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Phoenix, USA

3GPP TSG CN WG1 Meeting #17
Puerto Rico, 14th - 18th May 2001

Tdoc N1-010890

Title: [DRAFT] Liaison Statement on the IM Call Transfer service

Source: Joint CN WG1,2, 3, 4 groups

To: TSG SA3, SA5

cc: TSG SA2, TSG CN2, TSG CN3, TSG CN4

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1. Introduction

The joint CN1-4 groups reviewed proposed message flows for an IM Call Transfer service to be included in TS 24.228. It was noted that this service is similar to the Explicit Call Transfer service in GSM (TS23.091). Concerns were raised that there could be significant fraud problems with this service. Concerns were also raised that the charging principles for this service are not known.

The proposed detailed message flows are shown in contribution N1-010706. These build upon high level Call Transfer message flows described in TS 23.228. The message flows assume that the initial Mobile (UE) to Mobile (UE) call is established between mobiles that are served by a 3GPP IM network. However, it should be noted that it is possible for a Mobile to call a terminal which is not served by a 3GPP network.

CN1 is keen to progress the work on the IM Call Transfer service but needs guidance from security experts on how best to ensure that operators do not experience significant fraud problems with this service. CN1 also needs guidance from charging experts on the charging principles for this service. It seems possible that the security and charging aspects may be somehow related.

2. Actions:

To SA3.

SA3 security experts are requested to review the proposed IM Call Transfer service message flows (described in TS 23.228 and N1-010706) from a fraud potential viewpoint, and to provide guidance on any essential modifications that are necessary to ensure potential fraud problems are minimised.

To SA5.

SA5 charging experts are requested to review the proposed IM Call Transfer service message flows (described in TS 23.228 and N1-010706) from a charging viewpoint, and to provide guidance on charging principles.

3. Date of Next CN1 Meetings:

CN1_18 10th – 12th July 2001 Dresden, Germany.

CN1_19 27th – 31th August 2001

4. Attachments:

N1-010706

Source: AT&T
Title: CR for 24.228, Call Transfer Procedures
Agenda item: 8.4
Document for: APPROVAL

It is proposed that the following text be added to an informative Annex (TS 24.228 Annex B) as preliminary material for section 10.5.

In addition, the following IETF Internet-Drafts should be added to the Work Item Description as IETF dependencies:

- Draft-ietf-sip-cc-transfer-04
- Draft-roach-sip-subscribe-notify-03

10.5 Session Transfer Procedures

This section gives information flows for the procedures for performing session transfers. Section 10.5.1 gives the procedures for a transfer that initiates a new session (i.e. to a new destination not previously involved in the session). Section 10.5.2 gives the procedures for a transfer that replaces an existing session (i.e. to a destination that was previously involved in the session).

10.5.1 Session Transfer initiating a new session

An IP multi-media session already exists between UE#1 and UE#2. UE#2 desires UE#1 to initiate a new session to a new destination, UE#F, and terminate the existing session. The procedures for this transfer are shown in Figure 10.5.1-1.

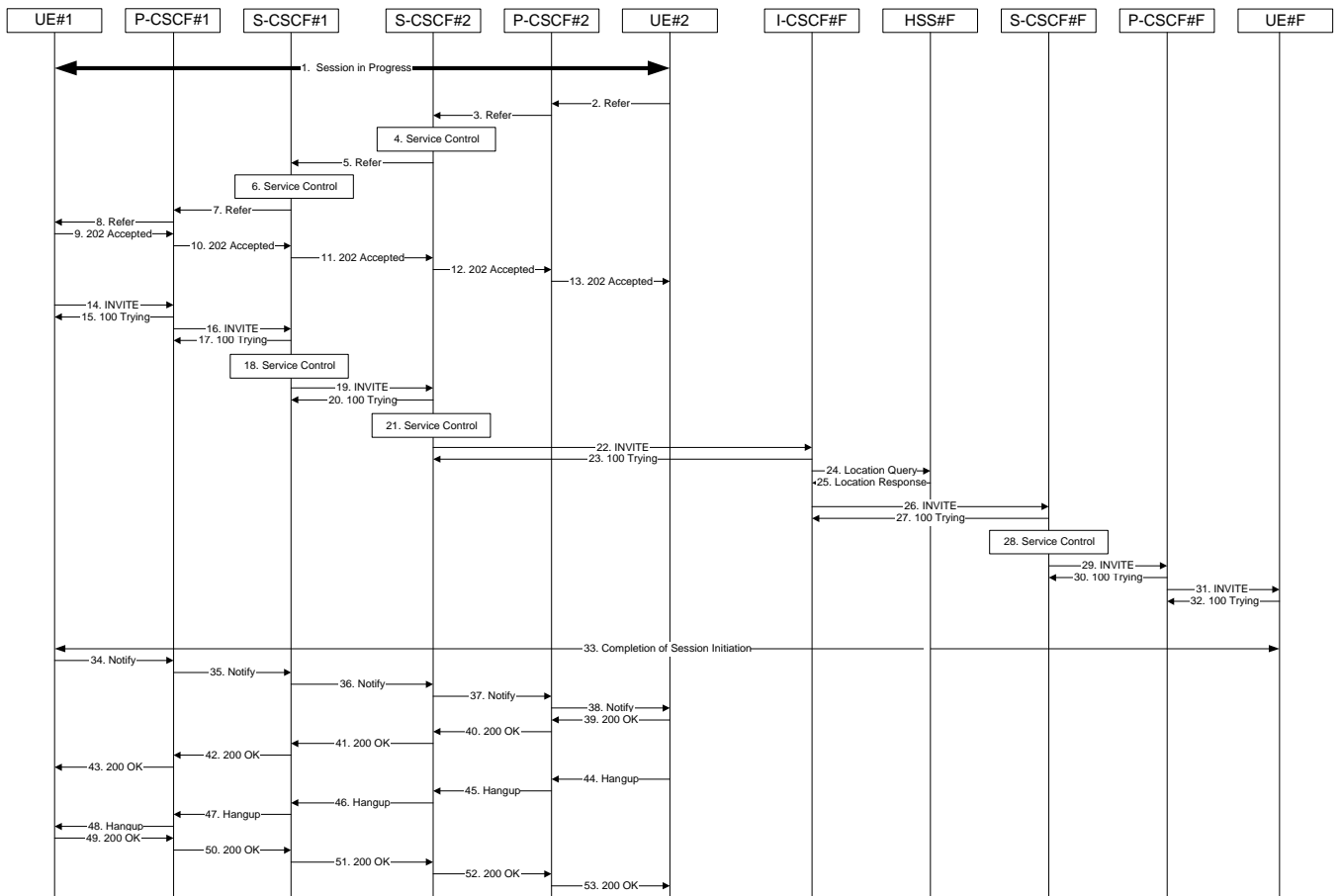


Figure 10.5.1-1 – Session Transfer initiating a new session

- 1. Session in Progress**
UE#1 initiates a multi-media session with UE#2. As a result, the state information stored at P-CSCF#2 is shown in Table 10.5.1-1

Table 10.5.1-1: State Information

```
Request-URI: sip:token6@pcscf2.home.net

From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost

Route: sip:scscf2.home.net, sip:scscf1.home.net,
sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
```

- 2. REFER (UE to P-CSCF) – see example in Table 10.5.1-2**
UE#2 sends a Refer request to its proxy, P-CSCF#2.

