chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdK9
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>
Call-ID: 7436222@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:bob@client.biloxi.example.com>
Referred-By: <alice@atlanta.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...


```
v=0
o=bob 2890844539 2890844539 IN IP4 client.biloxi.example.com
s=Session SDP
c=IN IP4 client.biloxi.example.com
t=3034423821 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F6 180 Ringing Carol -> Bob

```
SIP/2.0 180 Ringing
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdk9
    ;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=928287
Call-ID: 7436222@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:carol@client.chicago.example.com>
Content-Length: 0
```

F7 200 OK Carol -> Bob

```
SIP/2.0 200 OK
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashdk9
    ;received=192.0.2.113
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=928287
Call-ID: 7436222@atlanta.example.com
CSeq: 1 INVITE
Contact: <sips:carol@client.chicago.example.com>
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, REFER, NOTIFY
Supported: replaces
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=carol 2890844527 2890844527 IN IP4 client.chicago.example.com
s=Session SDP
c=IN IP4 client.chicago.example.com
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F8 ACK Bob -> Carol


```
ACK sips:carol@client.chicago.example.com SIP/2.0
Via: SIP/2.0/TLS client.biloxi.example.com:5061;branch=z9hG4bKnashd43
Max-Forwards: 70
From: Bob <sips:bob@biloxi.example.com>;tag=8675309
To: Carol <sips:carol@chicago.example.com>;tag=928287
Call-ID: 7436222@atlanta.example.com
CSeq: 1 ACK
Content-Length: 0
```

```
/* Bob and Carol now have established a session. */
```

3. Security Considerations

Since many of the examples in this document involve SIP call control, either peer-to-peer or 3pcc, the security considerations in the Multiparty Framework document [[12](#)] apply.

Many of the services shown in this document rely on a particular user agent being part of a group. Members of a group could be, for example, employees within a particular department, a set of home phone extensions, members of a call center, etc. As such, user agents which are part of the group permit other group members special privileges and features. For example, while a user agent may not in general allow another user agent to learn detailed dialog information, this information might be shared with another group member in order to facilitate a service such as call pickup. Group members must be authenticated using normal SIP means such as certificates or shared secrets.

The service examples in this document make extensive use of the SIP call control primitives REFER, Replaces, Join, and the dialog package. The security considerations associated with each of these extensions apply to the scenarios in this document.

4. IANA Considerations

None.

5. Acknowledgements

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6. Document History

The first version of this document was the Internet-Draft [draft-sparks-sip-service-examples](#) October 1999.

The next version was combined with the SIP Telephony Call Flows document into the [draft-ietf-sip-call-flows](#) April 2000.

The current version was renamed as a work item of the SIPING WG.

6.1 Changes since -07

- Minor corrects. - Updated references.

7. References

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