3GPP TSG-CN Meeting #24 **NP-040188**
2nd – 4th June 2004. Seoul, Korea.

Source: **TSG CN WG 1**

Title: **CRs to Rel-5 on Work Item IMS-CCR towards 24.228**

Agenda item: **8.1**

Document for: **APPROVAL**

Introduction:

This document contains **4** CRs, **Rel-5** Work Item **"IMS-CCR"**, that have been agreed by **TSG CN WG1 in CN1#34 meeting**, and are forwarded to TSG CN Plenary meeting #24 for approval.

There is dependancy from CR#131 (N1-040935) towards N1-040991/992 in NP-040189.

There is also a dependancy from CR#130r1 (N1-041058) towards N1-041099/1100 in NP-040189.

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Doc-2nd-Level
24.228	129		Rel-5	Removal of public user ID binding by P-CSCF	F	5.8.0	N1-040793
24.228	130	1	Rel-5	GPRS charging information in P-Charging-Vector header field	F	5.8.0	N1-041058
24.228	131		Rel-5	Revisions due to published version of draft-ietf-sipping-reg-event	F	5.8.0	N1-040935
24.228	132	1	Rel-5	Revision of IETF references to published versions	F	5.8.0	N1-040995

3GPP TSG-CN1 Meeting #34 **Tdoc N1-040793**
Zagreb, Croatia 10 – 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ **24.228** **CR** **129** ⌘ **rev** **-** ⌘ Current version: **5.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Removal of public user ID binding by P-CSCF
Source:	⌘	NTT DoCoMo
Work item code:	⌘	IMS-CCR~~TEI5~~
Date:	⌘	28/04/2004
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	In CN#21, a CR NP-030411(N1-031011) to remove all occurences which indicate that the P-CSCF stores the binding between the SIP URI and the terminal host address was approved. Another occurrence which should have been removed in the approved CR was found in the registration signalling flow for a non registered user with hiding inactivated (similar occurance in the hiding case has been removed from the flow in the approved CR). P-CSCF does not bind the public user identity to the Contact header in the registration signalling flow. This is done in the S-CSCF.
Summary of change:	⌘	Removal of sentence which indicates that "P-CSCF binds the public user identity under registration to the Contact header supplied by the user" when P-CSCF sends the REGISTER request to I-CSCF.
Consequences if not approved:	⌘	- wrong specification if not corrected - misalignment with TS24.229 (which is correct on this point) - misalignment with the registration signalling flow for the network configuration hiding case in TS24.228 subclause 16.2 (which is correct on this point)

Clauses affected:	⌘	6.2

Other specs affected: ⌘	Y	N		
		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request

6 Signalling flows for REGISTER (non hiding)

6.1 Introduction

In IMS Authentication is performed at registration time. The following sections show examples of SIP registration and UMTS AKA authentication. It is possible for the home to require other types of authentication.

In the example below, Digest AKA is used within SIP headers to carry the information related to the authentication-challenge and response.

6.2 Registration signalling: user not registered

Figure 6.2-1 shows the registration signalling flow for the scenario when the user is not registered. For the purpose of this registration signalling flow, the subscriber is considered to be roaming. This flow also shows the authentication of the private user identity. In this signalling flow, the home network does not have network configuration hiding active.

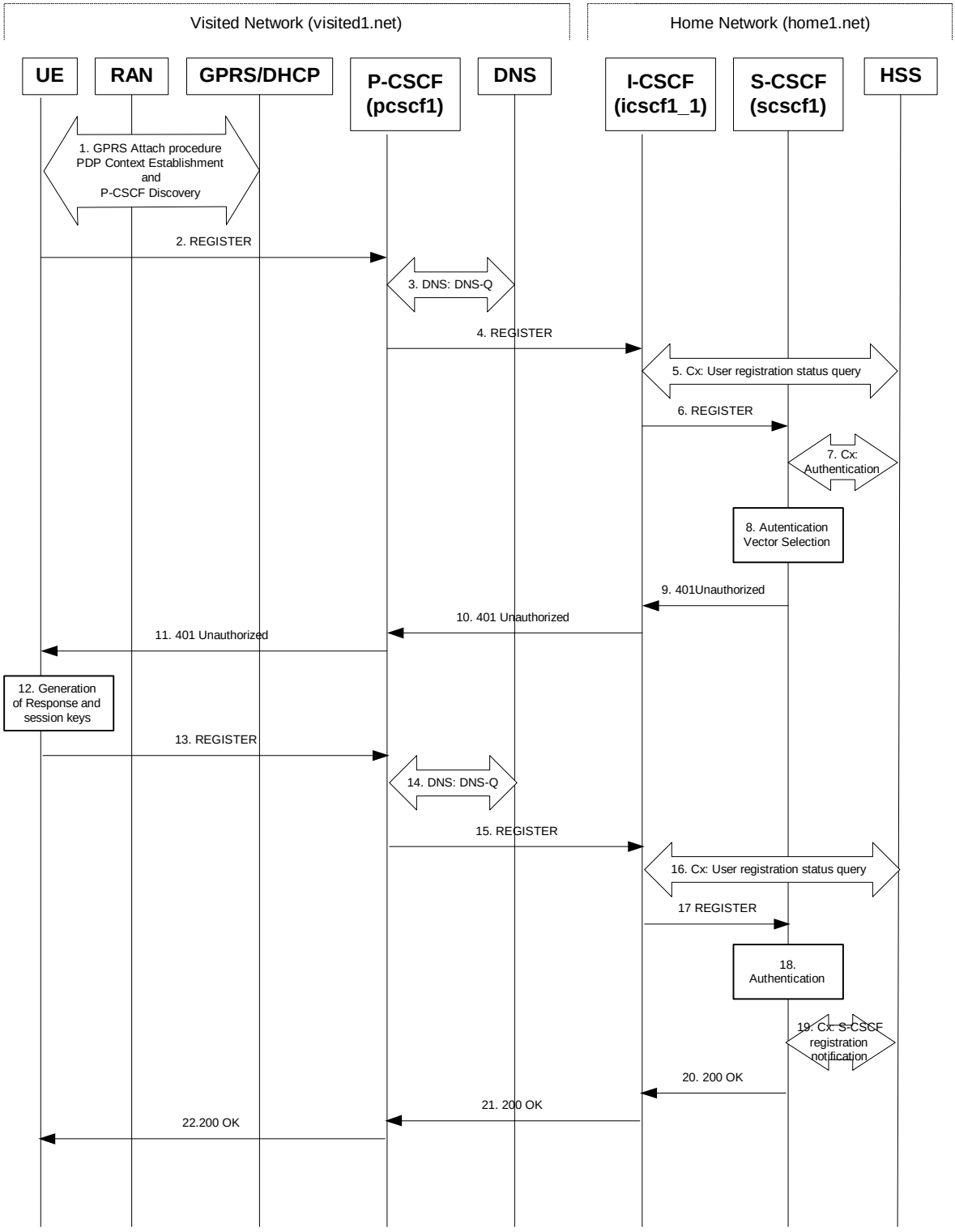

Figure 6.2-1: Registration signalling: user not registered

1. **GPRS Attach / PDP Context Establishment and P-CSCF Discovery (UE to GPRS)**

   This signalling flow is shown to indicate prerequisites for the registration signalling.

   See subclause 5.2 for details.

2. **REGISTER request (UE to P-CSCF) – see example in table 6.2-2**

The purpose of this request is to register the user's SIP URI with a S-CSCF in the home network. This request is routed to the P-CSCF because it is the only SIP server known to the UE.

Table 6.2-2: REGISTER request (UE to P-CSCF)

```
REGISTER sip:registrar.home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=4fa3
To: <sip:user1_public1@home1.net>
Contact: <sip:[5555::aaa:bbb:ccc:ddd];comp=sigcomp>;expires=600000
Call-ID: apb03a0s09dkjdfglkj49111
Authorization: Digest username="user1_private@home1.net", realm="registrar.home1.net",
   nonce="", uri="sip:registrar.home1.net", response=""
Security-Client: ipsec-3gpp; alg=hmac-sha-1-96; spi-c=23456789; spi-s=12345678; port-
   c=2468; port-s=1357
Require: sec-agree
Proxy-Require: sec-agree
CSeq: 1 REGISTER
Supported: path
Content-Length: 0
```

Request-URI: The Request-URI (the URI that follows the method name, "REGISTER", in the first line) indicates the destination domain of this REGISTER request. The rules for routing a SIP request describe how to use DNS to resolve this domain name ("registrar.home1.net") into an address or entry point into the home operator's network (the I-CSCF). This information is stored in the USIM.

Via: IPv6 address of the UE allocated during the PDP Context Activation process.

Max-Forwards: Set to 70 by the UE and used to prevent loops.

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

From: This indicates the public user identity originating the REGISTER request. The public user identity may be obtained from the USIM.

To: This indicates the public user identity being registered. This is the identity by which other parties know this subscriber. It may be obtained from the USIM.

Contact: This indicates the point-of-presence for the subscriber - the IP address of the UE. This is the temporary point of contact for the subscriber that is being registered. Subsequent requests destined for this subscriber will be sent to this address. This information is stored in the S-CSCF.

Authorization: It carries authentication information. The private user identity (user1_private@home1.net) is carried in theusername field of the Digest AKA protocol. The uri parameter (directive) contains the same value as the Request-URI. The realm parameter (directive) contains the network name where the username is authenticated. The Request-URI and the realm parameter (directive) value are obtained from the same field in the USIM and therefore, are identical. In this example, it is assumed that a new UICC card was just inserted into the terminal, and there is no other cached information to send. Therefore, nonce and response parameters (directives) are empty.

Security-Client: Lists the supported algorithm(s) by the UE.

Supported: This header is included to indicate to the recipient that the UE supports the Path header.

Upon receiving this request the P-CSCF will set it's SIP registration timer for this UE to the Expires time in this request.

3. **DNS: DNS-Q**

Based on the user's URI, the P-CSCF determines that UE is registering from a visiting domain and performs the DNS queries to locate the I-CSCF in the home network. The look up in the DNS is based on the address specified in the Request URI.

The P-CSCF sends the REGISTER request - after local processing - to the address indicated in the Request-URI. When forwarding the REGISTER request the P-CSCF needs to specify the protocol, port number and IP address of the I-CSCF server in the home network to which to send the REGISTER request. The P-CSCF tries to find this information by querying the DNS. Since the Request-URI does not specify a numeric IP address, and the transport protocol and port number are not indicated, the P-CSCF performs an NAPTR query for the domain specified in the Request-URI.

Table 6.2-3a DNS: DNS Query (P-CSCF to DNS)

```
OPCODE=SQUERY
QNAME=registrar.home1.net, QCLASS=IN, QTYPE=NAPTR
```

The DNS records are retrieved according to RFC 3263 [14].

Table 6.2-3b DNS Query Response (DNS to P-CSCF)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=registrar.home1.net,  QCLASS=IN, QTYPE=NAPTR

registrar.home1.net          0 IN NAPTR 50   50 "s" "SIP+D2U"    ""
     _sip._udp.registrar.home1.net
                    0 IN NAPTR 90   50 "s" "SIP+D2T"    ""  _sip._tcp.registrar.home1.net
                          0 IN NAPTR 100  50 "s" "SIPS+D2T"   ""
     _sips._tcp.registrar.home1.net
```

Based on the order and preference of the NAPTR record and the local preference, UDP is preferred and the P-CSCF finds the I-CSCF by a DNS SRV lookup according to RFC 2782 [4].

Table 6.2-3c: DNS: DNS Query (P-CSCF to DNS)

```
OPCODE=SQUERY
QNAME=_sip._udp.registrar.home1.net, QCLASS=IN, QTYPE=SRV
```

The DNS records are retrieved according to RFC 2782 [4].

Table 6.2-3d: DNS Query Response (DNS to P-CSCF)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=_sip._udp.registrar.home1.net, QCLASS=IN, QTYPE=SRV

_sip._udp.registrar.home1.net        0 IN SRV 1 10 5060 icscf1_p.home1.net
                                  0 IN SRV 1  0 5060 icscf7_p.home1.net

icscf1_p.home1.net              0 IN AAAA    5555::aba:dab:aaa:daa
icscf7_p.home1.net              0 IN AAAA    5555::a1a:b2b:c3c:d4d
```

In the Answer field of the query-response each I-CSCF is identified by its host domain name. The returned SRV Resource Records (RRs) are merged and ordered, and the selection technique (employing the Priority and Weight parameters returned in the RRs) as specified in RFC 2782 [4] is used to select the I-CSCF (i.e. the icscf1_p.home1.net). Since the Additional Data field of the query-response also contains the IP address of the selected I-CSCF (i.e. 5555::aba:dab:aaa:daa), a new query to the DNS is not required.

Once the IP address of the I-CSCF is obtained, the P-CSCF forwards the REGISTER request to this IP address (i.e. 5555::aba:dab:aaa:daa) using the UDP protocol and port number 5060.

4. **REGISTER request (P-CSCF to I-CSCF) - see example in table 6.2-4**

The P-CSCF needs to be in the path for all mobile terminated requests for this user. To ensure this, the P-CSCF adds itself to the Path header value for future requests.

~~The P-CSCF binds the public user identity under registration to the Contact header supplied by the user.~~

The P-CSCF adds also the P-Visited-Network-ID header with the contents of the identifier of the P-CSCF network. This may be the visited network domain name or any other identifier that identifies the visited network at the home network.

This signalling flow shows the REGISTER request being forward from the P-CSCF to the I-CSCF in the home domain.

The P-CSCF removes the Security-Client header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 6.2-4: REGISTER request (P-CSCF to I-CSCF)

```
REGISTER sip:registrar.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Path: <sip:term@pcscf1.visited1.net;lr>
Require: path
P-Visited-Network-ID: "Visited Network Number 1"
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Contact:
Call-ID:
Authorization: Digest username="user1_private@home1.net", realm="registrar.home1.net",
   nonce="", uri="sip:registrar.home1.net", response="", integrity-protected="no"
CSeq:
Supported:
Content-Length:
```

Path: This is the address of the P-CSCF and is included to inform the S-CSCF where to route terminating requests.

Require: This header is included to ensure that the recipient correctly handles the Path header. If the recipient does not support the path header, a response will be received with a status code of 420 and an Unsupported header indicating "path". Such a response indicates a misconfiguration of the routing tables and the request has been routed outside the IM CN subsystem.

P-Visited-Network-ID: It contains the identifier of the P-CSCF network at the home network.

P-Charging-Vector: The P-CSCF inserts this header and populates the icid parameters with a globally unique value.

5. **Cx: User registration status query procedure**

The I-CSCF makes a request for information related to the Subscriber registration status by sending the private user identity, public user identity and visited domain name to the HSS. The HSS returns the S-CSCF required capabilities and the I-CSCF uses this information to select a suitable S-CSCF.

For detailed message flows see 3GPP TS 29.228.

Table 6.2-5a provides the parameters in the REGISTER request (flow 4) which are sent to the HSS.

Table 6.2-5a Cx: User registration status query procedure (I-CSCF to HSS)

Message source & destination	Cx Information element name	Information Source in REGISTER	Description
I-CSCF to HSS	Private User Identity	Authorization:	The Private User Identity is encoded in the username field according to the Authorization protocol.
	Public User Identity	To:	Identity which is used to communicate with other users
	Visited Network Identifier	P-Visited-Network-ID:	This information indicates the network identifier of the visited network

6. **REGISTER request (I-CSCF to S-CSCF) – see example in table 6.2-6**

I-CSCF does not modify the Path header.

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected.

Table 6.2-6: REGISTER request (I-CSCF to S-CSCF)

```
REGISTER sip:scscf1.home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
    pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Access-Network-Info:
Path:
Require:
P-Visited-Network-ID:
P-Charging-Vector:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Content-Length:
```

P-Access-Network-Info: this header contains information from the UE.

Path: The S-CSCF stores the contents of the Path header and uses the URI for routing mobile terminated requests.

Upon receiving this request the S-CSCF may set its SIP registration timer for this UE to the Expires time in this request or the S-CSCF may assign another registration timer for this registration

7. **Cx: Authentication procedure**

As the REGISTER request arrived without integrity protection to the P-CSCF, the S-CSCF shall challenge it. For this, the S-CSCF requires at least one authentication vector to be used in the challenge to the user. If a valid AV is not available, then the S-CSCF requests at least one AV from the HSS.

The S-CSCF indicates to the HSS that it has been assigned to serve this user.

For detailed message flows see 3GPP TS 29.228.

Table 6.2-7a provides the parameters in the REGISTER request (flow 6) which are sent to the HSS.

Table 6.2-7a Cx: S-CSCF authentication information procedure (S-CSCF to HSS)

Message source & destination	Cx Information element name	Information Source in REGISTER	Description
S-CSCF to HSS	Public User Identify	To:	Identity which is used to communicate with other users
	Private User Identity	Authorization:	The Private User Identity is encoded in the username field according to the Authorization protocol.
	S-CSCF Name	Request-URI:	This information element contains the name of the S-CSCF. The presence of this IE indicates that the user has not been authenticated yet by the S-CSCF

8. **Authentication vector selection**

   The S-CSCF selects an authentication vector for use in the authentication challenge. For detailed description of the authentication vector, see 3GPP TS 33.203.

NOTE 1: The authentication vector may be of the form as in 3GPP TS 33.203 (if IMS AKA is the selected authentication scheme):

- $AV = RAND_n||AUTN_n||XRES_n||CK_n||IK_n$ where:
  - RAND: random number used to generate the XRES, CK, IK, and part of the AUTN. It is also used to generate the RES at the UE.
  - AUTN: Authentication token (including MAC and SQN).
  - XRES: Expected (correct) result from the UE.
  - CK: Cipher key (optional).
  - IK: Integrity key.

9. **401 Unauthorized response (S-CSCF to I-CSCF) - see example in table 6.2-9**

   The authentication challenge is sent in the 401 Unauthorized response towards the UE.

Table 6.2-9: 401 Unauthorized response (S-CSCF to I-CSCF)

```
SIP/2.0 401 Unauthorized
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
From: <sip:user1_public1@home1.net>;tag=4fa3
To: <sip:user1_public1@home1.net>; tag=5ef4
Call-ID: apb03a0s09dkjdfglkj49111
WWW-Authenticate: Digest realm="registrar.home1.net", nonce=base64(RAND + AUTN + server
   specific data), algorithm=AKAv1-MD5, ik="00112233445566778899aabbccddeeff",
   ck="ffeeddccbbaa11223344556677889900"
CSeq: 1 REGISTER
Content-Length: 0
```

WWW-Authenticate: The S-CSCF challenges the user. The nonce includes the quoted string, base64 encoded value of the concatenation of the AKA RAND, AKA AUTN and server specific data. The S-CSCF appends also the Integrity Key (IK) and the Cyphering key (CK).

NOTE 2: The actual nonce value in the WWW-Authenticate header field is encoded in base64, and it may look like: nonce="A34Cm+Fva37UYWpGNB34JP"

10. **401 Unauthorized response (I-CSCF to P-CSCF) - see example in table 6.2-10**

The authentication challenge is sent in the 401 Unauthorized response towards the UE.

Table 6.2-10: 401 Unauthorized response (I-CSCF to P-CSCF)

```
SIP/2.0 401 Unauthorized
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
WWW-Authenticate:
CSeq:
Content-Length:
```

11. **401 Unauthorized response (P-CSCF to UE) - see example in table 6.2-11**

The P-CSCF removes any keys received in the 401 Unauthorized response and forwards the rest of the response to the UE.

Table 6.2-11: 401 Unauthorized response (P-CSCF to UE)

```
SIP/2.0 401 Unauthorized
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
WWW-Authenticate: Digest realm="registrar.home1.net", nonce=base64(RAND + AUTN + server
   specific data), algorithm=AKAv1-MD5
Security-Server: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
CSeq:
Content-Length:
```

WWW-Authenticate: The P-CSCF removes the ik and ck parameters (directives) from the header.

Security-Server: q is the preference value, 0.1 means IPsec is the first preferred choice. The q value represents only relative degradation of all mechanisms listed here. The lower value, the higher prority.

12. **Generation of response and session keys at UE**

Upon receiving the Unauthorised response, the UE extracts the MAC and the SQN from the AUTN. The UE calculates the XMAC and checks that XMAC matches the received MAC and that the SQN is in the correct range. If both these checks are successful the UE calculates the authentication challenge response (using RES and other parameters as defined in RFC 3310 [18]), and also computes the session keys IK and CK. The authentication challenge response is put into the Authorization header and sent back to the registrar in the REGISTER request.

13. **REGISTER request (UE to P-CSCF) - see example in table 6.2-13**

Table 6.2-13 REGISTER request (UE to P-CSCF)

```
REGISTER sip:registrar.home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=4fa3
To: <sip:user1_public1@home1.net>
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>;expires=600000
Call-ID: apb03a0s09dkjdfglkj49111
Authorization: Digest username="user1_private@home1.net", realm="registrar.home1.net",
   nonce=base64(RAND + AUTN + server specific data), algorithm=AKAv1-MD5,
   uri="sip:registrar.home1.net", response="6629fae49393a05397450978507c4ef1"
Security-Client: ipsec-3gpp; alg=hmac-sha-1-96; spi-c=23456789; spi-s=12345678; port-
   c=2468; port-s=1357
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Require: sec-agree
Proxy-Require: sec-agree
CSeq: 2 REGISTER
Supported: path
Content-Length: 0
```

Authorization: This carries the response to the authentication challenge received in step 11 along with the private user identity, the realm, the nonce, the URI and the algorithm.

This message is protected by the IPsec SA negotiated.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

14. **DNS: DNS-Q**

Based on the user's URI, the P-CSCF determines that UE is registering from a visiting domain and performs the DNS queries to locate the I-CSCF in the home network. The look up in the DNS is based on the domain name specified in the Request URI.

The P-CSCF sends the REGISTER request - after local processing - to the address indicated in the Request-URI. When forwarding the REGISTER request the P-CSCF needs to specify the protocol, port number and IP address of the I-CSCF server in the home network to which to send the REGISTER request. The P-CSCF tries to find this information by querying the DNS. Since the Request-URI does not specify a numeric IP address, and the transport protocol and port number are not indicated, the P-CSCF performs an NAPTR query for the domain specified in the Request-URI.

Table 6.2-14a DNS: DNS Query (P-CSCF to DNS)

```
OPCODE=SQUERY
QNAME=registrar.home1.net, QCLASS=IN, QTYPE=NAPTR
```

The DNS records are retrieved according to RFC 3263 [14].

Table 6.2-14b DNS Query Response (DNS to P-CSCF)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=registrar.home1.net,  QCLASS=IN, QTYPE=NAPTR

registrar.home1.net          0 IN NAPTR 50   50 "s" "SIP+D2U"    ""
     _sip._udp.registrar.home1.net
                    0 IN NAPTR 90   50 "s" "SIP+D2T"    ""  _sip._tcp.registrar.home1.net
                          0 IN NAPTR 100  50 "s" "SIPS+D2T"   ""
     _sips._tcp.registrar.home1.net
```

Based on the order and preference of the NAPTR record and the local preference, UDP is preferred and the P-CSCF finds the I-CSCF by an DNS SRV lookup according to RFC 2782 [4].

Table 6.2-14c DNS: DNS Query (P-CSCF to DNS)

```
OPCODE=SQUERY
QNAME=__sip._udp.registrar.home1.net, QCLASS=IN, QTYPE=SRV
```

The DNS records are retrieved according to RFC 2782 [4].

Table 6.2-14d DNS Query Response (DNS to P-CSCF)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=__sip._udp.registrar.home1.net, QCLASS=IN, QTYPE=SRV

_sip._udp.registrar.home1.net        0 IN SRV 1 10 5060 icscf1_p.home1.net
                                  0 IN SRV 1  0 5060 icscf7_p.home1.net

icscf1_p.home1.net              0 IN AAAA    5555::aba:dab:aaa:daa
icscf7_p.home1.net              0 IN AAAA    5555::a1a:b2b:c3c:d4d
```

In the Answer field of the query-response each I-CSCF is identified by its host domain name. The returned SRV Resource Records (RRs) are merged and ordered, and the selection technique (employing the Priority and Weight parameters returned in the RRs) as specified in RFC2782 [4] is used to select the I-CSCF (i.e. the icscf1_p.home1.net). Since the Additional Data field of the query-response also contains the IP address of the selected I-CSCF (i.e. 5555::aba:dab:aaa:daa), a new query to the DNS is not required.

Once the IP address of the I-CSCF is obtained, the P-CSCF forwards the REGISTER request to this IP address (i.e. 5555::aba:dab:aaa:daa) using the UDP protocol and port number 5060.

15. **REGISTER request (P-CSCF to I-CSCF) - see example in table 6.2-15**

This signalling flow shows the REGISTER request being forwarded from the P-CSCF to the I-CSCF in the home domain.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 6.2-15 REGISTER request (P-CSCF to I-CSCF)

```
REGISTER sip:registrar.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Path: <sip:term@pcscf1.visited1.net;lr>
Require: path
P-Visited-Network-ID: "Visited Network Number 1"
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Contact:
Call-ID:
Authorization: Digest username="user1_private@home1.net", realm="registrar.home1.net",
   nonce=base64(RAND + AUTN + server specific data), algorithm=AKAv1-MD5,
   uri="sip:registrar.home1.net", response="6629fae49393a05397450978507c4ef1", integrity-
   protected="yes"
CSeq:
Supported:
Content-Length:
```

Path: This is the P-CSCF URI and it is included to inform the S-CSCF where to route terminating requests.

16. **Cx: User registration status query procedure**

The I-CSCF requests information related to the Subscriber registration status by sending the private user identity, public user identity and visited domain name to the HSS. The HSS returns the S-CSCF name which was previously selected in step 5 (Cx: User registration status query procedure).

For detailed message flows see 3GPP TS 29.228.

Table 6.2-16a provides the parameters in the REGISTER request (flow 15), which are sent to the HSS.

Table 6.2-16a Cx: User registration status query procedure (I-CSCF to HSS)

Message source & destination	Cx Information element name	Information Source in REGISTER	Description
I-CSCF to HSS	Private User Identity	Authorization:	The Private User Identity is encoded in the username field according to the Authorization protocol.
	Public User Identity	To:	Identity which is used to communicate with other users
	Visited Network Identifier	P-Visited-Network-ID:	This information indicates the network identifier of the visited network

17. **REGISTER request (I-CSCF to S-CSCF) - see example in table 6.2-17**

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF.

Table 6.2-17: REGISTER request (I-CSCF to S-CSCF)

```
REGISTER sip:scscf1.home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
    pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Access-Network-Info:
Path:
Require:
P-Visited-Network-ID:
P-Charging-Vector:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Content-Length:
```

Path: The S-CSCF stores the contents of the Path header and uses this URI for routing mobile terminated requests.

P-Charging-Vector: The S-CSCF stores the contents of the icid parameters for possible charging activities.

18. **Authentication**

Upon receiving an integrity protected REGISTER request carrying the authentication challenge response, the S-CSCF checks that the expected response (calculated by the S-CSCF using XRES and other parameter as defined in RFC 3310 [18]) matches the received challenge response. If the check is successful then the user has been authenticated and the public user identity is registered in the S-CSCF.

19. **Cx: S-CSCF registration notification procedure**

On registering a user the S-CSCF informs the HSS that the user has been registered at this instance. Upon being requested by the S-CSCF , the HSS will also include the user profile in the response sent to the S-CSCF.

For detailed message flows see 3GPP TS 29.228.

Table 6.2-19a provides the parameters in the REGISTER request (flow 17), which are sent to the HSS.

Table 6.2-19a Cx: S-CSCF registration notification procedure (S-CSCF to HSS)

Message source & destination	Cx Information element name	Information Source in REGISTER	Description
S-CSCF to HSS	Public User Identify	To:	Identity which is used to communicate with other users
	Private User Identity	Authorization:	The Private User Identity is encoded in the username field according to the Authorization protocol.
	S-CSCF name	Request-URI:	This information indicates the serving CSCF's name of that user

20. **200 OK response (S-CSCF to I-CSCF) - see example in table 6.2-20**

The S-CSCF sends a 200 (OK) response to the I-CSCF indicating that Registration was successful.

Table 6.2-20: 200 OK response (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
    pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Path: <sip:term@pcscf1.visited1.net;lr>
Service-Route: <sip:orig@scscf1.home1.net;lr>
From:
To:
Call-ID:
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>;expires=600000
CSeq:
Date: Wed, 11 July 2001 08:49:37 GMT
P-Associated-URI: <sip:user1_public2@home1.net>, <sip:user1_public3@home1.net>, <sip:+1-
   212-555-1111@home1.net;user=phone>
Content-Length:
```

Service-Route: The S-CSCF inserts the Service-Route header that includes its own URI including a character string in the user part to differentiate mobile originating requests from mobile terminating requests.

21. **200 OK response (I-CSCF to P-CSCF) - see example in table 6.2-21**

The I-CSCF forwards the 200 (OK) response from the S-CSCF to the P-CSCF indicating that the registration was successful.

Table 6.2-21: 200 OK response (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Path:
Service-Route:
From:
To:
Call-ID:
Contact:
CSeq:
Date:
P-Associated-URI:
Content-Length:
```

22. **200 OK response (P-CSCF to UE) - see example in table 6.2-22**

The P-CSCF saves the value of the Service-Route header and associates it with the UE. The P-CSCF then forwards the 200 (OK) response from the I-CSCF to the UE indicating that the registration was successful.