Table 10.5.1-2: REFER (UE to P-CSCF)

```
REFER sip:token6@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
To: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
    tag=171828
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 130 REFER
Contact: sip:[5555::eee:fff:aaa:bbb]
Refer-To: tel:+1-212-555-3333
Refer-By: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off
Content-length: 0
```

Request-URI: contains the value of the Contact header from the 200-OK response to the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response.

Cseq: next higher sequential value.

Contact: the IP address or FQDN of the originating UE.

Editor's Note: Use of Remote-Party-ID in REFER is FFS.

Editor's Note: The proper value for the Refer-By header is FFS.

3. **REFER (P-CSCF to S-CSCF) – see example in Table 10.5.1-3**

P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.

P-CSCF#2 forwards the Refer request to S-CSCF#2.

Table 10.5.1-3: REFER (P-CSCF to S-CSCF)

```
REFER sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:scscf1.home.net, sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aaaa%3afff%3aaaa%3abbb%5d@pcscf2.home.net
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

Request-URI: the first component of the saved Route header.

Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

4. Service Control

5. **REFER (S-CSCF to S-CSCF) – see example in Table 10.5.1-5**

In order to maintain the expectation of privacy of the identity of the new destination, S-CSCF#2 converts the "Refer-To" header into a private URL. S-CSCF#2 forwards the Refer request to S-CSCF#1.

Table 10.5.1-5: REFER (S-CSCF to S-CSCF)

```
REFER sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
Record-Route: sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To: sip:token(tel:+1-212-555-3333)@scscf2.home.net;private
Refer-By:
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off;screen=yes
Content-length:
```

6. Service Control

7. **REFER (S-CSCF to P-CSCF) – see example in Table 10.5.1-7**
S-CSCF#1 forwards the Refer request to P-CSCF#1.

Table 10.5.1-7: REFER (S-CSCF to P-CSCF)

```
INVITE sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UEP scscf1.home.net, SIP/2.0/UDP scscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

8. **REFER (P-CSCF to UE) – see example in Table 10.5.1-8**
P-CSCF#1 forwards the Refer request to UE#1.

Table 10.5.1-8: REFER (P-CSCF to UE)

```
REFER sip:[5555::aaa:bbb:ccc:ddd] SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
Cseq:
Contact: token3@pcscf2.home.net
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

9. **202-Accepted (UE to P-CSCF) – see example in Table 10.5.1-9**
UE#2 acknowledges receipt of the Refer request (8) with a 202-Accepted final response, sent to P-CSCF#1.

Table 10.5.1-8: 202 Accepted (UE to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

10. **202-Accepted (P-CSCF to S-CSCF) – see example in Table 10.5.1-10**
P-CSCF#1 forwards the 202 Accepted final response to S-CSCF#1.

Table 10.5.1-10: 202 Accepted (P-CSCF to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UEP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
CSeq:
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

11. **202-Accepted (S-CSCF to S-CSCF) – see example in Table 10.5.1-11**
S-CSCF#1 forwards the 202 Accepted final response to S-CSCF#2.

Table 10.5.1-11: 202 Accepted (S-CSCF to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Content-length:
```

12. **202-Accepted (S-CSCF to P-CSCF) – see example in Table 10.5.1-12**
S-CSCF#2 forwards the 202 Accepted final response to P-CSCF#2.

Table 10.5.1-12: 202 Accepted (S-CSCF to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Content-length:
```

13. **202-Accepted (P-CSCF to UE) – see example in Table 10.5.1-13**
P-CSCF#2 forwards the 202 Accepted final response to UE#2.

Table 10.5.1-13: 202 Accepted (P-CSCF to UE)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From:
To:
Call-ID:
CSeq:
Content-length:
```

P-CSCF removes the Record-Route header

14. **INVITE (UE to P-CSCF) – see example in Table 10.5.1-14**
UE#1 initiates an INVITE request based on the Refer-To header URL in the REFER request. The INVITE is sent from the UE to P-CSCF#1.

Table 10.5.1-14: INVITE (UE to P-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home.net;private SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Supported: 100rel
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off
Proxy-Require: privacy
Anonymity: Off
From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=74))@localhost>;
tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=75))@localhost
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 127 INVITE
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
Refer-By: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost
Content-Type: application/sdp
Content-length: (...)

v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c= IN IP6 5555::aaa:bbb:ccc:ddd
b=AS:64
t=907165275 0
m=audio 3456 RTP/AVP 97 3 96
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 G726-32/8000
a=qos:mandatory sendrecv
```

- 15. **100 Trying (P-CSCF to UE) – see example in Table 10.5.1-15**
P-CSCF#1 responds to the INVITE request (14) with a 100 Trying provisional response.

Table 10.5.1-15: 100 Trying (P-CSCF to UE)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

- 16. **INVITE (P-CSCF to S-CSCF) – see example in Table 10.5.1-16**
P-CSCF#1 remembers (from the registration procedure) the request routing for this UE. This becomes a Route header in the request. The next hop is the S-CSCF serving this UE. P-CSCF rewrites the Contact header with a locally defined value that identifies the UE. P-CSCF adds itself to the Via header.

Table 10.5.1-16: INVITE (P-CSCF to S-CSCF)

```
INVITE sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:token(tel:+1-212-555-3333)@scscf2.home.net;private
Supported:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

- 17. **100 Trying (S-CSCF to P-CSCF) – see example in Table 10.5.1-17**

S-CSCF#1 responds to the INVITE request (16) with a 100 Trying provisional response.

Table 10.5.1-17: 100 Trying (S-CSCF to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

18. Service Control

S-CSCF#1 performs whatever service control logic is appropriate for this call attempt.

19. INVITE (S-CSCF to S-CSCF) – see example in Table 10.5.1-19

S-CSCF#1 performs an analysis of the destination address, which is a private URL generated by S-CSCF#2. Since it is a destination within the same operator's network, S-CSCF#1 forwards the INVITE request directly to S-CSCF#2.

