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SIP Service Examples

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Abstract

This informational document gives examples of SIP (Session Initiation Protocol) services. This covers most features offered in so-called 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 method and Replaces header. 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 informational document provides 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	

It is the hope of the authors that this document will be useful for SIP implementors, users, designers, and protocol researchers alike and will help further the goal of a standard SIP implementation for IP Telephony. It is envisioned that as changes to the standard and additional RFCs are added that this document will reflect those changes and represent the current state of a standard SIP IP Telephony implementation.

These flows use SIP as defined by [RFC 2543](#) [2] with some noted updates for RFC 2543bis. Note that this document is informational, and nothing stated here should be taken as normative. [RFC 2543](#) 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) or Back-to-Back User Agents (B2BUA) may be more appropriate in some circumstances.

These flows assume the functionality described in the SIP Call Flow Examples document [3], which explores basic behavior and PSTN internetworking. Some of the scenarios described herein make use of the SIP method extension REFER [4] and the SIP header extension Replaces [5], the SIP header extension Accept-Contact [6], and some of the concepts in the 3pcc (third party call control) document [7].

These flows were prepared assuming a network of proxies, registrars, PSTN gateways, and other SIP servers that have a pre-established trust relationship with each other, secured through other means than SIP. User agents wishing to use the services in this network are required to authenticate themselves with an edge proxy using SIP Digest. To improve the clarity of this document, authentication of User Agents is not explicitly shown in all flows, except where authentication directly relates to the service example.

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 or PSTN 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. */
```

1.2 Document History

The first version of this document was the Internet-Draft "[draft-sparks-sip-service-examples.txt](#)" October 1999.

The next version was combined with the SIP Telephony Call Flows document into the "[draft-ietf-sip-call-flows-00.txt](#)" April 2000.

This version is based on [Section 7](#) of that document with many of the examples extensively rewritten using the REFER method.

1.3 Changes to 00

- Modified all REFER flows to include 202 Accepted and NOTIFY result message.
- Removed "Telephony" from title of document.
- Added note on 2.9 on use of REFER to exit 3-way conference.
- Modified Music on Hold/Call Park flow (2.2).
- Modified order of messages in transfers (2.4 and 2.5) to more closely resemble PSTN experience.
- Added Call Pickup flow (2.13).
- Added editorial notes on usefulness of Replaces header.

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- Added Replaces header to flows.
- Changed handling of call hold.
- Added Contact and Referred-By headers and ref parameters to REFER messages.
- Changed some Contacts, Routes, and Request-URIs to IP addresses.
- Incremented o= line when SDP is updated with hold.
- Added From tags throughout.
- Renamed Music On Hold/Call Park to Call Park and added new Music On Hold call flow using 3pcc.

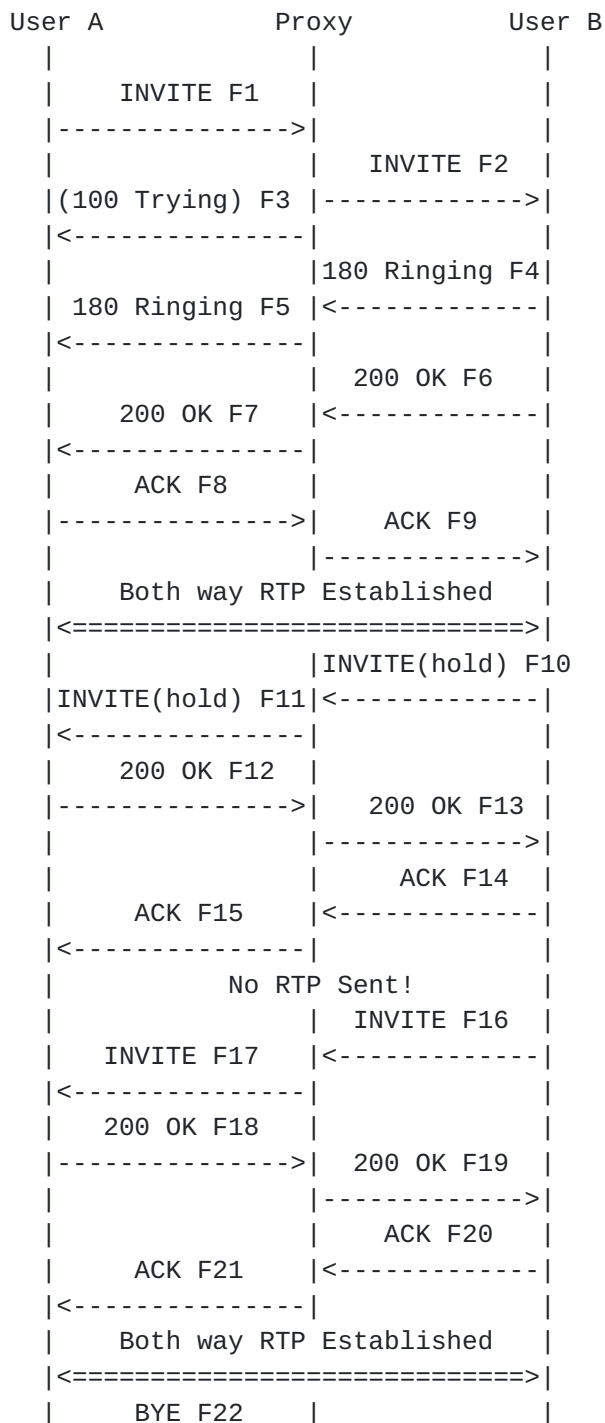
[1.5](#) Changes to 02

- Changed call hold flows to show sendonly attribute based on [\[8\]](#).
- Removed ref parameter from the Referred-By headers since it is now just a generic paramter in the latest draft [\[4\]](#). (Note that if the ref parameter stays, additional characters such as "<", "@", and ">" must be escaped.)
- Removed tags in CANCEL requests and responses.

2 IP Telephony Services Features Call Flows

These call flows show how a number of standard telephony features can be implemented using SIP. They are not meant to represent a complete set. Some calls make use of SIP extensions.

2.1 Call Hold



----->	BYE F23	
	----->	
	200 OK F24	

```

      |      200 OK F25      |<-----|
      |<-----|              |
      |              |        |

```

User A calls User B, User B places call on hold. User B then takes call off hold. User A hangs up call. 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.

Message Details

F1 INVITE A -> Proxy 1

```

INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

```

v=0

```

o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

```

F2 INVITE Proxy 1 -> B

```

INVITE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

```

v=0

o=UserA 2890844526 2890844526 IN IP4 client.here.com

```
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 (100 Trying) Proxy 1 -> A

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F4 180 Ringing B -> Proxy 1

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Content Length:0
```

F5 180 Ringing Proxy 1 -> A

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Content Length: 0
```

F6 200 OK B -> Proxy 1

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
```

Call-ID: 12345601@here.com
CSeq: 1 INVITE

Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F7 200 OK Proxy 1 -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 ACK A -> Proxy 1

ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.113>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0

F9 ACK Proxy 1 -> B

ACK sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1

```
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0
```

```
/* User B places User A on hold. Note that the version is
   incremented in the o= field of the SDP */
```

F10 INVITE B -> Proxy 1

```
INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F11 INVITE Proxy 1 -> A

```
INVITE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
```

o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP

```
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

```
/* A replies with normal SDP */
```

```
F12 200 OK A -> Proxy 1
```

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
F13 200 OK Proxy 1 -> B
```