Table 6.2-22: 200 OK response (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Path:
Service-Route:
From:
To:
Call-ID:
Contact:
CSeq:
Date:
P-Associated-URI:
Content-Length:
```

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Zagreb, Croatia 10 – 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ **24.228** **CR** **130** ⌘ **rev** **-1** ⌘ Current version: **5.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	GPRS charging information in P-Charging-Vector header field
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	30/04/2004
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The syntax of the extension that conveys GPRS charging information has changed in 24.229. This CR implements that change into the examples in 24.228
Summary of change:	⌘	The P-Charging-Vector header is modified according to the new syntax
Consequences if not approved:	⌘	Missalignment between 24.229 and 24.228
Clauses affected:	⌘	7.2.21, 7.3.2.1, 7.3.6.1, 7.3.71, 7.4.2.1, 7.4.3.1, 7.5.2, 10.3.3, 10.4.7, 17.2.2.1, 17.4.2.1, 17.5.2

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications	⌘	24.229
				Test specifications		
				O&M Specifications		

Other comments:	⌘	

First proposed change

7.2.2.1 (MO#1a) Mobile origination, roaming (S-S#1a, MT#1a assumed)

Figure 7.2.2.1-1 shows an origination procedure which applies to roaming subscribers when the home network operator does not desire to keep its internal configuration hidden from the visited network. The UE is located in a visited network, and determines the P-CSCF via the CSCF discovery procedure. During registration, the home network allocates a S-CSCF. The home network provides the S-CSCF name/address as the entry point from the visited network.

When registration is complete, P-CSCF knows the name/address of the S-CSCF.

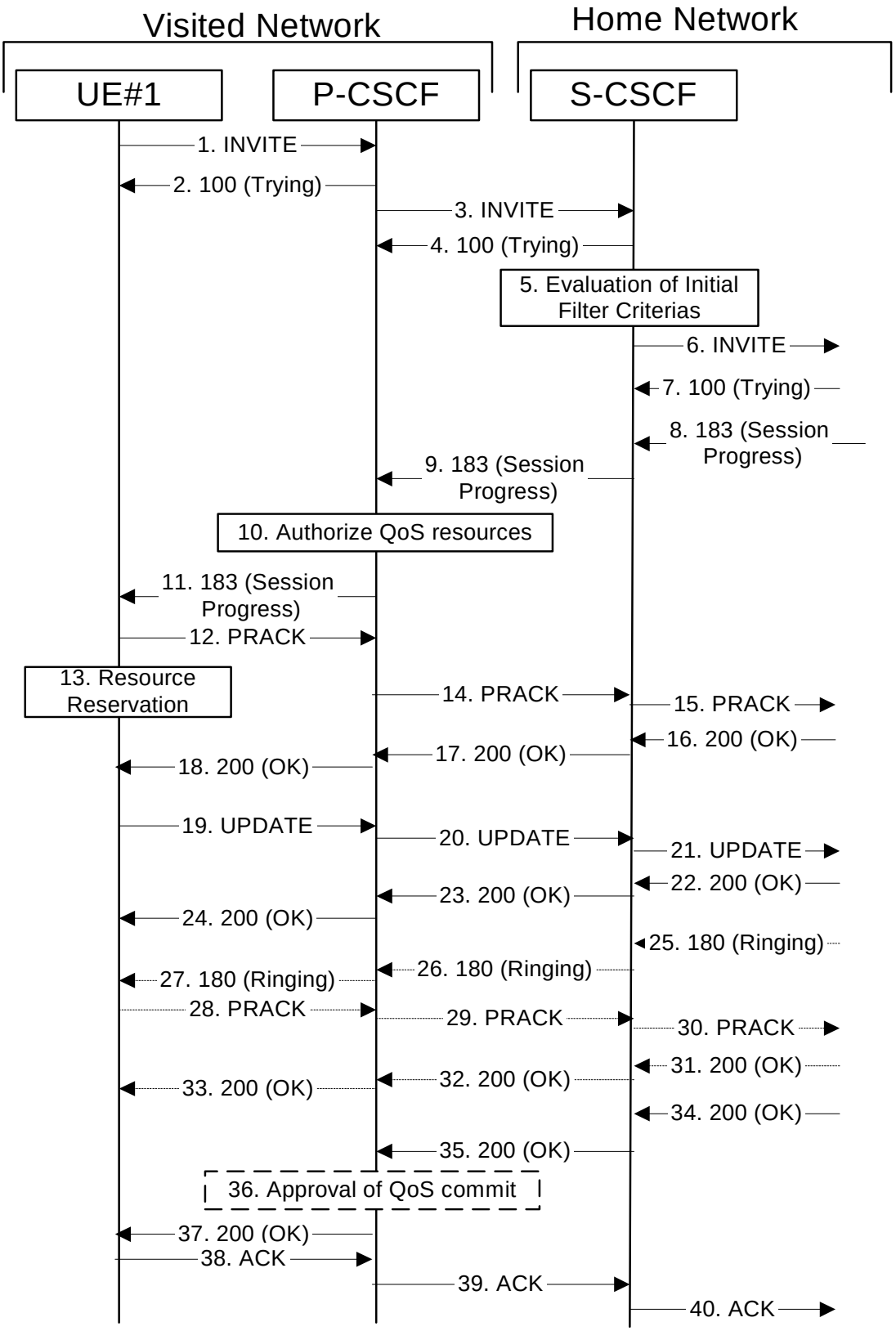

Figure 7.2.2.1-1: MO#1a

Procedure MO#1a is as follows:

1. **INVITE (UE to P-CSCF) - see example in table 7.2.2.1-1**

UE#1 determines the complete set of codecs that it is capable of supporting for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.

For this example, it is assumed that UE#1 is willing to establish a multimedia session comprising a video stream and an audio stream. The video stream supports two codecs, either H.263 or MPEG-4 Visual. The audio stream supports the AMR codec.

UE sends the INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism. The initial SDP may represent one or more media for a multimedia session.

Table 7.2.2.1-1: INVITE (UE to P-CSCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Supported: 100rel
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: contains the international E.164 number from the user.

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

Route: contains the P-CSCF address learnt during P-CSCF discovery, plus the elements from the Service-Route header from registration. The P-CSCF URI contains the port number learnt during the security agreement negotiation

Privacy: the user does not require privacy, therefore the Privacy header is set to the value “none” as specified in RFC 3325 [17] and RFC 3323 [13].

P-Preferred-Identity: the user provides a hint about the identity to be used for this session.

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

From: the user does not require privacy, the From header contains the value requested by the user.

Cseq: is a random starting number.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

Contact: is a SIP URI that contains the IP address or FQDN of the originating UE.

SDP The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session.

Upon receiving the INVITE, the P-CSCF stores the following information about this session, for use in possible error recovery actions - see example in table 7.2.2.1-1b.

Table 7.2.2.1-1b: Storage of information at P-CSCF

```
Request-URI: tel:+1-212-555-2222
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
Cseq(2orig): none
Route(2dest): <sip:scscf1.home1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

2. **100 Trying (P-CSCF to UE) - see example in table 7.2.2.1-2**

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

Table 7.2.2.1-2: 100 Trying (P-CSCF to UE)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **INVITE (P-CSCF to S-CSCF) - see example in table 7.2.2.1-3**

The P-CSCF adds itself to the Record-Route header and Via header. As the request is forwarded to an interface that is not compressed, the own P-CSCF SIP URI does not contain the "comp=sigcomp" parameter.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

The INVITE request is forwarded to the S-CSCF.

Table 7.2.2.1-3: INVITE (P-CSCF to S-CSCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
Record-Route: <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

P-Asserted-Identity: P-CSCF inserts the SIP URI in the P-Asserted-Identity header field and it also removes P-Preferred-Identity header field.

P-Access-Network-Info: this header contains information from the UE

P-Charging-Vector: The P-CSCF inserts this header and populates the icid parameters with a globally unique value.

Upon receiving the INVITE, the S-CSCF stores the following information about this session, for use in charging or possible error recovery actions - see example in table 7.2.2.1-3b.

Table 7.2.2.1-3b: Storage of information at S-CSCF

```
Request-URI: tel:+1-212-555-2222
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
Cseq(2orig): none
Route(2orig): <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

4. **100 Trying (S-CSCF to P-CSCF) - see example in table 7.2.2.1-4**

S-CSCF responds to the INVITE request (3) with a 100 Trying provisional response.

Table 7.2.2.1-4: 100 Trying (S-CSCF to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

5. **Evaluation of initial filter criterias**

   S-CSCF validates the service profile of this subscriber and evaluates the initial filter criterias.

6. **INVITE (MO#1 to S-S) - see example in table 7.2.2.1-6**

   S-CSCF forwards the INVITE request, as specified by the S-CSCF to S-CSCF procedures. As the S-CSCF does not know whether the I-CSCF at home2.net is a loose router or not, it does not introduce a Route header.

Table 7.2.2.1-6: INVITE request (MO#1a to S-S)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (...)

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

P-Asserted-Identity: The S-CSCF inserts the corresponding TEL URL to the P-Asserted-Identity header in order that the TEL URL is known to the destination network in case the INVITE is forwarded to a MGCF.

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the originating Inter Operator Identifier (IOI) parameter of this header.

Request-URI: In the case where the Request-URI of the incoming INVITE request to S-CSCF contains a TEL-URL [5], it has to be translated to a globally routable SIP-URL before applying it as Request-URI of the outgoing INVITE request. For this address translation the S-CSCF uses the services of an ENUM-DNS protocol according to RFC 2916 [6], or any other suitable translation database. Database aspects of ENUM are outside the scope of this specification.

7. **100 Trying (S-S to MO#1a) - see example in table 7.2.2.1-7 (related to table 7.2.2.1-6)**

S-CSCF receives a 100 Trying provisional response, as specified by the S-CSCF to S-CSCF procedures.

Table 7.2.2.1-7: 100 Trying (S-S to MO#1a)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **183 Session Progress (S-S to MO#1a) - see example in table 7.2.2.1-8 (related to table 7.2.2.1-6)**

The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response (to 6), per the S-CSCF to S-CSCF procedures.

Table 7.2.2.1-8: 183 Session Progress (S-S to MO#1a)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>, <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Upon receiving the 183 Session Progress, the S-CSCF stores the following information about this session, for use in providing enhanced services, charging or in possible error recovery actions – see example in table 7.2.2.1-8b.

Table 7.2.2.1-8b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:scscf2.home2.net;lr>,<sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

9. **183 Session Progress (S-CSCF to P-CSCF) - see example in table 7.2.2.1-9**

S-CSCF forwards the 183 Session Progress response to P-CSCF.

Table 7.2.2.1-9: 183 Session Progress (S-CSCF to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

Upon receiving the 183 Session Progress, the P-CSCF saves the information as shown in table 7.2.2.1-9b.

Table 7.2.2.1-9b: Storage of information at P-CSCF

```
Request-URI: tel:+1-212-555-2222
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>,
     <sip:pcscf2.visited2.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

10. **Authorize QoS Resources**

    P-CSCF authorizes the resources necessary for this session. The approval of QoS commitment either happens at this stage or after 200 OK of INVITE (35) based on operator local policy.

11. **183 Session Progress (P-CSCF to UE) – see example in table 7.2.2.1-11**

    P-CSCF forwards the 183 Session Progress response to the originating endpoint.

Table 7.2.2.1-11: 183 Session Progress (P-CSCF to UE)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
P-Asserted-Identity:
Privacy:
P-Media-Authorization:
   00200001001001017064663322e76697369746564322e6e6574000c020139425633303732
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Media-Authorization: a P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.visited2.net" with credentials "9BV3072". "00" at the end of the authorization token is required to pad to a multiple of 4 bytes.

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated during the security agreement and the comp=sigcomp parameter to its own SIP URI.

12. **PRACK (UE to P-CSCF) - see example in table 7.2.2.1-12**

UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was any change in media flows, or if there was more than one choice of codec for a media flow, then UE#1 includes a new SDP offer in the PRACK message sent to UE#2.

For this example, assume UE#1 chooses H.263 as the codec to use for the single video stream. Therefore, UE#1 sends a new SDP offer in the PRACK request.

Table 7.2.2.1-12: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: takes the value of the Contact header of the received 183 Session Progress response.

Via: takes the value of either the IP address or FQDN of the originating UE.

From:/To:/Call-ID: copied from the 183 Session Progress response so that they include any tag parameter.

Cseq: takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

13. **Resource Reservation**

After determining the final media streams in step #11, UE initiates the reservation procedures for the resources needed for this session.

14. **PRACK (P-CSCF to S-CSCF) – see example in table 7.2.2.1-14**

The P-CSCF forwards the PRACK request to S-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 7.2.2.1-14: PRACK (P-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require: precondition
RAck:
Content-Type:
Content-Length:

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

15. **PRACK (MO#1a to S-S) – see example in table 7.2.2.1-15**

    S-CSCF forwards the PRACK request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 7.2.2.1-15: PRACK (MO#1a to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

16. **200 OK (S-S to MO#1a) – see example in table 7.2.2.1-16 (related to table 7.2.2.1-15)**

    The destination endpoint responds to the PRACK request (14) with a 200 OK response, per the S-CSCF to S-CSCF procedures.

Table 7.2.2.1-16: 200 OK (S-S to MO#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

17. **200 OK (S-CSCF to P-CSCF) - see example in table 7.2.2.1-17**

    S-CSCF forwards the 200 OK response to P-CSCF.

Table 7.2.2.1-17: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

18. **200 OK (P-CSCF to UE) - see example in table 7.2.2.1-18**

    P-CSCF forwards the 200 OK response to UE.

Table 7.2.2.1-18: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

19. **UPDATE (UE to P-CSCF) – see example in table 7.2.2.1-19**

When the resource reservation is completed, UE sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request.

Table 7.2.2.1-19: UPDATE (UE to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: takes the value of the Contact header of the received 183 Session Progress response.

Via: takes the value of either the IP address or FQDN of the originating UE.

From:/To:/Call-ID: copied from the 183 Session Progress response so that they include any tag parameters.

Cseq: takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

The SDP indicates that the resource reservation was successful in the local segment.

20. **UPDATE (P-CSCF to S-CSCF) – see example in table 7.2.2.1-20**

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

P-CSCF forwards the UPDATE request to S-CSCF.

Table 7.2.2.1-20: UPDATE (P-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=[2]({2,1},{2,2})"
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

P-Charging-Vector: The P-CSCF added the GPRS access network information to this header, which is removed and stored by the S-CSCF.

Upon receiving the UPDATE, the S-CSCF stores the following information about this session, for use in charging - see example in table 7.2.2.1-20b.

Table 7.2.2.1-20b: Storage of information at S-CSCF

```
Request-URI: tel:+1-212-555-2222
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
Cseq(2orig): none
Route(2orig): <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
```

21. **UPDATE (MO#1a to S-S) - see example in table 7.2.2.1-21**

S-CSCF forwards the UPDATE request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 7.2.2.1-21: UPDATE (MO#1a to S-S)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

22. **200 OK (S-S to MO#1a) – see example in table 7.2.2.1-22 (related to table 7.2.2.1-21)**

    The destination endpoint responds to the UPDATE request (21) with a 200 OK, per the S-CSCF to S-CSCF procedures.

Table 7.2.2.1-22: 200 OK (S-S to MO#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

The SDP indicates that the resource reservation was successful both in the local and the remote segment.

23. **200 OK (S-CSCF to P-CSCF) - see example in table 7.2.2.1-23**

S-CSCF forwards the 200 OK response to P-CSCF.

Table 7.2.2.1-23: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

24. **200 OK (P-CSCF to UE) – see example in table 7.2.2.1-24**

The P-CSCF forwards the 200 (OK) response to UE.

Table 7.2.2.1-24: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

25. **180 Ringing (S-S to MO#1a) – see example in table 7.2.2.1-25 (related to table 7.2.2.1-6)**

The called UE may optionally perform alerting. If so, it signals this to the calling party by a 180 (Ringing) provisional response to (6). This response is sent to S-CSCF per the S-CSCF to S-CSCF procedure.

Table 7.2.2.1-25: 180 Ringing (S-S to MO#1a)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9022
Content-Length: 0
```

26. **180 Ringing (S-CSCF to P-CSCF) – see example in table 7.2.2.1-26**

The S-CSCF forwards the 180 (Ringing) response to P-CSCF.

Table 7.2.2.1-26: 180 Ringing (S-CSCF to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

27. **180 Ringing (P-CSCF to UE) - see example in table 7.1.1-27**

The P-CSCF forwards the 180 (Ringing) response to UE.

Table 7.2.2.1-27: 180 Ringing (P-CSCF to UE)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the comp=sigcomp parameter to its own SIP URI and its port number negotiated during the security agreement.

28. **PRACK (UE to P-CSCF) – see example in table 7.2.2.1-28**

The UE indicates to the originating subscriber that the destination is ringing. It responds to the 180 (Ringing) provisional response (28) with a PRACK request.

Table 7.2.2.1-28: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

Request-URI: takes the value of the Contact header of the received 180 Ringing response.

Via: takes the value of either the IP address or FQDN of the originating UE.

From:/To:/Call-ID: copied from the 180 Ringing response so that they include any revised tag parameters.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

Cseq: takes a higher value than in the previous request.

29. **PRACK (P-CSCF to S-CSCF) – see example in table 7.2.2.1-29**

The P-CSCF forwards the PRACK request to S-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 7.2.2.1-29: PRACK (P-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

30. **PRACK (MO#1a to S-S) - see example in table 7.2.2.1-30**

The S-CSCF forwards the PRACK request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 7.2.2.1-30: PRACK (MO#1a to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

31. **200 OK (S-S to MO#1a) - see example in table 7.2.2.1-31 (related to table 7.2.2.1-30)**

The destination endpoint responds to the PRACK request (30) with a 200 (OK) response.

Table 7.2.2.1-31: 200 OK (S-S to MO#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

32. **200 OK (S-CSCF to P-CSCF) - see example in table 7.2.2.1-32**

The S-CSCF forwards the 200 (OK) response to the P-CSCF.

Table 7.2.2.1-32: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

33. **200 OK (P-CSCF to UE) – see example in table 7.2.2.1-33**

The P-CSCF forwards the 200 (OK) response to the UE.

Table 7.2.2.1-33: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

34. **200 OK (S-S to MO#1a) – see example in table 7.2.2.1-34 (related to table 7.2.2.1-6)**

When the called party answers, the terminating endpoint sends a 200 (OK) final response to the INVITE request (6), as specified by the termination procedures and the S-CSCF to S-CSCF procedures, to the S-CSCF.

Table 7.2.2.1-34: 200 OK (S-S to MO#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length:0
```

35. **200 OK (S-CSCF to P-CSCF) – see example in table 7.2.2.1-35**

The S-CSCF sends a 200 (OK) final response along the signalling path back to the P-CSCF.

Table 7.2.2.1-35: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

36. **Approval of QoS Commit**

The P-CSCF approves the commitment of the QoS resources if it was not approved already in step (10).

37. **200 OK (P-CSCF to UE) – see example in table 7.2.2.1-37**

The P-CSCF forwards the 200 (OK) final response to the session originator. UE can start the media flow(s) for this session.

Table 7.2.2.1-37: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the comp=sigcomp parameter and port number negotiated during the security agreement to its own SIP URI.

38. **ACK (UE to P-CSCF) – see example in table 7.2.2.1-38**

The UE starts the media flow for this session, and responds to the 200 (OK) response (37) with an ACK request sent to the P-CSCF.

Table 7.2.2.1-38: ACK (UE to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 ACK
Content-Length: 0
```

Cseq: is required to be the same value as Cseq contained in original INVITE request [3].

39. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.2.1-39**

The P-CSCF forwards the ACK request to the S-CSCF.

Table 7.2.2.1-39: ACK (P-CSCF to S-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

40. **ACK (MO#1a to S-S) - see example in table 7.2.2.1-40**

The S-CSCF forwards the ACK request to the terminating endpoint, per the S-CSCF to S-CSCF procedure.

Table 7.2.2.1-40: ACK (MO#1a to S-S)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.3.2.1 (S-S#1a) Different network operators performing origination and termination (MO#1a, MT#1a assumed)

Figure 7.3.2.1-1 shows a S-CSCF handling session origination (S-CSCF#1), which performs an analysis of the destination address, and determines that it belongs to a subscriber of a different operator. The originating network

operator does not desire to keep their configuration hidden, so it forwards the request to a well-known entry point in the destination operator's network, I-CSCF. I-CSCF queries the HSS for current location information, and finds the S-CSCF assigned to the subscriber (S-CSCF#2), and forwards the request to S-CSCF#2. The terminating network operator does not desire to keep their configuration hidden, so the I-CSCF does not insert itself into the signalling path for future exchanges. This example flow does not show Application Server involvement.

Origination sequences that share this common S-CSCF to S-CSCF procedure are:

MO#1a Mobile origination, roaming, without a THIG. The "Originating Network" of S-S#1a is therefore a visited network.

MO#1b Mobile origination, roaming, with a THIG in home network. The "Originating Network" of S-S#1a is therefore a visited network.

MO#2 Mobile origination, located in home service area. The "Originating Network" of S-S#1a is therefore the home network.

Termination sequences that share this common S-CSCF to S-CSCF procedure are:

MT#1a Mobile termination, roaming, without a THIG. The "Terminating Network" of S-S#1a is a visited network.

MT#1b Mobile termination, roaming, with a THIG in home network. The "Terminating Network" of S-S#1a is a visited network.

MT#2 Mobile termination, located in home service area. The "Terminating Network" of S-S#1a is the home network.

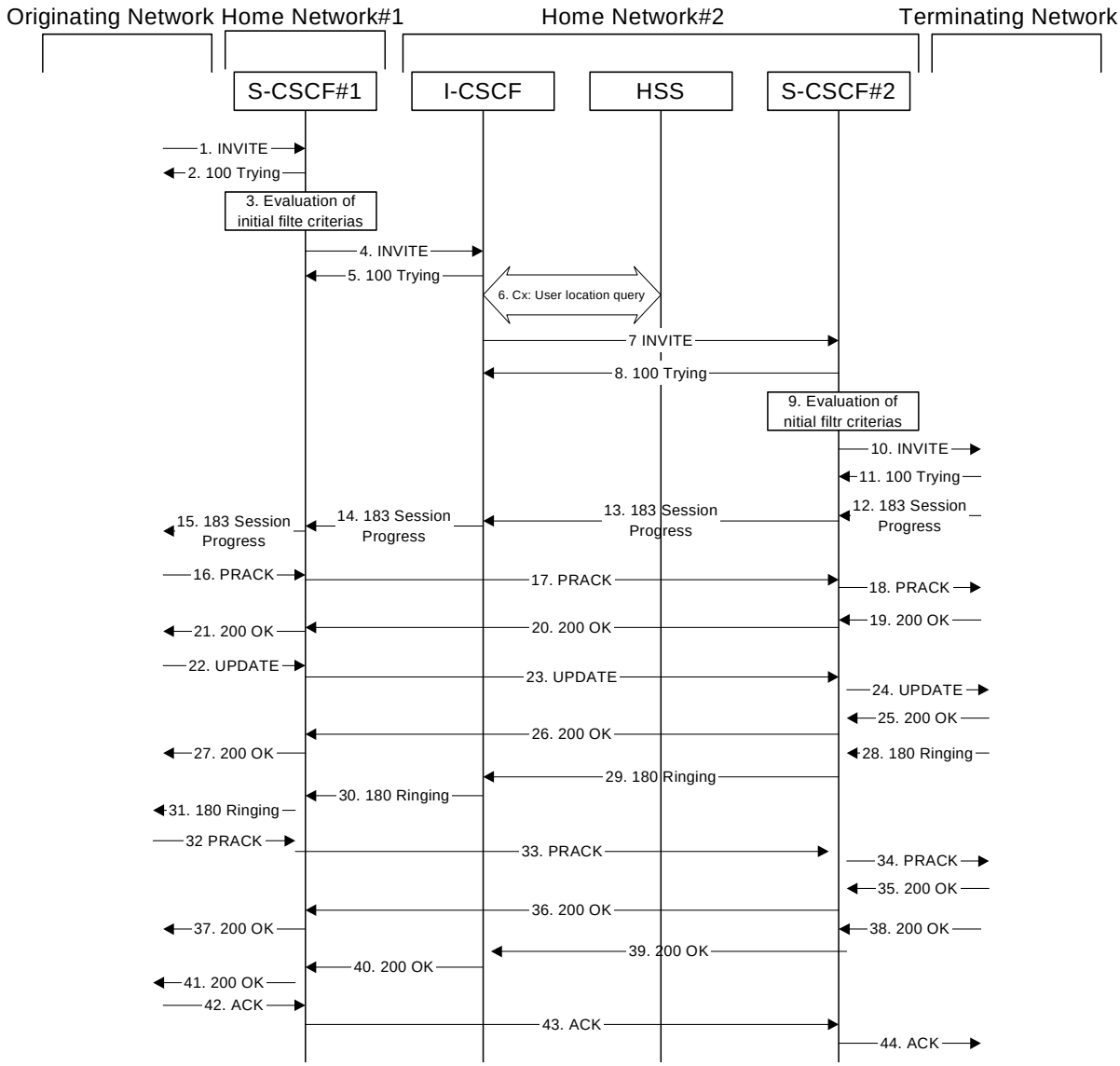

Figure 7.3.2.1-1: S-S#1a

Procedure S-S#1a is as follows:

1. **INVITE (MO to S-S#1a) – see example in table 7.3.2.1-1**

   The INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating signalling flow.

Table 7.3.2.1-1: INVITE (MO to S-S#1a)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
Record-Route: <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

2. **100 Trying (S-S#1a to MO) – see example in table 7.3.2.1-2**

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

Table 7.3.2.1-2: 100 Trying (S-S#1a to MO)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criterias**

S-CSCF#1 validates the service profile of this subscriber and evaluates the initial filter criterias. For this example, assume no Application Server involvement.

4. **INVITE (S-CSCF to I-CSCF) – see example in table 7.3.2.1-4**

S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the destination subscriber belongs. Since the originating operator does not desire to keep their internal configuration hidden, S-CSCF#1 forwards the INVITE request directly to to I-CSCF in the destination network.

As the S-CSCF does not know whether the I-CSCF at home2.net is a loose router or not, it does not introduce a Route header.

Table 7.3.2.1-4: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

Request-URI: In the case where the Request-URI of the incoming INVITE request to S-CSCF contains a TEL-URL [5], it has to be translated to a globally routable SIP-URL before applying it as Request-URI of the outgoing INVITE request. For this address translation the S-CSCF uses the services of an ENUM-DNS protocol according to RFC 2916 [6], or any other suitable translation database. Database aspects of ENUM are outside the scope of this specification.

P-Asserted-Identity: The S-CSCF adds the corresponding TEL URL to the P-Asserted-Identity header in order that the TEL URL is known to the destination network in case the INVITE is forwarded to a MGCF.

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the originating Inter Operator Identifier (IOI) parameter of this header.

5. **100 Trying (I-CSCF to S-CSCF) – see example in table 7.3.2.1-5**

I-CSCF responds to the INVITE request (4) by sending a 100 Trying provisional response to S-CSCF#1.

Table 7.3.2.1-5: 100 Trying (I-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
    pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **Cx: User Location Query procedure**

The I-CSCF sends a query to the HSS to find out the S-CSCF of the called user. The HSS responds with the address of the current S-CSCF for the terminating subscriber.

For detailed message flows see 3GPP TS 29.228 [11].

Table 6.3.2-6a provides the parameters in the SIP INVITE request (flow 4), which are sent to the HSS.

Table 7.3.2.1-6a Cx: User registration status query procedure (I-CSCF to HSS)

Message source & destination	Cx: Information element name	Information source in SIP INVITE	Description
I-CSCF to HSS	User Public Identity	Request-URI:	This information element indicates the public user identity

Table 7.3.2.1-6b provides the parameters sent from the HSS that need to be mapped to SIP INVITE (flow 7) and sent to S-CSCF.

Table 7.3.2.1-6b Cx: User registration status query procedure (HSS to I-CSCF)

Message source & destination	Cx: Information element name	Mapping to SIP header in SIP INVITE	Description
HSS to I-CSCF	S-CSCF name	Route header field	This information indicates the serving CSCF's name of that user

7. **INVITE (I-CSCF to S-CSCF) – see example in table 7.3.2.1-7**

I-CSCF forwards the INVITE request to the S-CSCF (S-CSCF#2) that will handle the session termination.

Table 7.3.2.1-7: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home2.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length:

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

8. **100 Trying (S-CSCF to I-CSCF) – see example in table 7.3.2.1-8**

S-CSCF#2 responds to the INVITE request (7) with a 100 Trying provisional response.

Table 7.3.2.1-8: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
    scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
    pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
    [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

9. **Evaluation of initial filter criterias**

S-CSCF#2 validates the service profile of this subscriber and evaluates the initial filter criterias.

10. **INVITE (S-S#1a to MT) – see example in table 7.3.2.1-10**

S-CSCF#2 forwards the INVITE request, as determined by the termination procedure. S-CSCF#2 remembers (from the registration procedure) the UE Contact address and the next hop CSCF for this UE.

Table 7.3.2.1-10: INVITE (S-S#1a to MT)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length: (…)

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

11. **100 Trying (MT to S-S#1a) – see example in table 7.3.2.1-11 (related to table 7.3.2.1-10)**

S-CSCF#2 receives a 100 Trying provisional response to the INVITE request (10), as specified by the termination procedures.

Table 7.3.2.1-11: 100 Trying (MT to S-S#1a)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

12. **183 Session Progress (MT to S-S#1a) – see example in table 7.3.2.1-12 (related to table 7.3.2.1-10)**

The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response to the INVITE request (10), as per the termination procedure.

Table 7.3.2.1-12: 183 Session Progress (MT to S-S#1a)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

13. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 7.3.2.1-13**

S-CSCF#2 forwards the 183 Session Progress provisional response to I-CSCF.

Table 7.3.2.1-13: 183 Session Progress (S-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>, <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Asserted-Identity: The S-CSCF adds the corresponding TEL URL to the P-Asserted-Identity header in order that the TEL URL is known to the destination network in case the INVITE is forwarded to a MGCF.

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the terminating Inter Operator Identifier (IOI) parameter of this header.

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

14. **183 Session Progress (I-CSCF to S-CSCF) – see example in table 7.3.2.1-14**

I-CSCF forwards the 183 Session Progress provisional response to S-CSCF#1.

Table 7.3.2.1-14: 183 Session Progress (I-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

15. **183 Session Progress (S-S#1a to MO) – see example in table 7.3.2.1-15**

S-CSCF#1 forwards the 183 Session Progress to the originator, as per the originating procedure.

Table 7.3.2.1-15: 183 Session Progress (S-S#1a to MO)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

16. **PRACK (MO to S-S#1a) – see example in table 7.3.2.1-16**

The originator decides the final set of media streams, and includes this information in the PRACK request sent to S-CSCF#1 by the origination procedures.

Table 7.3.2.1-16: PRACK (MO to S-S#1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:cscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

17. **PRACK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-17**

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

Table 7.3.2.1-17: PRACK (S-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

18. **PRACK (S-S#1a to MT) – see example in table 7.3.2.1-18**

S-CSCF#2 forwards the PRACK request to the terminating endpoint, as per the termination procedure.

Table 7.3.2.1-18: PRACK (S-S#1a to MT)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

19. **200 OK (MT to S-S#1a) – see example in table 7.3.2.1-19 (related to table 7.3.2.1-18)**

The terminating endpoint responds to the PRACK request (18) with a 200 OK response.

Table 7.3.2.1-19: 200 OK (MT to S-S#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

20. **200 OK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-20**

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

Table 7.3.2.1-20: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

21. **200 OK (S-S#1a to MO) – see example in table 7.3.2.1-21**

    S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.2.1-21: 200 OK (S-S#1a to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

22. **UPDATE (MO to S-S#1a) – see example in table 7.3.2.1-22**

When the originating endpoint has completed the resource reservation procedures, it sends the UPDATE request to S-CSCF#1 by the origination procedures.

Table 7.3.2.1-22: UPDATE (MO to S-S#1a)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

23. **UPDATE (S-CSCF to S-CSCF) – see example in table 7.3.2.1-23**

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

Table 7.3.2.1-23: UPDATE (S-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

24. **UPDATE (S-S#1a to MT) – see example in table 7.3.2.1-24**

S-CSCF#2 forwards the UPDATE request to the terminating endpoint, as per the termination procedure.

Table 7.3.2.1-24: UPDATE (S-S#1a to MT)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

25. **200 OK (MT to S-S#1a) – see example in table 7.3.2.1-25 (related to table 7.3.2.1-24)**

The terminating endpoint responds to the UPDATE request (24) with a 200 OK response.

Table 7.3.2.1-25: 200 OK (MT to S-S#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

26. **200 OK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-26**

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

Table 7.3.2.1-26: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

27. **200 OK (S-S#1a to MO) – see example in table 7.3.2.1-27**

S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.2.1-27: 200 OK (S-S#1a to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

28. **180 Ringing (MT to S-S#1a) – see example in table 7.3.2.1-28 (related to table 7.3.2.1-10)**

The terminating endpoint may optionally send a 180 Ringing provisional response indicating alerting is in progress. This response is sent by the termination procedure to S-CSCF#2.

Table 7.3.2.1-28: 180 Ringing (MT to S-S#1a)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
     <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9022
Content-Length: 0
```

29. **180 Ringing (S-CSCF to I-CSCF) – see example in table 7.3.2.1-29**

S-CSCF#2 forwards the 180 Ringing response to I-CSCF.