Table 10.5.1-19: INVITE (S-CSCF to S-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home.net;private SIP/2.0
Via: SIP/2.0/UDP sip:scscf1.home.net SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf1.home.net
Supported:
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off;screen=yes
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:
```

```
v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

20. 100 Trying (S-CSCF to S-CSCF) – see example in Table 10.5.1-20

S-CSCF#2 responds to the INVITE request (19) by sending a 100 Trying provisional response to S-CSCF#1.

Table 10.5.1-20: 100 Trying (S-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

21. Service Control

S-CSCF#2 performs whatever service control logic is appropriate for this call transfer attempt.

22. INVITE (S-CSCF to I-CSCF) – see example in Table 10.5.1-22

S-CSCF#2 determines the destination address from the private URL contained in the INVITE request. Based on information in that URL, and information saved from step #4 above (implementation decision), S-CSCF#2 verifies the validity of the transfer request, and that it is within a short time delay from the REFER request.

S-CSCF#2 performs an analysis of the destination address, and determines the network operator to whom the destination subscriber belongs. Since (for this example) the forwarding network operator

does not desire to keep their internal configuration hidden, S-CSCF#2 forwards the INVITE request directly to I-CSCF#F.

Table 10.5.1-22: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:+1-212-555-3333@home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
    SIP/2.0/UDP [5555:aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
Supported:
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off;screen=yes
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off;screen=yes;party=transferor
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

Editor's Note: Use of "party=transferor" in a separate Remote-Party-ID header is FFS.

23. **100 Trying (I-CSCF to S-CSCF) – see example in Table 10.5.1-23**
I-CSCF#F responds to the INVITE request (22) by sending a 100 Trying provisional response to S-CSCF#2.

Table 10.5.1-23: 100 Trying (I-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
    SIP/2.0/UDP [5555:aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

24. **Location Query**
I-CSCF (at the border of the terminating subscriber's network) queries the HSS for current location information. It will send "Cx-location-query" to the HSS to obtain the location information for the destination.
25. **Location Response**
HSS responds with the address of the current Serving-CSCF for the terminating subscriber.
26. **INVITE (I-CSCF to S-CSCF) – see example in Table 10.5.1-26**
I-CSCF#F forwards the INVITE request to the S-CSCF (S-CSCF#F) that will handle the call termination.

Table 10.5.1-26: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:scscff.home.net SIP/2.0
Via: SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP
    pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:+1-212-555-2222@home.net;user=phone
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
Supported:
Remote-Party-ID:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

NOTE: The I-CSCF does not add itself to the Record-Route header, as it has no need to remain in the signalling path once the session is established.

27. **100 Trying (S-CSCF to I-CSCF) – see example in Table 10.5.1-27**
S-CSCF#F responds to the INVITE request (26) with a 100 Trying provisional response.

Table 10.5.1-27: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP
    pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

28. **Service Control**
S-CSCF#F performs whatever service control logic is appropriate for this call attempt.
29. **INVITE (S-CSCF to P-CSCF) – see example in Table 10.5.1-29**
S-CSCF#F remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE request to P-CSCF#F.

Table 10.5.1-29: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:+1-212-555-3333@home.net;user=phone SIP/2.0
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP
scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscff.home.net, sip:scscf2.home.net, sip:scscf1.home.net
Supported:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

30. **100 Trying (P-CSCF to S-CSCF) – see example in Table 10.5.1-30**
P-CSCF#F responds to the INVITE request (29) by sending a 100 Trying provisional response to S-CSCF#F.

Table 10.5.1-12: 100 Trying (P-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP
scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

31. **INVITE (P-CSCF to UE) – see example in Table 10.5.1-31**
P-CSCF forwards the INVITE request to the UE.

Table 10.5.1-31: INVITE (P-CSCF to UE)

```
INVITE sip:+1-212-555-3333@home.net;user=phone SIP/2.0
Via: SIP/2.0/UDP pcscff.home.net;branch=token6
Supported:
Remote-Party-ID:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact: token6@pcscff.home.net
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

32. **100 Trying (UE to P-CSCF) – see example in Table 10.5.1-32**
UE#F may optionally send a 100 Trying provisional response to P-CSCF.

Table 10.5.1-32: 100 Trying (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home.net;branch=token6
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

33. **Completion of Session Initiation**
UE#1 and UE#F complete the session initiation, as shown in the MO, S-S, and MT procedures.

34. **NOTIFY (UE to P-CSCF) – see example in Table 10.5.1-34**
When the session with UE#F has been successfully established, UE#1 sends a Notify request to its proxy, P-CSCF#1.

Table 10.5.1-34: Notify (UE to P-CSCF)

```
NOTIFY sip:token7@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 130 NOTIFY
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Event: refer
Content-Type: application/sip
Content-length: (...)

200 OK
```

- Request-URI:** contains the value of the Contact header from the 200-OK response to the initial INVITE.
- Via:** contains the IP address or FQDN of the originating UE.
- From:, To:, Call-ID:** contain the values previously used to establish the session, including the tag value from the response.
- Cseq:** next higher sequential value.
- Contact:** the IP address or FQDN of the originating UE.

35. **Notify (P-CSCF to S-CSCF) – see example in Table 10.5.1-35**
P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.
P-CSCF#1 forwards the Notify request to S-CSCF#1.

Table 10.5.1-35: Notify (P-CSCF to S-CSCF)

```
NOTIFY sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:scscf2.home.net, sip:%5b5555%3a%3ae%3aff%3aaa%3abb%5d@pcscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aaa%3abb%3acc%3add%5d@pcscf1.home.net
Event:
Content-Type:
Content-length:

200 OK
```

- Request-URI:** the first component of the saved Route header.
- Route:** saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

36. **Notify (S-CSCF to S-CSCF) – see example in Table 10.5.1-36**
S-CSCF#1 forwards the Notify request to S-CSCF#2.

Table 10.5.1-36: Notify (S-CSCF to S-CSCF)

```
NOTIFY sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf2.home.net
Record-Route: sip:scscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Event:
Content-Type:
Content-length:

200 OK
```

37. **Notify (S-CSCF to P-CSCF) – see example in Table 10.5.1-37**
S-CSCF#2 forwards the Notify request to P-CSCF#2.

Table 10.5.1-37: Notify (S-CSCF to P-CSCF)

```
NOTIFY sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Event:
Content-Type:
Content-length:

200 OK
```

38. **Notify (P-CSCF to UE) – see example in Table 10.5.1-38**
P-CSCF#2 forwards the Notify request to UE#2.

Table 10.5.1-38: Notify (P-CSCF to UE)

```
NOTIFY sip:[5555::eee:fff:aaa:bbb] SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
Cseq:
Contact: token3@pcscf2.home.net
Event:
Content-Type:
Content-length:

200 OK
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

39. **200-OK (UE to P-CSCF) – see example in Table 10.5.1-39**
UE#2 acknowledges receipt of the Notify request (38) with a 200-OK final response, sent to P-CSCF#2.