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
```

t=3034423619 0
m=audio 49170 RTP/AVP 0

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a=rtpmap:0 PCMU/8000

F14 ACK B -> Proxy 1

ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserB@110.111.112.113>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0

F15 ACK Proxy 1 -> A

ACK sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0

/* User B takes the call off hold */

F16 INVITE B -> Proxy 1

INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0

o=UserB 2890844529 2890844529 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F17 INVITE Proxy 1 -> A

INVITE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844529 2890844529 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F18 200 OK A -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F19 200 OK Proxy 1 -> B

SIP/2.0 200 OK

Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>

From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F20 ACK B -> Proxy 1

ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 ACK
Content-Length: 0

F21 ACK Proxy 1 -> A

ACK sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 ACK
Content-Length: 0

/* RTP Media stream re-established. User A disconnects. */

F22 BYE A -> Proxy 1

BYE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.113>
From: BigGuy <sip:UserA@here.com>;tag=1234567

To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com

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CSeq: 2 BYE
Content-Length: 0

F23 BYE Proxy 1 -> B

BYE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 BYE
Content-Length: 0

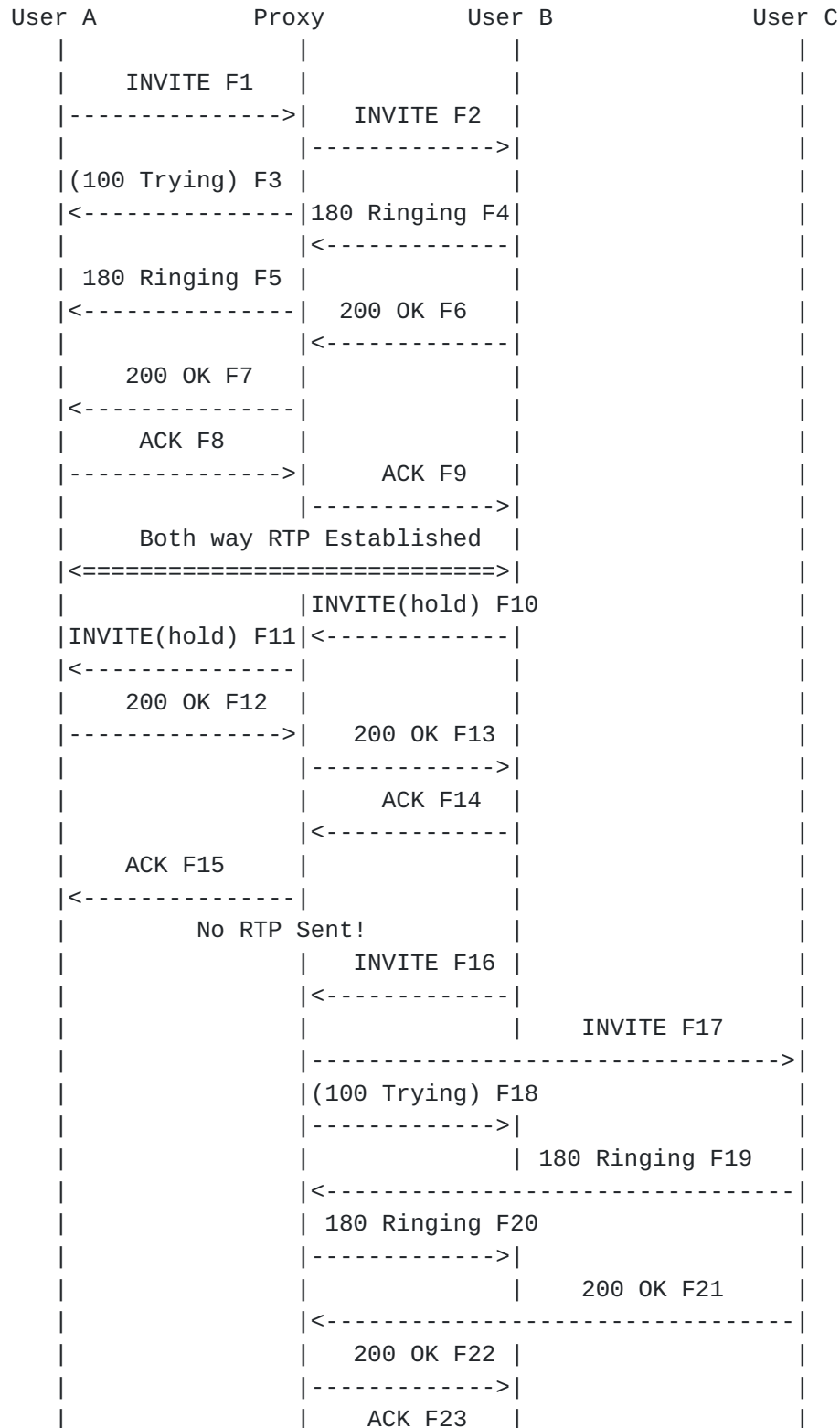
F24 200 OK B -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 BYE
Content-Length: 0

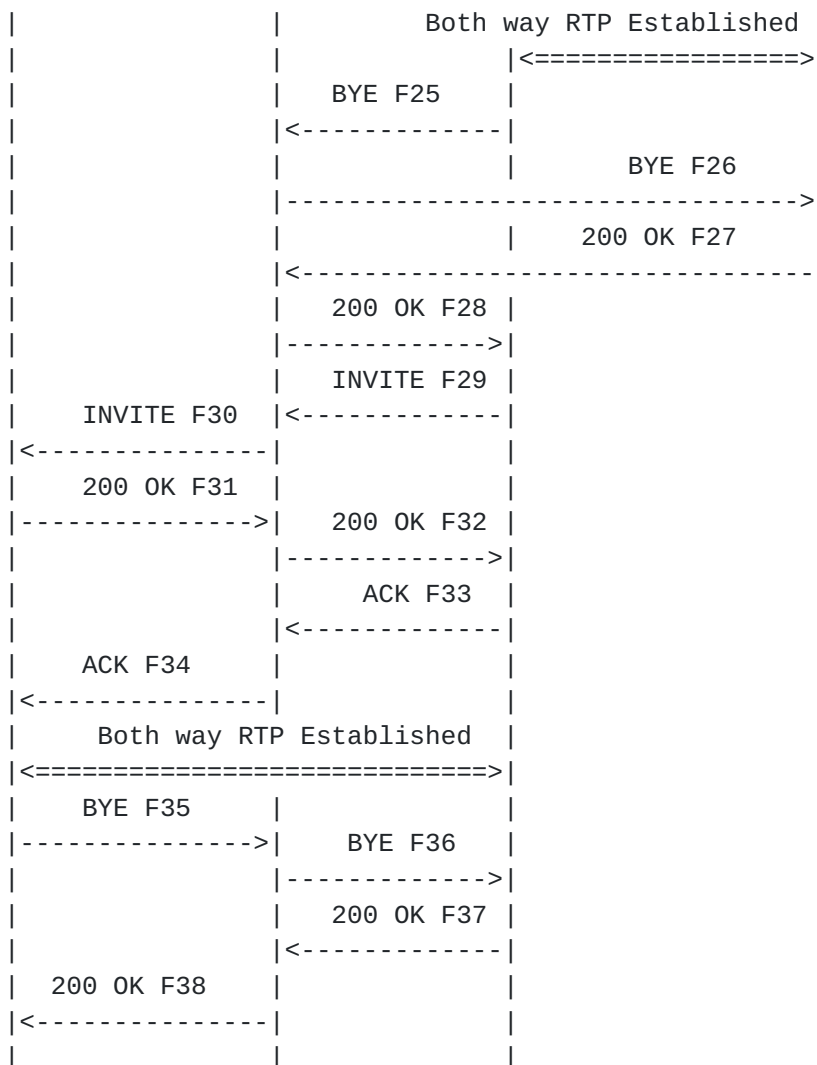
F25 200 OK Proxy 1 -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 BYE
Content-Length: 0

2.2 Consultation Hold







User A calls user B. User B places call on hold. User B calls User C. User B then disconnects with C, then takes the call with User A off hold. The call ends with B hangs up.

Message Details

F1 INVITE A -> Proxy 1

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
```

Content-Length: ...

v=0

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```
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy 1 -> B

```
INVITE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3(100 Trying) Proxy 1 -> A

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F4 180 Ringing B -> Proxy 1

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
```

Call-ID: 12345600@here.com
CSeq: 1 INVITE

Content Length:0

F5 180 Ringing Proxy 1 -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content Length: 0

F6 200 OK B -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F7 200 OK Proxy 1 -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

$v=0$

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```
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F8 ACK A -> Proxy 1

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.113>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

F9 ACK Proxy 1 -> B

```
ACK sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

/* User B places User A on hold. */

F10 INVITE B -> Proxy 1

```
INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=UserB 2890844528 2890844528 IN IP4 client.there.com
```

s=Session SDP
c=IN IP4 110.111.112.113


```
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F11 INVITE Proxy 1 -> A

```
INVITE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F12 200 OK A -> Proxy 1

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
```

m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F13 200 OK Proxy 1 -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F14 ACK B -> Proxy 1

ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F15 ACK Proxy 1 -> A

ACK sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F16 INVITE B -> Proxy 1

INVITE sip:UserC@anywhere.com SIP/2.0

Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: 9876543210@there.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844526 2890844526 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 50170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F17 INVITE Proxy 1 -> C

INVITE sip:UserC@120.121.122.123 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserC@anywhere.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: 9876543210@there.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844526 2890844526 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 50170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F18 (100 Trying) Proxy 1 -> B

SIP/2.0 100 Trying
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: 9876543210@there.com
CSeq: 1 INVITE

Content-Length: 0

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F19 180 Ringing C -> Proxy 1

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@here.com
CSeq: 1 INVITE
Content Length:0

F20 180 Ringing Proxy 1 -> B

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 1 INVITE
Content Length: 0

F21 200 OK C -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserC@anywhere.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 1 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserC 2890844527 2890844527 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F22 200 OK Proxy 1 -> B

SIP/2.0 200 OK

Via: SIP/2.0/UDP there.com:5060

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Record-Route: <sip:UserC@anywhere.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 1 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserC 2890844527 2890844527 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F23 ACK B -> Proxy 1

ACK sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserC@120.121.122.123>
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 1 ACK
Content-Length: 0

F24 ACK Proxy 1 -> C

ACK sip:UserC@120.121.122.123 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 1 ACK
Content-Length: 0

F25 BYE B -> Proxy 1

BYE sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserC@120.121.122.123>
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654

Call-ID: 9876543210@there.com
CSeq: 2 BYE

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Content-Length: 0

F26 BYE Proxy 1 -> C

BYE sip:UserC@120.121.122.123 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 2 BYE
Content-Length: 0

F27 200 OK C -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 2 BYE
Content-Length: 0

F28 200 OK Proxy 1 -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=456654
Call-ID: 9876543210@there.com
CSeq: 2 BYE
Content-Length: 0

/* User B takes the call off hold */

F29 INVITE B -> Proxy 1

INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 INVITE

Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp

Content-Length: ...

v=0
o=UserB 2890844529 2890844529 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F30 INVITE Proxy 1 -> A

INVITE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844529 2890844529 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F31 200 OK A -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0

o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP

```
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F32 200 OK Proxy 1 -> B

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
Record-Route: <sip:UserA@here.com;maddr=ss1.wcom.com>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F33 ACK B -> Proxy 1