Table 7.3.2.1-29: 180 Ringing (S-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

30. **180 Ringing (I-CSCF to S-CSCF) – see example in table 7.3.2.1-30**

I-CSCF forwards the 180 Ringing response to S-CSCF#1.

Table 7.3.2.1-30: 180 Ringing (I-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

31. **180 Ringing (S-S#1a to MO) – see example in table 7.3.2.1-31**

S-CSCF#1 forwards the 180 Ringing response to the originator, per the origination procedure.

Table 7.3.2.1-31: 180 Ringing (S-S#1a to MO)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

32. **PRACK (MO to S-S#1a) – see example in table 7.3.2.1-32**

The originator acknowledges the 180 Ringing provisional response (31) with a PRACK request.

Table 7.3.2.1-32: PRACK (MO to S-S#1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

33. **PRACK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-33**

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

Table 7.3.2.1-33: PRACK (S-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

34. **PRACK (S-S#1a to MT) – see example in table 7.3.2.1-34**

S-CSCF#2 forwards the PRACK request to the terminating endpoint.

Table 7.3.2.1-34: PRACK (S-S#1a to MT)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

35. **200 OK (MT to S-S#1a) – see example in table 7.3.2.1-35 (related to table 7.3.2.1-34)**

The terminating endpoint responds to the PRACK request (34) with a 200 OK response.

Table 7.3.2.1-35: 200 OK (MT to S-S#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

36. **200 OK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-36**

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

Table 7.3.2.1-36: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

37. **200 OK (S-S#1a to MO) – see example in table 7.3.2.1-37**

S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.2.1-37: 200 OK (S-S#1a to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

38. **200 OK (MT to S-S#1a) – see example in table 7.3.2.1-38 (related to table 7.3.2.1-10)**

The final response to the INVITE request (10), 200 OK, is sent by the terminating endpoint over the signalling path. This is typically generated when the subscriber has accepted the incoming session attempt. The response is sent to S-CSCF#2 per the termination procedure.

Table 7.3.2.1-38: 200 OK (MT to S-S#1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Content-Length: 0
```

39. **200 OK (S-CSCF to I-CSCF) – see example in table 7.3.2.1-39**

The 200 OK response is forwarded to the I-CSCF.

Table 7.3.2.1-39: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

40. **200 OK (I-CSCF to S-CSCF) – see example in table 7.3.2.1-40**

The 200 OK response is forwarded to S-CSCF#1.

Table 7.3.2.1-40: 200 OK (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

41. **200 OK (S-S#1a to MO) – see example in table 7.3.2.1-41**

The 200 OK response is returned to the originating endpoint, by the origination procedure.

Table 7.3.2.1-41: 200 OK (S-S#1a to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

42. **ACK (MO to S-S#1a) – see example in table 7.3.2.1-42**

The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.

Table 7.3.2.1-42: ACK (MO to S-S#1a)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

43. **ACK (S-CSCF to S-CSCF) – see example in table 7.3.2.1-43**

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

Table 7.3.2.1-43: ACK (S-CSCF to S-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

44. **ACK (S-S#1a to MT) – see example in table 7.3.2.1-44**

S-CSCF#2 forwards the ACK request to the terminating endpoint, as per the termination procedure.

Table 7.3.2.1-44: ACK (S-S#1a to MT)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
     scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.3.6.1 (S-S#3) PSTN Termination performed by home network of originator (MO#2 assumed)

Figure 7.3.6.1-1 shows a S-CSCF handling session origination, which performs an analysis of the destination address, and determines that it will result in a PSTN termination. The request is therefore forwarded to a local BGCF. The BGCF performs further analysis of the destination address, combined with information of agreements between operators for optimum Gateway selection, and decides to do the PSTN termination locally. The BGCF therefore allocates a MGCF within the home network, and sends the request to it. This example flow does not show Application Server involvement.

Origination sequences that share this common S-CSCF to S-CSCF procedure are:

MO#1a Mobile origination, roaming, without a THIG. The "Originating Network" of S-S#3 is therefore a visited network.

MO#1b Mobile origination, roaming, with a THIG in home network. The "Originating Network" of S-S#3 is therefore a visited network.

MO#2 Mobile origination, located in home service area. The "Originating Network" of S-S#3 is therefore the home network.

CS-O CS Networks origination. The "Originating Network" of S-S#3 is the home network. The element labelled S-CSCF#1 is the MGCF of the CS-O procedure.

Termination sequences that share this common S-CSCF to S-CSCF procedure are:

CS-T CS Networks termination.

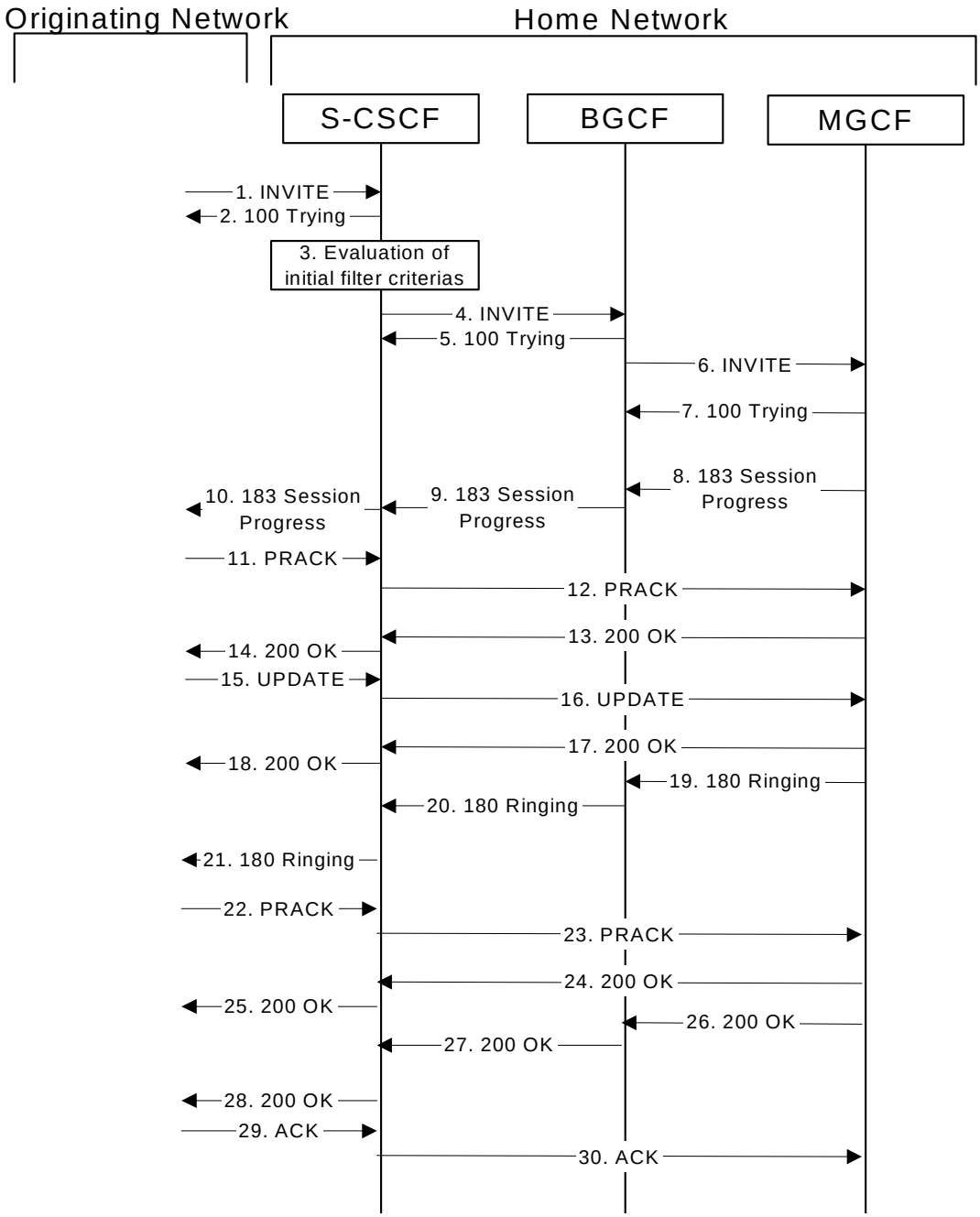

Figure 7.3.6.1-1: S-S#3

Procedure S-S#3 is as follows:

1. **INVITE (MO to S-S#3) – see example in table 7.3.6.1-1**

   The INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating signalling flow.

Table 7.3.6.1-1: INVITE (MO to S-S#3)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

2. **100 Trying (S-S#3 to MO) – see example in table 7.3.6.1-2**

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

Table 7.3.6.1-2: 100 Trying (S-S#3 to MO)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criterias**

   S-CSCF#1 validates the service profile of this subscriber and evaluates the initial filter criterias. For this example, assume no Application Server involvement.

4. **INVITE (S-CSCF to BGCF) – see example in table 7.3.6.1-4**

   S-CSCF#1 performs an analysis of the destination address, and determines the destination is on the PSTN. S-CSCF forwards the INVITE request to the BGCF in the local network.

Table 7.3.6.1-4: INVITE (S-CSCF to BGCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:bgcf1.home1.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
P-Charging-Vector:
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

P-Charging-Vector: The S-CSCF passes this header to the BGCF for charging.

P-Charging-Function-Addresses: The S-CSCF inserts this header to provide the charging function addresses to the BGCF.

5. **100 Trying (BGCF to S-CSCF) – see example in table 7.3.6.1-5**

BGCF sends a 100 Trying provisional response to S-CSCF.

Table 7.3.6.1-5: 100 Trying (BGCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **INVITE (BGCF to MGCF) – see example in table 7.3.6.1-6**

BGCF analyzes the destination address, and allocates a MGCF to handle the termination. BGCF forwards the INVITE request to the MGCF.

Table 7.3.6.1-6: INVITE (BGCF to MGCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:mgcf1.home1.net;lr>
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
P-Charging-Function-Addresses:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length:

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

NOTE: The BGCF 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.

7. **100 Trying (MGCF to BGCF) – see example in table 7.3.6.1-7**

MGCF responds to the INVITE request (6) with a 100 Trying provisional response.

Table 7.3.6.1-7: 100 Trying (MGCF to BGCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **183 Session Progress (MGCF to BGCF) – see example in table 7.3.6.1-8**

   The MGCF returns the media stream capabilities of the destination along the signalling path in a 183 Session Progress provisional response.

Table 7.3.6.1-8: 183 Session Progress (MGCF to BGCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; term-ioi=home1.net
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:mgcf1.home1.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

9. **183 Session Progress (BGCF to S-CSCF) – see example in table 7.3.6.1-9**

   BGCF forwards the 183 Session Progress provisional response to S-CSCF.

Table 7.3.6.1-9: 183 Session Progress (BGCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcopm;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

10. **183 Session Progress (S-S#3 to MO) – see example in table 7.3.6.1-10**

S-CSCF#1 forwards the 183 Session Progress to the originator, as per the originating procedure.

Table 7.3.6.1-10: 183 Session Progress (S-S#3 to MO)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

11. **PRACK (MO to S-S#3) – see example in table 7.3.6.1-11**

The originator confirms with a PRACK request sent to S-CSCF#1 by the origination procedures. The request does not contain SDP because in the initial SDP offer/answer there was a single media stream with a single codec.

Table 7.3.6.1-11: PRACK (MO to S-S#3)

```
PRACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Length: 0
```

12. **PRACK (S-CSCF to MGCF) – see example in table 7.3.6.1-12**

S-CSCF forwards the PRACK request to MGCF.

Table 7.3.6.1-12: PRACK (S-CSCF to MGCF)

```
PRACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

13. **200 OK (MGCF to S-CSCF) – see example in table 7.3.6.1-13**

The MGCF responds to the PRACK request (12) with a 200 OK response.

Table 7.3.6.1-13: 200 OK (MGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
Content-Length: 0
```

14. **200 OK (S-S#3 to MO) – see example in table 7.3.6.1-14**

S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.6.1-14: 200 OK (S-S#3 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

15. **UPDATE (MO to S-S#3) – see example in table 7.3.6.1-15**

When the originating endpoint has completed the resource reservation procedures, it sends the UPDATE request to S-CSCF#1 by the origination procedures.

Table 7.3.6.1-15: UPDATE (MO to S-S#3)

```
UPDATE sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

P-Charging-Vector: The P-CSCF added the GPRS access network information to this header, which is removed and stored by the S-CSCF.

Upon receiving the UPDATE, the S-CSCF stores the P-Charging-Vector information for use in charging.

16. **UPDATE (S-CSCF to MGCF) – see example in table 7.3.6.1-16**

S-CSCF forwards the UPDATE request to MGCF.

Table 7.3.6.1-16: UPDATE (S-CSCF to MGCF)

```
UPDATE sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

17. **200 OK (MGCF to S-CSCF) – see example in table 7.3.6.1-17**

The MGCF responds to the UPDATE request (16) with a 200 OK response.

Table 7.3.6.1-17: 200 OK (MGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

18. **200 OK (S-S#3 to MO) – see example in table 7.3.6.1-18**

S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.6.1-18: 200 OK (S-S#3 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

19. **180 Ringing (MGCF to BGCF) – see example in table 7.3.6.1-19**

The MGCF may optionally send a 180 Ringing provisional response indicating alerting is in progress. This response is sent by the termination procedure to BGCF.

Table 7.3.6.1-19: 180 Ringing (MGCF to BGCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 INVITE
Require: 100rel
Contact: <sip:mgcf1.home1.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
RSeq: 9022
Content-Length: 0
```

20. **180 Ringing (BGCF to S-CSCF) – see example in table 7.3.6.1-20**

BGCF forwards the 180 Ringing response to S-CSCF.

Table 7.3.6.1-20: 180 Ringing (BGCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

21. **180 Ringing (S-S#3 to MO) – see example in table 7.3.6.1-21**

S-CSCF forwards the 180 Ringing response to the originator, per the origination procedure.

Table 7.3.6.1-21: 180 Ringing (S-S#3 to MO)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

22. **PRACK (MO to S-S#3) – see example in table 7.3.6.1-22**

The originator acknowledges the 180 Ringing provisional response (21) with a PRACK request.

Table 7.3.6.1-22: PRACK (MO to S-S#3)

```
PRACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

23. **PRACK (S-CSCF to MGCF) – see example in table 7.3.6.1-23**

S-CSCF forwards the PRACK request to MGCF.

Table 7.3.6.1-23: PRACK (S-CSCF to MGCF)

```
PRACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

24. **200 OK (MGCF to S-CSCF) – see example in table 7.3.6.1-24**

The MGCF responds to the PRACK request (23) with a 200 OK response.

Table 7.3.6.1-24: 200 OK (MGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

25. **200 OK (S-S#3 to MO) – see example in table 7.3.6.1-25**

S-CSCF forwards the 200 OK response to the originating endpoint.

Table 7.3.6.1-25: 200 OK (S-S#3 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

26. **200 OK (MGCF to BGCF) – see example in table 7.3.6.1-26**

The final response, 200 OK, is sent by the MGCF over the signalling path when the subscriber has accepted the incoming session attempt.

Table 7.3.6.1-26: 200 OK (MGCF to BGCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:mgcf1.home1.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
Content-Length: 0
```

27. **200 OK (BGCF to S-CSCF) – see example in table 7.3.6.1-27**

The 200 OK response is forwarded to the S-CSCF.

Table 7.3.6.1-27: 200 OK (BGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

28. **200 OK (S-S#3 to MO) – see example in table 7.3.6.1-28**

The 200 OK is returned to the originating endpoint, by the origination procedure.

Table 7.3.6.1-28: 200 OK (S-S#3 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

29. **ACK (MO to S-S#3) – see example in table 7.3.6.1-29**

The originating endpoint sends the final acknowledgement to S-CSCF#1 by the origination procedures.

Table 7.3.6.1-29: ACK (MO to S-S#3)

```
ACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scsf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 ACK
Content-Length: 0
```

30. **ACK (S-CSCF to MGCF) – see example in table 7.3.6.1-30**

S-CSCF#1 forwards the ACK request to MGCF.

Table 7.3.6.1-30: ACK (S-CSCF to MGCF)

```
ACK sip:mgcf1.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.3.7.1 (S-S#4) PSTN Termination performed by different operator than origination (MO#2 assumed)

Figure 7.3.7.1-1 shows a S-CSCF handling session origination, which performs an analysis of the destination address, and determines that it will result in a PSTN termination. The request is therefore forwarded to a local BGCF (BGCF#1). BGCF#1 performs further analysis of the destination address, combined with information of agreements between operators for optimum Gateway selection, and decides to do the PSTN termination in a different operator's network. BGCF#1 therefore forwards the request to a BGCF in the terminating operator's

network, BGCF#2. BGCF#2 allocates a MGCF within the its network, and sends the request to it. This example flow does not show Application Server involvement.

Origination sequences that share this common S-CSCF to S-CSCF procedure are:

MO#1a Mobile origination, roaming, without a THIG. The "Originating Network" of S-S#4 is therefore a visited network.

MO#1b Mobile origination, roaming, with a THIG in home network. The "Originating Network" of S-S#4 is therefore a visited network.

MO#2 Mobile origination, located in home service area. The "Originating Network" of S-S#4 is therefore the home network.

CS-O CS Networks origination. The "Originating Network" of S-S#4 is the home network. The element labeled S-CSCF#1 is the MGCF of the CS-O procedure.

Termination sequences that share this common S-CSCF to S-CSCF procedure are:

CS-T CS Networks termination.

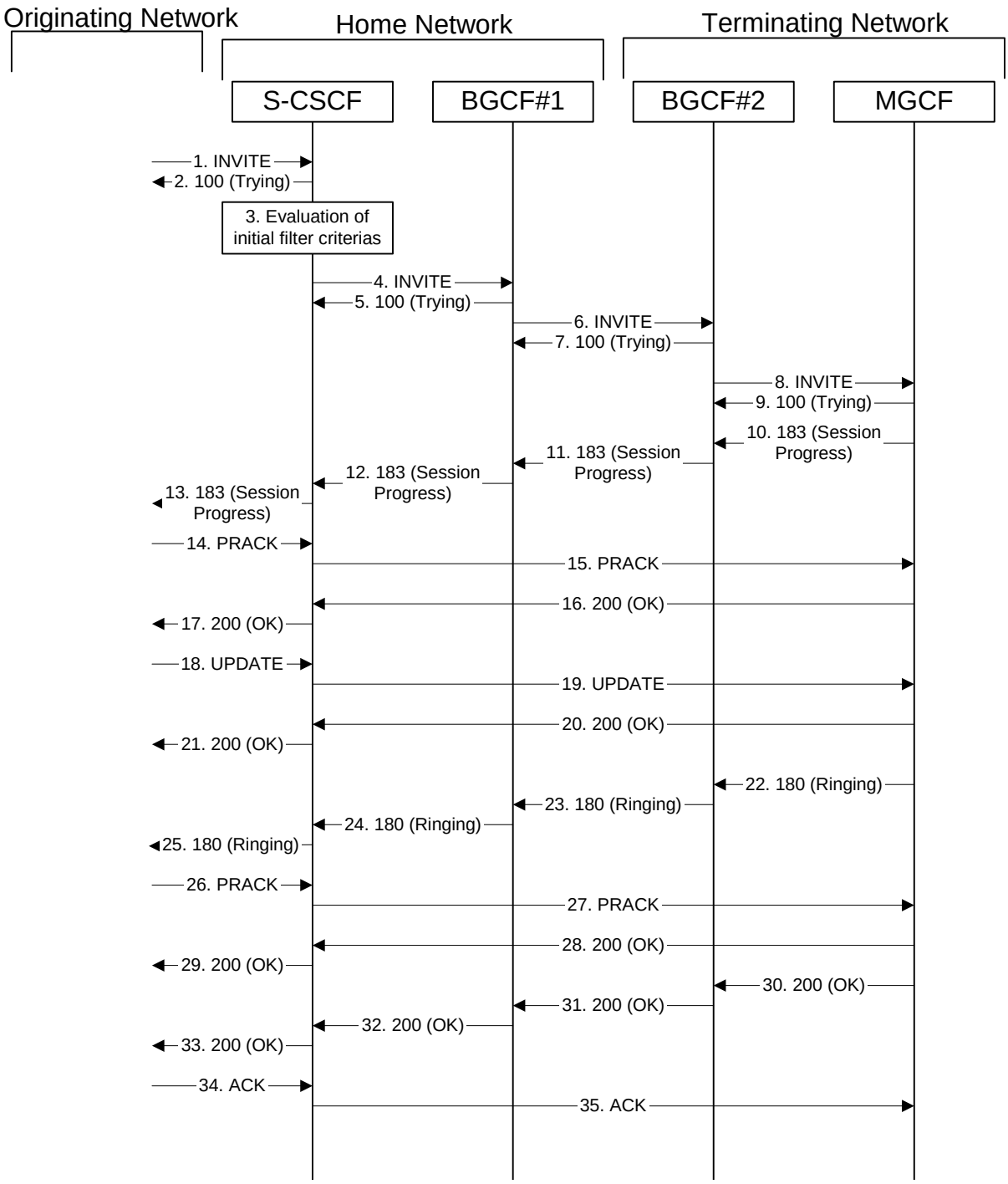

Figure 7.3.7.1-1: S-S#4

Procedure S-S#4 is as follows:

1. **INVITE (MO to S-S#4) – see example in table 7.3.7.1-1**

   The INVITE request is sent from the UE to S-CSCF#1 by the procedures of the originating signalling flow.

Table 7.3.7.1-1: INVITE (MO to S-S#4)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

2. **100 Trying (S-S#4 to MO) – see example in table 7.3.7.1-2**

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

Table 7.3.7.1-2: 100 Trying (S-S#4 to MO)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criterias**

   S-CSCF#1 validates the service profile of this subscriber and evaluates the initial filter criterias. For this example, assume no Application Server involvement.

4. **INVITE (S-CSCF to BGCF) – see example in table 7.3.7.1-4**

   S-CSCF#1 performs an analysis of the destination address, and determines the destination is on the PSTN. S-CSCF#1 forwards the INVITE request to the BGCF in the local network.

Table 7.3.7.1-4: INVITE (S-CSCF to BGCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:bgcf1.home1.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
P-Charging-Vector:
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

P-Charging-Vector: The S-CSCF passes this header to the BGCF for charging.

P-Charging-Function-Addresses: The S-CSCF inserts this header to provide the charging function addresses to the BGCF.

5. **100 Trying (BGCF to S-CSCF) – see example in table 7.3.7.1-5**

BGCF#1 sends a 100 Trying provisional response to S-CSCF#1.

Table 7.3.7.1-5: 100 Trying (BGCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **INVITE (BGCF to BGCF) – see example in table 7.3.7.1-6**

BGCF#1 analyses the destination address, and the inter-operator agreements for optimal PSTN termination, and selects the network operator that can best terminate this session. BGCF#1 forwards the INVITE request to the BGCF (BGCF#2) in the network that will handle the session termination.

Table 7.3.7.1-6: INVITE (BGCF to BGCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:bgcf2.home2.net;lr>
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length:

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

7. **100 Trying (BGCF to BGCF) – see example in table 7.3.7.1-7**

BGCF#2 responds to the INVITE request (6) with a 100 Trying provisional response.

Table 7.3.7.1-7: 100 Trying (BGCF to BGCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **INVITE (BGCF to MGCF) – see example in table 7.3.7.1-8**

BGCF#2 allocates a Media Gateway Controller, and forwards the INVITE request to that MGCF.

Table 7.3.7.1-8: INVITE (BGCF to MGCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP bgcf2.home2.net;branch=z9hG4bK456u71.1, SIP/2.0/UDP
   bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:mgcf2.home2.net;lr>
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length:

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

9. **100 Trying (MGCF to BGCF) – see example in table 7.3.7.1-9**

MGCF sends a 100 Trying provisional response.

Table 7.3.7.1-9: 100 Trying (MGCF to BGCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP bgcf2.home2.net;branch=z9hG4bK456u71.1, SIP/2.0/UDP
   bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

10. **183 Session Progress (MGCF to BGCF) – see example in table 7.3.7.1-10**

MGCF returns the media stream capabilities of the destination in a 183 Session Progress provisional response.

Table 7.3.7.1-10: 183 Session Progress (MGCF to BGCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP bgcf2.home2.net;branch=z9hG4bK456u71.1, SIP/2.0/UDP
   bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; term-ioi=home2.net
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:mgcf2.home2.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

11. **183 Session Progress (BGCF to BGCF) – see example in table 7.3.7.1-11**

BGCF#2 forwards the 183 Session Progress provisional response to BGCF#1.

Table 7.3.7.1-11: 183 Session Progress (BGCF to BGCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

12. **183 Session Progress (BGCF to S-CSCF) – see example in table 7.3.7.1-12**

BGCF#1 forwards the 183 Session Progress provisional response to S-CSCF.

Table 7.3.7.1-12: 183 Session Progress (BGCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

13. **183 Session Progress (S-S#4 to MO) – see example in table 7.3.7.1-13**

S-CSCF#1 forwards the 183 Session Progress response to the originator, as per the originating procedure.

Table 7.3.7.1-13: 183 Session Progress (S-S#4 to MO)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

14. **PRACK (MO to S-S#4) – see example in table 7.3.7.1-14**

The originator sends a PRACK request sent to S-CSCF by the origination procedures. The PRACK request does not contain SDP because in the initial SDP offer/answer the negotiation resulted in a single media stream with a single codec.

Table 7.3.7.1-14: PRACK (MO to S-S#4)

```
PRACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Length: 0
```

15. **PRACK (S-CSCF to MGCF) – see example in table 7.3.7.1-15**

S-CSCF forwards the PRACK request to the MGCF.

Table 7.3.7.1-15: PRACK (S-CSCF to MGCF)

```
PRACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

16. **200 OK (MGCF to S-CSCF) – see example in table 7.3.7.1-16**

The MGCF responds to the PRACK request (15) with a 200 OK response.

Table 7.3.7.1-16: 200 OK (MGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

17. **200 OK (S-S#4 to MO) – see example in table 7.3.7.1-17**

S-CSCF forwards the 200 OK response to the originating endpoint.

Table 7.3.7.1-17: 200 OK (S-S#4 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

18. **UPDATE (MO to S-S#4) – see example in table 7.3.7.1-18**

When the originating endpoint has completed the resource reservation procedures, it sends the UPDATE request to S-CSCF#1 by the origination procedures.

Table 7.3.7.1-18: UPDATE (MO to S-S#4)

```
UPDATE sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

P-Charging-Vector: The P-CSCF added the GPRS access network information to this header, which is removed and stored by the S-CSCF.

Upon receiving the UPDATE, the S-CSCF stores the P-Charging-Vector information for use in charging.

19. **UPDATE (S-CSCF to MGCF) – see example in table 7.3.7.1-19**

S-CSCF forwards the UPDATE request to the MGCF.

Table 7.3.7.1-19: UPDATE (S-CSCF to MGCF)

```
UPDATE sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

20. **200 OK (MGCF to S-CSCF) – see example in table 7.3.7.1-20**

The MGCF responds to the UPDATE request (19) with a 200 OK response.

Table 7.3.7.1-20: 200 OK (MGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 0 RTP/AVP 98 99
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

21. **200 OK (S-S#4 to MO) – see example in table 7.3.7.1-21**

S-CSCF#1 forwards the 200 OK response to the originating endpoint.

Table 7.3.7.1-21: 200 OK (S-S#4 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

22. **180 Ringing (MGCF to BGCF) – see example in table 7.3.7.1-22**

The MGCF may optionally send a 180 Ringing provisional response indicating alerting is in progress.

Table 7.3.7.1-22: 180 Ringing (MGCF to BGCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP bgcf2.home2.net;branch=z9hG4bK456u71.1, SIP/2.0/UDP
   bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 INVITE
Require: 100rel
Contact: <sip:mgcf2.home2.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
RSeq: 9022
Content-Length: 0
```

23. **180 Ringing (BGCF to BGCF) – see example in table 7.3.7.1-23**

BGCF#2 forwards the 180 Ringing response to BGCF#1.

Table 7.3.7.1-23: 180 Ringing (BGCF to BGCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP bgcf1.home1.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

24. **180 Ringing (BGCF to S-CSCF) – see example in table 7.3.7.1-24**

BGCF#1 forwards the 180 Ringing response to S-CSCF.

Table 7.3.7.1-24: 180 Ringing (BGCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

25. **180 Ringing (S-S#4 to MO) – see example in table 7.3.7.1-25**

S-CSCF#1 forwards the 180 Ringing response to the originator, per the origination procedure.

Table 7.3.7.1-25: 180 Ringing (S-S#4 to MO)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

26. **PRACK (MO to S-S#4) – see example in table 7.3.7.1-26**

The originator acknowledges the 180 Ringing provisional response (25) with a PRACK request.

Table 7.3.7.1-26: PRACK (MO to S-S#4)

```
PRACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

27. **PRACK (S-CSCF to MGCF) – see example in table 7.3.7.1-27**

S-CSCF forwards the PRACK request to the MGCF.

Table 7.3.7.1-27: PRACK (S-CSCF to MGCF)

```
PRACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

28. **200 OK (MGCF to S-CSCF) – see example in table 7.3.7.1-28**

The MGCF responds to the PRACK request (27) with a 200 OK response.