Table 10.5.1-39: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
CSeq:
Contact: sip:[5555::eee:fff:aaa:bbb]
Content-length: 0
```

40. **200-OK (P-CSCF to S-CSCF) – see example in Table 10.5.1-40**
P-CSCF#2 forwards the 200 OK final response to S-CSCF#2.

Table 10.5.1-40: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
From:
To:
Call-ID:
CSeq:
Contact: sip:%5b5555%3a%3ae%3aff%3aaa%3abb%5d@pcscf2.home.net
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

Contact: a locally defined value that identifies the UE.

41. **200-OK (S-CSCF to S-CSCF) – see example in Table 10.5.1-41**
S-CSCF#2 forwards the 200 OK final response to S-CSCF#1.

Table 10.5.1-41: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

42. **200-OK (S-CSCF to P-CSCF) – see example in Table 10.5.1-42**
S-CSCF#1 forwards the 200 OK final response to P-CSCF#1.

Table 10.5.1-42: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

43. **200-OK (P-CSCF to UE) – see example in Table 10.5.1-43**
P-CSCF#1 forwards the 200 OK final response to UE#1.

Table 10.5.1-43: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Contact: sip:token2@pcscf1.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information

44. **BYE (UE to P-CSCF) – see example in Table 10.5.1-44**

Upon receiving the notification of successful refer operation (38), UE#2 terminates the session with UE#1..

Table 10.5.1-34: Bye (UE to P-CSCF)

```
BYE sip:token6@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
To: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 131 BYE
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

Request-URI: contains the value of the Contact header from the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response. Since this request is being initiated by the destination, the From and To are reversed.

Cseq: next higher sequential value.

Contact: the IP address or FQDN of the originating UE.

45. **Bye (P-CSCF to S-CSCF) – see example in Table 10.5.1-45**

P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.

P-CSCF#2 forwards the Notify request to S-CSCF#2.

Table 10.5.1-45: Bye (P-CSCF to S-CSCF)

```
BYE sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:scscf1.home.net, sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf1.home.net
Content-length:
```

Request-URI: the first component of the saved Route header.

Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

46. **Bye (S-CSCF to S-CSCF) – see example in Table 10.5.1-46**

S-CSCF#2 forwards the Bye request to S-CSCF#1.

Table 10.5.1-46: Bye (S-CSCF to S-CSCF)

```
BYE sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
Record-Route: sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

47. **Bye (S-CSCF to P-CSCF) – see example in Table 10.5.1-47**
S-CSCF#1 forwards the Bye request to P-CSCF#1.

Table 10.5.1-47: Bye (S-CSCF to P-CSCF)

```
BYE sip:%5b5555%3a%3aaaa%3aff%3aaaa%3abbb%5d@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

48. **Bye (P-CSCF to UE) – see example in Table 10.5.1-48**
P-CSCF#2 forwards the Bye request to UE#2.

Table 10.5.1-48: Bye (P-CSCF to UE)

```
BYE sip:[5555::aaa:bbb:ccc:ddd] SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net;branch=token9
From:
To:
Call-ID:
Cseq:
Contact: token9@pcscf1.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

49. **200-OK (UE to P-CSCF) – see example in Table 10.5.1-49**
UE#2 acknowledges receipt of the Bye request (48) with a 200-OK final response, sent to P-CSCF#1.

Table 10.5.1-49: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home.net;branch=token9
From:
To:
Call-ID:
CSeq:
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

50. **200-OK (P-CSCF to S-CSCF) – see example in Table 10.5.1-50**
P-CSCF#1 forwards the 200 OK final response to S-CSCF#1.

Table 10.5.1-50: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
    SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
CSeq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf2.home.net
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

Contact: a locally defined value that identifies the UE.

51. 200-OK (S-CSCF to S-CSCF) – see example in Table 10.5.1-51

S-CSCF#1 forwards the 200 OK final response to S-CSCF#2.

Table 10.5.1-51: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

52. 200-OK (S-CSCF to P-CSCF) – see example in Table 10.5.1-52

S-CSCF#2 forwards the 200 OK final response to P-CSCF#2.

Table 10.5.1-52: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

53. 200-OK (P-CSCF to UE) – see example in Table 10.5.1-53

P-CSCF#2 forwards the 200 OK final response to UE#2.

Table 10.5.1-53: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From:
To:
Call-ID:
CSeq:
Contact: sip:token2@pcscf2.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information

10.5.2 Session Transfer replacing an existing session

An IP multi-media session already exists between UE#1 and UE#2, and an IP multi-media session already exists between UE#2 and UE#F. UE#2 desires UE#1 to initiate a new session to destination UE#F, and terminate the existing sessions. The procedures for this transfer are shown in Figure 10.5.2-1.

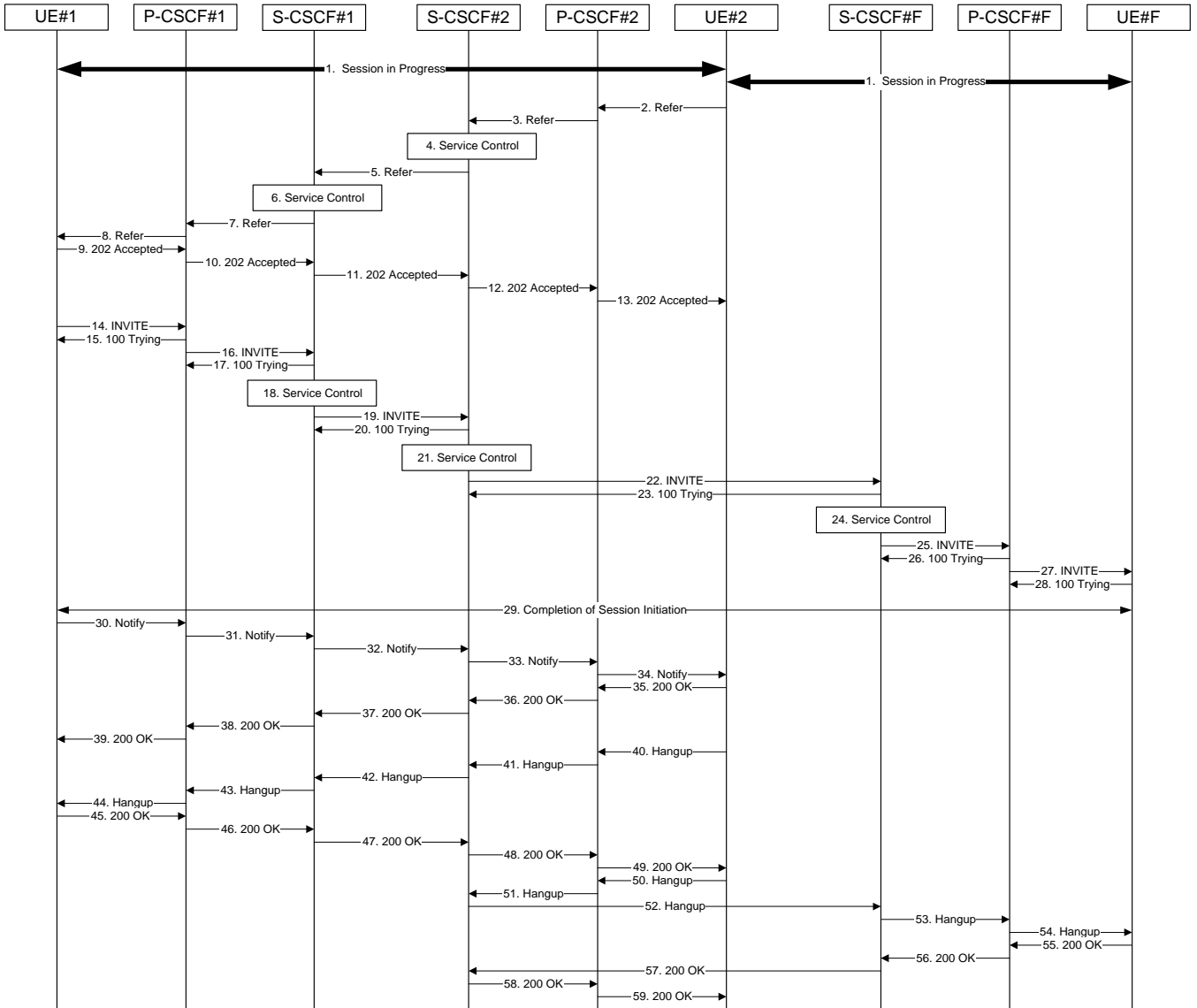


Figure 10.5.2-1 – Session Transfer replacing an existing session

1. Sessions in Progress
 UE#1 initiates a multi-media session with UE#2. As a result, the state information stored at P-CSCF#2 is shown in Table 10.5.2-1a

Table 10.5.2-1a: State Information