```
ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 ACK
Content-Length: 0
```

F34 ACK Proxy 1 -> A

```
ACK sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 2 ACK
```

Content-Length: 0

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F35 BYE A -> Proxy 1

BYE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.113>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F36 BYE Proxy 1 -> B

BYE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F37 200 OK B -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F38 200 OK Proxy 1 -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

2.3 Music On Hold

User A	User B	Music Server
INVITE F1		
----->		
(100 Trying) F2		
<-----		
180 Ringing F3		
<-----		
200 OK F4		
<-----		
ACK F5		
----->		
RTP		
<=====		
B places A on hold with music		
	INVITE no sdp F6	
	----->	
	200 OK sdpM F7	
	<-----	
INVITE c=0 F7		
<-----		
200 OK sdpA F9		
----->		
ACK F10		
<-----		
	ACK sdpA F11	
	----->	
	RTP	
<=====		
B Picks up the Call		
	BYE F12	
	----->	
	200 OK F13	
	<-----	
INVITE F14		
<-----		
200 OK F15		
----->		
ACK F16		
<-----		
RTP		
<=====		

In this flow, B places A on hold with music. This is performed by B acting as a B2BUA (Back-to-Back User Agent) using 3pcc (third party call control) [7] to INVITE a Music Server into the session, which sends RTP music to A. B picks the call up from hold by sending a BYE to the music server and taking A off of hold.

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

Note also that A will receive RTP packets from two different IP addresses during this call flow.

Message Details

F1 INVITE A -> B

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 (100 Trying B -> A)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F3 180 Ringing B -> A

SIP/2.0 180 Ringing

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```
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F4 200 OK B -> A

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F5 ACK A -> B

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

/* User B places A on hold with music by acting as a B2BUA and
sending an INVITE to the Music Server */

F6 INVITE B -> Music Server

```
INVITE sip:music@server.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: Music <sip:music@server.com>
```

Call-ID: sdjfdjfskdf@there.com
CSeq: 1 INVITE

Contact: <sip:UserB@110.111.112.113>
Content-Length: 0

F7 200 OK C -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: Music <sip:music@server.com>;tag=90210
Call-ID: sdjfdjfskdf@there.com
CSeq: 1 INVITE
Contact: <sip:music@server.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=MusicServer 2890844576 2890844576 IN IP4 music.server.com
s=Session SDP
c=IN IP4 50.60.70.80
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

/* B re-INVITES A on hold */

F8 INVITE B -> A

INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
To: BigGuy <sip:UserA@here.com>;tag=1234567
From: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly

```
/* A responds with normal SDP */
```

F9 200 OK A -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
To: BigGuy <sip:UserA@here.com>;tag=1234567
From: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F10 ACK B -> A

ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
To: BigGuy <sip:UserA@here.com>;tag=1234567
From: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

/* B passes SDP of A to the Music Server to allow music to be sent
from B to A */

F11 ACK B -> Music Server

ACK sip:music@server.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: Music <sip:music@server.com>;tag=90210
Call-ID: sdjfdjfskdf@there.com
CSeq: 1 ACK
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP

c=IN IP4 100.101.102.103
t=3034423619 0

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

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

```
/* B picks up the call from the Music Server */
```

```
F12 BYE B -> Music Server
```

```
BYE sip:music@server.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: Music <sip:music@server.com>;tag=90210
Call-ID: sdjfdjfskdf@there.com
CSeq: 2 BYE
Content-Length: 0
```

```
F13 200 OK Music Server -> B
```

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: Music <sip:music@server.com>;tag=90210
Call-ID: sdjfdjfskdf@there.com
CSeq: 2 BYE
Content-Length:0
```

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

```
F14 INVITE B -> A
```

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
To: BigGuy <sip:UserA@here.com>;tag=1234567
From: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
```

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

F15 200 OK A -> B

SIP/2.0 200 OK

Via: SIP/2.0/UDP here.com:5060

To: BigGuy <sip:UserA@here.com>;tag=1234567

From: LittleGuy <sip:UserB@there.com>;tag=23431

Call-ID: 12345600@here.com

CSeq: 2 INVITE

Contact: <sip:UserB@100.101.102.103>

Content-Type: application/sdp

Content-Length: ...

v=0

o=UserA 2890844526 2890844526 IN IP4 client.here.com

s=Session SDP

c=IN IP4 100.101.102.103

t=3034423619 0

m=audio 49170 RTP/AVP 0

a=rtpmap:0 PCMU/8000

F16 ACK B -> A

ACK sip:UserB@there.com SIP/2.0

Via: SIP/2.0/UDP here.com:5060

To: BigGuy <sip:UserA@here.com>;tag=1234567

From: LittleGuy <sip:UserB@there.com>;tag=23431

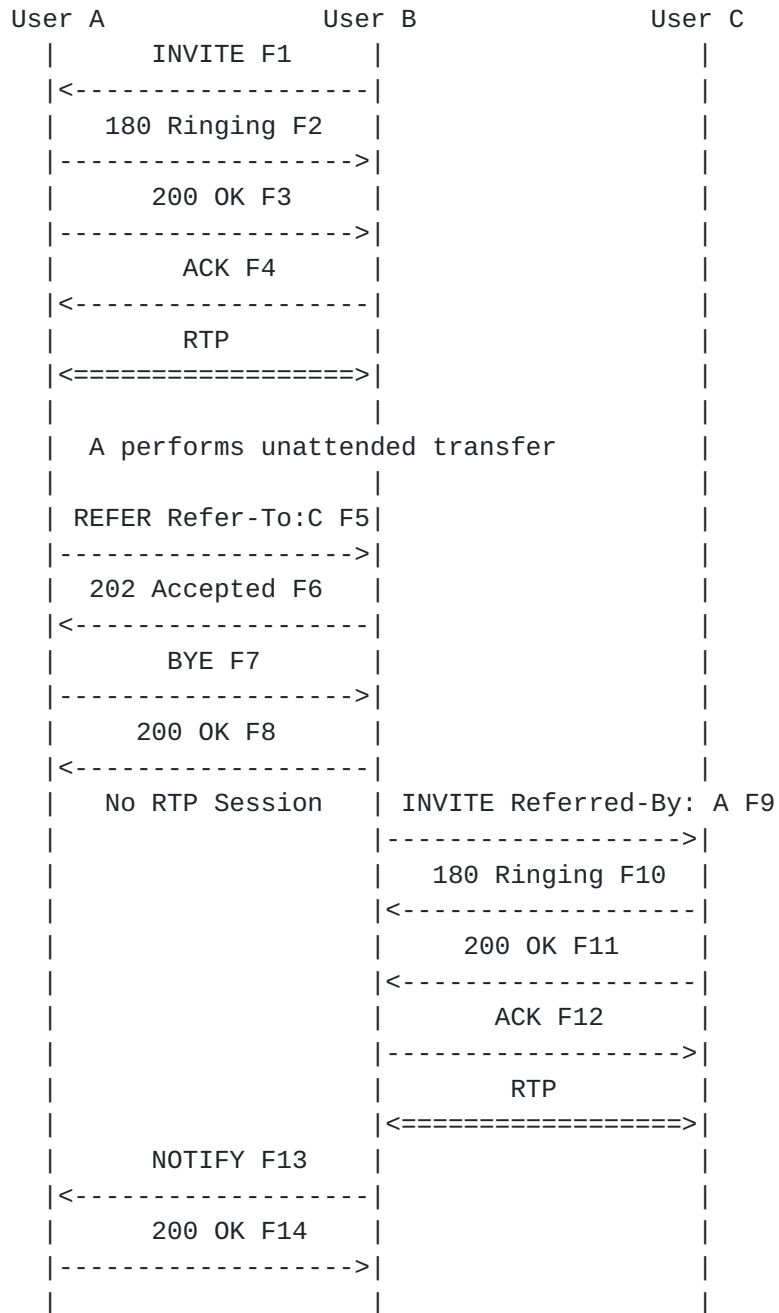
Call-ID: 12345600@here.com

CSeq: 2 ACK

Content-Length: 0

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

2.4 Unattended Transfer



User B call User A. User A then transfers User B to User C, then User A disconnects with User B. User B establishes the session to C then reports the success back to A in the NOTIFY. If the transfer fails, User B can send a new INVITE back to A to re-establish the session.

Note that the BYE could be sent by A after the NOTIFY. Also, if A has flushed all state information, the NOTIFY may receive a 481 Call Leg Does Not Exist.

Message Details

F1 INVITE B -> A

```
INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 180 Ringing A -> B

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F3 200 OK A -> B

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
```

Content-Length: ...

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```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 ACK B -> A

```
ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0
```

/* Session is established between A and B. */

/* A performs unattended transfer of B to C */

F5 REFER A -> B

```
REFER sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 REFER
Refer-To: <sip:UserC@anywhere.com>
Referred-By: <UserA@here.com>
Contact: <sip:UserA@100.101.102.103>
Content-Length: 0
```

F6 202 Accepted B -> A

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 REFER
Content-Length: 0
```

```
/* A now disconnects with B */
```

F7 BYE A -> B

BYE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 3 BYE
Content-Length: 0

F8 200 OK B -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 3 BYE
Content-Length: 0

/* B attempts the transfer to C */

F9 INVITE B -> C

INVITE sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: 7436222@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Referred-By: <UserA@here.com>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844539 2890844539 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423821 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F10 180 Ringing C -> B

SIP/2.0 180 Ringing

Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309

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To: OtherGuy <sip:UserC@anywhere.com>;tag=928287
Call-ID: 7436222@here.com
CSeq: 1 INVITE

F11 200 OK C -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=928287
Call-ID: 7436222@here.com
CSeq: 1 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserC 2890844527 2890844527 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F12 ACK B -> C

ACK sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=928287
Call-ID: 7436222@here.com
CSeq: 1 ACK
Content-Length: 0

/* B and C now have established a session. B reports success to A
which A probably ignores. */

F13 NOTIFY B -> A

NOTIFY sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 NOTIFY
Event: refer

Content-Type: application/sip
Content-Length: ...