Table 7.3.7.1-28: 200 OK (MGCF to S-SCSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP pcscf1.home2.net,
   SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

29. **200 OK (S-S#4 to MO) – see example in table 7.3.7.1-29**

S-CSCF forwards the 200 OK to the originating endpoint.

Table 7.3.7.1-29: 200 OK (S-S#4 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

30. **200 OK (MGCF to BGCF) – see example in table 7.3.7.1-30**

The final response, 200 OK, is sent by the MGCF when the subscriber has accepted the incoming session attempt.

Table 7.3.7.1-30: 200 OK (MGCF to BGCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:mgcf2.home2.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
Content-Length: 0
```

31. **200 OK (BGCF to BGCF) – see example in table 7.3.7.1-31**

BGCF#2 forwards the 200 OK final response to BGCF#1.

Table 7.3.7.1-31: 200 OK (BGCF to BGCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP bgcf1.home.net;branch=z9hG4bK6546q2.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

32. **200 OK (BGCF to S-CSCF) – see example in table 7.3.7.1-32**

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

Table 7.3.7.1-32: 200 OK (BGCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

33. **200 OK (S-S#4 to MO) – see example in table 7.3.7.1-33**

The 200 OK response is returned to the originating endpoint, by the origination procedure.

Table 7.3.7.1-33: 200 OK (S-S#4 to MO)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

34. **ACK (MO to S-S#4) – see example in table 7.3.7.1-34**

The originating endpoint sends the final acknowledgement to S-CSCF by the origination procedures.

Table 7.3.7.1-34: ACK (MO to S-S#4)

```
ACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 ACK
Content-Length: 0
```

35. **ACK (S-CSCF to MGCF) – see example in table 7.3.7.1-35**

S-CSCF forwards the ACK request to the MGCF.

Table 7.3.7.1-35: ACK (S-CSCF to MGCF)

```
ACK sip:mgcf2.home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.4.2.1 (MT#1a) Mobile termination, roaming (MO#1a, S-S#1a assumed)

Figure 7.4.2.1 shows a termination procedure which applies to roaming subscribers when the home network operator does not desire to keep its internal configuration hidden from the visited network. The UE is located in a visited network, and determines the P-CSCF via the P-CSCF discovery procedure. During registration, the home network allocates the S-CSCF.

When registration is complete, S-CSCF knows the name/address of P-CSCF and the UE Contact address, and P-CSCF obtains the name/address of the UE.

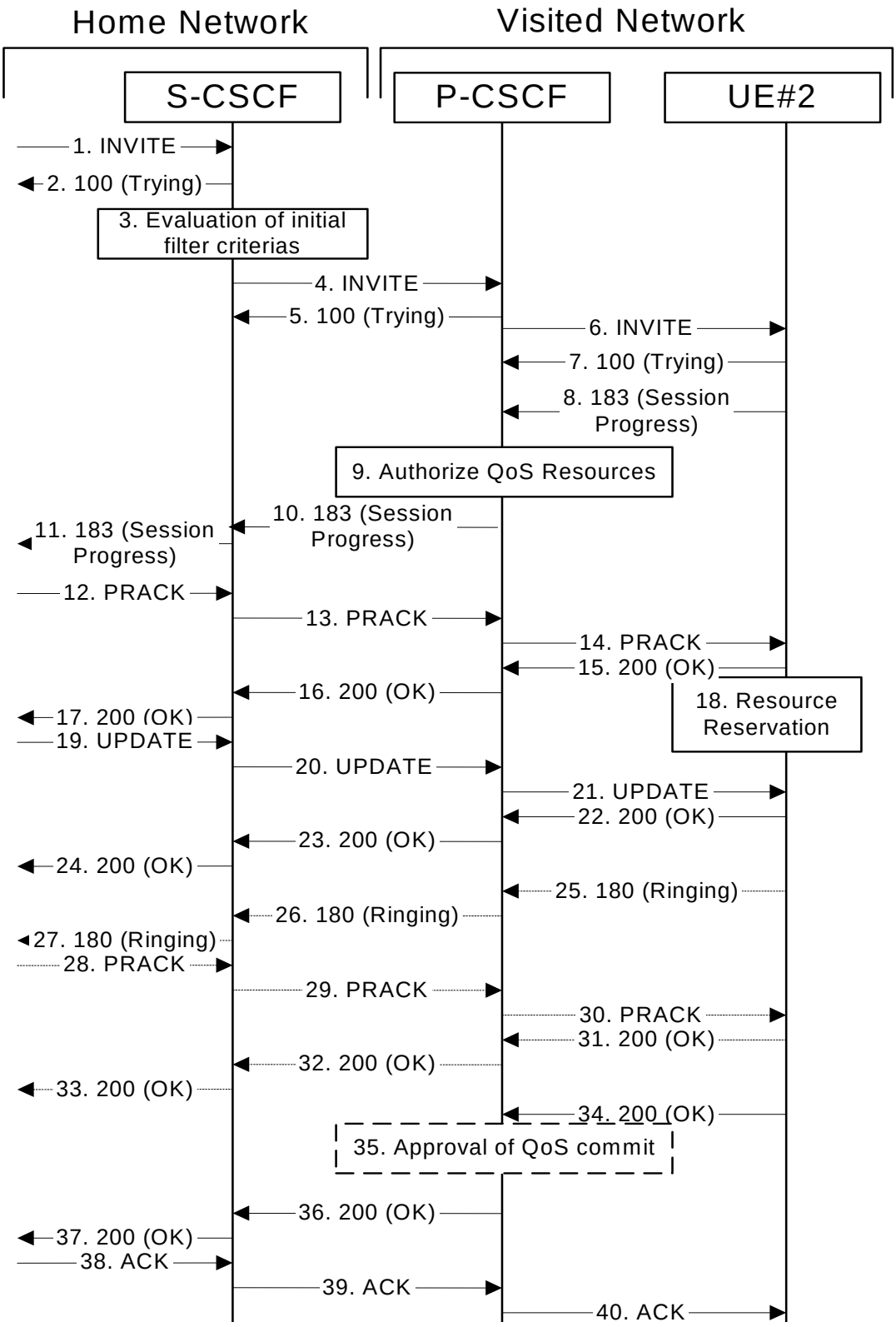

Figure 7.4.2.1-1: MT#1a

Procedure MT#1a is as follows:

1. **INVITE (S-S to MT#1a) – see example in table 7.4.2.1-1**

   The calling party sends the INVITE request, via one of the origination procedures and via one of the S-CSCF to S-CSCF procedures, to the S-CSCF for the terminating subscriber.

Table 7.4.2.1-1: INVITE (S-S to MT#1a)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home2.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
Supported:
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

SDP The SDP contains the complete set of supported and desired codecs from the session originator.

Upon receipt of the INVITE, the S-CSCF stores the following information about this session, for use in providing enhanced services, charging or in possible error recovery actions – see example in table 7.4.2.1-1b.

Table 7.4.2.1-1b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

2. **100 Trying (MT#1a to S-S) – see example in table 7.4.2.1-2**

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

Table 7.4.2.1-2: 100 Trying (MT#1a to S-S)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criterias**

   S-CSCF validates the service profile of this subscriber, and evaluates the initial filter criterias.

4. **INVITE (S-CSCF to P-CSCF) – see example in table 7.4.2.1-4**

   S-CSCF remembers (from the registration procedure) the UE Contact address and the next hop CSCF for this UE. It forwards the INVITE to the P-CSCF.

Table 7.4.2.1-4: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length: (…)

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

Route: Built from the Path header stored at registration.

P-Called-Party-ID: Includes the dialled URL with its parameters.

Via:/Record-Route: S-CSCF adds itself.

P-CSCF saves information from the received INVITE request. The saved value of the information for this session is – see example in table 7.4.2.1-4b.

Table 7.4.2.1-4b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
     <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

5. **100 Trying (P-CSCF to S-CSCF) – see example in table 7.4.2.1-5**

P-CSCF responds to the INVITE request (4) with a 100 Trying provisional response.

Table 7.4.2.1-5: 100 Trying (P-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **INVITE (P-CSCF to UE) – see example in table 7.4.2.1-6**

Table 7.4.2.1-6: INVITE (P-CSCF to UE)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
P-Media-Authorization:
   00200001001001017064663l2e686f6d65312e6e6574000c02013331533134363231
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID:
Content-Type:
Content-Length: (...)

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

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its Via header.

Record-Route: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own URI.

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.home1.net" with credentials "31S14621".

7. **100 Trying (UE to P-CSCF) – see example in table 7.4.2.1-7**

UE may optionally send a 100 Trying provisional response to P-CSCF.

Table 7.4.2.1-7: 100 Trying (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **183 Session Progress (UE to P-CSCF) – see example in table 7.4.2.1-8**

UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE request.

UE responds with a 183 Session Progress response containing SDP back to the originator. This response is sent to P-CSCF.

Table 7.4.2.1-8: 183 Session Progress (UE to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

To: A tag is added to the To header.

Contact: Contains a SIP URI with the IP address or FQDN of the UE. It includes the comp=sigcomp parameter.

SDP The SDP contains the set of codecs supported by UE. It requests a confirmation of the QoS preconditions for establishing the session

Upon receipt of the 183 Session Progress, the P-CSCF stores the following information about this session, for use in providing enhanced services or in possible error recovery actions – see example in table 7.4.2.1-8b.

Table 7.4.2.1-8b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
     <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

9. **Authorize QoS Resources**

   P-CSCF authorizes the resources necessary for this session. The approval of QoS commitment either happens at this stage or after 200 OK of INVITE (34) based on operator local policy.

10. **183 Session Progress (P-CSCF to S-CSCF) – see example in table 7.4.2.1-10**

    P-CSCF forwards the 183 Session Progress response to S-CSCF.

Table 7.4.2.1-10: 183 Session Progress (P-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7)
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number used for the security association and the comp=sigcomp parameter from its own URI

P-Asserted-Identity: P-CSCF inserts the default SIP URI of the user in the P-Asserted-Identity header field.

P-Access-Network-Info: this header contains information from the UE.

Upon receipt of the 183 Session Progress, the S-CSCF stores the following information about this session, for use in providing enhanced services or in possible error recovery actions – see example in table 7.4.2.1-10b.

Table 7.4.2.1-10b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

11. **183 Session Progress (MT#1a to S-S) – see example in table 7.4.2.1-11**

S-CSCF forwards the 183 Session Progress response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-11: 183 Session Progress (MT#1a to S-S)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>, <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Asserted-Identity: S-CSCF inserts the TEL URI of the user in the P-Asserted-Identity header field.

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the terminating Inter Operator Identifier (IOI) parameter of this header and puts back the originating IOI parameter.

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

12. **PRACK (S-S to MT#1a) – see example in table 7.4.2.1-12**

The originating endpoint sends a PRACK request containing the final SDP to be used in this session, via the S-CSCF to S-CSCF procedure, to S-CSCF.

Table 7.4.2.1-12: PRACK (S-S to MT#1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

13. **PRACK (S-CSCF to P-CSCF) – see example in table 7.4.2.1-13**

    S-CSCF forwards the PRACK request to P-CSCF.

Table 7.4.2.1-13: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

14. **PRACK (P-CSCF to UE) – see example in table 7.4.2.1-14**

    P-CSCF forwards the PRACK request to UE.

Table 7.4.2.1-14: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own entry in the Via header.

15. **200 OK (UE to P-CSCF) – see example in table 7.4.2.1-15**

UE acknowledges the PRACK request (14) with a 200 OK response.

Table 7.4.2.1-15: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

16. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.2.1-16**

    P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.2.1-16: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

17. **200 OK (MT#1a to S-S) – see example in table 7.4.2.1-17**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-17: 200 OK (MT#1a to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

18. **Resource Reservation**

    UE initiates the reservation procedures for the resources needed for this session.

19. **UPDATE (S-S to MT#1a) – see example in table 7.4.2.1-19**

    When the originating endpoint has completed its resource reservation, it sends the UPDATE request to S-CSCF, via the S-CSCF to S-CSCF procedures.

Table 7.4.2.1-19: UPDATE (S-S to MT#1a)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

20. **UPDATE (S-CSCF to P-CSCF) – see example in table 7.4.2.1-20**

    S-CSCF forwards the UPDATE request to P-CSCF.

Table 7.4.2.1-20: UPDATE (S-CSCF to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
Content-Type:
Content-Length:

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

21. **UPDATE (P-CSCF to UE) – see example in table 7.4.2.1-21**

    P-CSCF forwards the UPDATE request to UE.

Table 7.4.2.1-21: UPDATE (P-CSCF to UE)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

Via: The P-CSCF adds the port number negotiated in the security agreement and the comp=sigcomp parameter to its own entry in the Via header.

22. **200 OK (UE to P-CSCF) – see example in table 7.4.2.1-22**

UE acknowledges the UPDATE request (21) with a 200 OK response.

Table 7.4.2.1-22: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

23. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.2.1-23**

P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.2.1-23: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

24. **200 OK (MT#1a to S-S) – see example in table 7.4.2.1-24**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-24: 200 OK (MT#1a to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

25. **180 Ringing (UE to P-CSCF) – see example in table 7.4.2.1-25**

Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #17 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #20 received by UE). The UE may now immediately accept the session (and proceed with step #34), or alert the destination subscriber of an incoming session attempt; if the latter it indicates this to the calling party by a 180 Ringing provisional response sent to P-CSCF.

Table 7.4.2.1-25: 180 Ringing (UE to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9022
Content-Length: 0
```

26. **180 Ringing (P-CSCF to S-CSCF) – see example in table 7.4.2.1-26**

P-CSCF forwards the 180 Ringing response to S-CSCF.

Table 7.4.2.1-26: 180 Ringing (P-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>,<sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id={{1,1},{1,2}}flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id={{2,1},{2,2}}flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number and the comp=sigcomp parameter from its own entry.

Upon receipt of the 180, the S-CSCF stores the following information about this session, for use in charging – see example in table 7.4.2.1-26b.

Table 7.4.2.1-26b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

27. **180 Ringing (MT#1a to S-S) – see example in table 7.4.2.1-27**

S-CSCF forwards the 180 Ringing response to the originating endpoint, per the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-27: 180 Ringing (MT#1a to S-S)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

28. **PRACK (S-S to MT#1a) – see example in table 7.4.2.1-28**

The originator acknowledges the 180 Ringing response (27) with a PRACK request.

Table 7.4.2.1-28: PRACK (S-S to MT#1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

29. **PRACK (S-CSCF to P-CSCF) – see example in table 7.4.2.1-29**

S-CSCF forwards the PRACK request to P-CSCF.

Table 7.4.2.1-29: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

30. **PRACK (P-CSCF to UE) – see example in table 7.4.2.1-30**

P-CSCF forwards the PRACK request to UE.

Table 7.4.2.1-30: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

Via: The P-CSCF adds the port number negotiated during the security agreement and the parameter comp=sigcomp to its own entry in the Via header.

31. **200 OK (UE to P-CSCF) – see example in table 7.4.2.1-31**

UE acknowledges the PRACK request (31) with a 200 OK response.

Table 7.4.2.1-31: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

32. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.2.1-32**

P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.2.1-32: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Content-Length:
```

Upon receipt of the 200, the S-CSCF stores the following information about this session (unless already done if information received with the 180), for use in charging – see example in table 7.4.2.1-32b.

Table 7.4.2.1-32b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

33. **200 OK (MT#1a to S-S) – see example in table 7.4.2.1-33**

S-CSCF forwards the 200 OK response to the session originator, per the S-CSCF to S-CSCF procedures.

Table 7.4.2.1-33: 200 OK (MT#1a to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

34. **200 OK (UE to P-CSCF) – see example in table 7.4.2.1-34**

When the called party answers the UE sends a 200 OK final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

Table 7.4.2.1-34: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Content-Length: 0
```

35. **Approval of QoS Commit**

The P-CSCF approves the commitment of the QoS resources if it was not approved already in step (9).

36. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.2.1-36**

P-CSCF sends the 200 OK final response to S-CSCF.

Table 7.4.2.1-36: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

P-Access-Network-Info: this header contains information from the UE.

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number and the comp=sigcomp parameter from its own URI.

37. **200 OK (MT#1a to S-S) – see example in table 7.4.2.1-37**

S-CSCF forwards the 200 OK final response along the signalling path back to the session originator, as per the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-37: 200 OK (MT#1a to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

38. **ACK (S-S to MT#1a) – see example in table 7.4.2.1-38**

The calling party responds to the 200 OK final response (37) with an ACK request which is sent to S-CSCF via the S-CSCF to S-CSCF procedure.

Table 7.4.2.1-38: ACK (S-S to MT#1a)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

39. **ACK (S-CSCF to P-CSCF) – see example in table 7.4.2.1-39**

S-CSCF forwards the ACK request to P-CSCF.

Table 7.4.2.1-39: ACK (S-CSCF to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

40. **ACK (P-CSCF to UE) – see example in table 7.4.2.1-40**

P-CSCF forwards the ACK request to UE.

Table 7.4.2.1-40: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.4.3.1 (MT#2) Mobile termination, located in home network (MO#2, S-S#2 assumed)

Figure 7.4.3.1-1 shows a termination procedure which applies to subscribers located in their home service area.

The UE is located in the home network, and determines the P-CSCF via the CSCF discovery procedure. During registration, the home network allocates a S-CSCF in the home network, S-CSCF.

When registration is complete, S-CSCF knows the name/address of P-CSCF, and P-CSCF knows the name/address of the UE.

NOTE: Although S-S#2 flow is assumed, home2.net is used in the Via, Record-Route and Route headers in order to be more generic and clearly identify the originating and terminating nodes. In the S-S#2 scenario home2.net = home1.net.

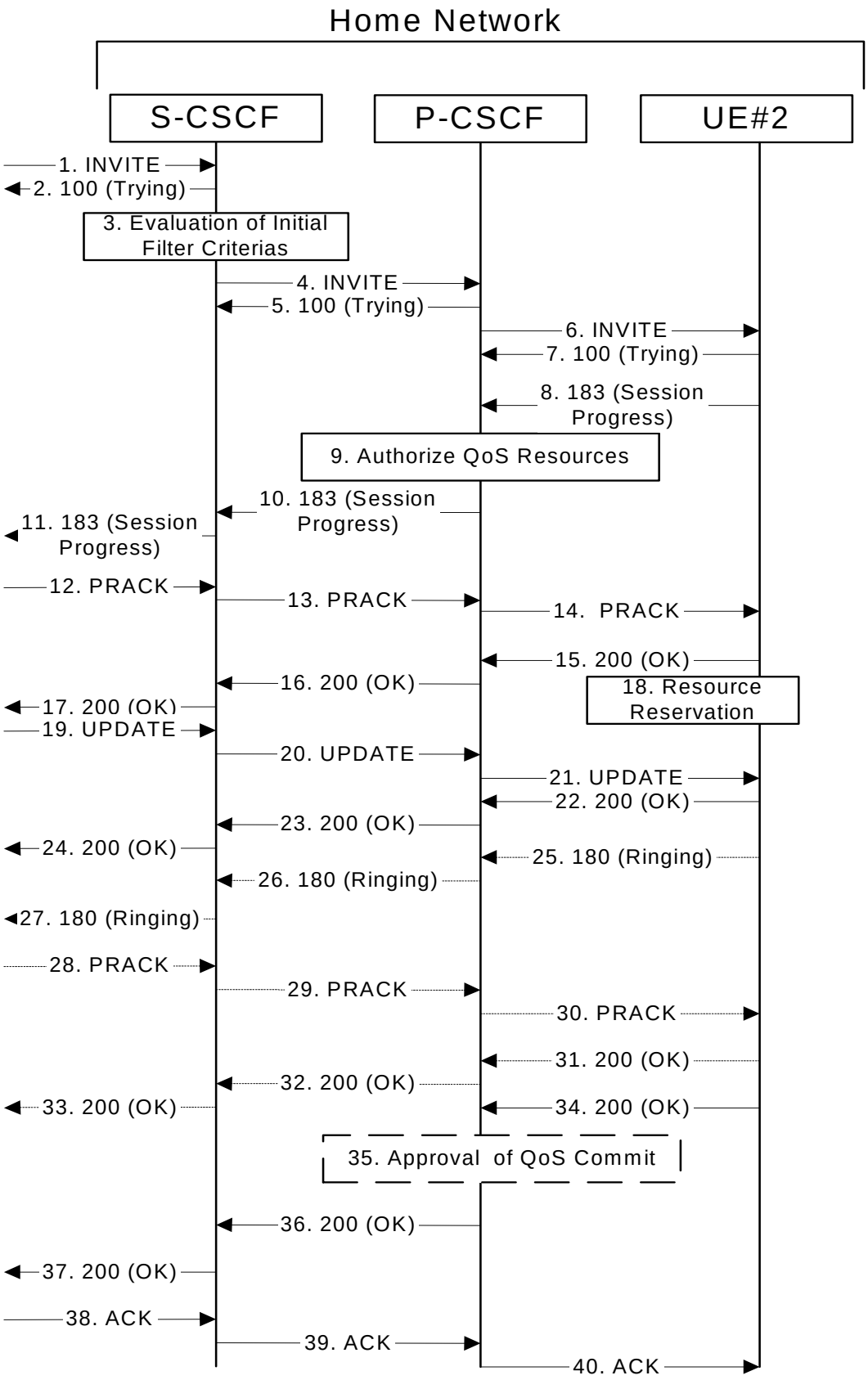

Figure 7.4.3.1-1: MT#2

Procedure MT#2 is as follows:

1. **INVITE (S-S to MT#2) – see example in table 7.4.3.1-1**

   The calling party sends the INVITE request, via one of the origination procedures and via one of the S-CSCF to S-CSCF procedures, to the S-CSCF for the terminating subscriber.

Table 7.4.3.1-1: INVITE (S-S to MT#2)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home1.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:99 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

   Upon receipt of the INVITE, the S-CSCF stores the following information about this session, for use in providing enhanced services, charging or in possible error recovery actions – see example in table 7.4.3.1-1b.

Table 7.4.3.1-1b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

2. **100 Trying (MT#2 to S-S) – see example in table 7.4.3.1-2**

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

Table 7.4.3.1-2: 100 Trying (MT#2 to S-S)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criterias**

   S-CSCF validates the service profile of this subscriber, and evaluates the initial filter criterias.

4. **INVITE (S-CSCF to P-CSCF) – see example in table 7.4.3.1-4**

   S-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE request to the P-CSCF.

Table 7.4.3.1-4: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.home2.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length:

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

Route: Built from the Path header stored at registration.

P-Called-Party-ID: Includes the dialled URL with its parameters.

Via:, Record-Route: S-CSCF adds itself in the Record-Route and Via headers.

P-CSCF saves information from the received INVITE request. The saved value of the information for this session is – see example in table 7.4.3.1-4b.

Table 7.4.3.1-4b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

5. **100 Trying (P-CSCF to S-CSCF) – see example in table 7.4.3.1-5**

P-CSCF responds to the INVITE request (4) with a 100 Trying provisional response.

Table 7.4.3.1-5: 100 Trying (P-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **INVITE (P-CSCF to UE) – see example in table 7.4.3.1-6**

Table 7.4.3.1-6: INVITE (P-CSCF to UE)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID:
P-Media-Authorization:
   00200001001001017064663 22e686f6d65312e6e6574000c02013331533134363231
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.home1.net" with credentials "31S14621".

Record-Route: The P-CSCF adds the port number negotiated in the security agreement and the comp=sigcomp parameter to its own SIP URI.

Via: The P-CSCF adds the port number negotiated in the security agreement and the comp=sigcomp parameter to its own entry.

7. **100 Trying (UE to P-CSCF) – see example in table 7.4.3.1-7**

UE may optionally send a 100 Trying provisional response to P-CSCF.

Table 7.4.3.1-7: 100 Trying (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **183 Session Progress (UE to P-CSCF) – see example in table 7.4.3.1-8**

UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE request.

UE responds with a 183 Session Progress response containing SDP back to the originator. This response is sent to P-CSCF.

Table 7.4.3.1-8: 183 Session Progress (UE to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

To: A tag is added to the To header.

Contact: Contains a SIP URI with the IP address or FQDN of the terminating UE.

SDP The SDP contains the subset of codecs supported by UE. It requests a confirmation of the QoS preconditions for establishing the session.

Upon receipt of the 183 Session Progress, the P-CSCF stores the following information about this session, for use in providing enhanced services or in possible error recovery actions – see example in table 7.4.3.1-8b.

Table 7.4.3.1-8b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

9. **Authorize QoS Resources**

P-CSCF authorizes the resources necessary for this session. The approval of QoS commitment either happens at this stage or after 200 OK of INVITE (34) based on operator local policy.

10. **183 Session Progress (P-CSCF to S-CSCF) – see example in table 7.4.3.1-10**

P-CSCF forwards the 183 Session Progress response to S-CSCF.

Table 7.4.3.1-10: 183 Session Progress (P-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7)
Record-Route: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

P-Asserted-Identity: P-CSCF inserts the default SIP URI of the user in the P-Asserted-Identity header field.

Record-Route: The P-CSCF rewrites the Record-Route header to remove the port number and the comp=sigcomp parameter from its own SIP URI

Upon receipt of the 183 Session Progress, the S-CSCF stores the following information about this session, for use in providing enhanced services or in possible error recovery actions – see example in table 7.4.3.1-10b.

Table 7.4.3.1-10b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.home2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

11. **183 Session Progress (MT#2 to S-S) – see example in table 7.4.3.1-11**

S-CSCF forwards the 183 Session Progress response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-11: 183 Session Progress (MT#2 to S-S)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the terminating Inter Operator Identifier (IOI) parameter of this header and puts back the originating IOI parameter.

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

12. **PRACK (S-S to MT#2) – see example in table 7.4.3.1-12**

The originating endpoint sends a PRACK request containing the final SDP to be used in this session, via the S-CSCF to S-CSCF procedure, to S-CSCF.

Table 7.4.3.1-12: PRACK (S-S to MT#2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

13. **PRACK (S-CSCF to P-CSCF) – see example in table 7.4.3.1-13**

S-CSCF forwards the PRACK request to P-CSCF.

Table 7.4.3.1-13: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

14. **PRACK (P-CSCF to UE) – see example in table 7.4.3.1-14**

    P-CSCF forwards the PRACK request to UE.

Table 7.4.3.1-14: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

15. **200 OK (UE to P-CSCF) – see example in table 7.4.3.1-15**

    UE acknowledges the PRACK request (14) with a 200 OK response.

Table 7.4.3.1-15: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

16. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.3.1-16**

    P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.3.1-16: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

17. **200 OK (MT#2 to S-S) – see example in table 7.4.3.1-17**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-17: 200 OK (MT#2 to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

18. **Resource Reservation**

    UE initiates the reservation procedures for the resources needed for this session.

19. **UPDATE (S-S to MT#2) – see example in table 7.4.3.1-19**

    When the originating endpoint has completed its resource reservation, it sends the UPDATE request to S-CSCF, via the S-CSCF to S-CSCF procedures.

Table 7.4.3.1-19: UPDATE (S-S to MT#2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

20. **UPDATE (S-CSCF to P-CSCF) – see example in table 7.4.3.1-20**

S-CSCF forwards the UPDATE request to P-CSCF.

Table 7.4.3.1-20: UPDATE (S-CSCF to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
Content-Type:
Content-Length:

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

21. **UPDATE (P-CSCF to UE) – see example in table 7.4.3.1-21**

    P-CSCF forwards the UPDATE request to UE.

Table 7.4.3.1-21: UPDATE (P-CSCF to UE)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

22. **200 OK (UE to P-CSCF) – see example in table 7.4.3.1-22**

UE acknowledges the UPDATE request (21) with a 200 OK response.

Table 7.4.3.1-22: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

23. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.3.1-23**

P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.3.1-23: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

24. **200 OK (MT#2 to S-S) – see example in table 7.4.3.1-24**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-24: 200 OK (MT#2 to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

25. **180 Ringing (UE to P-CSCF) – see example in table 7.4.3.1-25**

Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #17 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #20 received by UE). The UE may now immediately accept the session (and proceed with step #34), or alert the destination subscriber of an incoming session attempt; if the latter it indicates this to the calling party by a 180 Ringing provisional response sent to P-CSCF.

Table 7.4.3.1-25: 180 Ringing (UE to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Require:
Contact: <sip:[5555::eee:fff:aaa:bbb]>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9022
Content-Length: 0
```

26. **180 Ringing (P-CSCF to S-CSCF) – see example in table 7.4.3.1-26**

P-CSCF forwards the 180 Ringing response to S-CSCF.

Table 7.4.3.1-26: 180 Ringing (P-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to remove the port number and the comp=sigcomp parameter from its own SIP URI

Upon receipt of the 180, the S-CSCF stores the following information about this session, for use in charging – see example in table 7.4.3.1-26b.

Table 7.4.3.1-26b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.home2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

27. **180 Ringing (MT#2 to S-S) – see example in table 7.4.3.1-27**

S-CSCF forwards the 180 Ringing response to the originating endpoint, per the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-27: 180 Ringing (MT#2 to S-S)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

28. **PRACK (S-S to MT#2) – see example in table 7.4.3.1-28**

The originator acknowledges the 180 Ringing response (27) with a PRACK request.

Table 7.4.3.1-28: PRACK (S-S to MT#2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip: scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

29. **PRACK (S-CSCF to P-CSCF) – see example in table 7.4.3.1-29**

S-CSCF forwards the PRACK request to P-CSCF.

Table 7.4.3.1-29: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

30. **PRACK (P-CSCF to UE) – see example in table 7.4.3.1-30**

P-CSCF forwards the PRACK request to UE.

Table 7.4.3.1-30: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

31. **200 OK (UE to P-CSCF) – see example in table 7.4.3.1-31**

UE acknowledges the PRACK request (31) with a 200 OK response.

Table 7.4.3.1-31: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

32. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.3.1-32**

P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.4.3.1-32: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Content-Length:
```

Upon receipt of the 200, the S-CSCF stores the following information about this session (unless already done if information received with the 180), for use in charging – see example in table 7.4.3.1-32b.

Table 7.4.3.1-32b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.home2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

33. **200 OK (MT#2 to S-S) – see example in table 7.4.3.1-33**

S-CSCF forwards the 200 OK response to the session originator, per the S-CSCF to S-CSCF procedures.

Table 7.4.3.1-33: 200 OK (MT#2 to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

34. **200 OK (UE to P-CSCF) – see example in table 7.4.3.1-34**

When the called party answers, the UE sends a 200 OK final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

Table 7.4.3.1-34: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Content-Length: 0
```

35. **Approval of QoS Commit**

The P-CSCF approves the commitment of the QoS resources if it was not approved already in step (9).

36. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.3.1-36**

P-CSCF indicates the resources reserved for this session should now be committed, and sends the 200 OK final response to S-CSCF.