```
Request-URI: sip:token6@pcscf2.home.net

From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost

Route: sip:scscf2.home.net, sip:scscf1.home.net,
sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
```

UE#2 initiates a multi-media session with UE#F. As a result, the state information stored at P-CSCF#2 is shown in Table 10.5.2-1b

Table 10.5.2-1b: State Information

```
Request-URI: sip:token3@pcscf2.home.net

From: sip:B36(SHA-1(+1-212-555-2222; time=36123F05; seq=31))@localhost;tag=171828
To: sip:B36(SHA-1(+1-212-555-3333; time=36123F05; seq=32))@localhost;tag=314159
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=31))@localhost

Route: sip:scscf2.home.net, sip:scscff.home.net,
sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscff.home.net
```

UE#2 has placed both of these sessions on hold.

2. **REFER (UE to P-CSCF) – see example in Table 10.5.2-2**

UE#2 sends a Refer request to its proxy, P-CSCF#2.

Table 10.5.2-2: REFER (UE to P-CSCF)

```
REFER sip:token6@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
To: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 130 REFER
Contact: sip:[5555::eee:fff:aaa:bbb]
Refer-To: tel:+1-212-555-3333 ? Call-ID=B36(SHA-1(555-1111;time=36123E5B;seq=31))@localhost
Refer-By: sip:B36(SHA-1(+1-212-555-2222; time=36123F05; seq=31))@localhost;tag=171828
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off
Content-length: 0
```

Request-URI: contains the value of the Contact header from the 200-OK response to the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response.

Cseq: next higher sequential value.

Contact: the IP address or FQDN of the originating UE.

Editor's Note: Use of Remote-Party-ID in REFER is FFS.

Editor's Note: The proper value for the Refer-By header is FFS. The value of the From header of the session to be replaced seems most appropriate.

3. **REFER (P-CSCF to S-CSCF) – see example in Table 10.5.2-3**

P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.

P-CSCF#2 forwards the Refer request to S-CSCF#2.

Table 10.5.2-3: REFER (P-CSCF to S-CSCF)

```
REFER sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:scscf1.home.net, sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf2.home.net
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

Request-URI: the first component of the saved Route header.

Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

4. Service Control

5. **REFER (S-CSCF to S-CSCF) – see example in Table 10.5.2-5**

In order to maintain the expectation of privacy of the identity of the new destination, S-CSCF#2 converts the “Refer-To” header into a private URL. S-CSCF#2 forwards the Refer request to S-CSCF#1.

NOTE: If the network operator desired configuration independence, the REFER would be routed through an I-CSCF before leaving the operator’s network. For example, see configuration S-S#1b. That I-CSCF would convert the private URL into one that specified the I-CSCF as the hostname.

Table 10.5.2-5: REFER (S-CSCF to S-CSCF)

```
REFER sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
Record-Route: sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To: sip:token(tel:+1-212-555-3333)@scscf2.home.net;private ?
      Call-ID=B36(SHA-1(555-1111;time=36123E5B;seq=31))@localhost
Refer-By:
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off;screen=yes
Content-length:
```

6. Service Control

7. **REFER (S-CSCF to P-CSCF) – see example in Table 10.5.2-7**

S-CSCF#1 forwards the Refer request to P-CSCF#1.

Table 10.5.2-7: REFER (S-CSCF to P-CSCF)

```
INVITE sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UEP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
      SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

8. **REFER (P-CSCF to UE) – see example in Table 10.5.2-8**

P-CSCF#1 forwards the Refer request to UE#1.

Table 10.5.2-8: REFER (P-CSCF to UE)

```
REFER sip:[5555::aaa:bbb:ccc:ddd] SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
Cseq:
Contact: token3@pcscf2.home.net
Refer-To:
Refer-By:
Remote-Party-ID:
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

9. **202-Accepted (UE to P-CSCF) – see example in Table 10.5.2-9**

UE#2 acknowledges receipt of the Refer request (8) with a 202-Accepted final response, sent to P-CSCF#1.

Table 10.5.2-8: 202 Accepted (UE to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

10. **202-Accepted (P-CSCF to S-CSCF) – see example in Table 10.5.2-10**

P-CSCF#1 forwards the 202 Accepted final response to S-CSCF#1.