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SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=928287
Call-ID: 7436222@here.com
CSeq: 1 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...

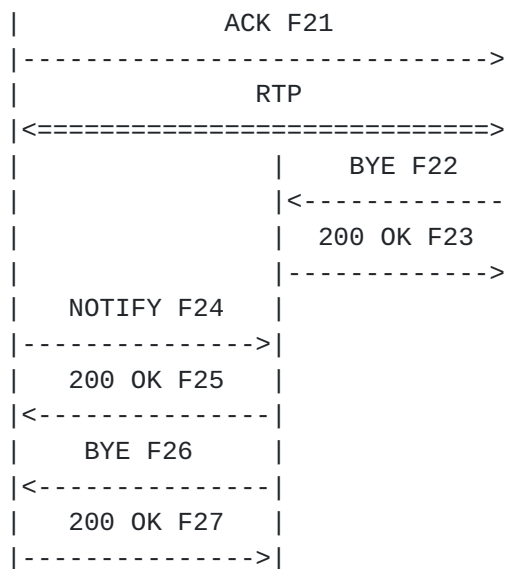
F14 200 OK A -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=314159
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345601@here.com
CSeq: 2 NOTIFY
Content-Length: 0

2.5 Attended Transfer

User A	User B	User C
INVITE F1		
----->		
(100 Trying) F2		
<-----		
180 Ringing F3		
<-----		
200 OK F4		
<-----		
ACK F5		
----->		
RTP		
<=====		
INVITE c=0 F6		
<-----		
200 OK F7		
----->		
ACK F8		
<-----		
No RTP		
	INVITE F9	
	----->	
	(100 Trying) F10	
	<-----	
	180 Ringing F11	
	<-----	
	200 OK F12	
	<-----	
	ACK F13	
	----->	
	RTP	
	<=====	
	INVITE c=0 F14	
	----->	
	200 OK F15	
	<-----	
	ACK F16	
	----->	
	No RTP	
REFER Refer-To: C F17		
<-----		
202 Accepted F18		
----->		
INVITE Replaces: B F19		

```
|----->|
|      200 OK F20      |
|<-----|
```



User A calls User B. User B puts User A on hold then calls User C to announce transfer, then places C on hold. User B transfers User A to User C which replaces the session between B and C. C then disconnects session with B. A reports success of transfer to B, who then disconnects with A. In this example, the Replaces header [5] is inserted into the Refer-To URL by B. The Accept-Contact header [6] is also used to ensure that the triggered INVITE reaches the same instance of the User C.

Message Details

F1 INVITE A -> B

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
```

a=rtpmap:0 PCMU/8000

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F2 (100 Trying B -> A)

SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F3 180 Ringing B -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F4 200 OK B -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0

o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F5 ACK A -> B

ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431

Call-ID: 12345600@here.com
CSeq: 1 ACK

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Content-Length: 0

/* User A and User B have established a session. User B puts User A
on Hold */

F6 INVITE B -> A

INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1024 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly

F7 200 OK A -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1024 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 ACK B -> A

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```
ACK sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1024 ACK
Content-Length: 0
```

```
/* User B calls User C */
```

```
F9 INVITE B -> C
```

```
INVITE sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: sdjfdjfskdf@there.com
CSeq: 42 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844528 2890844528 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423645 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
F10 (100 Trying C -> B)
```

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>
Call-ID: sdjfdjfskdf@there.com
CSeq: 42 INVITE
Content-Length: 0
```

```
F11 180 Ringing C -> B
```

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
```

Call-ID: sdjfdjfskdf@there.com
CSeq: 42 INVITE

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Content-Length: 0

F12 200 OK C -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 42 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserC 2890844527 2890844527 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F13 ACK B -> C

ACK sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 42 ACK
Content-Length: 0

/* User B puts User C on hold */

F14 INVITE B -> C

INVITE sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 43 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...

v=0

o=UserB 2890844529 2890844529 IN IP4 client.there.com


```
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423645 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=sendonly
```

F15 200 OK C -> B

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 43 INVITE
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserC 2890844527 2890844527 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F16 ACK B -> C

```
ACK sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=8675309
To: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 43 ACK
Content-Length: 0
```

/* User B Transfers User A to User C. */

F17 REFER B -> A

```
REFER sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345678900@here.com
CSeq: 1025 REFER
```

Refer-To: <sip:UserC@anywhere.com?Replaces=
sdjfdjfskdf@there.com%3Bto-tag%3D5f35a3%3Bfrom-tag%3D8675309&Accept-

```
Contact=%3Csip%3AUserC@120.121.122.123%3C%3Bonly%3Dtrue>
Referred-By: <sip:UserB@there.com>
Contact: <sip:UserB@110.111.112.113>
Content-Length: 0
```

F18 202 Accepted A -> B

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=1234567
To: BigGuy <sip:UserA@here.com>;tag=23431
Call-ID: 12345678900@here.com
CSeq: 1025 REFER
Content-Length: 0
```

/* User A establishes session with User C which replaces the session
between User B and User C */

F19 INVITE A -> C

```
INVITE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP anywhere.com:5060
To: OtherGuy <sip:UserC@anywhere.com>
From: BigGuy <sip:UserA@here.com>;tag=3461
Call-ID: 9435674543@here.com
CSeq: 1 INVITE
Referred-By: <sip:UserB@there.com>
Accept-Contact: <sip:UserC@120.121.122.123>;only=true
Replaces: 12345600@here.com;to-tag=23431;from-tag=8675309
Contact: <sip:UserC@120.121.122.123>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserC 2890844529 2890844529 IN IP4 client.anywhere.com
s=Session SDP
c=IN IP4 120.121.122.123
t=3034423643 0
m=audio 3458 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F20 200 OK C -> A

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP anywhere.com:5060
To: OtherGuy <sip:UserC@anywhere.com>;tag=ff3a
```

From: BigGuy <sip:UserA@here.com>;tag=3461
Call-ID: 9435674543@here.com

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CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844538 2890844538 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423452 0
m=audio 49172 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F21 ACK A -> C

ACK sip:UserC@anywhere.com SIP/2.0
Via: SIP/2.0/UDP anywhere.com:5060
To: OtherGuy <sip:UserC@anywhere.com>;tag=ff3a
From: BigGuy <sip:UserA@here.com>;tag=3461
Call-ID: 9435674543@here.com
CSeq: 1 INVITE
Content-Length: 0

/* User C then disconnects from User B */

F22 BYE C -> B

BYE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
To: LittleGuy <sip:UserB@there.com>;tag=8675309
From: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 1 BYE
Content-Length: 0

F23 200 OK B -> C

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
To: LittleGuy <sip:UserB@there.com>;tag=8675309
From: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: sdjfdjfskdf@there.com
CSeq: 1 BYE
Content-Length: 0

```
/* User A tells User B that the call has been successfully  
transferred */
```

F24 NOTIFY A -> B

NOTIFY sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=23431
Call-ID: 12345678900@here.com
CSeq: 2 NOTIFY
Content-Type: application/sdp
Content-Length: ...

SIP/2.0 200 OK
Via: SIP/2.0/UDP anywhere.com:5060
From: OtherGuy <sip:UserC@anywhere.com>;tag=ff3a
To: BigGuy <sip:UserA@here.com>;tag=3461
Call-ID: 9435674543@anywhere.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>

F25 200 OK B -> C

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
To: LittleGuy <sip:UserB@there.com>;tag=1234567
From: OtherGuy <sip:UserC@anywhere.com>;tag=5f35a3
Call-ID: 12345678900@here.com
CSeq: 2 NOTIFY
Content-Length: 0

/* User B disconnects with User A */

F26 BYE B -> A

BYE sip:UserA@here.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345678900@here.com
CSeq: 1026 BYE
Content-Length: 0

F27 200 OK A -> B

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060

From: LittleGuy <sip:UserB@there.com>;tag=23431
To: BigGuy <sip:UserA@here.com>;tag=1234567

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Call-ID: 12345678900@here.com

CSeq: 1026 BYE

Content-Length: 0

2.6 Call Forwarding Unconditional

User A	Proxy	Gateway
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		
<=====		
BYE F10		
----->	BYE F11	
	----->	
	200 OK F12	
200 OK F13	<-----	
<-----		

User B wants all calls forwarded to the PSTN. User A calls User B. The Proxy server rewrites the request URI, and forwards the INVITE to a Gateway. Details of messaging behind the Gateway are not shown.

Message Details

F1 INVITE A -> Proxy

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

v=0

```
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
```

c=IN IP4 100.101.102.103
t=3034423619 0

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

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

```
F2 INVITE Proxy -> Gateway
```

```
INVITE sip:+19727293660@gw1.wcom.com;user=phone SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
F3 (100 Trying) Proxy -> A
```

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

```
F4 180 Ringing Gateway -> Proxy
```

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
```

Content Length:0

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F5 180 Ringing Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content Length: 0

F6 200 OK Gateway -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:+19727293660@gw1.wcom.com;user=phone>
Content-Type: application/sdp
Content-Length: ...