Table 7.4.3.1-36: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP icscf2_s.home2.net,
   SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to remove the port number and the comp=sigcomp parameter from its own SIP URI

37. **200 OK (MT#2 to S-S) – see example in table 7.4.3.1-37**

S-CSCF forwards the 200 OK final response along the signalling path back to the session originator, as per the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-37: 200 OK (MT#2 to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1,SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

38. **ACK (S-S to MT#2) – see example in table 7.4.3.1-38**

The calling party responds to the 200 OK final response (37) with an ACK request which is sent to S-CSCF via the S-CSCF to S-CSCF procedure.

Table 7.4.3.1-38: ACK (S-S to MT#2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

39. **ACK (S-CSCF to P-CSCF) – see example in table 7.4.3.1-39**

S-CSCF forwards the ACK request to P-CSCF.

Table 7.4.3.1-39: ACK (S-CSCF to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

40. **ACK (P-CSCF to UE) – see example in table 7.4.3.1-40**

P-CSCF forwards the ACK request to UE.

Table 7.4.3.1-40: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

7.5.2 Sample multimedia signalling flow - addition of further media - originator and terminator are both roaming and operated by different networks

Figure 7.5.2-1 shows a multimedia signalling flow for the addition of another media where the originator and terminator are both roaming and operated by different networks. Both networks are without I-CSCF providing configuration independence. The UE has already established an IM session carrying voice and is generating an INVITE request to add video media to the already established IM session.

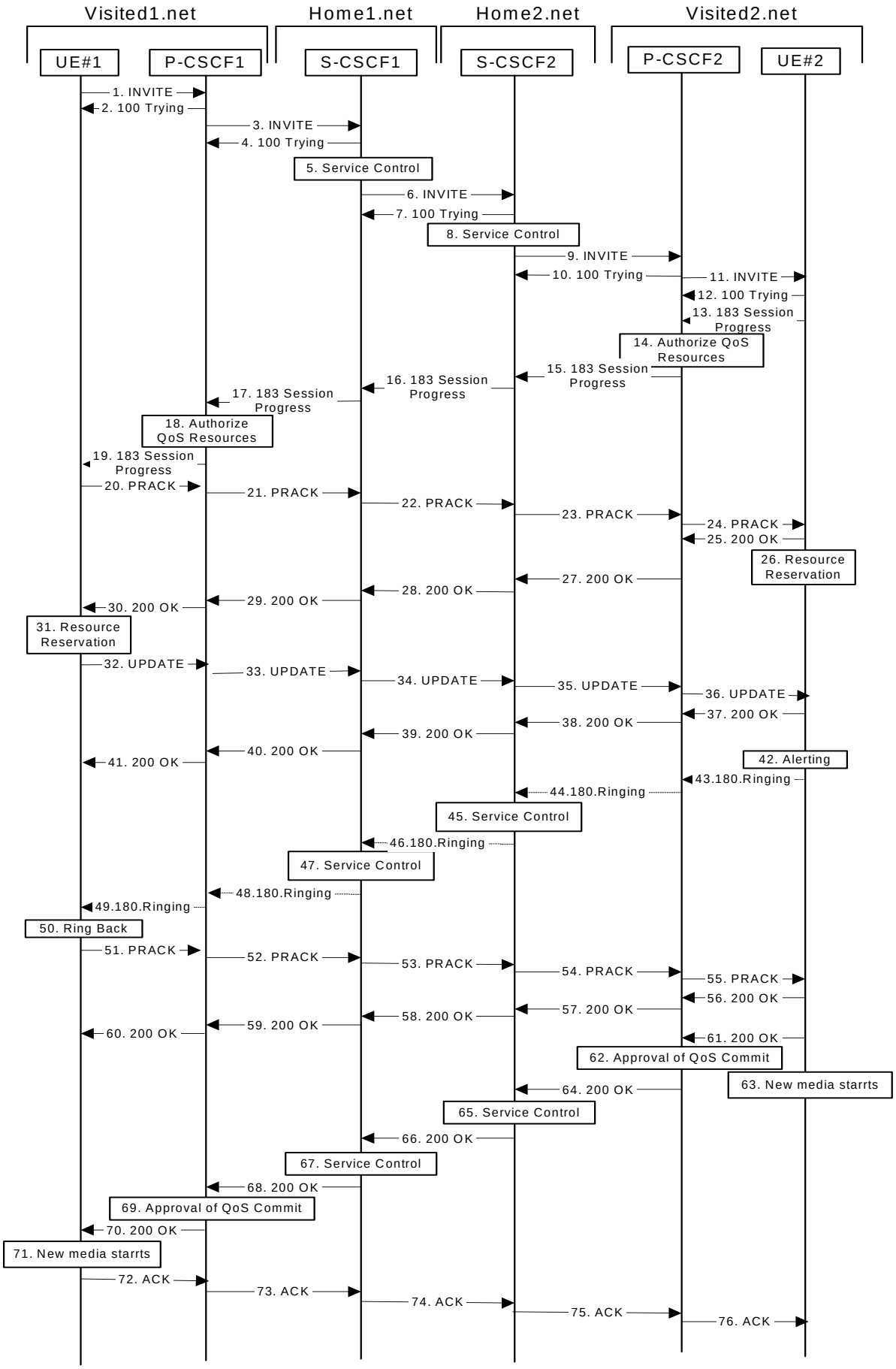

Figure 7.5.2-1: Sample multimedia signalling flow - addition of further media

1. **INVITE (UE1 to P-CSCF1) – see example in table 7.5.2-1**

   UE#1 sends a SIP INVITE request, containing new SDP for the new video media and including the original SDP, to P-CSCF1, which is pcscf1.visited1.net in its visited network.

Table 7.5.2-1 INVITE (UE1 to P-CSCF1)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Preferred-Identity: "John Doe" <tel:+1-212-555-1111>
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 132 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933618 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=rtpmap:96 telephone-event
m=application 32416 udp wb
b=AS:10
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
```

Request-URI: Contains the international E.164 number from the user.

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

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

P-Preferred-Identity: The user provides a hint about the identity to be used for this session.

Cseq: Is a random starting number.

Contact: Is the SIP URI that contains the IP address or FQDN of the originating UE.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

2. **100 Trying (P-CSCF1 to UE1) - see example in table 7.5.2-2**

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

Table 7.5.2-2: 100 Trying (P-CSCF1 to UE1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **INVITE (P-CSCF1 to S-CSCF1) - see example in table 7.5.2-3**

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

The INVITE request is sent by the P-CSCF to the next hop scscf1.home1.net, which is in UE's home network. Because this a re-invite, so the I-CSCF1 is not involved in sip transaction.

Table 7.5.2-3: INVITE (P-CSCF1 to S-CSCF1)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Record-Route: <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

P-Access-Network-Info: This header contains information from the UE.

4. **100 Trying (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-4**

   S-CSCF sends the 100 Trying provisional response to P-CSCF.

Table 7.5.2-4: 100 Trying (S-CSCF1 to P-CSCF1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

5. **Evaluation of initial filter criterias**

   S-CSCF#1 validates the service profile of this subscriber and evaluates the initial filter criterias.

6. **INVITE (S-CSCF1 to S-CSCF2) - see example in table 7.5.2-6**

   S-CSCF#1 sends the INVITE request to UE's serving CSCF-scscf2.home2.net, which is in the callee (UE2)'s home network. Because this is a re-invite, so the I-CSCF2 is not involved in the sip transaction.

Table 7.5.2-6: INVITE (S-CSCF1 to S-CSCF2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
Content-Type:
Content-Length: (…)

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

7. **100 Trying (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-7**

   S-CSCF1 receives a 100 Trying provisional response, as specified by the S-CSCF to S-CSCF procedures.

Table 7.5.2-7: 100 Trying (S-CSCF2 to S-CSCF1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **Evaluation of initial filter criterias**

   S-CSCF2 validates the service profile of this subscriber and evaluates the initial filter criterias.

9. **INVITE (S-CSCF2 to P-CSCF2) - see example in table 7.5.2-9**

S-CSCF2 forwards the INVITE request tocallee's P-CSCF pcscf2.visited2.net which is in the UE2's visited network, called visited2.net

Table 7.5.2-9: INVITE (S-CSCF2 to P-CSCF2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length: (…)

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

10. **100 Trying (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-10**

P-CSCF sends a 100 Trying provisional response back to S-CSCF2.

Table 7.5.2-10: 100 Trying (P-CSCF2 to S-CSCF2)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

11. **INVITE (P-CSCF2 to UE2) - see example in table 7.5.2-11**

Table 7.5.2-11: INVITE (P-CSCF2 to UE2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Media-Authorization:
   00200001001001017064663322e76697369746564322e6e6574000c020133315331343363233
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Allow:
P-Called-Party-ID:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.visited2.net" with credentials "31S14623".

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its Via header.

Record-Route: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own URI.

12. **100 Trying (UE2 to P-CSCF2) - see example in table 7.5.2-12**

P-CSCF receives a 100 Trying provisional response back to S-CSCF2.

Table 7.5.2-12: 100 Trying (UE2 to P-CSCF2)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bKert23.8, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

13. **183 Session Progress (UE2 to P-CSCF2) - see example in table 7.5.2-13**

The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response.

Table 7.5.2-13: 183 Session Progress response (UE2 to P-CSCF2)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9022
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933626 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=rtpmap:96 telephone-event
m=application 61423 udp wb
b=AS:10
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
```

14. **Authorize QoS Resources**

P-CSCF2 authorizes the resources necessary for this new media.

15. **183 Session Progress (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-15**

P-CSCF2 forwards the 183 Session Progress response to S-CSCF2.

Table 7.5.2-15: 183 Session Progress (P-CSCF2 to S-CSCF2)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: <sip:user2_public1@home2.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

Record-Route: The P-CSCF rewrites the Record-Route header to remove the port number and the comp=sigcomp parameter from its own SIP URI.

16. **183 Session Progress (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-16**

S-CSCF2 forwards the 183 Session Progress response to caller's S-CSCF.

Table 7.5.2-16: 183 Session Progress (S-CSCF2 to S-CSCF1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

17. **183 Session Progress (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-17**

S-CSCF1 forwards the 183 Session Progress response to the caller's P-CSCF.

Table 7.5.2-17: 183 Session Progress (S-CSCF1 to P-CSCF1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

18. **Authorize QoS Resources**

    P-CSCF1 authorizes the resources necessary for this new media.

19. **183 Session Progress (P-CSCF1 to UE1) - see example in table 7.5.2-19**

    P-CSCF forwards the 183 Session Progress response to the originating endpoint.

Table 7.5.2-19: 183 Session Progress (P-CSCF1 to UE1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Media-Authorization:
   00200001001001017064663l2e76697369746564312e6e6574000c02013942563330373400
P-Asserted-Identity:
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
Allow:
RSeq:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.visited1.net" with credentials "9BV3074".

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated in the security agreement and the comp=sigcomp parameter to its own SIP URI.

20. **PRACK (UE1 to P-CSCF1) - see example in table 7.5.2-20**

The originating endpoint sends a PRACK request. This request does not contains SDP, because the previous SDP offer answer contain just one codec per media stream.

Table 7.5.2-20: PRACK (UE1 to P-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 133 PRACK
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
RAck: 9022 132 INVITE
Content-Length: 0
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

21. **PRACK (P-CSCF1 to S-CSCF1) - see example in table 7.5.2-21**

The P-CSCF1 forwards the PRACK request to S-CSCF1.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 7.5.2-21: PRACK (P-CSCF1 to S-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require: precondition
RAck:
Content-Length:
```

22. **PRACK (S-CSCF1 to S-CSCF2) - see example in table 7.5.2-22**

S-CSCF1 forwards the PRACK request to S-CSCF2.

Table 7.5.2-22: PRACK (S-CSCF1 to S-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

23. **PRACK (S-CSCF2 to P-CSCF2) - see example in table 7.5.2-23**

S-CSCF2 forwards the PRACK request to P-CSCF2.

Table 7.5.2-23: PRACK (S-CSCF2 to P-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

24. **PRACK (P-CSCF2 to UE2) - see example in table 7.5.2-24**

P-CSCF2 forwards the PRACK request to callee UE2.

Table 7.5.2-24: PRACK (P-CSCF2 to UE2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

25. **200 OK (UE2 to P-CSCF2) - see example in table 7.5.2-25**

UE acknowledges the PRACK request with a 200 OK response.

Table 7.5.2-25: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
RAck:
Content-Length:
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

26. **Resource Reservation**

UE2 initiates the reservation procedures for the new media.

27. **200 OK (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-27**

P-CSCF forwards the 200 OK response to S-CSCF.

Table 7.5.2-27: 200 OK (P-CSCF2 to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

28. **200 OK (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-28**

S-CSCF2 forwards the 200 OK response to the originator's S-CSCF, sip:scscf1.home1.net.

Table 7.5.2-28: 200 OK (S-CSCF2 to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

29. **200 OK (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-29**

S-CSCF1 forwards the 200 OK response to the originator's P-CSCF1.

Table 7.5.2-29: 200 OK (S-CSCF1 to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

30. **200 OK (P-CSCF1 to UE1) - see example in table 7.5.2-30**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.5.2-30: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

31. **Resource Reservation**

UE1 initiates the reservation procedures for the new media.

32. **UPDATE (UE1 to P-CSCF1) - see example in table 7.5.2-32**

When the resource reservation is completed, UE sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request. The request is sent first to P-CSCF.

Table 7.5.2-32: UPDATE (UE1 to P-CSCF1)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 134 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933619 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=rtpmap:96 telephone-event
m=application 32416 udp wb
b=AS:10
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

33. **UPDATE (P-CSCF1 to S-CSCF1) - see example in table 7.5.2-33**

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

The P-CSCF1 forwards the UPDATE request to S-CSCF1.

Table 7.5.2-33: UPDATE (P-CSCF1 to S-CSCF1)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length: (…)

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

34. **UPDATE (S-CSCF1 to S-CSCF2) - see example in table 7.5.2-34**

S-CSCF1 forwards the UPDATE request to S-CSCF2.

Table 7.5.2-34: UPDATE (S-CSCF1 to S-CSCF2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length: (…)

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

35. **UPDATE (S-CSCF2 to P-CSCF2) - see example in table 7.5.2-35**

S-CSCF2 forwards the UPDATE request to P-CSCF2.

Table 7.5.2-35: UPDATE (S-CSCF2 to P-CSCF2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Type:
Content-Length:

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

36. **UPDATE (P-CSCF2 to UE2) - see example in table 7.5.2-36**

    P-CSCF forwards the UPDATE request to UE2.

Table 7.5.2-36: UPDATE (P-CSCF2 to UE2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

37. **200 OK (UE2 to P-CSCF2) - see example in table 7.5.2-37**

UE acknowledges the UPDATE request with a 200 OK response.

Table 7.5.2-37: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

v=0
o=- 2987933623 2987933627 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=rtpmap:96 telephone-event
m=application 61423 udp wb
b=AS:10
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
```

38. **200 OK (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-38**

P-CSCF2 forwards the 200 OK response to S-CSCF2.

Table 7.5.2-38: 200 OK (P-CSCF2 to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

39. **200 OK (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-39**

S-CSCF2 forwards the 200 OK response to the originator's serving CSCF.

Table 7.5.2-39: 200 OK (S-CSCF2 to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

40. **200 OK (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-40**

S-CSCF1 forwards the 200 OK response to the P-CSCF1.

Table 7.5.2-40: 200 OK (S-CSCF1 to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

41. **200 OK (P-CSCF1 to UE1) - see example in table 7.5.2-41**

P-CSCF1 forwards the 200 OK response to UE1.

Table 7.5.2-41: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

42. **Alerting**

UE#2 may optionally delay the session establishment in order to alert the subscriber to the incoming additional media.

43. **180 Ringing (UE2 to P-CSCF2) – see example in table 7.5.2-43**

Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #26 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #31 received by UE). The UE may now immediately accept the session or alert the destination subscriber of an incoming session attempt; if the latter it indicates this to the calling party by a 180 Ringing provisional response sent to P-CSCF.

Table 7.5.2-43: 180 Ringing (UE2 to P-CSCF2)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Require: 100rel
From:
To:
Call-ID:
CSeq:
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
RSeq: 9023
Content-Length: 0
```

44. **180 Ringing (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-44**

P-CSCF2 forwards the 180 Ringing response to S-CSCF2.

Table 7.5.2-44: 180 Ringing (P-CSCF2 to S-CSCF2)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
Record-Route: <sip:pcscf2.visited2.net:5088;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
Require:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
RSeq:
Content-Length:
```

45. **180 Ringing (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-45**

S-CSCF forwards the 180 Ringing response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.5.2-45: 180 Ringing (S-CSCF2 to S-CSCF1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Require:
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
RSeq:
Content-Length:
```

46. **180 Ringing (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-46**

S-CSCF1 forwards the 180 Ringing response to the P-CSCF1.

Table 7.5.2-46: 180 Ringing (S-CSCF1 to P-CSCF1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Require:
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
RSeq:
Content-Length:
```

47. **180 Ringing (P-CSCF1 to UE1) - see example in table 7.5.2-47**

P-CSCF forwards the 180 Ringing response to the UE1.

Table 7.5.2-47: 180 Ringing (P-CSCF1 to UE1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Require:
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated during the security agreement and the comp=sigcomp parameter to its own SIP URI.

48. **Ringback**

UE1 indicates to the originator that the media addition is being delayed due to alerting. Typically this involves playing a ringback sequence.

49. **PRACK (UE1 to P-CSCF1) - see example in table 7.5.2-49**

The originating endpoint sends a PRACK request for the Ringing response to the terminator.

Table 7.5.2-49: PRACK (UE1 to P-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Cseq: 135 PRACK
RAck: 9023 132 INVITE
Content-Length: 0
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

50. **PRACK (P-CSCF1 to S-CSCF1) - see example in table 7.5.2-50**

The P-CSCF1 forwards the PRACK request to S-CSCF1.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 7.5.2-50: PRACK (P-CSCF1 to S-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

51. **PRACK (S-CSCF1 to S-CSCF2) - see example in table 7.5.2-51**

S-CSCF1 forwards the PRACK request to S-CSCF2.

Table 7.5.2-51: PRACK (S-CSCF1 to S-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length: 0
```

52. **PRACK (S-CSCF2 to P-CSCF2) - see example in table 7.5.2-52**

S-CSCF2 forwards the PRACK request to P-CSCF2.

Table 7.5.2-52: PRACK (S-CSCF2 to P-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

53. **PRACK (P-CSCF2 to UE2) - see example in table 7.5.2-53**

P-CSCF2 forwards the PRACK request to callee UE2.

Table 7.5.2-53: PRACK (P-CSCF2 to UE2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

54. **200 OK (UE2 to P-CSCF2) - see example in table 7.5.2-54**

UE2 acknowledges the PRACK request with a 200 OK response.

Table 7.5.2-54: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

55. **200 OK (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-55**

P-CSCF2 forwards the 200 OK response to S-CSCF2.

Table 7.5.2-55: 200 OK (P-CSCF2 to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

56. **200 OK (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-56**

S-CSCF2 forwards the 200 OK response to the originator's serving CSCF.

Table 7.5.2-56: 200 OK (S-CSCF2 to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

57. **200 OK (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-57**

S-CSCF1 forwards the 200 OK response to the P-CSCF1.

Table 7.5.2-57: 200 OK (S-CSCF1 to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

58. **200 OK (P-CSCF1 to UE1) - see example in table 7.5.2-58**

P-CSCF1 forwards the 200 OK response to UE1.

Table 7.5.2-58: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

59. **200 OK (UE2 to P-CSCF2) - see example in table 7.5.2-59**

UE acknowledges the INVITE request with a 200 (OK) response.

Table 7.5.2-59: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 132 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE
Content-Length: 0
```

60. **Approval of QoS Commit**

P-CSCF2 approves the commitment of the QoS resources for this additional media

61. **New media can start here**

62. **200 OK (P-CSCF2 to S-CSCF2) - see example in table 7.5.2-62**

P-CSCF2 forwards the 200 OK response to S-CSCF2.

Table 7.5.2-62: 200 OK (P-CSCF2 to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-
   id=3[1], pdp-item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

63. **200 OK (S-CSCF2 to S-CSCF1) - see example in table 7.5.2-63**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.5.2-63: 200 OK (S-CSCF2 to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

64. **200 OK (S-CSCF1 to P-CSCF1) - see example in table 7.5.2-64**

S-CSCF1 forwards the 200 OK response to the P-CSCF1.

Table 7.5.2-64: 200 OK (S-CSCF1 to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

65. **Approval of QoS Commit**

P-CSCF1 approves the commitment of the QoS resources for this additional media.

66. **200 OK (P-CSCF1 to UE1) - see example in table 7.5.2-66**

P-CSCF forwards the 200 OK response to the UE1.

Table 7.5.2-66: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Allow:
Content-Length:
```

67. **New media can start here**

68. **ACK (UE1 to P-CSCF1) - see example in table 7.5.2-68**

UE1 forwards the ACK request to P-CSCF1.

Table 7.5.2-68: ACK (UE1 to P-CSCF1)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 132 ACK
Content-Length: 0
```

69. **ACK (P-CSCF1 to S-CSCF1) - see example in table 7.5.2-69**

P-CSCF1 forwards the ACK request to S-CSCF1.

Table 7.5.2-69: ACK (P-CSCF1 to S-CSCF1)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

70. **ACK (S-CSCF1 to S-CSCF2) - see example in table 7.5.2-70**

S-CSCF1 forwards the ACK request to S-CSCF2.

Table 7.5.2-70: ACK (S-CSCF1 to S-CSCF2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

71. **ACK (S-CSCF2 to P-CSCF2) - see example in table 7.5.2-71**

S-CSCF2 forwards the ACK request to P-CSCF2.

Table 7.5.2-71: ACK (S-CSCF2 to P-CSCF2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

72. **ACK (P-CSCF2 to UE2) - see example in table 7.5.2-72**

P-CSCF forwards the ACK request to UE2.

Table 7.5.2-72: ACK (P-CSCF2 to UE2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

10.3.3 Codec or media flow change requiring new resources and/or authorisation

After the multimedia session is established, it is possible for either endpoint to change the set of media flows or codec for a media flow. If the change requires additional resources beyond those previously signalled or reserved, then it is necessary to perform the resource reservation and bearer establishment procedures. If the reservation request fails for whatever reason, the original multimedia session remains in progress.

An example signalling flow for a codec or media flow change requiring new resources and/or authorization is given in figure 10.3.3-1. This example shows mobile originated while in home network, establishing a session with another mobile served by the same network operator, also in its home network (MO#2, S-S#2, MT#2). Other configurations may include I-CSCFs in the signalling path; procedures at the I-CSCFs are identical to those described for the BYE, PRACK, and UPDATE requests and responses described in other clauses.

As this flow may require user interaction at the remote end to accept the proposed changes, it is realized with a re-INVITE request.

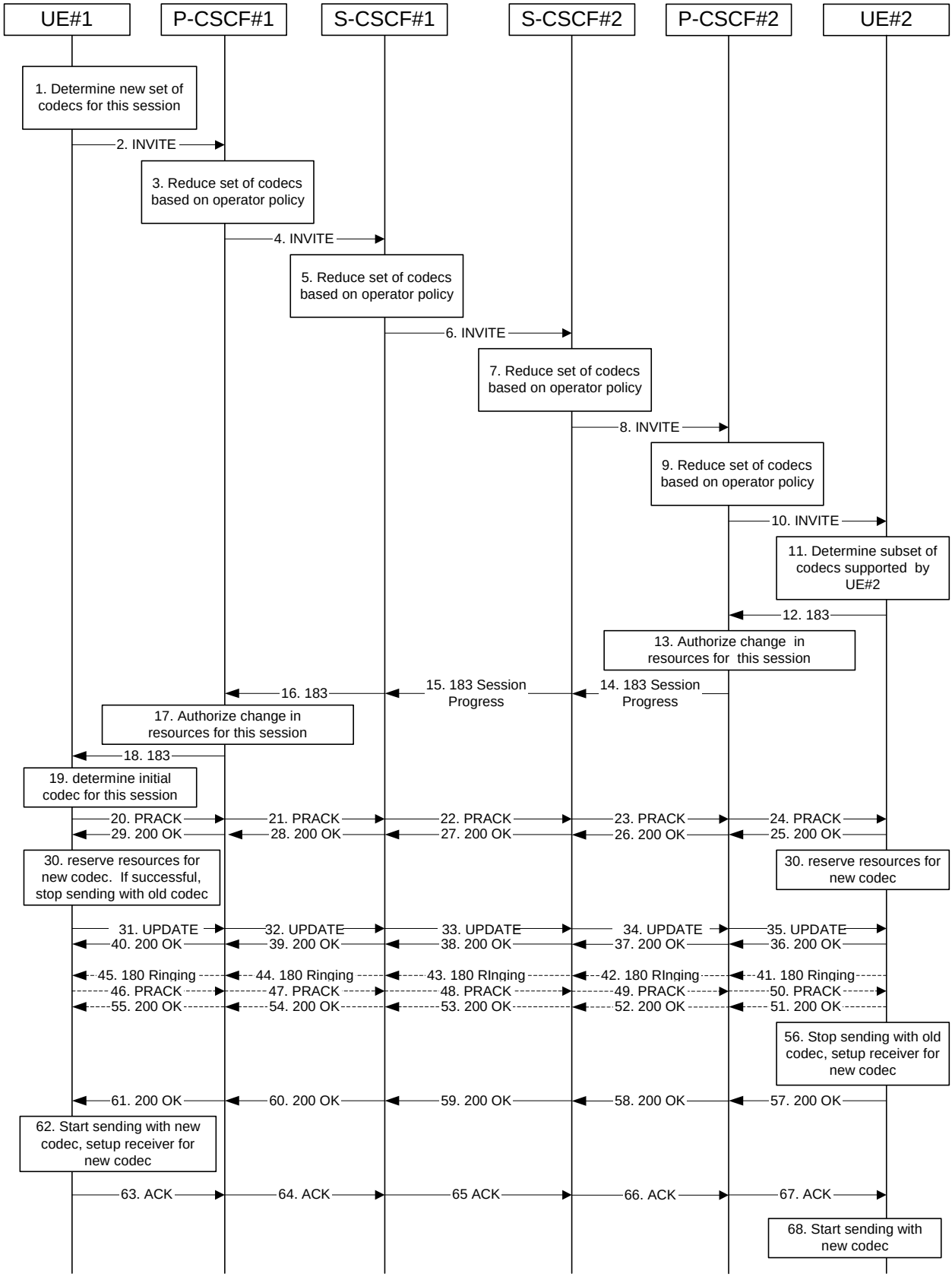

Figure 10.3.3-1: Codec or media flow change - new reservation

The detailed procedure is as follows:

1. **Determine new set of codecs for this session**

   UE#1 determines the revised set of codecs or media streams that it is wishes to support for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.

   For this example, assume UE#1 originally established the session using audio (AMR) only, and now wishes to change to stereo (using the L16 2-channel codec, RTP/AVP code 10) and add an additional video media stream (MPV).

2. **INVITE (UE to P-CSCF) – see example in table 10.3.3-2**

   UE#1 sends the INVITE request to P-CSCF#1 containing this SDP.

Table 10.3.3-2: INVITE (UE to P-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Preferred-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 131 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
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
t=907165275 0
m=video 3400 RTP/AVP 99
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:99:MPV
m=audio 3456 RTP/AVP 10
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
```

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.

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

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 SIP URI that contains the IP address or FQDN of the originating UE.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

SDP The SDP contains the revised set of codecs desired by UE#1.

3. **P-CSCF reduces set of supported codecs based on operator policy**

   P-CSCF#1 examines the media parameters, and removes any choices that the network operator decides based on local policy, not to allow on the network.

4. **INVITE (P-CSCF to S-CSCF) – see example in table 10.3.3-4**

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

   The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 10.3.3-4: INVITE (P-CSCF to S-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

5. **S-CSCF reduces set of supported codecs based on operator policy**

   S-CSCF#1 examines the media parameters, and removes any choices that the subscriber does not have authority to request.

6. **INVITE (S-CSCF to S-CSCF) – see example in table 10.3.3-6**

   S-CSCF#1 forwards the INVITE request, through the S-CSCF to S-CSCF signalling flow procedures, to S-CSCF#2.

Table 10.3.3-6: INVITE (S-CSCF to S-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

7. **S-CSCF reduces set of supported codecs based on operator policy**

   S-CSCF#2 examines the media parameters, and removes any choices that the destination subscriber does not have authority to request.

8. **INVITE (S-CSCF to P-CSCF) – see example in table 10.3.3-8**

   S-CSCF#3 forwards the INVITE request to P-CSCF#2.

Table 10.3.3-8: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>
Route: <sip:pcscf2.home2.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

9. **P-CSCF reduces set of supported codecs based on operator policy**

   P-CSCF#2 examines the media parameters, and removes any that the network operator decides, based on local policy, not to allow on the network.

10. **INVITE (P-CSCF to UE) – see example in table 10.3.3-10**

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

Table 10.3.3-10: INVITE (P-CSCF to UE)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK556g98.5, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Media-Authorization:
   00200001001001017064663 22e686f6d65322e6e6574000c020133315331343363231
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.home2.net" with credentials "31S14621".

11. **Determine set of codecs supported by UE#2**

    UE#2 determines the set of codecs that it is capable of supporting for this session.

    For this example, assume UE#2 supports all those requested by UE#1.

12. **183 Session Progress (UE to P-CSCF) – see example in table 10.3.3-12**

    UE#2 returns a 183 Session Progress response, containing the SDP answer, to P-CSCF#2.

Table 10.3.3-12: 183 Session Progress (UE to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK556g98.5, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Preferred-Identity: "John Smith" <tel:+1-212-555-2222>
Privacy: none
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 18
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933615 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907165275 0
m=video 6540 RTP/AVP 99
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:99:MPV
m=audio 6544 RTP/AVP 10
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

SDP The SDP contains an answer to the received offer.

13. **Authorize resources for common codecs for this session**

P-CSCF#2 authorises the QoS resources for the common media flows and codec choices.

14. **183 Session Progress (P-CSCF to S-CSCF) - see example in table 10.3.3-14**

P-CSCF#2 forwards the 183 Session Progress response to S-CSCF#2.

Table 10.3.3-14: 183 Session Progress (P-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
Record-Route:
P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

15. **183 Session Progress (S-CSCF to S-CSCF) – see example in table 10.3.3-15**

S-CSCF#2 forwards the 183 Session Progress response to S-CSCF#1.

Table 10.3.3-15: 183 Session Progress (S-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

16. **183 Session Progress (S-CSCF to P-CSCF) – see example in table 10.3.3-16**

S-CSCF#1 forwards the 183 Session Progress response to P-CSCF#1.

Table 10.3.3-16: 183 Session Progress (S-CSCF to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

17. **Authorize resources for common codecs for this session**

    P-CSCF#1 authorises the QoS resources for the remaining media flows and codec choices.

18. **183 Session Progress (P-CSCF to UE) – see example in table 10.3.3-18**

    P-CSCF#1 forwards the 183 Session Progress response to UE#1.

Table 10.3.3-18: 183 Session Progress (P-CSCF to UE)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
P-Asserted-Identity:
Privacy:
P-Media-Authorization:
   00200001001001017064663l2e686f6d65312e6e6574000c02013942563330373200
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.home1.net" with credentials "9BV3072".

19. **Determine revised codec(s) for this session**

    UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was any change in media flows, or if there was more than one choice of codec for a media flow, then UE#1 must include an SDP in the PRACK request sent to UE#2.

    For this example, assume UE#1 chooses L10 for stereo audio and MPV for video, so no changes are made to the SDP.

20. **PRACK (UE to P-CSCF) – see example in table 10.3.3-20**

    UE#1 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-20: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 132 PRACK
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
RAck: 18 131 INVITE
Content-Length: 0
```

Request-URI: Takes the value of the Contact header of the received 183 Session Progress response.