Table 10.5.2-10: 202 Accepted (P-CSCF to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UEP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
CSeq:
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

11. **202-Accepted (S-CSCF to S-CSCF) – see example in Table 10.5.2-11**

S-CSCF#1 forwards the 202 Accepted final response to S-CSCF#2.

Table 10.5.2-11: 202 Accepted (S-CSCF to S-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Content-length:
```

12. **202-Accepted (S-CSCF to P-CSCF) – see example in Table 10.5.2-12**

S-CSCF#2 forwards the 202 Accepted final response to P-CSCF#2.

Table 10.5.2-12: 202 Accepted (S-CSCF to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Content-length:
```

13. **202-Accepted (P-CSCF to UE) – see example in Table 10.5.2-13**
P-CSCF#2 forwards the 202 Accepted final response to UE#2.

Table 10.5.2-13: 202 Accepted (P-CSCF to UE)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From:
To:
Call-ID:
CSeq:
Content-length:
```

P-CSCF removes the Record-Route header

14. **INVITE (UE to P-CSCF) – see example in Table 10.5.2-14**
UE#1 initiates an INVITE request based on the Refer-To header URL in the REFER request. The INVITE is sent from the UE to P-CSCF#1.

Table 10.5.2-14: INVITE (UE to P-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home.net;private SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Supported: 100rel
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off
Proxy-Require: privacy
Anonymity: Off
From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=74))@localhost>;
    tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=75))@localhost
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=31))@localhost
Cseq: 127 INVITE
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
Refer-By: sip:B36(SHA-1(+1-212-555-2222; time=36123F05; seq=31))@localhost;tag=171828
Content-Type: application/sdp
Content-length: (...)

v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c= IN IP6 5555::aaa:bbb:ccc:ddd
b=AS:64
t=907165275 0
m=audio 3456 RTP/AVP 97 3 96
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 G726-32/8000
a=qos:mandatory sendrecv
```

Call-ID: value taken from the URL parameter attached to the Refer-To header

15. **100 Trying (P-CSCF to UE) – see example in Table 10.5.2-15**
P-CSCF#1 responds to the INVITE request (14) with a 100 Trying provisional response.

Table 10.5.2-15: 100 Trying (P-CSCF to UE)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

16. **INVITE (P-CSCF to S-CSCF) – see example in Table 10.5.2-16**

P-CSCF#1 remembers (from the registration procedure) the request routing for this UE. This becomes a Route header in the request. The next hop is the S-CSCF serving this UE. P-CSCF rewrites the Contact header with a locally defined value that identifies the UE. P-CSCF adds itself to the Via header.

Table 10.5.2-16: INVITE (P-CSCF to S-CSCF)

```
INVITE sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:token(tel:+1-212-555-3333)@scscf2.home.net;private
Supported:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

17. **100 Trying (S-CSCF to P-CSCF) – see example in Table 10.5.2-17**
S-CSCF#1 responds to the INVITE request (16) with a 100 Trying provisional response.

Table 10.5.2-17: 100 Trying (S-CSCF to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

18. **Service Control**
S-CSCF#1 performs whatever service control logic is appropriate for this call attempt.
19. **INVITE (S-CSCF to S-CSCF) – see example in Table 10.5.2-19**
S-CSCF#1 performs an analysis of the destination address, which is a private URL generated by S-CSCF#2. Since it is a destination within the same operator's network, S-CSCF#1 forwards the INVITE request directly to S-CSCF#2.

Table 10.5.2-19: INVITE (S-CSCF to S-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home.net;private SIP/2.0
Via: SIP/2.0/UDP sip:scscf1.home.net SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf1.home.net
Supported:
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off;screen=yes
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

- 20. **100 Trying (S-CSCF to S-CSCF) – see example in Table 10.5.2-20**
S-CSCF#2 responds to the INVITE request (19) by sending a 100 Trying provisional response to S-CSCF#1.

Table 10.5.2-20: 100 Trying (S-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

- 21. **Service Control**
S-CSCF#2 performs whatever service control logic is appropriate for this call transfer attempt.
- 22. **INVITE (S-CSCF to S-CSCF) – see example in Table 10.5.2-22**
S-CSCF#2 determines the destination address from the private URL contained in the INVITE request. Based on information in that URL, and information saved from step #4 above (implementation decision), S-CSCF#2 verifies the validity of the transfer request, and that it is within a short time delay from the REFER request.
S-CSCF#2 builds a Route header based on stored state information for the Refer'd session (as determined by the Call-ID and Refer-By values in step #4 above).
S-CSCF#2 forwards the INVITE request to S-CSCF#F.

Table 10.5.2-22: INVITE (S-CSCF to S-CSCF)

```
INVITE sip:scscff.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
    SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscff.home.net, sip:+1-212-555-3333@home.net
Supported:
Remote-Party-ID: "John Doe" <tel:+1-212-555-1111>;privacy=off;screen=yes
Remote-Party-ID: "John Smith" <tel:+1-212-555-2222>;privacy=off;screen=yes;party=transferor
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

Editor's Note: Use of "party=transferor" in a separate Remote-Party-ID header is FFS.

- 23. **100 Trying (S-CSCF to S-CSCF) – see example in Table 10.5.2-23**
S-CSCF#F responds to the INVITE request (22) by sending a 100 Trying provisional response to S-CSCF#2.

Table 10.5.2-23: 100 Trying (S-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
    SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

- 24. **Service Control**
S-CSCF#F performs whatever service control logic is appropriate for this call attempt.
- 25. **INVITE (S-CSCF to P-CSCF) – see example in Table 10.5.2-25**
S-CSCF#F uses the Route header value to determine the next hop CSCF for this UE. It forwards the INVITE request to P-CSCF#F.

Table 10.5.2-25: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscff.home.net SIP/2.0
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP
scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscff.home.net, sip:scscf2.home.net, sip:scscf1.home.net
Route: sip:+1-212-555-3333@home.net
Supported:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

26. **100 Trying (P-CSCF to S-CSCF) – see example in Table 10.5.2-26**
P-CSCF#F responds to the INVITE request (25) by sending a 100 Trying provisional response to S-CSCF#F.