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

F7 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:+19727293660@gw1.wcom.com;user=phone>
Content-Type: application/sdp
Content-Length: ...

v=0

o=GATEWAY1 2890844527 2890844527 IN IP4 gatewayone.wcom.com
s=Session SDP

c=IN IP4 gatewayone.wcom.com
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F8 ACK A -> Proxy

ACK sip:+19727293660@gw1.wcom.com;user=phone SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:+19727293660@gw1.wcom.com;user=phone>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F9 ACK Proxy -> Gateway

ACK sip:+19727293660@gw1.wcom.com;user=phone SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F10 BYE A -> Proxy 1

BYE sip:+19727293660@gw1.wcom.com;user=phone SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:+19727293660@gw1.wcom.com;user=phone>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F11 BYE Proxy 1 -> Gateway

BYE sip:+19727293660@gw1.wcom.com;user=phone SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159

Call-ID: 12345600@here.com
CSeq: 2 BYE

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Content-Length: 0

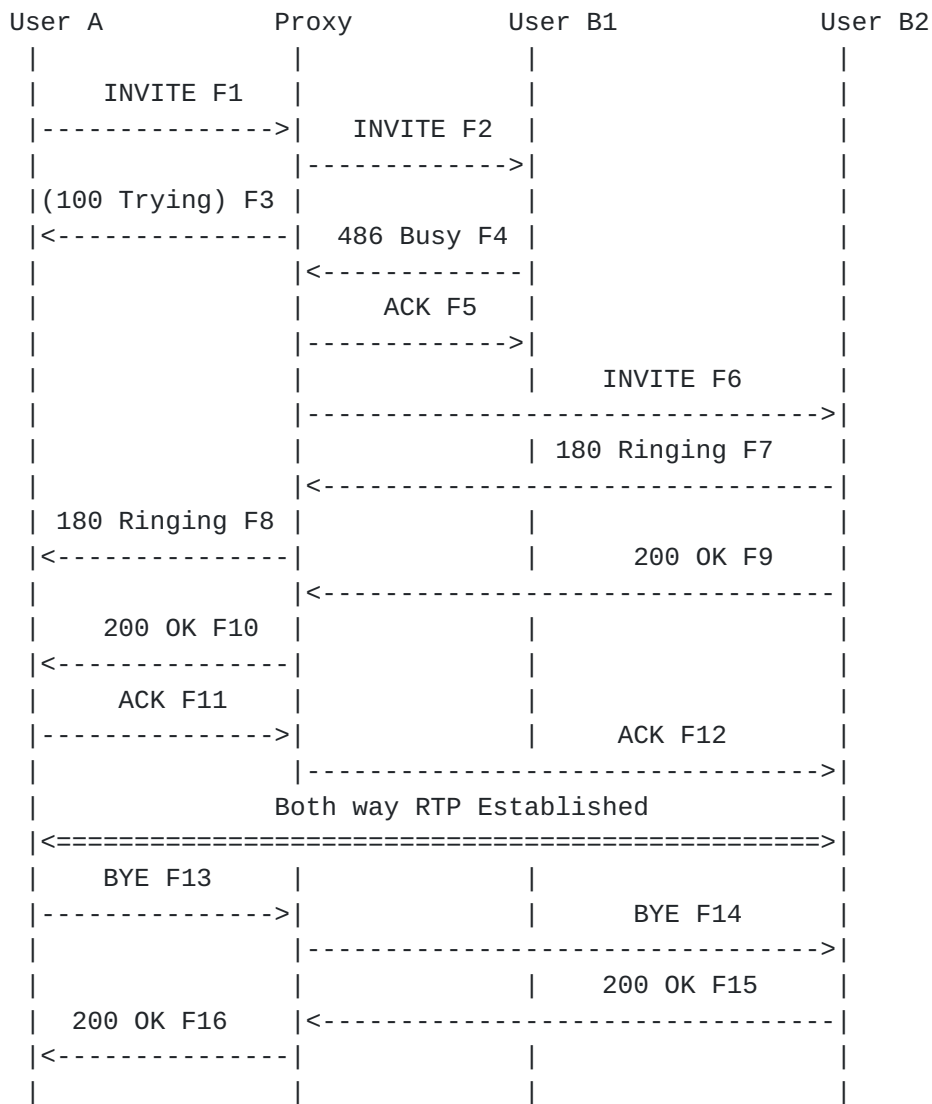
F12 200 OK Gateway -> Proxy 1

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F13 200 OK Proxy 1 -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

2.7 Call Forwarding - Busy



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

Message Details

F1 INVITE A -> Proxy

```

INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
  
```

Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>

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

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F2 INVITE Proxy -> B1

INVITE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F3 (100 Trying) Proxy -> A

SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F4 486 Busy Here B1 -> Proxy

SIP/2.0 486 Busy Here

Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060

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From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F5 ACK Proxy -> B1

ACK sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

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

F6 INVITE Proxy -> B2

INVITE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F7 180 Ringing B2 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567

To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com

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CSeq: 1 INVITE
Content-Length: 0

F8 180 Ringing Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F9 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F10 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp

Content-Length: ...

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```
v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F11 ACK A -> Proxy

```
ACK sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB2@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

F12 ACK Proxy -> B2

```
ACK sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

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

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

F13 BYE A -> Proxy

```
BYE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB2@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0
```

F14 BYE Proxy -> B2

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```
BYE sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0
```

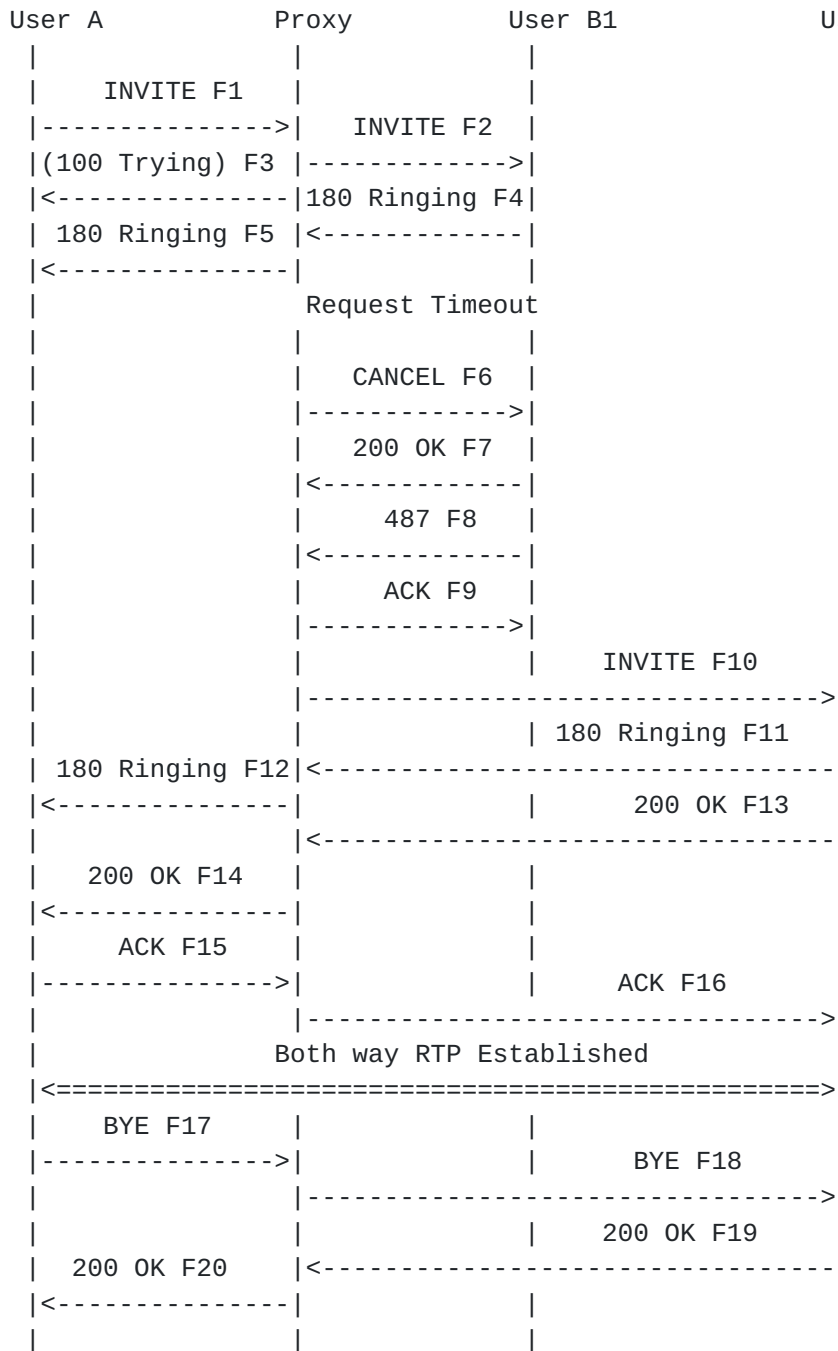
F15 200 OK B2 -> Proxy

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0
```

F16 200 OK Proxy -> A

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0
```


2.8 Call Forwarding - No Answer



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

Message Details

F1 INVITE A -> Proxy

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```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy -> B1

```
INVITE sip:UserB1@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 (100 Trying) Proxy -> A