From:/To:/Call-ID: Copied from the 183 Session Progress response so that they include any tag parameter.

Cseq: Takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

21. **PRACK (P-CSCF to S-CSCF) – see example in table 10.3.3-21**

P-CSCF#1 sends the PRACK request to S-CSCF#1, along the signalling path established by the INVITE request.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 10.3.3-21: PRACK (P-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

Route: Saved from the previous response.

22. **PRACK (S-CSCF to S-CSCF) – see example in table 10.3.3-22**

S-CSCF#1 sends the PRACK request to S-CSCF#2, along the signalling path established by the INVITE request.

Table 10.3.3-22: PRACK (S-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

23. **PRACK (S-CSCF to P-CSCF) – see example in table 10.3.3-23**

S-CSCF#2 sends the PRACK request to P-CSCf#2, along the signalling path established by the INVITE request.

Table 10.3.3-23: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

24. **PRACK (P-CSCF to UE) – see example in table 10.3.3-24**

P-CSCF#2 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-24: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

25. **200 OK (UE to P-CSCF) – see example in table 10.3.3-25**

UE#2 responds to the PRACK request (24) with a 200 OK response to P-CSCF#2.

Table 10.3.3-25: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

26. **200 OK (P-CSCF to S-CSCF) – see example in table 10.3.3-26**

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

Table 10.3.3-26: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

27. **200 OK (S-CSCF to S-CSCF) – see example in table 10.3.3-27**

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

Table 10.3.3-27: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

28. **200 OK (S-CSCF to P-CSCF) – see example in table 10.3.3-28**

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

Table 10.3.3-28: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

29. **200 OK (P-CSCF to UE) – see example in table 10.3.3-29**

P-CSCF#1 sends the 200 OK response to UE#1.

Table 10.3.3-29: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

30. **Reserve resources for new media streams**

UE#1 and UE#2 reserve the resources needed for the added or changed media flows. If the reservation is successfully completed by UE#1, it stops transmitting any deleted media streams.

31. **UPDATE (UE to P-CSCF) – see example in table 10.3.3-31**

UE#1 sends the UPDATE request to P-CSCF#1.

Table 10.3.3-31: UPDATE (UE to P-CSCF)

```
UPDATE sip:[5555:eee:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 133 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
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
t=907165275 0
m=video 3400 RTP/AVP 99
b=AS:54.6
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:99:MPV
m=audio 3456 RTP/AVP 10
b=AS:25.4
a=curr:qos local senedrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
```

CSeq: Takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

The SDP indicates that the resource reservation was successful in the local segment.

32. **UPDATE (P-CSCF to S-CSCF) – see example in table 10.3.3-32**

The P-CSCF#1 sends the UPDATE request to S-CSCF#1.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 10.3.3-32: UPDATE (P-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF723084371; auth-token=43876559; flow-id=1; pdp-sig=no;
   gcid=723084392; auth-token=43876648; flow-id=({1,1},{1,2})flow-id=2[1], pdp-item=2;
   pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-id=({2,1},{2,2})flow-
   id=[2]"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

Route: Saved from the 183 Session Progress response .

33. **UPDATE (S-CSCF to S-CSCF) – see example in table 10.3.3-33**

S-CSCF#1 sends the UPDATE request to S-CSCF#2.

Table 30.3.3-33: UPDATE (S-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

34. **UPDATE (S-CSCF to P-CSCF) – see example in table 10.3.3-34**

S-CSCF#2 sends the UPDATE request to P-CSCF#2.

Table 10.3.3-34: UPDATE (S-CSCF to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

35. UPDATE **(P-CSCF to UE) – see example in table 10.3.3-35**

P-CSCF#2 sends the UPDATE request to UE#2.

Table 10.3.3-35: UPDATE (P-CSCF to UE)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

36. **200 OK (UE to P-CSCF) – see example in table 10.3.3-36**

UE#2 responds to the UPDATE request (35) with a 200 OK response, sent to P-CSCF#2.

Table 10.3.3-36: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933615 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907165275 0
m=video 6540 RTP/AVP 99
b=AS:54.6
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:99:MPV
m=audio 6544 RTP/AVP 10
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
```

37. **200 OK (P-CSCF to S-CSCF) – see example in table 10.3.3-37**

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

Table 10.3.3-37: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length: (…)

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

38. **200 OK (S-CSCF to S-CSCF) – see example in table 10.3.3-38**

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

Table 10.3.3-38: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

39. **200 OK (S-CSCF to P-CSCF) – see example in table 10.3.3-39**

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

Table 10.3.3-39: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

40. **200 OK (P-CSCF to UE) – see example in table 10.3.3-40**

P-CSCF#1 sends the 200 OK response to UE#1.

Table 10.3.3-40: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

41. **180 Ringing (UE to P-CSCF) – see example in table 10.3.3-41**

Depending on the type of codec change being performed, alerting may be required at the destination UE. If so, UE#2 sends a 180 Ringing provisional response to the originator, through P-CSCF#2.

Table 10.3.3-41: 180 Ringing (UE to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK556g98.5, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2,home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 19
Content-Length: 0
```

42. **180 Ringing (P-CSCF to S-CSCF) – see example in table 10.3.3-42**

P-CSCF#2 sends the 180 Ringing response to S-CSCF#2.

Table 10.3.3-42: 180 Ringing (P-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2,home2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=1;
   pdp-sig=no; gcid=309685786; auth-token=86243681; flow-id=2[1], pdp-item=2; pdp-sig=no;
   gcid=F312D5E3BC730293842; auth-token=95567834; flow-id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

43. **180 Ringing (S-CSCF to S-CSCF) – see example in table 10.3.3-43**

S-CSCF#2 sends the 180 Ringing response to S-CSCF#1.

Table 10.3.3-43: 180 Ringing (S-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

44. **180 Ringing (S-CSCF to P-CSCF) – see example in table 10.3.3-44**

S-CSCF#1 sends the 180 Ringing response to P-CSCF#1.

Table 10.3.3-44: 180 Ringing (S-CSCF to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

45. **180 Ringing (P-CSCF to UE) – see example in table 10.3.3-45**

P-CSCF#1 sends the 180 Ringing response to UE#1.

Table 10.3.3-45: 180 Ringing (P-CSCF to UE)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Require:
From:
To:
Call-ID:
CSeq:
Contact:
RSeq:
Content-Length:
```

46. **PRACK (UE to P-CSCF) – see example in table 10.3.3-46**

UE#1 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-46: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scsf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222;tag=314159>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321;
   port-c=8642; port-s=7531
RAck: 19 131 INVITE
Content-Length: 0
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

47. **PRACK (P-CSCF to S-CSCF) – see example in table 10.3.3-47**

P-CSCF#1 sends the PRACK request to S-CSCF#1, along the signalling path established by the INVITE request.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 10.3.3-47: PRACK (P-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scsf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

48. **PRACK (S-CSCF to S-CSCF) – see example in table 10.3.3-48**

S-CSCF#1 sends the PRACK request to S-CSCF#2, along the signalling path established by the INVITE request.

Table 10.3.3-48: PRACK (S-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

49. **PRACK (S-CSCF to P-CSCF) – see example in table 10.3.3-49**

S-CSCF#2 sends the PRACK request to P-CSCf#2, along the signalling path established by the INVITE request.

Table 10.3.3-49: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

50. **PRACK (P-CSCF to UE) – see example in table 10.3.3-50**

P-CSCF#2 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-50: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

51. **200 OK (UE to P-CSCF) – see example in table 10.3.3-51**

UE#2 responds to the PRACK request (50) with a 200 OK response to P-CSCF#2.

Table 10.3.3-51: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

52. **200 OK (P-CSCF to S-CSCF) – see example in table 10.3.3-52**

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

Table 10.3.3-52: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

53. **200 OK (S-CSCF to S-CSCF) – see example in table 10.3.3-53**

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

Table 10.3.3-53: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

54. **200 OK (S-CSCF to P-CSCF) – see example in table 10.3.3-54**

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

Table 10.3.3-54: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

55. **200 OK (P-CSCF to UE) – see example in table 10.3.3-55**

P-CSCF#1 sends the 200 OK response to UE#1.

Table 10.3.3-55: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

56. **Perform Codec change**

UE#2 stops sending the media streams to be deleted, and initialises its media receivers for the new codec.

57. **200 OK (UE to P-CSCF) – see example in table 10.3.3-57**

UE#2 responds to the INVITE request (10) with a 200 OK response, sent to P-CSCF#2.

Table 10.3.3-57: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 131 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length: 0
```

58. **200 OK (P-CSCF to S-CSCF) – see example in table 10.3.3-58**

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

Table 10.3.3-58: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-
   sig=no; gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=1;
   pdp-sig=no; gcid=309685786; auth-token=86243681; flow-id=2[1], pdp-item=2; pdp-sig=no;
   gcid=F312D5E3BC730293842; auth-token=95567834; flow-id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

59. **200 OK (S-CSCF to S-CSCF) – see example in table 10.3.3-59**

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

Table 10.3.3-59: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

60. **200 OK (S-CSCF to P-CSCF) – see example in table 10.3.3-60**

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

Table 10.3.3-60: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

61. **200 OK (P-CSCF to UE) – see example in table 10.3.3-61**

P-CSCF#1 sends the 200 OK response to UE#1.

Table 10.3.3-61: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

62. **Start using new codec**

UE#1 starts sending media using the new codecs. UE#1 also releases any excess resources no longer needed.

63. **ACK (UE to P-CSCF) – see example in table 10.3.3-63**

UE#1 sends the ACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-63: ACK (UE to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 131 ACK
Content-Length: 0
```

64. **ACK (P-CSCF to S-CSCF) – see example in table 10.3.3-64**

P-CSCF#1 sends the ACK request to S-CSCF#1, along the signalling path established by the INVITE request.

Table 10.3.3-64: ACK (P-CSCF to S-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

65. **ACK (S-CSCF to S-CSCF) – see example in table 10.3.3-65**

S-CSCF#1 sends the ACK request to S-CSCF#2, along the signalling path established by the INVITE request.

Table 10.3.3-65: ACK (S-CSCF to S-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

66. **ACK (S-CSCF to P-CSCF) – see example in table 10.3.3-66**

S-CSCF#2 sends the ACK request to P-CSCf#2, along the signalling path established by the INVITE request.

Table 10.3.3-66: ACK (S-CSCF to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

67. **ACK (P-CSCF to UE) – see example in table 10.3.3-67**

P-CSCF#2 sends the ACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.3.3-67: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net:5088;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Length:
```

68. **Start using new codec**

UE#2 starts sending media using the new codecs. UE#2 also releases any excess resources no longer needed.

Next proposed change

10.4.7 Session redirection initiated after bearer establishment

The UE of the destination subscriber may request the session be redirected after a customer-specified ringing interval. The UE may also implement customer-specific feature processing, and base its decision to redirect this session on such things as the identity of caller, current sessions in progress, other applications currently being accessed, etc. The UE sends the SIP Redirect response to its P-CSCF, who forwards back along the signalling path to the originating endpoint, who initiates a session to the new destination.

The service implemented by this signalling flow is typically "Session Forward No Answer".

Redirection to another CN subsystem endpoint (e.g. a sip: URL) is shown in figure 10.4.7-1. The figure starts at the point in the session establishment when the destination is known, resources have been reserved, and the destination subscriber is being alerted. If the desire for redirection was known earlier than this point, the procedures of Subclause 10.4.6 would be followed instead.

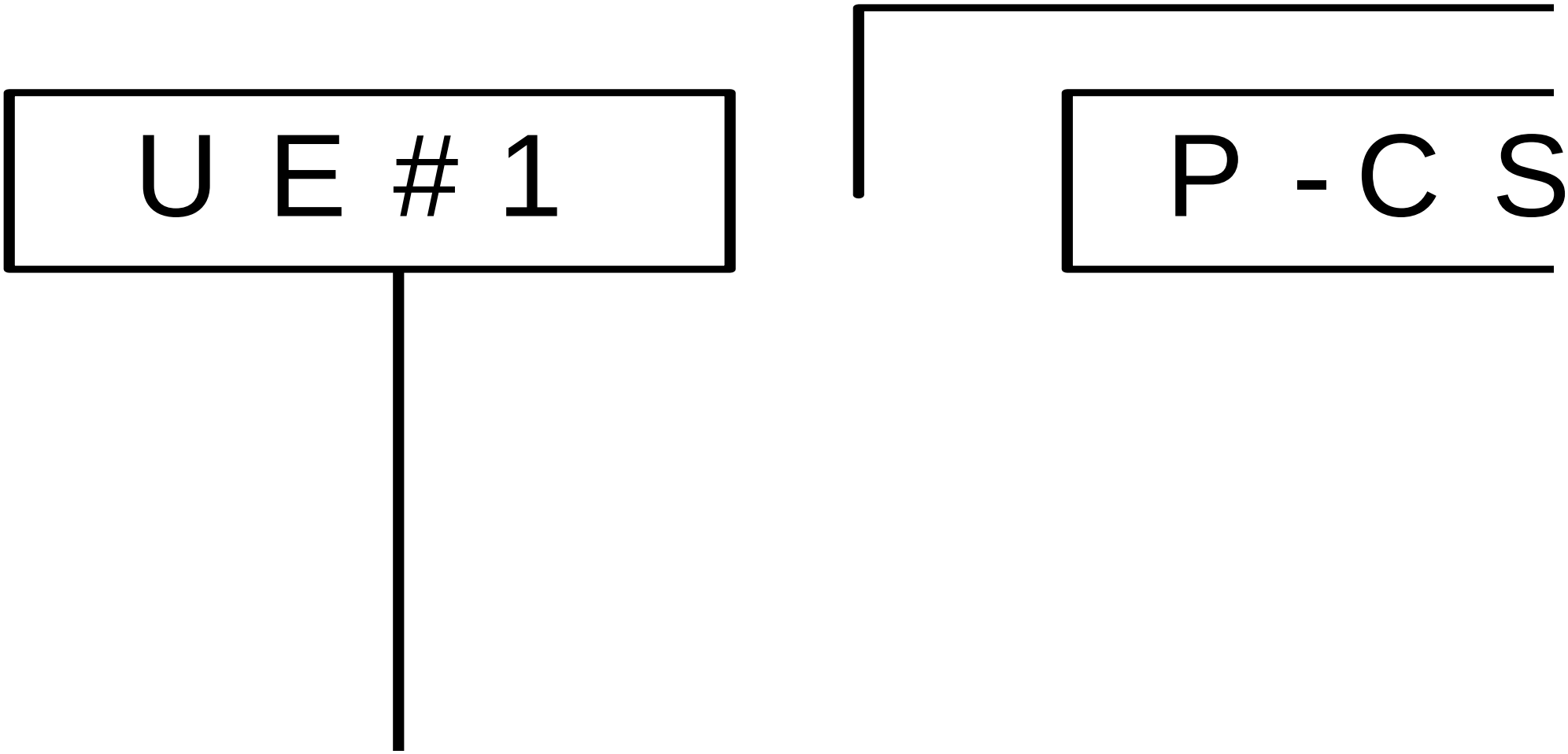

Figure 10.4.7-1: Session redirection after bearer establishment

Step-by-step processing is as follows:

1. **180 Ringing (UE to P-CSCF) – see example in table 10.4.7-1**

   Depending on the type of codec change being performed, alerting may be required at the destination UE. If so, UE#2 sends a 180 Ringing provisional response to the originator, through P-CSCF#2.

Table 10.4.7-1: 180 Ringing (UE to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.home1.net:5088;comp=sigcomp;branch=z9hG4bK556g98.5, SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home1.net:5088;lr;comp=sigcomp>, <sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222;tag=314159>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 131 INVITE
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 19
Content-Length: 0
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

2. **180 Ringing (P-CSCF to S-CSCF) – see example in table 10.4.7-2**

   P-CSCF#2 sends the 180 Ringing response to S-CSCF#2.

Table 10.4.7-2: 180 Ringing (P-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
Record-Route: <sip:pcscf2.home1.net:lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=1[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

3. **180 Ringing (S-CSCF to I-CSCF) – see example in table 10.4.7-3**

   S-CSCF#2 sends the 180 Ringing response to I-CSCF#2.

Table 10.4.7-3: 180 Ringing (S-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

4. **180 Ringing (I-CSCF to S-CSCF) – see example in table 10.4.7-4**

I-CSCF#2 sends the 180 Ringing response to S-CSCF#1.

Table 10.4.7-4: 180 Ringing (I-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

5. **180 Ringing (S-CSCF to P-CSCF) – see example in table 10.4.7-5**

S-CSCF#1 sends the 180 Ringing response to P-CSCF#1.

Table 10.4.7-5: 180 Ringing (S-CSCF to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require
Contact:
RSeq:
Content-Length:
```

6. **180 Ringing (P-CSCF to UE) – see example in table 10.4.7-6**

P-CSCF#1 sends the 180 Ringing response to UE#1.

Table 10.4.7-6: 180 Ringing (P-CSCF to UE)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

7. **PRACK (UE to P-CSCF) – see example in table 10.4.7-7**

UE#1 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.4.7-7: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
RAck: 19 131 INVITE
Content-Length: 0
```

Request-URI: Takes the value of the Contact header of the 180 Ringing response.

P-Access-Network-Info: The UE provides the access-type and access-info, related to the serving access network.

Via: Take the value of either the IP address or FQDN of the UE.

From:/To:/Call-ID: Copied from the 180 Ringing response so that they include any revised tag parameters.

Cseq: Takes a higher value than in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

8. **PRACK (P-CSCF to S-CSCF) – see example in table 10.4.7-8**

P-CSCF#1 sends the PRACK request to S-CSCF#1, along the signalling path established by the INVITE request.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 10.4.7-8: PRACK (P-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
Contact:
RAck:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

9. **PRACK (S-CSCF to S-CSCF) – see example in table 10.4.7-9**

   S-CSCF#1 sends the PRACK request to S-CSCF#2, along the signalling path established by the INVITE request.

Table 10.4.7-9: PRACK (S-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
RAck:
Content-Length:
```

10. **PRACK (S-CSCF to P-CSCF) – see example in table 10.4.7-10**

    S-CSCF#2 sends the PRACK request to P-CSCf#2, along the signalling path established by the INVITE request.

Table 10.4.7-10: PRACK (S-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
RAck:
Content-Length:
```

11. **PRACK (P-CSCF to UE) – see example in table 10.4.7-11**

    P-CSCF#2 sends the PRACK request to UE#2, along the signalling path established by the INVITE request.

Table 10.4.7-11: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home1.net:5088;comp=sigcomp;branch=z9hG4bK526mj01.5, SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
Contact:
RAck:
Content-Length:
```

12. **200 OK (UE to P-CSCF) – see example in table 10.4.7-12**

UE#2 responds to the PRACK request (11) with a 200 OK response to P-CSCF#2.

Table 10.4.7-12: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home1.net:5088;comp=sigcomp;branch=z9hG4bK526mj01.5, SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

13. **200 OK (P-CSCF to S-CSCF) – see example in table 10.4.7-13**

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

Table 10.4.7-13: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

14. **200 OK (S-CSCF to S-CSCF) – see example in table 10.4.7-14**

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

Table 10.4.7-14: 200 OK (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

15. **200 OK (S-CSCF to P-CSCF) – see example in table 10.4.7-15**

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

Table 10.4.7-15: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

16. **200 OK (P-CSCF to UE) – see example in table 10.4.7-16**

P-CSCF#1 sends the 200 OK response to UE#1.

Table 10.4.7-16: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

17. **302 Moved Temporarily (UE to P-CSCF) – see example in table 10.4.7-17**

Based on some service criterion, such as a timeout value, UE#2 decides to redirect this session request to another destination. UE#2 sends a 302 Moved Temporarily response to P-CSCF, containing the new destination. For this example, consider the new destination to be <tel:+1-212-555-3333>.

Table 10.4.7-17: 302 Moved Temporarily (UE to P-CSCF)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP pcscf2.home1.net:5088;comp=sigcomp;branch=z9hG4bK523r01.2, SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Contact: <tel:+1-212-555-3333>
Content-Length: 0
```

18. **ACK (P-CSCF to UE) – see example in table 10.4.7-18**

P-CSCF acknowledges receipt of the 302 Moved Temporarily response (17) by sending an ACK request to UE#2.

Table 10.4.7-18: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home1.net:5088;comp=sigcomp;branch=z9hG4bK523r01.2
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

19. **Revoke QoS**

P-CSCF revokes any authorization is had made for Quality of Service for this session.

20. **302 Moved Temporarily (P-CSCF to S-CSCF) – see example in table 10.4.7-20**

P-CSCF#2 sends a 302 (Moved Temporarily) response to S-CSCF#2, containing the new destination.

Table 10.4.7-20: 302 Moved Temporarily (P-CSCF to S-CSCF)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:5088;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

21. **ACK (S-CSCF to P-CSCF) – see example in table 10.4.7-21**

S-CSCF acknowledges receipt of the 302 (Moved Temporarily) response (20) by sending an ACK request to P-CSCF#2.

Table 10.4.7-21: ACK (S-CSCF to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1
Max-Forwards:70
Route: <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

22. **302 Moved Temporarily (S-CSCF to I-CSCF) – see example in table 10.4.7-22**

S-CSCF#2 sends a 302 (Moved Temporarily) response to I-CSCF, containing the updated destination.

Table 10.4.7-22: 302 Moved Temporarily (S-CSCF to I-CSCF)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact: <sip:Token(tel:+1-212-555-3333)@scscf3.home1.net;lr;tokenized-by=scscf2.home1.net>
Content-Length:
```

23. **ACK (I-CSCF to S-CSCF) – see example in table 10.4.7-23**

I-CSCF acknowledges receipt of the 302 (Moved Temporarily) response (22) by sending an ACK request to S-CSCF#2.

Table 10.4.7-23: ACK (I-CSCF to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

24. **302 Moved Temporarily (I-CSCF to S-CSCF) – see example in table 10.4.7-24**

I-CSCF may (based on operator preferences) update the new destination address, in order to hide the S-CSCF address and maintain configuration independence. If so, it generates a new private URL with its own hostname. I-CSCF sends a 302 (Moved Temporarily) response to S-CSCF#1, containing the new destination.

Table 10.4.7-24: 302 Moved Temporarily (I-CSCF to S-CSCF)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact: <sip:Token(token(tel:+1-212-555-3333)@scscf3.home1.net;lr;tokenized-
   by=scscf2.home1.net)@icscf3_s.home1.net;lr;tokenized-by=icscf2_s.home1.net>
Content-Length: 0
```

25. **ACK (S-CSCF to I-CSCF) – see example in table 10.4.7-25**

S-CSCF#1 acknowledges receipt of the 302 (Moved Temporarily) response (24) by sending an ACK request to I-CSCF.

Table 10.4.7-25: ACK (S-CSCF to I-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Mas-Forwards: 70
Route: <sip:icscf2_s.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

26. **302 Moved Temporarily (S-CSCF to P-CSCF) – see example in table 10.4.7-26**

S-CSCF#1 sends a 302 (Moved Temporarily) response to P-CSCF, containing the new destination.

Table 10.4.7-26 302 Moved Temporarily (S-CSCF to P-CSCF)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length: 0
```

27. **ACK (P-CSCF to S-CSCF) – see example in table 10.4.7-27**

P-CSCF acknowledges receipt of the 302 (Moved Temporarily) response (26) by sending an ACK request to S-CSCF#1.

Table 10.4.7-27: ACK (P-CSCF to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

28. **302 Moved Temporarily (P-CSCF to UE) – see example in table 10.4.7-28**

P-CSCF sends a 302 (Moved Temporarily) response to UE, containing the new destination.

Table 10.4.7-28: 302 Moved Temporarily (P-CSCF to UE)

```
SIP/2.0 302 Moved Temporarily
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length: 0
```

29. **ACK (UE to P-CSCF) – see example in table 10.4.7-29**

UE acknowledges receipt of the 302 /Moved Temporarily) response (28) by sending an ACK request to P-CSCF.

Table 10.4.7-29: ACK (UE to P-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

30. **INVITE (UE to P-CSCF) – see example in table 10.4.7-30**

UE sends the INVITE request, containing an initial SDP and the new destination, to the P-CSCF determined via the CSCF discovery mechanism.

Table 10.4.7-30: INVITE (UE to P-CSCF)

```
INVITE sip:Token(token(tel:+1-212-555-3333)@scscf2.home1.net;lr;tokenized-
   by=scscf2.home1.net)@icscf2_s.home1.net;lr;tokenized-by=icscf2_s.home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
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
t=907165275 0
m=audio 3456 RTP/AVP 97 3 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 G726-32/8000
```

Request-URI: Contains the SIP URI from the Contact header in the received 302 (Moved Temporarily) response.

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

P-Preferred-Identity: the user provides a hint about the identity to be used for this session.

P-Access-Network-Info: The UE provides the access-type and access-info, related to the serving access network.

From:/To:/Call-ID: Follow the recommendations of RFC 3323 [13], even though privacy is not being requested for this session.

Cseq: is a random starting number.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

Contact: is a SIP URI that contains the IP address or FQDN of the originating UE.

31. **100 Trying (P-CSCF to UE) – see example in table 10.4.7-31**

P-CSCF responds to the INVITE request (30) with a 100 (Trying) provisional response.

Table 10.4.7-31: 100 Trying (P-CSCF to UE)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

32. **INVITE (P-CSCF to S-CSCF) – see example in table 10.4.7-32**

The P-CSCF adds itself to the Record-Route header, and adds a Via header.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

The INVITE request is forwarded to the S-CSCF.

Table 10.4.7-32: INVITE (P-CSCF to S-CSCF)

```
INVITE sip:Token(token(tel:+1-212-555-3333)@scscf2.home1.net;lr;tokenized-
   by=scscf2.home1.net)@icscf2_s.home1.net;lr;tokenized-by=icscf2_s.home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Record-Route: <sip:pcscf1.home1.net;lr>
Route: <sip:scscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Content-Type:
Content-Length:

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

P-Access-Network-Info: this header contains information from the UE.

33. **100 Trying (S-CSCF to P-CSCF) – see example in table 10.4.7-33**

S-CSCF responds to the INVITE request (32) with a 100 (Trying) provisional response.

Table 10.4.7-33: 100 Trying (S-CSCF to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

34. **Evaluation of initial filter criterias**

S-CSCF validates the service profile of this subscriber, and evaluates the initial filter criterias. In this example it is assume that no application server is involved.

35. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.7-35**

S-CSCF forwards the INVITE request to the I-CSCF specified in the destination URL.

Table 10.4.7-35: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:Token(token(tel:+1-212-555-3333)@scscf2.home1.net;lr;tokenized-
   by=scscf2.home1.net)@icscf2_s.home1.net;lr;tokenized-by=icscf2_s.home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

Request-URI: This is the private URL obtained from the previous 302 (Moved Temporarily) response, which identifies the I-CSCF that must first translate the destination (then the S-CSCF that must further translate the destination).

36. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.7-36**

I-CSCF responds to the INVITE request (35) with a 100 (Trying) provisional response.

Table 10.4.7-36: 100 Trying (I-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

37. **INVITE (I-CSCF to S-CSCF) – see example in table 10.4.7-37**

I-CSCF translates the private portion of the URL, and determines the destination is S-CSCF#2. I-CSCF forwards the INVITE request to the S-CSCF#2 that will further translate the destination.

Table 10.4.7-37: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:Token(tel:+1-212-555-3333)@scscf2.home1.net;lr;tokenized-by=scscf2.home1.net
   SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

38. **100 Trying (S-CSCF to I-CSCF) – see example in table 10.4.7-38**

S-CSCF#2 responds to the INVITE request (37) with a 100 (Trying) provisional response.

Table 10.4.7-38: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

39. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.7-39**

S-CSCF#2 translates the private portion of the URL, and determines the destination address. S-CSCF#2 forwards the INVITE request to the I-CSCF#3, the entry point to the destination operator's network.