Table 10.5.2-26: 100 Trying (P-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP icscf.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP
scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Content-length: 0
```

27. **INVITE (P-CSCF to UE) – see example in Table 10.5.2-27**
P-CSCF forwards the INVITE request to the UE.

Table 10.5.2-27: INVITE (P-CSCF to UE)

```
INVITE sip:+1-212-555-3333@home.net;user=phone SIP/2.0
Via: SIP/2.0/UDP pcscff.home.net;branch=token6
Supported:
Remote-Party-ID:
Remote-Party-ID:
Proxy-Require:
Anonymity:
From:
To:
Call-ID:
Cseq:
Contact: token6@pcscff.home.net
Refer-By:
Content-Type:
Content-length:

v=
o=
s=
c=
b=
t=
m=
a=
a=
a=
a=
```

Editor's Note: The mechanism by which UE#F knows it is to replace an existing session with this new session is FFS. A match of the Call-ID to an existing session, and the Refer-By to either From or To of the same session should be sufficient.

28. **100 Trying (UE to P-CSCF) – see example in Table 10.5.2-28**
UE#F may optionally send a 100 Trying provisional response to P-CSCF.

Table 10.5.2-28: 100 Trying (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home.net;branch=token6
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

29. **Completion of Session Initiation**
UE#1 and UE#F complete the session initiation, as shown in the MO, S-S, and MT procedures.

30. **NOTIFY (UE to P-CSCF) – see example in Table 10.5.2-30**
When the session with UE#F has been successfully established, UE#1 sends a Notify request to its proxy, P-CSCF#1. The call leg identification for this Notify is taken from that used in the Refer, earlier.

Table 10.5.2-30: Notify (UE to P-CSCF)

```
NOTIFY sip:token7@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
To: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 130 NOTIFY
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Event: refer
Content-Type: application/sip
Content-length: (...)

200 OK
```

Request-URI: contains the value of the Contact header from the 200-OK response to the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response.

Cseq: next higher sequential value.

Contact: the IP address or FQDN of the originating UE.

31. **Notify (P-CSCF to S-CSCF) – see example in Table 10.5.2-31**

P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.

P-CSCF#1 forwards the Notify request to S-CSCF#1.

Table 10.5.2-31: Notify (P-CSCF to S-CSCF)

```
NOTIFY sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:scscf2.home.net, sip:%5b5555%3a%3aeed%3aff%3aaaa%3abbb%5d@pcscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf1.home.net
Event:
Content-Type:
Content-length:

200 OK
```

Request-URI: the first component of the saved Route header.

Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

32. **Notify (S-CSCF to S-CSCF) – see example in Table 10.5.2-32**

S-CSCF#1 forwards the Notify request to S-CSCF#2.

Table 10.5.2-32: Notify (S-CSCF to S-CSCF)

```
NOTIFY sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Route: sip:%5b5555%3a%3aeed%3aff%3aaaa%3abbb%5d@pcscf2.home.net
Record-Route: sip:scscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Event:
Content-Type:
Content-length:

200 OK
```

33. **Notify (S-CSCF to P-CSCF) – see example in Table 10.5.2-33**

S-CSCF#2 forwards the Notify request to P-CSCF#2.

Table 10.5.2-33: Notify (S-CSCF to P-CSCF)

```
NOTIFY sip:%5b5555%3a%3aeee%3afff%3aaaa%3abbb%5d@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Event:
Content-Type:
Content-length:

200 OK
```

34. Notify (P-CSCF to UE) – see example in Table 10.5.2-34

P-CSCF#2 forwards the Notify request to UE#2.

Table 10.5.2-34: Notify (P-CSCF to UE)

```
NOTIFY sip:[5555::eee:fff:aaa:bbb] SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
Cseq:
Contact: token3@pcscf2.home.net
Event:
Content-Type:
Content-length:

200 OK
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

35. 200-OK (UE to P-CSCF) – see example in Table 10.5.2-35

UE#2 acknowledges receipt of the Notify request (34) with a 200-OK final response, sent to P-CSCF#2.

Table 10.5.2-35: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home.net;branch=token3
From:
To:
Call-ID:
CSeq:
Contact: sip:[5555::eee:fff:aaa:bbb]
Content-length: 0
```

36. 200-OK (P-CSCF to S-CSCF) – see example in Table 10.5.2-36

P-CSCF#2 forwards the 200 OK final response to S-CSCF#2.

Table 10.5.2-36: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net,
SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route: sip:scscf2.home.net, sip:scscf1.home.net
From:
To:
Call-ID:
CSeq:
Contact: sip:%5b5555%3a%3aeee%3afff%3aaaa%3abbb%5d@pcscf2.home.net
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

Contact: a locally defined value that identifies the UE.

37. **200-OK (S-CSCF to S-CSCF) – see example in Table 10.5.2-37**
S-CSCF#2 forwards the 200 OK final response to S-CSCF#1.

Table 10.5.2-37: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

38. **200-OK (S-CSCF to P-CSCF) – see example in Table 10.5.2-38**
S-CSCF#1 forwards the 200 OK final response to P-CSCF#1.

Table 10.5.2-38: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

39. **200-OK (P-CSCF to UE) – see example in Table 10.5.2-39**
P-CSCF#1 forwards the 200 OK final response to UE#1.

Table 10.5.2-39: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
From:
To:
Call-ID:
CSeq:
Contact: sip:token2@pcscf1.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information

40. **BYE (UE to P-CSCF) – see example in Table 10.5.2-40**
Upon receiving the notification of successful refer operation (34), UE#2 terminates the session with UE#1.

Table 10.5.2-40: Bye (UE to P-CSCF)

```
BYE sip:token6@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
To: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 131 BYE
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

Request-URI: contains the value of the Contact header from the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response. Since this request is being initiated by the destination, the From and To are reversed.

Cseq: next higher sequential value.
Contact: the IP address or FQDN of the originating UE.

41. **Bye (P-CSCF to S-CSCF) – see example in Table 10.5.2-41**
P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.
P-CSCF#2 forwards the Notify request to S-CSCF#2.

Table 10.5.2-41: Bye (P-CSCF to S-CSCF)

```
BYE sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:scscf1.home.net, sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf1.home.net
Content-length:
```

Request-URI: the first component of the saved Route header.
Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).
Contact: a locally defined value that identifies the UE.

42. **Bye (S-CSCF to S-CSCF) – see example in Table 10.5.2-42**
S-CSCF#2 forwards the Bye request to S-CSCF#1.

Table 10.5.2-42: Bye (S-CSCF to S-CSCF)

```
BYE sip:scscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscf1.home.net
Record-Route: sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

43. **Bye (S-CSCF to P-CSCF) – see example in Table 10.5.2-43**
S-CSCF#1 forwards the Bye request to P-CSCF#1.

Table 10.5.2-43: Bye (S-CSCF to P-CSCF)

```
BYE sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf1.home.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

44. **Bye (P-CSCF to UE) – see example in Table 10.5.2-44**
P-CSCF#2 forwards the Bye request to UE#2.