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
```

CSeq: 1 INVITE
Content-Length: 0

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F4 180 Ringing B1 -> Proxy

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F5 180 Ringing Proxy -> A

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
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 sip:UserB1@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0
```

F7 200 OK B1 -> Proxy

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0
```

F8 487 Request Terminated B1 -> Proxy

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SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F9 ACK Proxy -> B1

ACK sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F10 INVITE Proxy -> B2

INVITE sip:UserB4@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F11 180 Ringing B2 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2

Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567

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To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F12 180 Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F13 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F14 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE

Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp

Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F15 ACK A -> Proxy

ACK sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F16 ACK Proxy -> B2

ACK sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

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

F17 BYE A -> Proxy

BYE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F18 BYE Proxy -> B2

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BYE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F19 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F20 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

[2.9](#) 3-way Conference

User A calls User B, User B then invites user C to a 3-way call. User B will mix the audio streams (act as the conference bridge). If user B drops out of the call then the entire call is dropped. This is not a fully meshed conference, and does not make use of the concepts in the call control draft.

The signaling for this scenario is as follows: User A calls User B, this establishes the call between A and B. User B calls User C, this establishes the call between B and C. User B will mix the audio streams, sending media originating at A to C, and media originating at C to A. There is no SIP signaling relationship between User A and User C.

The REFER method with the Replaces header could be used by User B to drop out of the call without disconnecting A and C.

2.10

Single Line Extension

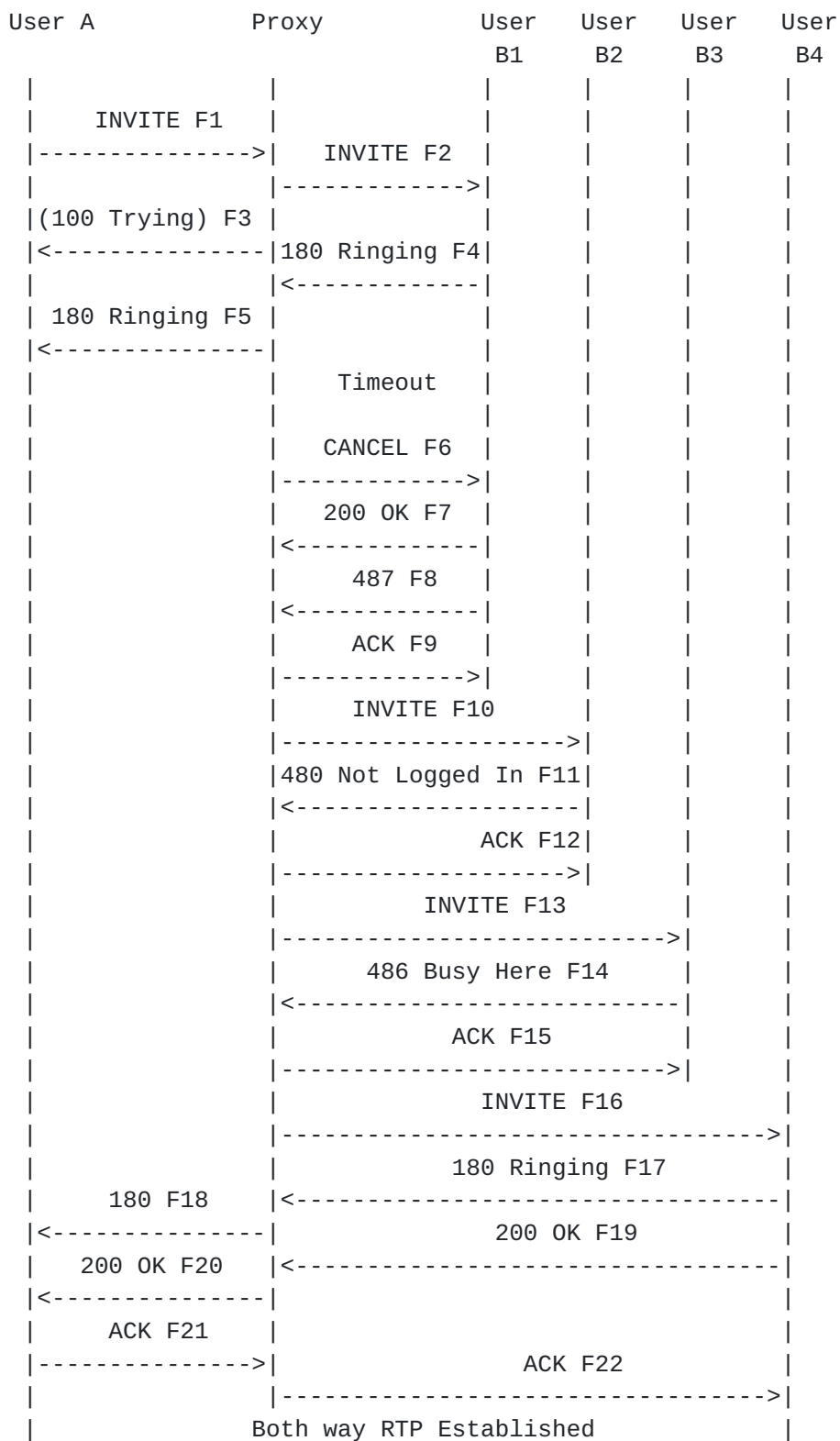
Single Line Extension (Sequential, First Wins implementation), a call will ring several extensions in sequence. The extension to answer the call becomes the active set, no other sets may join the call.

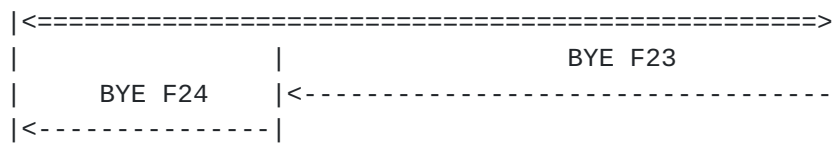
The signaling is described in [Section 2.11](#) of this document. It is anticipated that Single Line Extension will be associated with help desk/call center applications rather than individual users. The signaling for this implementation of Single Line Extension and Find-Me is the same, the difference may be in the provisioning of the service.

Note that the call flows for a Home Extension have not yet been designed.

2.11

Find-Me







A call to a user will 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.

It is anticipated that the Find-me feature will be associated with individual users. The signaling for the implementation of Single Line Extension and Find-Me is the same, the difference may be in the provisioning of the service.

Message Details

F1 INVITE A -> Proxy

```

INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
  
```

v=0

```

o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t= 0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
  
```

F2 INVITE Proxy -> B1

```

INVITE sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
  
```

Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp

Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t= 0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F3 (100 Trying) Proxy -> A

SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F4 180 Ringing B1 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F5 180 Ringing Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
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 sip:UserB@110.111.112.113 SIP/2.0

Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0

F7 200 OK B1 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0

F8 487 Request Terminated B1 -> Proxy

SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F9 ACK Proxy -> B1

ACK sip:UserB@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F10 INVITE Proxy -> B2

INVITE sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567

To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com

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CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
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/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314756
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F12 ACK Proxy -> B2

ACK sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314756
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F13 INVITE Proxy -> B3

INVITE sip:UserB3@110.111.112.115 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.3
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp

Content-Length: ...

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```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
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/UDP ss1.wcom.com:5060;branch=83749.3
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F15 ACK Proxy -> B3

```
ACK sip:UserB3@110.111.112.115 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.3
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7654321
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

F16 INVITE Proxy -> B4

```
INVITE sip:UserB4@110.111.112.116 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.4
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
```

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/UDP ss1.wcom.com:5060;branch=83749.4
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F18 180 Ringing B4 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F19 200 OK B4 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.4
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB4@110.111.112.116>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client4.there.com
s=Session SDP
c=IN IP4 110.111.112.116
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F20 200 OK Proxy -> A

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```
SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB4@110.111.112.113.116>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844527 2890844527 IN IP4 client4.there.com
s=Session SDP
c=IN IP4 110.111.112.116
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F21 ACK A -> Proxy

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB4@110.111.112.116>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

F22 ACK Proxy -> B4

```
ACK sip:UserB4@110.111.112.116 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=7137136
Call-ID: 12345600@here.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 sip:UserA@here.com SIP/2.0

Via: SIP/2.0/UDP there.com:5060
Route: <sip:UserA@100.101.102.103>
From: LittleGuy <sip:UserB@there.com>;tag=7137136
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 BYE
Content-Length: 0

F24 BYE Proxy -> A

BYE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=7137136
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 BYE
Content-Length: 0

F25 200 OK A -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=7137136
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 BYE
Content-Length: 0

F26 200 OK Proxy -> B4

SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=7137136
To: BigGuy <sip:UserA@here.com>;tag=1234567
Call-ID: 12345600@here.com
CSeq: 1 BYE
Content-Length: 0

2.12

Call Management (Incoming Call Screening)

User A	Proxy	User B
INVITE F1		
----->		
305 Use Proxy F2		
<-----		
ACK F3		
----->		
INVITE F4		
----->		
407 Proxy Authorization F5		
<-----		
ACK F6		
----->		
INVITE F7		
----->		
403 Screening Failure (Terminating) F8		
<-----		
ACK F9		
----->		

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

Message Details

F1 INVITE A -> B

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

v=0

o=UserA 2890844526 2890844526 IN IP4 client.here.com

s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0

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