Table 10.4.7-39: INVITE (S-CSCF to I-CSCF)

```
INVITE tel:+1-212-555-3333 SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Record-Route: <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Route: <sip:icscf3_s.home3.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

40. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.7-40**

I-CSCF#3 responds to the INVITE request (39) with a 100 (Trying) provisional response.

Table 10.4.7-40: 100 Trying (I-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK09a238.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

The remainder of this session completes as shown in clause 7.

Next proposed change

17.2.2.1 (MO#1b) Mobile origination, roaming (S-S#2, MT#2 assumed)

Figure 17.2.2.1-1 shows an origination procedure which applies to roaming subscribers when the home network operator desires to keep its internal configuration hidden from the visited network. The UE is located in a visited network, and determines the P-CSCF via the CSCF discovery procedure. During registration, the home network allocates an S-CSCF. The home network advertises an I-CSCF as the entry point from the visited network, who forwards requests to the S-CSCF.

When registration is complete, P-CSCF knows the name/address of the next hop in the signalling path toward the S-CSCF, the I-CSCF. I-CSCF receives information in the request, from which it determines the name/address of the proper S-CSCF.

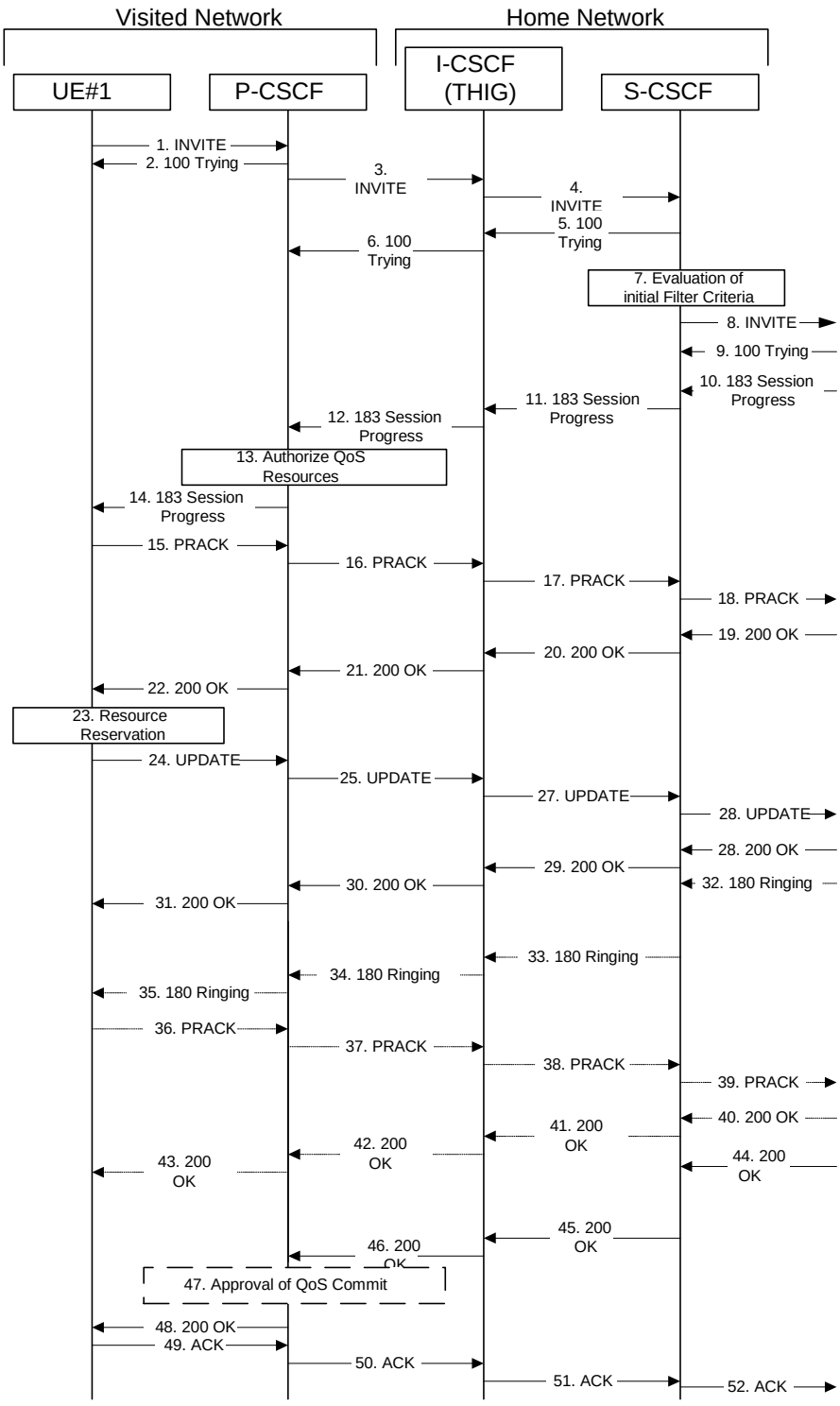

Figure 17.2.2.1-1: MO#1b

Procedure MO#1b is as follows:

1. **INVITE (UE to P-CSCF) – see example in table 17.2.2.1-1**

   UE#1 determines the complete set of codecs that it is capable of supporting for this session. It builds a SDP containing bandwidth requirements and characteristics of each, and assigns local port numbers for each possible media flow. Multiple media flows may be offered, and for each media flow (m= line in SDP), there may be multiple codec choices offered.

   For this example, assume UE#1 is capable of sending two simultaneous video streams, either H261 or MPV format, and two simultaneous audio streams, either AMR, G726-32, PCMU, or G728.

UE sends the INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism. An example is contained in table 17.2.2.1-1.

Table 17.2.2.1-1: INVITE (UE to P-CSCF)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:icscf1_p.home1.net;lr>,
   <sip:Token(sip:scscf1.home1.net;lr)@home1.net;tokenized-by=home1.net>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Supported: 100rel
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: Contains the public user identity of the called user.

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

Route: contains the P-CSCF address learnt during P-CSCF discovery, plus the elements from the Service-Route header from registration. The P-CSCF URI contains the port number learnt during the security agreement negotiation

Privacy: the user does not require privacy, therefore the Privacy header is set to the value “none” as specified in RFC 3325 [17] and RFC 3323 [13].

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

P-Preferred-Identity: the user provides a hint about the identity to be used for this session.

Cseq: Is a random starting number.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

Contact: Is a SIP URI that contains the IP address or FQDN of the originating UE.

SDP The SDP contains et of codecs supported by UE#1 and desired by the user at UE#1 for this session

Upon receiving the INVITE, the P-CSCF stores the following information about this session, for use in possible error recovery actions – see example in table 17.2.2.1-1b:

Table 17.2.2.1-1b: Storage of information at P-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
Cseq(2orig): none
Route(2dest): <sip:icscf1_p.home1.net;lr>,
   <sip:Token(sip:scscf1.home1.net;lr)@home1.net;tokenized-by=home1.net>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

2. **100 Trying (P-CSCF to UE) – see example in table 17.2.2.1-2**

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

Table 17.2.2.1-2: 100 Trying (P-CSCF to UE)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **INVITE (P-CSCF to I-CSCF) – see example in table 17.2.2.1-3**

The P-CSCF adds itself to the Record-Route header and Via header. As the request is forwarded to an interface that is not compressed, the own P-CSCF SIP URI does not contain the "comp=sigcomp" parameter.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

The INVITE request is forwarded through this I-CSCF to the S-CSCF.

Table 17.2.2.1-3: INVITE (P-CSCF to I-CSCF)

```
INVITE sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(sip:scscf1.home1.net;lr)@home1.net;tokenized-
   by=home1.net>
Record-Route: <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Content-Type:
Content-Length: (…)

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

P-Asserted-Identity: The P-CSCF inserts this header based on the user's hint present in the incoming P-Preferred-Identity header.

P-Charging-Vector: The P-CSCF inserts this header and populates the icid parameters with a globally unique value.

4. **INVITE (I-CSCF to S-CSCF) – see example in table 17.2.2.1-4**

   I-CSCF adds itself to the Record-Route header, and adds a Via header.

   I-CSCF determines the routing information contained in the request, and forwards the request to S-CSCF that is serving the UE.

Table 17.2.2.1-4: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Route: <sip:scscf1.home1.net;lr>
P-Asserted-Identity:
P-Access-Network-Info:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

Upon receiving the INVITE, the S-CSCF stores the following information about this session, for use in possible error recovery actions – see example in table 17.2.2.1-4b:

Table 17.2.2.1-4b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): none
Route(2orig): <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

5. **100 Trying (S-CSCF to I-CSCF) – see example in table 17.2.2.1-5**

S-CSCF responds to the INVITE request (4) with a 100 Trying provisional response.

Table 17.2.2.1-5: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

6. **100 Trying (I-CSCF to P-CSCF) – see example in table 17.2.2.1-6**

   I-CSCF forwards the 100 Trying provisional response to P-CSCF.

Table 17.2.2.1-6: 100 Trying (I-CSCF to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

7. **Evaluation of initial filter criteria**

   S-CSCF validates the service profile of this subscriber, and evaluates the initial filter criteria.

8. **INVITE (MO#1b to S-S) – see example in table 17.2.2.1-8**

   S-CSCF forwards the INVITE request, as specified by the S-CSCF to S-CSCF procedures. As the S-CSCF does not know whether the I-CSCF at home2.net is a loose router or not, it does not introduce a Route header.

Table 17.2.2.1-8: INVITE (MO#1b to S-S)

```
INVITE sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Record-Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_p.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length: (...)

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

P-Asserted-Identity: The S-CSCF inserts the corresponding TEL URL to the P-Asserted-Identity header in order that the TEL URL is known to the destination network in case the INVITE is forwarded to a MGCF.

P-Charging-Vector: The S-CSCF adds the identifier of its own network to the originating Inter Operator Identifier (IOI) parameter of this header.

9. **100 Trying (S-S to MO#1b) – see example in table 17.2.2.1-9 (related to 17.2.2.1-8)**

S-CSCF receives a 100 Trying provisional response, as specified by the S-CSCF to S-CSCF procedures.

Table 17.2.2.1-9: 100 Trying (S-S to MO#1b)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

10. **183 Session Progress (S-S to MO#1b) – see example in table 17.2.2.1-10 (related to 17.2.2.1-8)**

The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response (to (8)), per the S-CSCF to S-CSCF procedures.

Table 17.2.2.1-10: 183 Session Progress response (S-S to MO#1b)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Smith" <sip:user2_public1@home1.net>, <tel:+1-212-555-2222>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Upon receiving the 183 Session Progress, the S-CSCF stores the following information about this session, for use in providing enhanced services, charging or in possible error recovery actions – see example in table 17.2.2.1-10b.

Table 17.2.2.1-10b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>; tag=171828
To: <sip:user2_public1@home2.net>; tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

11. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 17.2.2.1-11**

S-CSCF forwards the 183 Session Progress response to I-CSCF.

Table 17.2.2.1-11: 183 Session Progress (S-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

12. **183 Session Progress (I-CSCF to P-CSCF) – see example in table 17.2.2.1-12**

    I-CSCF forwards the 183 Session Progress response to P-CSCF.

Table 17.2.2.1-12: 183 Session Progress (I-CSCF to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

Record-Route: Header entries of the home network of the I-CSCF are tokenized. The I-CSCF itself and the UE addresses are not subject to tokenization.

Upon receiving the 183 Session Progress, the P-CSCF removes the Record-Route headers, calculates the proper Route header to add to future requests, and saves that information without passing it to UE. The saved value of the information for this session is as shown table 17.2.2.1-12b:

Table 17.2.2.1-12b: Storage of information at P-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
Cseq(2orig): none
Route(2dest): <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
        <sip:scscf2.home1.net;lr>, <pcscf2.home1.net;lr>);tokenized-by=home1.net>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

13. **Authorize QoS Resources**

P-CSCF authorizes the resources necessary for this session. The approval of QoS commitment either happens at this stage or after 200 OK of INVITE (35) based on operator local policy.

14. **183 Session Progress (P-CSCF to UE) – see example in table 17.2.2.1-14**

P-CSCF forwards the 183 Session Progress response to the originating endpoint.

Table 17.2.2.1-14: 183 Session Progress (P-CSCF to UE)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <scscf1.home1.net;lr)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net>,
   <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
P-Asserted-Identity:
Privacy:
P-Media-Authorization:
   00200001001001017064663l2e76697369746564322e6e6574000c02013942563330373200
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.visited1.net" with credentials "9BV3072". "00" at the end of the authorization token is required to pad to a multiple of 4 bytes.

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated during the security agreement and the comp=sigcomp parameter to its own SIP URI.

15. **PRACK (UE to P-CSCF) – see example in table 17.2.2.1-15**

UE#1 determines which media flows should be used for this session, and which codecs should be used for each of those media flows. If there was any change in media flows, or if there was more than one choice of codec for a media flow, then UE#1 includes a new SDP offer in the PRACK message sent to UE#2.

For this example, assume UE#1 chooses H.263 as the codec to use for the single video stream. Therefore, UE#1 sends a new SDP offer in the PRACK request.

Table 17.2.2.1-15: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:icscf1_p.home1.net;lr>,
   <sip:Token(<sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From: <sip:user1_public1@home1.net>;tag=171828
To:
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: Takes the value of the Contact header of the received 183 Session Progress response.

Via: Take the value of either the IP address of FQDN of the originating UE.

From:/To:/Call-ID: Copied from the 183 Session Progress response so that they include any tag parameter.

Cseq: Takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

16. **Resource Reservation**

After determining the final media streams in step #15, UE initiates the reservation procedures for the resources needed for this session.

17. **PRACK (P-CSCF to I-CSCF) – see example in table 17.2.2.1-17**

The P-CSCF forwards the PRACK request to the I-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 17.2.2.1-17: PRACK (P-CSCF to I-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
Cseq:
Require: precondition
RAck:
Content-Type:
Content-Length:

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

Route: Saved from the Record-Route header of the 183 Session Progress response.

18. **PRACK (I-CSCF to S-CSCF) – see example in table 17.2.2.1-18**

I-CSCF determines the routing information, and forwards the PRACK request to S-CSCF.

Table 17.2.2.1-18: PRACK (I-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Require: precondition
RAck:
Content-Type:
Content-Length:

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

19. **PRACK (MO#1b to S-S) – see example in table 17.2.2.1-19**

S-CSCF forwards the PRACK request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 17.2.2.1-19: PRACK (MO#1b to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

20. **200 OK (S-S to MO#1b) – see example in table 17.2.2.1-20 (related to 17.2.2.1-19)**

The destination endpoint responds to the PRACK request (19) with a 200 OK response, per the S-CSCF to S-CSCF procedures.

Table 17.2.2.1-20: 200 OK (S-S to MO#1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (...)

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

21. **200 OK (S-CSCF to I-CSCF) – see example in table 17.2.2.1-21**

    S-CSCF forwards the 200 OK response to I-CSCF.

Table 17.2.2.1-21: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

22. **200 OK (I-CSCF to P-CSCF) – see example in table 17.2.2.1-22**

I-CSCF forwards the 200 OK response to P-CSCF.

Table 17.2.2.1-22: 200 OK (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

23. **200 OK (P-CSCF to UE) – see example in table 17.2.2.1-23**

    P-CSCF forwards the 200 OK response to UE.

Table 17.2.2.1-23: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

24. **UPDATE (UE to P-CSCF) – see example in table 17.2.2.1-24**

When the resource reservation is completed, UE sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request. The request is sent first to P-CSCF.

Table 17.2.2.1-24: UPDATE (UE to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:icscf1_p.home1.net;lr>,
   <sip:Token(<sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

Request-URI: Takes the value of the Contact header of the received 183 Session Progress response.

Via: Take the value of either the IP address or FQDN of the originating UE.

From:/To:/Call-ID: Copied from the 183 Session Progress response so that they include any tag parameters.

Cseq: Takes a higher value than that in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

The SDP indicates that the resource reservation was successful in the local segment.

25. **UPDATE (P-CSCF to I-CSCF) – see example in table 17.2.2.1-25**

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

The P-CSCF forwards the UPDATE request to the I-CSCF.

Table 17.2.2.1-25: UPDATE (P-CSCF to I-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-id=1[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

26. **UPDATE (I-CSCF to S-CSCF) – see example in table 17.2.2.1-26**

I-CSCF determines the routing information, and forwards the request to S-CSCF.

Table 17.2.2.1-26: UPDATE (I-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

P-Charging-Vector: The P-CSCF added the GPRS access network information to this header, which is removed and stored by the S-CSCF.

Upon receiving the UPDATE, the S-CSCF stores the following information about this session, for use in charging - see example in table 17.2.2.1-26b.

Table 17.2.2.1-26b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq(2dest): 127 INVITE
Cseq(2orig): none
Route(2dest): <sip:scscf2.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
```

27. **UPDATE (MO#1b to S-S) – see example in table 17.2.2.1-27**

S-CSCF forwards the UPDATE request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 17.2.2.1-27 UPDATE (MO#1b to S-S)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

28. **200 OK (S-S to MO#1b) – see example in table 17.2.2.1-28 (related to 17.2.2.1-27)**

    The destination endpoint responds to the UPDATE request (27) with a 200 OK, per the S-CSCF to S-CSCF procedures.

    The SDP indicates that the resource reservation was successful both in the local and the remote segment.

Table 17.2.2.1-28: 200 OK (S-S to MO#1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (...)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

29. **200 OK (S-CSCF to I-CSCF) – see example in table 17.2.2.1-29**

S-CSCF forwards the 200 OK response to I-CSCF.

Table 17.2.2.1-29 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

30. **200 OK (I-CSCF to P-CSCF) – see example in table 17.2.2.1-30**

I-CSCF forwards the 200 OK response to P-CSCF.

Table 17.2.2.1-30: 200 OK (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

31. **200 OK (P-CSCF to UE) – see example in table 17.2.2.1-31**

P-CSCF forwards the 200 OK response to UE.

Table 17.2.2.1-31: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

32. **180 Ringing (S-S to MO#1b) – see example in table 17.2.2.1-32 (related to 17.2.2.1-8)**

The called UE may optionally perform alerting. If so, it signals this to the calling party by a 180 Ringing provisional response to (8). This response is sent to S-CSCF per the S-CSCF to S-CSCF procedure.

Table 17.2.2.1-32: 180 Ringing (S-S to MO#1b)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 9022
Content-Length: 0
```

33. **180 Ringing (S-CSCF to I-CSCF) – see example in table 8.1.2-33**

S-CSCF forwards the 180 Ringing response to I-CSCF.

Table 17.2.2.1-33: 180 Ringing (S-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

34. **180 Ringing (I-CSCF to P-CSCF) – see example in table 17.2.2.1-34**

I-CSCF forwards the 180 Ringing response to P-CSCF.

Table 17.2.2.1-34: 180 Ringing (I-CSCF to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Record-Route: Header entries of the home network of the I-CSCF are tokenized. The I-CSCF itself and the UE addresses are not subject to tokenization.

35. **180 Ringing (P-CSCF to UE) – see example in table 17.2.2.1-35**

P-CSCF forwards the 180 Ringing response to UE.

Table 17.2.2.1-35: 180 Ringing (P-CSCF to UE)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>,<sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the comp=sigcomp parameter to its own SIP URI and its port number negotiated during the security agreement.

36. **PRACK (UE to P-CSCF) – see example in table 17.2.2.1-36**

UE indicates to the originating subscriber that the destination is ringing. It acknowledges the 180 Ringing provisional response (35) with a PRACK request.

Table 17.2.2.1-36: PRACK (UE to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>,<sip:icscf1_p.home1.net;lr>,
   <sip:Token(<sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
RAck: 9022 127 INVITE
Content-Length: 0
```

Request-URI: Takes the value of the Contact header of the 180 Ringing response.

Via: Take the value of either the IP address or FQDN of the UE.

From:/To:/Call-ID: Copied from the 180 Ringing response so that they include any revised tag parameters.

Cseq: Takes a higher value than in the previous request.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

37. **PRACK (P-CSCF to I-CSCF) – see example in table 17.2.2.1-37**

The P-CSCF adds the Route header corresponding to the session.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

The P-CSCF forwards the PRACK request to the I-CSCF.

Table 17.2.2.1-37: PRACK (P-CSCF to I-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
P-Access-Network-Info:
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

38. **PRACK (I-CSCF to S-CSCF) – see example in table 17.2.2.1-38**

I-CSCF forwards the PRACK request to S-CSCF.

Table 17.2.2.1-38: PRACK (I-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
P-Access-Network-Info:
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

39. **PRACK (MO#1b to S-S) – see example in table 17.2.2.1-39**

S-CSCF forwards the PRACK request to the terminating endpoint, as per the S-CSCF to S-CSCF procedure.

Table 17.2.2.1-39: PRACK (MO#1b to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

40. **200 OK (S-S to MO#1b) – see example in table 17.2.2.1-40 (related to 17.2.2.1-39)**

The destination endpoint responds to the PRACK request (39) with a 200 OK response.

Table 17.2.2.1-40: 200 OK (S-S to MO#1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

41. **200 OK (S-CSCF to I-CSCF) – see example in table 17.2.2.1-41**

S-CSCF forwards the 200 OK response to I-CSCF.

Table 17.2.2.1-41: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

42. **200 OK (I-CSCF to P-CSCF) – see example in table 17.2.2.1-42**

I-CSCF forwards the 200 OK response to P-CSCF.

Table 17.2.2.1-42: 200 OK (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

43. **200 OK (P-CSCF to UE) – see example in table 17.2.2.1-43**

P-CSCF forwards the 200 OK response to UE.

Table 17.2.2.1-43: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

44. **200 OK (S-S to MO#1b) – see example in table 17.2.2.1-44 (related to 17.2.2.1-8)**

When the called party answers, the terminating endpoint sends a 200 OK final response to the INVITE request (8), as specified by the termination procedures and the S-CSCF to S-CSCF procedures, to S-CSCF.

Table 17.2.2.1-44: 200 OK (S-S to MO#1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq: 127 INVITE
Contact: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
Content-Length: 0
```

45. **200 OK (S-CSCF to I-CSCF) – see example in table 17.2.2.1-45**

S-CSCF sends a 200 OK final response along the signalling path back to I-CSCF.

Table 17.2.2.1-45: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

46. **200 OK (I-CSCF to P-CSCF) – see example in table 17.2.2.1-46**

I-CSCF sends the 200 OK final response to P-CSCF.

Table 17.2.2.1-46: 200 OK (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net>,
   <sip:pcscf1.visited1.net>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: Header entries of the home network of the I-CSCF are tokenized. The I-CSCF itself and the UE addresses are not subject to tokenization.

47. **Approval of QoS Commit**

The P-CSCF approves the commitment of the QoS resources if it was not approved already in step (13).

48. **200 OK (P-CSCF to UE) – see example in table 17.2.2.1-48**

P-CSCF forwards the 200 OK final response to the session originator. UE can start the media flow(s) for this session.

Table 17.2.2.1-48: 200 OK (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>, <sip:icscf1_p.home1.net>,
   <sip:pcscf1.visited1.net>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the comp=sigcomp parameter and port number negotiated during the security agreement to its own SIP URI.

49. **ACK (UE to P-CSCF) – see example in table 17.2.2.1-49**

UE starts the media flow for this session, and responds to the 200 OK (48) with an ACK request sent to P-CSCF.

Table 17.2.2.1-49: ACK (UE to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>,<sip:icscf1_p.home1.net;lr>,
   <sip:Token(<sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>,
   <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 ACK
Content-Length: 0
```

Cseq: Is required to be the same value as Cseq contained in original INVITE request [3].

50. **ACK (P-CSCF to I-CSCF) – see example in table 17.2.2.1-50**

P-CSCF forwards the ACK request to I-CSCF.

Table 17.2.2.1-50: ACK (P-CSCF to I-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

51. **ACK (I-CSCF to S-CSCF) – see example in table 17.2.2.1-51**

I-CSCF determines the routing information, and forwards the ACK request to S-CSCF.

Table 17.2.2.1-51: ACK (I-CSCF to S-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

52. **ACK (MO#1b to S-S) – see example in table 17.2.2.1-52**

S-CSCF forwards the ACK request to the terminating endpoint, per the S-CSCF to S-CSCF procedure.

Table 17.2.2.1-52: ACK (MO#1b to S-S)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

17.4.2.1 (MT#1b) Mobile termination, roaming (MO#2, S-S#2 assumed)

Figure 17.4.2.1-1 shows a termination procedure which applies to roaming subscribers when the home network operator desires to keep its internal configuration hidden from the visited network. The UE is located in a visited network, and determines the P-CSCF via the P-CSCF discovery procedure. During registration, the home network allocates a S-

CSCF. The home network advertises an I-CSCF as the entry point from the visited network, who protects the S-CSCF identity and forwards requests to the P-CSCF.

When registration is complete, S-CSCF knows the name/address of its next hop in the signalling path toward the UE, the I-CSCF, and the S-CSCF knows the UE Contact address. I-CSCF receives information in the request, which it translates and obtains the name/address of P-CSCF, and P-CSCF obtains the name/address of the UE.

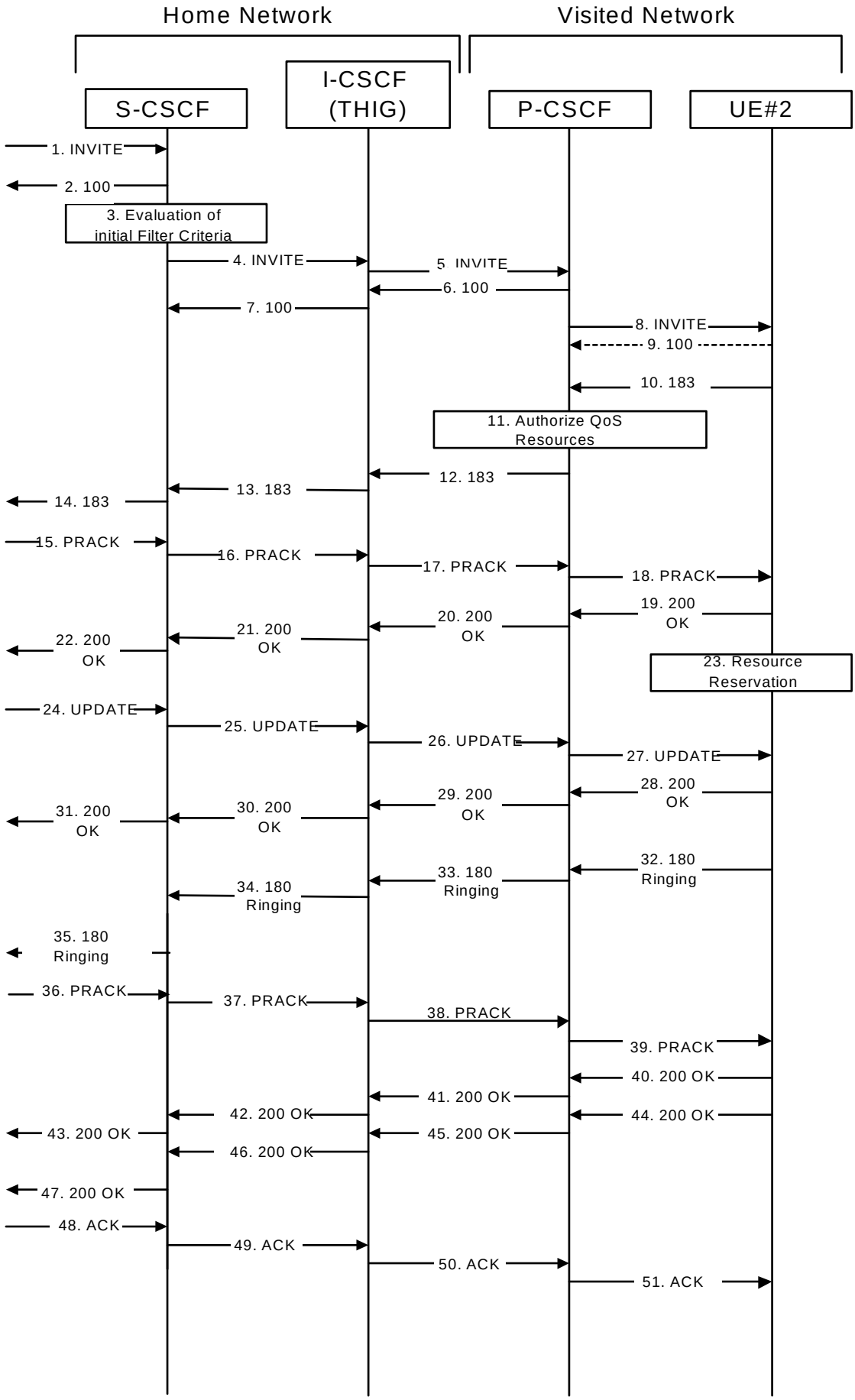

Figure 17.4.2.1-1: MT#1b

Procedure MT#1b is as follows:

1. **INVITE (S-S to MT#1b) – see example in table 17.4.2.1-1**

   The calling party sends the INVITE request, via one of the origination procedures and via one of the S-CSCF to S-CSCF procedures, to the S-CSCF for the terminating subscriber.

Table 17.4.2.1-1: INVITE (S-S to MT#1b)

```
INVITE sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf2.home1.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: preconditions
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
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
t=0 0
m=video 3400 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

SDP The SDP contains the complete set of supported and desired codecs from the session originator.

Upon receipt of the INVITE, the S-CSCF stores the following information about this session, for use in providing enhanced services, charging or in possible error recovery actions – see example in table 17.4.2.1-1b.

Table 17.4.2.1-1b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home1.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Route(2dest): <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
```

2. **100 Trying (MT#1b to S-S) – see example in table 17.4.2.1-2**

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

Table 17.4.2.1-2: 100 Trying (MT#1b to S-S)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **Evaluation of initial filter criteria**

   S-CSCF validates the service profile of this subscriber, and evaluates the initial filter criteria.

4. **INVITE (S-CSCF to I-CSCF) – see example in table 17.4.2.1-4**

   S-CSCF remembers (from the registration procedure) the UE Contact address and the next hop CSCF for this UE. It forwards the INVITE to the I-CSCF to perform the THIG functions.

Table 17.4.2.1-4: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length: (…)

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

Via:/Record-Route: S-CSCF adds itself in the Record-Route and Via headers.

Request-URI: Built from the registration information.

Route: Built from the Contact address stored at registration.

P-Called-Party-ID: Includes the dialled URL with its parameters.

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

5. **INVITE (I-CSCF to P-CSCF) – see example in table 17.4.2.1-5**

I-CSCF translates the Via headers in the request, and forwards the INVITE request to P-CSCF.

Table 17.4.2.1-5: INVITE (I-CSCF to P-CSCF)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Route: <sip:pcscf2.visited2.net;lr>
Record-Route: <sip:icscf2_p.home1.net;lr>, <sip:Token(<sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr)@home1.net;tokenized-by=home1.net>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID:
Content-Type:
Content-Length:

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

Via: Translated to preserve configuration independence of the home network.

Record-Route: Translated to preserve configuration independence of the home network.

P CSCF saves information from the received INVITE request. The saved value of the information for this session is – see example in table 17.4.2.1-5b:

Table 17.4.2.1-5b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:icscf2_p.home1.net;lr>, <sip:Token(<sip:scscf2.home1.net;lr>,
   <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

6. **100 Trying (P-CSCF to I-CSCF) – see example in table 17.4.2.1-6**

P-CSCF responds to the INVITE request (5) with a 100 Trying provisional response.

Table 17.4.2.1-6: 100 Trying (P-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 17.4.2.1-7**

   I-CSCF determines the Via header, and forwards the 100 Trying provisional response to S-CSCF.

Table 17.4.2.1-7: 100 Trying (I-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

8. **INVITE (P-CSCF to UE) – see example in table 17.4.2.1-8**

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

Table 17.4.2.1-8: INVITE (P-CSCF to UE)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Media-Authorization:
   00200001001001017064663322e76697369746564322e6e6574000c020133315331343363231
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID:
Content-Type:
Content-Length:

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

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its Via header.

Record-Route: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own URI.

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.visited2.net" with credentials "31S14621".

9. **100 Trying (UE to P-CSCF) – see example in table 17.4.2.1-9**

UE may optionally send a 100 Trying provisional response to P-CSCF.

Table 17.4.2.1-9: 100 Trying (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

10. **183 Session Progress (UE to P-CSCF) – see example in table 17.4.2.1-10**

    UE#2 determines the complete set of codecs that it is capable of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE request. For each media flow that is not supported, UE#2 inserts a SDP entry for media (m= line) with port=0.