Table 10.5.2-44: Bye (P-CSCF to UE)

```
BYE sip:[5555::aaa:bbb:ccc:ddd] SIP/2.0
Via: SIP/2.0/UDP pcscf1.home.net;branch=token9
From:
To:
Call-ID:
Cseq:
Contact: token9@pcscf1.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

45. 200-OK (UE to P-CSCF) – see example in Table 10.5.2-45

UE#2 acknowledges receipt of the Bye request (44) with a 200-OK final response, sent to P-CSCF#1.

Table 10.5.2-45: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home.net;branch=token9
From:
To:
Call-ID:
CSeq:
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

46. 200-OK (P-CSCF to S-CSCF) – see example in Table 10.5.2-46

P-CSCF#1 forwards the 200 OK final response to S-CSCF#1.

Table 10.5.2-46: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscf1.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
CSeq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscf2.home.net
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.

Contact: a locally defined value that identifies the UE.

47. 200-OK (S-CSCF to S-CSCF) – see example in Table 10.5.2-47

S-CSCF#1 forwards the 200 OK final response to S-CSCF#2.

Table 10.5.2-547: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

48. 200-OK (S-CSCF to P-CSCF) – see example in Table 10.5.2-48

S-CSCF#2 forwards the 200 OK final response to P-CSCF#2.

Table 10.5.2-48: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

49. **200-OK (P-CSCF to UE) – see example in Table 10.5.2-49**
P-CSCF#2 forwards the 200 OK final response to UE#2.

Table 10.5.2-49: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From:
To:
Call-ID:
CSeq:
Contact: sip:token2@pcscf2.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information

50. **BYE (UE to P-CSCF) – see example in Table 10.5.2-50**
Upon receiving the notification of successful refer operation (38), UE#2 terminates the session with UE#F.

Table 10.5.2-50: Bye (UE to P-CSCF)

```
BYE sip:token4@pcscf2.home.net SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From: sip:B36(SHA-1(+1-212-555-2222; time=36123E5B; seq=73))@localhost;tag=314159
To: "Alien Blaster" <sip:B36(SHA-1(+1-212-555-1111; time=36123E5B; seq=72))@localhost>;
tag=171828
Call-ID: B36(SHA-1(555-1111;time=36123E5B;seq=72))@localhost
Cseq: 131 BYE
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

Request-URI: contains the value of the Contact header from the initial INVITE.

Via: contains the IP address or FQDN of the originating UE.

From:, To:, Call-ID: contain the values previously used to establish the session, including the tag value from the response. Since this request is being initiated by the destination, the From and To are reversed.

Cseq: next higher sequential value.

Contact: the IP address or FQDN of the originating UE.

51. **Bye (P-CSCF to S-CSCF) – see example in Table 10.5.2-51**
P-CSCF adds a Route header, with the saved value from the previous 200-OK response. P-CSCF identifies the proper saved value by the Request-URI.
P-CSCF#2 forwards the Notify request to S-CSCF#2.

Table 10.5.2-51: Bye (P-CSCF to S-CSCF)

```
BYE sip:scscf2.home.net SIP/2.0
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:scscff.home.net, sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscff.home.net
From:
To:
Call-ID:
Cseq:
Contact: sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscf2.home.net
Content-length:
```

Request-URI: the first component of the saved Route header.

Route: saved from the 200-OK response to the initial INVITE (with first element moved to Request-URI).

Contact: a locally defined value that identifies the UE.

52. **Bye (S-CSCF to S-CSCF) – see example in Table 10.5.2-52**
S-CSCF#2 forwards the Bye request to S-CSCF#F.

Table 10.5.2-52: Bye (S-CSCF to S-CSCF)

```
BYE sip:scscff.home.net SIP/2.0
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Route: sip:%5b5555%3a%3aaaa%3abbb%3acc%3add%5d@pcscff.home.net
Record-Route: sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

53. **Bye (S-CSCF to P-CSCF) – see example in Table 10.5.2-53**
S-CSCF#F forwards the Bye request to P-CSCF#F.

Table 10.5.2-53: Bye (S-CSCF to P-CSCF)

```
BYE sip:%5b5555%3a%3aeee%3aff%3aaaa%3abbb%5d@pcscff.home.net SIP/2.0
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscff.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
Cseq:
Contact:
Content-length:
```

54. **Bye (P-CSCF to UE) – see example in Table 10.5.2-54**
P-CSCF#F forwards the Bye request to UE#F.

Table 10.5.2-54: Bye (P-CSCF to UE)

```
BYE sip:[5555::aaa:bbb:ccc:ddd] SIP/2.0
Via: SIP/2.0/UDP pcscff.home.net;branch=token9
From:
To:
Call-ID:
Cseq:
Contact: token9@pcscff.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information.

Via: P-CSCF removes the Via headers, and generates a locally unique token to identify the saved values. It inserts this as a branch value on its Via header.

55. **200-OK (UE to P-CSCF) – see example in Table 10.5.2-55**
UE#F acknowledges receipt of the Bye request (58) with a 200-OK final response, sent to P-CSCF#F.

Table 10.5.2-55: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscff.home.net;branch=token9
From:
To:
Call-ID:
CSeq:
Contact: sip:[5555::aaa:bbb:ccc:ddd]
Content-length: 0
```

56. **200-OK (P-CSCF to S-CSCF) – see example in Table 10.5.2-56**
P-CSCF#F forwards the 200 OK final response to S-CSCF#F.

Table 10.5.2-56: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscff.home.net, SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route: sip:scscff.home.net, sip:scscf2.home.net
From:
To:
Call-ID:
CSeq:
Contact: sip:%5b5555%3a%3aaaa%3abbb%3accc%3add%5d@pcscff.home.net
Content-length:
```

P-CSCF restores the Via headers and Record-Route headers from the branch value in its Via.
Contact: a locally defined value that identifies the UE.

57. **200-OK (S-CSCF to S-CSCF) – see example in Table 10.5.2-57**
S-CSCF#F forwards the 200 OK final response to S-CSCF#2.

Table 10.5.2-57: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home.net, SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

58. **200-OK (S-CSCF to P-CSCF) – see example in Table 10.5.2-58**
S-CSCF#2 forwards the 200 OK final response to P-CSCF#2.

Table 10.5.2-58: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home.net, SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

59. **200-OK (P-CSCF to UE) – see example in Table 10.5.2-59**
P-CSCF#2 forwards the 200 OK final response to UE#2.

Table 10.5.2-59: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]
From:
To:
Call-ID:
CSeq:
Contact: sip:token2@pcscf2.home.net
Content-length:
```

P-CSCF removes the Record-Route and Contact headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE.

Contact: a locally unique token to identify the saved routing information