```
/* User B only accepts INVITEs that have been screened by the proxy
*/
```

```
F2 305 Use Proxy B -> A
```

```
SIP/2.0 305 Use Proxy
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=342123
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:ss1.wcom.com>
Content-Length: 0
```

```
F3 ACK A -> B
```

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=342123
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

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

```
F4 INVITE A -> Proxy 1
```

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
```

m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

```
/* Proxy 1 challenges User A for authentication */
```

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

```
SIP/2.0 407 Proxy Authorization Required
```

```
Via: SIP/2.0/UDP here.com:5060
```

```
From: BigGuy <sip:UserA@here.com>;tag=1234567
```

```
To: LittleGuy <sip:UserB@there.com>;tag=7886765
```

```
Call-ID: 12345600@here.com
```

```
CSeq: 2 INVITE
```

```
Proxy-Authenticate: Digest realm="MCI WorldCom SIP",  
  domain="sip:ss1.wcom.com", nonce="ea9c8e88df84f1cec4341ae6cbe5a359",  
  opaque="", stale=FALSE, algorithm=MD5
```

```
Content-Length: 0
```

```
F6 ACK A -> Proxy 1
```

```
ACK sip:UserB@there.com SIP/2.0
```

```
Via: SIP/2.0/UDP here.com:5060
```

```
From: BigGuy <sip:UserA@here.com>;tag=1234567
```

```
To: LittleGuy <sip:UserB@there.com>;tag=7886765
```

```
Call-ID: 12345600@here.com
```

```
CSeq: 2 ACK
```

```
Content-Length: 0
```

```
/* User A responds by sending an INVITE with authentication  
credentials in it. */
```

```
F7 INVITE A -> Proxy 1
```

```
INVITE sip:UserB@there.com SIP/2.0
```

```
Via: SIP/2.0/UDP here.com:5060
```

```
From: BigGuy <sip:UserA@here.com>;tag=1234567
```

```
To: LittleGuy <sip:UserB@there.com>
```

```
Call-ID: 12345600@here.com
```

```
CSeq: 3 INVITE
```

```
Contact: <sip:UserA@100.101.102.103>
```

```
Proxy-Authorization: DIGEST username="UserA",  
  realm="MCI WorldCom SIP", nonce="ae9137be1c87d175c2dd63302a0d6e0a",  
  opaque="", uri="sip:ss1.wcom.com",  
  response="bbaec39f943bdcb3620d90afc548a45c"
```

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

```
Content-Length: ...
```

```
v=0
```

o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP


```
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

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

```
SIP/2.0 403 Screening Failure (Terminating)
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=ffe254
Call-ID: 12345600@here.com
CSeq: 3 INVITE
Content-Length: 0
```

F9 ACK A -> Proxy 1

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=ffe254
Call-ID: 12345600@here.com
CSeq: 3 ACK
Content-Length: 0
```


2.13

Call Management (Outgoing Call Screening)

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

User A has an outgoing call screening list, User B is included on the list of addresses User A will not be able to place a call to. User A attempts to call user B.

Message Details

F1 INVITE A -> Proxy 1

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

/* Proxy 1 challenges User A for authentication */

F2 407 Proxy Authorization Required Proxy 1 -> A

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```
SIP/2.0 407 Proxy Authorization Required
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=90210
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Proxy-Authenticate: Digest realm="MCI WorldCom SIP",
    domain="sip:ss1.wcom.com", nonce="ea9c8e88df84f1cec4341ae6cbe5a359",
    opaque="", stale=FALSE, algorithm=MD5
Content-Length: 0
```

F3 ACK A -> Proxy 1

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=90210
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0
```

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

F4 INVITE A -> Proxy 1

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Contact: <sip:UserA@100.101.102.103>
Proxy-Authorization: DIGEST username="UserA", realm="MCI WorldCom
    SIP", nonce="cb360afc54bbaec39f943bd820d9a45c", opaque="",
    uri="sip:ss1.wcom.com", response="b9d2e5bcdec9f69ab2a9b44f270285a6"
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

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

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SIP/2.0 403 Screening Failure (Originating)
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=18017
Call-ID: 12345600@here.com
CSeq: 2 INVITE
Content-Length: 0

F6 ACK A -> Proxy 1

ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=18017
Call-ID: 12345600@here.com
CSeq: 2 ACK
Content-Length: 0

2.14

Call Park

User A	User B	Park Server
INVITE F1		
----->		
180 Ringing F2		
<-----		
200 OK F3		
<-----		
ACK F4		
----->		
RTP Media		
<=====		
User B Parks Call		
	REFER Refer-To: A F5	
	----->	
	202 F6	
	<-----	
INVITE F7 Replaces: B		
<-----		
200 OK F8		
----->		
ACK F9		
<-----		
RTP Music		
<=====		
BYE F10		
----->	NOTIFY F12	
200 OK F11	<-----	
<-----	200 OK F13	
	----->	
User B picks up the call		
INVITE F14		
<-----		
200 F15		
----->		
ACK F16		
<-----		
RTP Media		
<=====		
BYE F17		
----->		
200 OK F18		
<-----		

In this example, User A calls User B. User B then parks the call at the Park Server by sending a REFER to the Park Server. The server

sends an INVITE to A which replaces the session between A and B. The call is accepted by A and causes A to send a BYE to B. User B receives notification of the successful park, and also receives the Call-ID in the application/sip body of the NOTIFY response. When User B wishes to retrieve the call, a new INVITE is sent to A which replaces the session with the Park Server. User A accepts the call and sends a BYE to the Park Server. If someone besides User B retrieves the call, then this becomes Call Park and Pickup.

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 A -> B

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 180 Ringing B -> A

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Content-Length: 0
```

F3 200 OK B -> A

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```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserB 2890844527 2890844527 IN IP4 client.there.com
s=Session SDP
c=IN IP4 110.111.112.113
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F4 ACK A -> B

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 1 ACK
Content-Length: 0
```

/* User B 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 B -> Park Server

```
REFER sip:park@server.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=02134
To: Park Server <sip:park@server.com>
Call-ID: 4802029847@there.com
CSeq: 1 REFER
Refer-To: <sip:UserA@here.com?Replaces=
  12345601@here.com%3Bfrom-tag%3D314159%3Bto-tag%3D1234567&Accept-
  Contact=%3Csip%3AUserA@100.101.102.103%3C%3Bonly%3Dtrue>
Referred-By: <sip:UserB@there.com>
Contact: <sip:UserB@110.111.112.113>
Content-Length: 0
```

F6 202 Accepted Park Server -> B

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```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP there.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=02134
To: Park Server <sip:park@server.com>;tag=56323
Call-ID: 4802029847@there.com
CSeq: 1 REFER
Content-Length: 0
```

```
/* Park Server places call to User A to replace session between A and
B */
```

```
F7 INVITE Park Server -> A
```

```
INVITE sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP server.com:5060
From: <sip:park@server.com>;tag=0111
To: <sip:UserA@100.101.102.103>
Call-ID: a5-75-34-12-76@server.com
CSeq: 1 INVITE
Referred-By: <sip:UserB@there.com>
Contact: <sip:park@server.com>
Replaces: 12345601@here.com;from-tag=314159;to-tag=1234567
Accept-Contact: <sip:UserA@100.101.102.103>;only=true
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=ParkServer 2890844576 2890844576 IN IP4 Park.server.com
s=Session SDP
c=IN IP4 50.60.70.80
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

```
F8 200 OK A-> Park Server
```

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP server.com:5060
From: <sip:park@server.com>;tag=0111
To: BigGuy <sip:UserA@100.101.102.103>;tag=098594
Call-ID: a5-75-34-12-76@server.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

v=0

o=UserA 2890844526 2890844526 IN IP4 client.here.com


```
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
a=recvnly
```

F9 ACK Park Server -> A

```
ACK sip:UserA@100.101.102.103 SIP/2.0
Via: SIP/2.0/UDP server.com:5060
From: <sip:park@server.com>;tag=0111
To: BigGuy <sip:UserA@100.101.102.103>;tag=098594
Call-ID: a5-75-34-12-76@server.com
CSeq: 1 ACK
Content-Length: 0
```

F10 BYE A -> B

```
ACK sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 BYE
Content-Length: 0
```

F11 200 OK B -> A

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP there.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=314159
Call-ID: 12345601@here.com
CSeq: 2 BYE
Content-Length: 0
```

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

F12 NOTIFY Park Server -> B

```
NOTIFY sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
To: LittleGuy <sip:UserB@there.com>;tag=02134
```

From: Park Server <sip:park@server.com>;tag=56323
Call-ID: 4802029847@there.com

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CSeq: 1 NOTIFY
Event: refer
Content-Type: application/sip
Content-Length: ...

SIP/2.0 200 OK
Via: SIP/2.0/UDP server.com:5060
From: <sip:park@server.com>;tag=0111
To: BigGuy <sip:UserA@100.101.102.103>;tag=098594
Call-ID: a5-75-34-12-76@server.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>

F13 200 OK B -> Park Server

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
To: LittleGuy <sip:UserB@there.com>;tag=02134
From: Park Server <sip:park@server.com>;tag=56323
Call-ID: 4802029847@there.com
CSeq: 1 NOTIFY
Content-Length: 0

/* User A is now parked at the Park Server */

/* User B picks up the call by sending an INVITE to A which replaces the existing session with the Park/Park Server. Note that B knows the Call-ID of the existing session from the NOTIFY response. */

/* Another UA besides B can pickup the call as long as it can construct the appropriate Replaces header. */

F14 INVITE B -> A

INVITE sip:UserA@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=5893461
To: BigGuy <sip:UserA@here.com>
Call-ID: 6485356@here.com
CSeq: 1 INVITE
Contact: <sip:UserB@110.111.112.113>
Replaces: a5-75-34-12-76@server.com;from-tag=098594;to-tag=0111
Content-Type: application/sdp
Content-Length: ...

v=0

o=UserB 2890844528 2890844528 IN IP4 client.there.com

s=Session SDP
c=IN IP4 110.111.112.113

```
t=3034423619 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F15 200 OK A -> B

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=5893461
To: BigGuy <sip:UserA@here.com>;tag=222
Call-ID: 6485356@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844527 2890844527 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=3034423619 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F16 ACK B -> A

```
ACK sip:UserA@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: LittleGuy <sip:UserB@there.com>;tag=5893461
To: BigGuy <sip:UserA@here.com>;tag=222
Call-ID: 6485356@here.com
CSeq: 1 ACK
Content-Length: 0
```

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

F17 BYE A -> Park Server

```
BYE sip:park@server.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=098594
To: <sip:park@server.com>;tag=0111
Call-ID: a5-75-34-12-76@server.com
CSeq: 1 BYE
Content-Length: 0
```


F18 200 OK Park Server -> A

SIP/2.0 200 OK

Via: SIP/2.0/UDP here.com:5060

From: BigGuy <sip:UserA@here.com>;tag=098594

To: <sip:park@server.com>;tag=0111

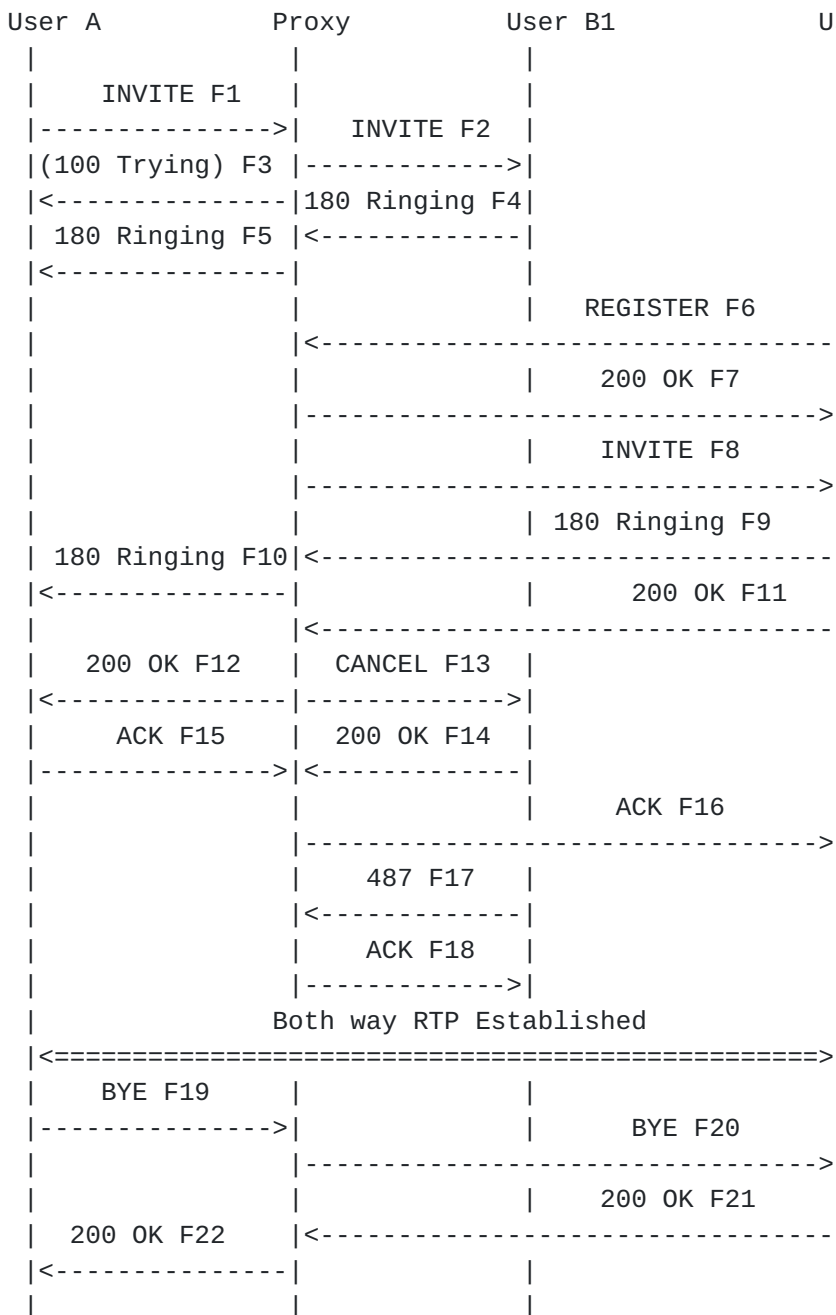
Call-ID: a5-75-34-12-76@server.com

CSeq: 1 BYE

Content-Length: 0

2.15

Call Pickup



User B1 and B2 are part of a work group that can pick up each others calls. User A calls B1 who does not answer. User B2 wishes to pick up the call and sends a REGISTER with Expires:0 to the proxy which recognizes this as a call pickup not a register based on the Request-URI. The proxy server then forks the INVITE by sending it to B2 who answers. The proxy then cancels the B1 fork of the INVITE.

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F1 INVITE A -> Proxy

```
INVITE sip:UserB@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F2 INVITE Proxy -> B1

```
INVITE sip:UserB1@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...
```

```
v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000
```

F3 (100 Trying) Proxy -> A

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
```

To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com

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CSeq: 1 INVITE
Content-Length: 0

F4 180 Ringing B1 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F5 180 Ringing Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

/* User B2 decides to pick up the call */

F6 REGISTER B2 -> Proxy

REGISTER sip:pickupgroup37.ss1.wcom.com SIP/2.0
Via: SIP/2.0/UDP b2.there.com:5060
From: LittleGuy <sip:UserB2@there.com>;tag=8675309
To: LittleGuy <sip:UserB2@there.com>
Call-ID: 563456212@b2.there.com
CSeq: 1 REGISTER
Contact: <sip:UserB2@110.111.112.114>
Expires: 0
Content-Length: 0

F7 200 OK Proxy -> B2

SIP/2.0 200 OK
Via: SIP/2.0/UDP b2.there.com:5060
From: LittleGuy <sip:UserB2@there.com>;tag=8675309
To: LittleGuy <sip:UserB2@there.com>;tag=2913
Call-ID: 563456212@b2.there.com

CSeq: 1 REGISTER

Contact: <sip:UserB2@110.111.112.114>

Expires: 0
Content-Length: 0

/* Proxy recognizes the REGISTER directed at pickgroup37.ss1.wcom.com
as being a call pickup attempt for the pending INVITE to B1. The
proxy then forks the INVITE and sends it to B2. */

F8 INVITE Proxy -> B2

INVITE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserA@100.101.102.103>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserA 2890844526 2890844526 IN IP4 client.here.com
s=Session SDP
c=IN IP4 100.101.102.103
t=0 0
m=audio 49170 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F9 180 Ringing B2 -> Proxy

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F10 180 Proxy -> A

SIP/2.0 180 Ringing
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432

Call-ID: 12345600@here.com
CSeq: 1 INVITE

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Content-Length: 0

F11 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.2
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

F12 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
Record-Route: <sip:UserB@there.com;maddr=ss1.wcom.com>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Contact: <sip:UserB2@110.111.112.114>
Content-Type: application/sdp
Content-Length: ...

v=0
o=UserB 2890844527 2890844527 IN IP4 client2.there.com
s=Session SDP
c=IN IP4 110.111.112.114
t=0 0
m=audio 3456 RTP/AVP 0
a=rtpmap:0 PCMU/8000

/* The Proxy detects the answer by B2 and cancels the B1 branch */

F13 CANCEL Proxy -> B1

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CANCEL sip:UserB1@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0

F14 200 OK B1 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>
Call-ID: 12345600@here.com
CSeq: 1 CANCEL
Content-Length: 0

F15 ACK A -> Proxy

ACK sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F16 ACK Proxy -> B2

ACK sip:UserB2@110.111.112.114 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

F17 487 Request Terminated B1 -> Proxy

SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1

Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567

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To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 INVITE
Content-Length: 0

F18 ACK Proxy -> B1

ACK sip:UserB1@110.111.112.113 SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=3145678
Call-ID: 12345600@here.com
CSeq: 1 ACK
Content-Length: 0

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

F19 BYE A -> Proxy

BYE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP here.com:5060
Route: <sip:UserB@110.111.112.114>
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F20 BYE Proxy -> B2

BYE sip:UserB2@there.com SIP/2.0
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F21 200 OK B2 -> Proxy

SIP/2.0 200 OK
Via: SIP/2.0/UDP ss1.wcom.com:5060;branch=83749.1
Via: SIP/2.0/UDP here.com:5060

From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432

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Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

F22 200 OK Proxy -> A

SIP/2.0 200 OK
Via: SIP/2.0/UDP here.com:5060
From: BigGuy <sip:UserA@here.com>;tag=1234567
To: LittleGuy <sip:UserB@there.com>;tag=765432
Call-ID: 12345600@here.com
CSeq: 2 BYE
Content-Length: 0

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