    UE responds with a 183 Session Progress response containing SDP back to the originator. This SDP may represent one or more media for a multimedia session. This response is sent to P-CSCF.

Table 17.4.2.1-10: 183 Session Progress (UE to P-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 9021
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98 99
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
a=rtpmap:99 MP4V-ES
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

P-Access-Network-Info: The UE provides the access-type and access-info, related to the serving access network.

To: A tag is added to the To header.

Contact: Identifies the IP address or FQDN of the UE. It includes the comp=sigcomp parameter.

SDP The SDP contains the subset of codecs supported by UE. It requests a confirmation of the QoS preconditions for establishing the session

P-CSCF saves information from the received INVITE request. The saved value of the information for this session is – see example in table 17.4.2.1-10b.

Table 17.4.2.1-10b: Storage of information at P-CSCF

```
Request-URI: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2orig): <sip:icscf2_p.home1.net;lr>, <sip:Token(<sip:scscf2.home1.net;lr>,
     <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-
     by=home1.net>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

11. **Authorize QoS Resources**

    P-CSCF authorizes the resources necessary for this session.

12. **183 Session Progress (P-CSCF to I-CSCF) – see example in table 17.4.2.1-12**

    P-CSCF forwards the 183 Session Progress response to I-CSCF.

Table 17.4.2.1-12: 183 Session Progress (P-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net, SIP/2.0/UDP icscf2_s.home1.net, SIP/2.0/UDP scscf1.home1.net, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info:
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number used for the security association and the comp=sigcomp parameter from its own URI

P-Asserted-Identity: P-CSCF inserts the default SIP URI of the user in the P-Asserted-Identity header field.

13. **183-Session-Progress (I-CSCF to S-CSCF) – see example in table 17.4.2.1-13**

I-CSCF determines the Via and Record-Route headers, and forwards the response to S-CSCF.

Table 17.4.2.1-13: 183 Session Progress (I-CSCF to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info:
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

Upon receipt of the 183 Session Progress, the S-CSCF stores the following information about this session, for use in providing enhanced services or in possible error recovery actions – see example in table 17.4.2.1-13b.

Table 17.4.2.1-13b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

14. **183 Session Progress (MT#1b to S-S) – see example in table 17.4.2.1-14**

S-CSCF forwards the 183 Session Progress response to the originator, per the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-14: 183 Session Progress (MT#1b to S-S)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity: "John Smith" <sip:user2_public1@home1.net>, <tel:+1-212-555-2222>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
From:
To:
Call-ID:
Require:
CSeq:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Charging-Vector: The S-CSCF adds its the identifier of its own network to the terminating Inter Operator Identifier (IOI) parameter of this header and puts back the originating IOI parameter.

P-Charging-Function-Addresses: The S-CSCF passes this header to the I-CSCF for charging.

15. **PRACK (S-S to MT#1b) – see example in table 17.4.2.1-15**

The originating endpoint sends a PRACK request containing the final SDP to be used in this session, via the S-CSCF to S-CSCF procedure, to S-CSCF.

Table 17.4.2.1-15: PRACK (S-S to MT#1b)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home1.net;lr>, <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: precondition
RAck: 9021 127 INVITE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

16. **PRACK (S-CSCF to I-CSCF) – see example in table 17.4.2.1-16**

S-CSCF forwards the PRACK request to I-CSCF.

Table 17.4.2.1-16: PRACK (S-CSCF to I-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf2_s.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

17. **PRACK (I-CSCF to P-CSCF) – see example in table 17.4.2.1-17**

I-CSCF translates the Via headers in the PRACK request, and forwards the request to P-CSCF.

Table 17.4.2.1-17: PRACK (I-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

Via: Translated to preserve configuration independence of the home network.

18. **PRACK (P-CSCF to UE) – see example in table 17.4.2.1-18**

P-CSCF forwards the PRACK request to UE.

Table 17.4.2.1-18: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own entry in the Via header.

19. **200 OK (UE to P-CSCF) – see example in table 17.4.2.1-19**

UE acknowledges the PRACK request (18) with a 200 OK response.

Table 17.4.2.1-19: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (...)

v=0
o=- 2987933623 2987933624 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

20. **200 OK (P-CSCF to I-CSCF) – see example in table 17.4.2.1-20**

P-CSCF forwards the 200 OK response to I-CSCF.

Table 17.4.2.1-20: 200 OK (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

Via: P-CSCF restores the Via headers from saved values, based on the token value in the branch parameter of its Via.

21. **200 OK (I-CSCF to S-CSCF) – see example in table 17.4.2.1-21**

I-CSCF determines the Via and Record-Route headers, and forwards the 200 OK response to S-CSCF.

Table 17.4.2.1-21: 200 OK (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

22. **200 OK (MT#1b to S-S) – see example in table 17.4.2.1-22**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-22: 200 OK (MT#1b to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type
Content-Length:

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

23. **Resource Reservation**

UE initiates the reservation procedures for the resources needed for this session.

24. **UPDATE (S-S to MT#1b) – see example in table 17.4.2.1-24**

When the originating endpoint has completed its resource reservation, it sends the UPDATE request to S-CSCF, via the S-CSCF to S-CSCF procedures.

Table 17.4.2.1-24: UPDATE (S-S to MT#1b)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home1.net;lr>, <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 UPDATE
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933617 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=video 3400 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 3456 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

25. **UPDATE (S-CSCF to I-CSCF) – see example in table 17.4.2.1-25**

S-CSCF forwards the UPDATE request to I-CSCF.

Table 17.4.2.1-25: UPDATE (S-CSCF to I-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

26. **UPDATE (I-CSCF to P-CSCF) – see example in table 17.4.2.1-26**

I-CSCF translates the Via headers in the UPDATE request, and forwards the request to P-CSCF.

Table 17.4.2.1-26: UPDATE (I-CSCF to P-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

Via: Translated to preserve configuration independence of the home network.

Record-Route: Translated to preserve configuration independence of the home network.

27. **UPDATE (P-CSCF to UE) – see example in table 17.4.2.1-27**

P-CSCF forwards the UPDATE request to UE.

Table 17.4.2.1-27: UPDATE (P-CSCF to UE)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

Via: The P-CSCF adds the port number negotiated in the security agreement and the comp=sigcomp parameter to its own entry in the Via header.

28. **200 OK (UE to P-CSCF) – see example in table 17.4.2.1-28**

UE acknowledges the UPDATE request (27) with a 200 OK response.

Table 17.4.2.1-28: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-type: application/sdp
Content-Length: (...)

v=0
o=- 2987933623 2987933625 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=0 0
m=video 10001 RTP/AVP 98
b=AS:75
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:98 H263
a=fmtp:98 profile-level-id=0
m=audio 6544 RTP/AVP 97 96
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos mandatory remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

29. **200 OK (P-CSCF to I-CSCF) – see example in table 17.4.2.1-29**

P-CSCF forwards the 200 OK response to I-CSCF.

Table 17.4.2.1-29: 200 OK (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP scscf1.home1.net, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-type:
Content-Length:

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

30. 200 OK (I-CSCF to S-CSCF) – see example in table 17.4.2.1-30

I-CSCF determines the Via and Record-Route headers, and forwards the 200 OK to S-CSCF

Table 17.4.2.1-30: 200 OK (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-type:
Content-Length:

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

31. **200 OK (MT#1b to S-S) – see example in table 17.4.2.1-31**

S-CSCF forwards the 200 OK response to the originator, per the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-31: 200 OK (MT#1b to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-type:
Content-Length:

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

32. **180 Ringing (UE to P-CSCF) – see example in table 17.4.2.1-32 (related to 17.4.2.1-8)**

Before proceeding with session establishment, the UE waits for two events. First, the resource reservation initiated in step #23 must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by message #27 received by UE). The UE may now immediately accept the session (and proceed with step #45), or alert the destination subscriber of an incoming session attempt; if the latter it indicates this to the calling party by a 180 Ringing provisional response sent to P-CSCF.

Table 17.4.2.1-32: 180 Ringing (UE to P-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 9022
Content-Length: 0
```

33. **180 Ringing (P-CSCF to I-CSCF) – see example in table 17.4.2.1-33**

P-CSCF forwards the 180 Ringing response to I-CSCF.

Table 17.4.2.1-33: 180 Ringing (P-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP scscf1.home1.net SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=3[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number and the comp=sigcomp parameter from its own entry.

34. 1**80 Ringing (I-CSCF to S-CSCF) – see example in table 17.4.2.1-34**

I-CSCF determines the Via and Record-Route headers, and forwards the 180 Ringing response to S-CSCF.

Table 17.4.2.1-34: 180 Ringing (I-CSCF to S-CSCF)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_s.home1.net;lr>,
   <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Upon receipt of the 180, the S-CSCF stores the following information about this session, for use in charging – see example in table 17.4.2.1-34b.

Table 17.4.2.1-34b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:scscf1.home1.net;lr>, <sip:icscf2_s.home1.net;lr>,
     <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

35. **180 Ringing (MT#1b to S-S) – see example in table 17.4.2.1-35**

S-CSCF forwards the 180 Ringing response to the originating endpoint, per the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-35: 180 Ringing (MT#1b to S-S)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

36. **PRACK (S-S to MT#1b) – see example in table 17.4.2.1-36**

The originator acknowledges the 180 Ringing response (35) with a PRACK request.

Table 17.4.2.1-36: PRACK (S-S to MT#1b)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home1.net>, <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

37. **PRACK (S-CSCF to I-CSCF) – see example in table 17.4.2.1-37**

S-CSCF forwards the PRACK request to I-CSCF.

Table 17.4.2.1-37: PRACK (S-CSCF to I-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf2_s.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

38. **PRACK (I-CSCF to P-CSCF) – see example in table 17.4.2.1-38**

I-CSCF translates the Via headers in the PRACK request, and forwards the request to P-CSCF.

Table 17.4.2.1-38: PRACK (I-CSCF to P-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

Via: Translated to preserve configuration independence of the home network.

Record-Route: Translated to preserve configuration independence of the home network.

39. **PRACK (P-CSCF to UE) – see example in table 17.4.2.1-39**

P-CSCF forwards the PRACK request to UE.

Table 17.4.2.1-39: PRACK (P-CSCF to UE)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

Via: The P-CSCF adds the port number negotiated during the security agreement and the parameter comp=sigcomp to its own entry in the Via header.

40. **200 OK (UE to P-CSCF) – see example in table 17.4.2.1-40**

UE acknowledges the PRACK request (39) with a 200 OK response.

Table 17.4.2.1-40: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

41. **200 OK (P-CSCF to I-CSCF) – see example in table 17.4.2.1-41**

P-CSCF forwards the 200 OK to I-CSCF.

Table 17.4.2.1-41: 200 OK (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

42. **200 OK (I-CSCF to S-CSCF) – see example in table 17.4.2.1-42**

I-CSCF determines the Via and Record-Route headers, and forwards the 200 OK response to S-CSCF.

Table 17.4.2.1-42: 200 OK (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

Upon receipt of the 200, the S-CSCF stores the following information about this session (unless already done if information received with the 180), for use in charging – see example in table 17.4.2.1-42b.

Table 7.4.2.1-42b: Storage of information at S-CSCF

```
Request-URI: sip:user2_public1@home2.net
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq(2dest): 127 INVITE
CSeq(2orig): none
Route(2dest): <sip:pcscf2.visited2.net;lr>
Route(2orig): <sip:icscf2_p.home1.net;lr>, <sip:Token(<sip:scscf2.home1.net;lr>,
     <sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
     <sip:pcscf1.visited1.net;lr>
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

43. **200 OK (MT#1b to S-S) – see example in table 17.4.2.1-43**

S-CSCF forwards the 200 OK to the session originator, per the S-CSCF to S-CSCF procedures.

Table 17.4.2.1-43: 200 OK (MT#1b to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

44. **200 OK (UE to P-CSCF) – see example in table 17.4.2.1-44 (related to 17.4.2.1-8)**

When the called party answers, the UE sends a 200 OK final response to the INVITE request (8) to P-CSCF, and starts the media flow(s) for this session.

Table 17.4.2.1-44: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)
   @home1.net;tokenized-by=home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length: 0
```

45. **200 OK (P-CSCF to I-CSCF) – see example in table 17.4.2.1-45**

P-CSCF indicates the resources reserved for this session should now be committed, and sends the 200 OK final response to I-CSCF.

Table 17.4.2.1-45: 200 OK (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP scscf1.home1.net, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_s.home1.net;lr>,
   <sip:Token(<sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF309685742; auth-token=86243614; flow-id={{1,1},{1,2}}flow-id=3[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id={{2,1},{2,2}}flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header field value to remove the port number and the comp=sigcomp parameter from its own URI.

46. **200 OK (I-CSCF to S-CSCF) – see example in table 17.4.2.1-46**

I-CSCF determines the Via and Record-Route headers, and forwards the 200 OK response to S-CSCF.

Table 17.4.2.1-46: 200 OK (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home1.net;lr>,
   <sip:iscscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Upon receipt of the 200, the S-CSCF stores the P-Charging-Vector information for this session (unless already done if information received with the 180).

47. **200 OK (MT#1b to S-S) – see example in table 17.4.2.1-47**

S-CSCF forwards the 200 OK final response along the signalling path back to the session originator, as per the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-47: 200 OK (MT#1b to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

48. **ACK (S-S to MT#1b) – see example in table 17.4.2.1-48**

The calling party responds to the 200 OK final response (47) with an ACK request which is sent to S-CSCF via the S-CSCF to S-CSCF procedure.

Table 17.4.2.1-48: ACK (S-S to MT#1b)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf2.home1.net;lr>; <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

49. **ACK (S-CSCF to I-CSCF) – see example in table 17.4.2.1-49**

S-CSCF forwards the ACK request to I-CSCF.

Table 17.4.2.1-49: ACK (S-CSCF to I-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Route: <sip:icscf2_s.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

50. **ACK (I-CSCF to P-CSCF) – see example in table 17.4.2.1-50**

I-CSCF forwards the ACK request to P-CSCF.

Table 17.4.2.1-50: ACK (I-CSCF to P-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
Content-Length:
```

Via: Translated to preserve configuration independence of the home network.

51. **ACK (P-CSCF to UE) – see example in table 17.4.2.1-51**

P-CSCF forwards the ACK request to UE.

Table 17.4.2.1-51: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf2.home1.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   pcscf1.home1.net;branch=z9hG4bK431h23.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Next proposed change

17.5.2 Sample multimedia signalling flow - addition of further media originator and terminator are both roaming and operated by different networks

Figure 17.5.2-1 shows a multimedia signalling flow for the addition of another media where the originator and terminator are both roaming and operated by different networks. Both networks are with I-CSCF providing configuration independence. The UE has already established an IM CN session carrying voice and is generating an INVITE request to add video media to the already established IM session.

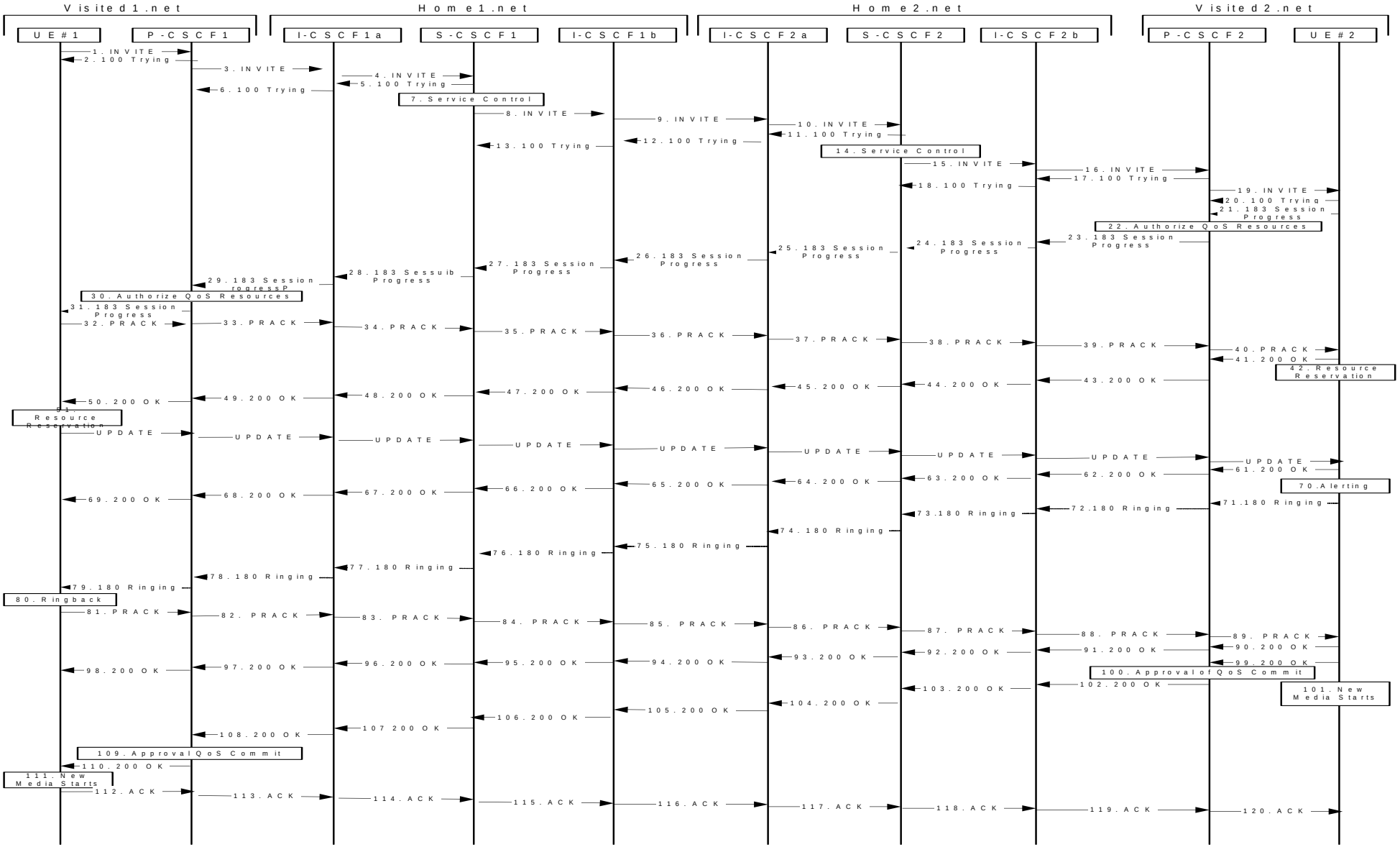

Figure 17.5.2-1: Sample multimedia signalling flow - additional of further media with I-CSCF (THIG)

1. **INVITE (UE1 to P-CSCF1) - see example in table 17.5.2-1**

   UE sends the Re-INVITE request, containing another media description in SDP, to the P-CSCF determined via the CSCF discovery mechanism. An example is contained in table 17.5.2-1.

Table 17.5.2-1: INVITE (UE1 to P-CSCF1)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:icscf1_p.home1.net;lr>,
   <sip:token(<sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-
   by=home1.net>, <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 132 INVITE
Require: precondition, sec-agree
Proxy-Require: sec-agree
Supported: 100rel
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
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
t=907166275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
m=video 9544 RTP/AVP 31
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:31 H261/90000
```

Request-URI: Contains the keyed number from the user. This is specified by the UE as sip:<keyed number>@home1.net. This is in accordance to standard IETF procedure for specifying dialled digits.

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

P-Preferred-Identity: the user provides a hint about the identity to be used for this session.

P-Access-Network-Info: The UE provides the access-type and access-info, related to the serving access network.

From:/To:/Call-ID: Follow the recommendations of RFC 3323 [13], even though anonymity is not being requested for this session.

Cseq: Is a random starting number.

Contact: Is a SIP URI that contains the IP address or FQDN of the originating UE.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

2. **100 Trying (P-CSCF1 to UE1) - see example in table 17.5.2-2**

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

Table 17.5.2-2: 100 Trying (P-CSCF1 to UE1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

3. **INVITE (P-CSCF1 to I-CSCF1a) - see example in table 17.5.2-3**

P-CSCF1 forwards the INVITE to the next hop name/address, as determined from previous response messages.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 17.5.2-3: INVITE (P-CSCF1 to I-CSCF1a)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Record-Route: <sip:pcscf1.visited1.net;lr>
Route: <sip:icscf1_p.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Content-Type:
Content-Length: (…)

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

4. **INVITE (I-CSCF1a to S-CSCF1) - see example in table 17.5.2-4**

I-CSCF1a performs the THIG function and forwards the invite to S-CSCF1.

Table 17.5.2-4: INVITE (I-CSCF1a to S-CSCF1)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
P-Access-Network-Info:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

5. **100 Trying (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-5**

S-CSCF1 sends the 100 Trying provisional response to P-CSCF1 through I-CSCF1a.

Table 17.5.2-5: 100 Trying (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

6. **100 Trying (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-6**

I-CSCF1a forwards the 100 Trying provisional response to P-CSCF1.

Table 17.5.2-6: 100 Trying (I-CSCF1a to P-CSCF1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

7. **Evaluation of initial filter criterias**

   S-CSCF validates the service profile of this subscriber and evaluates the initial filter criterias.

8. **INVITE (S-CSCF1 to I-CSCF1b) - see example in table 17.5.2-8**

   S-CSCF1 recognizes that this invite applies to an existing session. It therefore forwards the INVITE along the existing path to I-CSCF1b.

Table 17.5.2-8: INVITE (S-CSCF1 to I-CSCF1b)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Record-Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_p.home1.net;lr>,
   <sip:pcscf1.visited1.net;lr>
Route: <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity: <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length: (…)

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

9. **INVITE (I-CSCF1b to I-CSCF2a) - see example in table 17.5.2-9**

   I-CSCF1b forwards the INVITE request to the next hop I-CSCF2a and performs the THIG function.

Table 17.5.2-9: INVITE (I-CSCF1b to I-CSCF2a)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Record-Route: <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
Route: <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

10. **INVITE (I-CSCF2a to S-CSCF2) - see example in table 17.5.2-10**

    I-CSCF2a forwards the INVITE request to S-CSCF2.

Table 17.5.2-10: INVITE (I-CSCF2a to S-CSCF2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Record-Route: <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
   <sip:token(<sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-
   by=home1.net>, <sip:pcscf1.visited1.net;lr>
Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
Content-Type:
Content-Length:

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

11. **100 Trying (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-11**

S-CSCF2 sends a 100 Trying provisional response back to S-CSCF1 through I-CSCF2a.

Table 17.5.2-11: 100 Trying (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

12. **100 Trying (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-12**

I-CSCF2a forwards a 100 Trying provisional response to the upstream next hop I-CSCF1b.

Table 17.5.2-12: 100 Trying (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

13. **100 Trying (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-13**

I-CSCF forwards a 100 Trying provisional response to the S-CSCF1.

Table 17.5.2-13: 100 Trying (I-CSCF1b to S-CSCF1)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

14. **Evaluation of initial filter criterias**

S-CSCF validates the service profile of this subscriber and evaluates the initial filter criterias.

15. **INVITE (S-CSCF2 to I-CSCF2b) - see example in table 17.5.2-15**

S-CSCF2 recognizes that this invite applies to an existing session. It therefore forwards the INVITE along the existing path to I-CSCF2b.

Table 17.5.2-15: INVITE (S-CSCF2 to I-CSCF2b)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Record-Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
Route: <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
P-Charging-Function-Addresses: ccf=[5555::b99:c88:d77:e66]; ccf=[5555::a55:b44:c33:d22];
   ecf=[5555::1ff:2ee:3dd:4cc]; ecf=[5555::6aa:7bb:8cc:9dd]
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length: (…)

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

16. **INVITE (I-CSCF2b to P-CSCF2) - see example in table 17.5.2-16**

I-CSCF2b performs the THIG function and forwards the INVITE request to P-CSCF2.

Table 17.5.2-16: INVITE (I-CSCF2 to P-CSCF2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 63
Record-Route: <sip:icscf2_p.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
Route: <sip:pcscf2.visited2.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID:
Content-Type:
Content-Length:

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

17. **100 Trying (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-17**

P-CSCF2 sends a 100 Trying provisional response back to S-CSCF2 through I-CSCF2b.

Table 17.5.2-17: 100 Trying (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

18. **100 Trying (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-18**

I-CSCF2b forwards a 100 Trying provisional response back to S-CSCF2.

Table 17.5.2-18: 100 Trying (I-CSCF2b to S-CSCF2)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

19. **INVITE (P-CSCF2 to UE2) - see example in table 17.5.2-19**

P-CSCF forwards the INVITE request to the UE.

Table 17.5.2-19: INVITE (P-CSCF2 to UE2)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 62
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Media-Authorization:
   00200001001001017064663 22e76697369746564322e6e6574000c020133315331343363233
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.visited2.net" with credentials "31S14623".

Via: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its Via header.

Record-Route: The P-CSCF adds the port number negotiated during the security agreement and the comp=sigcomp parameter to its own URI.

20. **100 Trying (UE2 to P-CSCF2) - see example in table 17.5.2-20**

UE2 sends a 100 Trying provisional response back to P-CSCF2.

Table 17.5.2-20: 100 Trying (UE2 to P-CSCF2)

```
SIP/2.0 100 Trying
Via: pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bKert23.8 SIP/2.0/UDP, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

21. **183 Session Progress (UE2 to P-CSCF2) - see example in table 17.5.2-21**

    The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response.

Table 17.5.2-21: 183 Session Progress response (UE2 to P-CSCF2)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;lr;comp=sigcomp>
RSeq: 9022
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907166275 0
m=audio 6544 RTP/AVP 97
b=AS:25.4 3
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
m=video 7544 RTP/AVP 31
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:31 H261/90000
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

22. **Authorize QoS Resources**

    P-CSCF2 authorizes the resources necessary for this new media.

23. **183 Session Progress (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-23**

    P-CSCF forwards the 183 Session Progress response to P-CSCF.

Table 17.5.2-23: 183 Session Progress (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Smith" <sip:user2_public1@home2.net>
P-Access-Network-Info:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

Record-Route: The P-CSCF rewrites the Record-Route header to remove the port number and the comp=sigcomp parameter from its own SIP URI.

24. **183 Session Progress (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-24**

I-CSCF2b forwards the 183 Session Progress response to S-CSCF2.

Table 17.5.2-24: 183 Session Progress (I-CSCF2b to S-CSCF2)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
   <sip:token(<sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-
   by=home1.net>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Access-Network-Info:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Access-Network-Info: This header contains information from the UE.

25. **183 Session Progress (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-25**

S-CSCF2 forwards the 183 Session Progress response to I-CSCF2a.

Table 17.5.2-25: 183 Session Progress (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

26. **183 Session Progress (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-26**

I-CSCF2a forwards the 183 Session Progress response to I-CSCF1b.

Table 17.5.2-26: 183 Session Progress (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>,  <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

27. **183 Session Progress (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-27**

I-CSCF1b forwards the 183 Session Progress response to the S-CSCF1.

Table 17.5.2-27: 183 Session Progress (I-CSCF1b to S-CSCF1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>,  <sip:icscf1_s.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

28. **183 Session Progress (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-28**

S-CSCF1 forwards the 183 Session Progress response to I-CSCF1a.

Table 17.5.2-28: 183 Session Progress (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

29. **183 Session Progress (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-29**

I-CSCF1a forwards the 183 Session Progress response to P-CSCF1.

Table 17.5.2-29: 183 Session Progress (I-CSCF1a to P-CSCF1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)>)@home2.net;tokenized-
   by=home2.net>,  <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

30. **Authorize QoS Resources**

    P-CSCF1 authorizes the resources necessary for this new media.

31. **183 Session Progress (P-CSCF1 to UE1) - see example in table 17.5.2-31**

    P-CSCF1 forwards the 183 Session Progress response to the originating endpoint.

Table 17.5.2-31: 183 Session Progress (P-CSCF1 to UE1)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)>)@home2.net;tokenized-
   by=home2.net>,  <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
P-Media-Authorization:
   00200001001001017064663l2e76697369746564312e6e6574000c02013942563330373400
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Type:
Content-Length:

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

P-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf1.visited1.net" with credentials "9BV3074".

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated in the security agreement and the comp=sigcomp parameter to its own SIP URI.

32. **PRACK (UE1 to P-CSCF1) - see example in table 17.5.2-32**

The originator decides the final set of media streams for this media addition, and sends the Final SDP to P-CSCF1.

Table 17.5.2-32: PRACK (UE1 to P-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_s.home2.net;lr>)>)@home2.net;tokenized-by=home2.net>,
   <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 133 PRACK
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
RAck: 9022 132 INVITE
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
t=907166275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
m=video 9544 RTP/AVP 31
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:31 H261/90000
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

33. **PRACK (P-CSCF1 to I-CSCF1a) - see example in table 17.5.2-33**

The PRACK request is forwarded through this I-CSCF to the S-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Proxy-Require header is empty, it removes this header completely.

Table 17.5.2-33: PRACK (P-CSCF1 to I-CSCF1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
Require: precondition
RAck:
Content-Type:
Content-Length:

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

34. **PRACK (I-CSCF1a to S-CSCF1) - see example in table 17.5.2-34**

The PRACK request is forwarded through this I-CSCF1a to the S-CSCF1.

Table 17.5.2-34: PRACK (I-CSCF1a to S-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

35. **PRACK (S-CSCF1 to I-CSCF1b) - see example in table 17.5.2-35**

S-CSCF1 forwards the PRACK request to I-CSCF1b.

Table 17.5.2-35: PRACK (S-CSCF1 to I-CSCF1b)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

36. **PRACK (I-CSCF1b to I-CSCF2a) - see example in table 17.5.2-36**

I-CSCF1b forwards the PRACK request to I-CSCF2a.

Table 17.5.2-36: PRACK (I-CSCF1b to I-CSCF2a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

37. **PRACK (I-CSCF2a to S-CSCF2) - see example in table 17.5.2-37**

I-CSCF2a forwards the PRACK request to S-CSCF2.

Table 17.5.2-37: PRACK (I-CSCF2a to S-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

38. **PRACK (S-CSCF2 to I-CSCF2b) - see example in table 17.5.2-38**

S-CSCF2 forwards the PRACK request to I-CSCF2b.

Table 17.5.2-38: PRACK (S-CSCF2 to I-CSCF2b)

```
PRACK sip:[5555:eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Route: <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

39. **PRACK (I-CSCF2b to P-CSCF2) - see example in table 17.5.2-39**

I-CSCF1b forwards the PRACK request to P-CSCF2.

Table 17.5.2-39: PRACK (I-CSCF2b to P-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 63
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

40. **PRACK (P-CSCF2 to UE2) - see example in table 17.5.2-40**

P-CSCF2 and forwards the PRACK request to the UE2.

Table 17.5.2-40: PRACK (P-CSCF2 to UE2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 62
From:
To:
Call-ID:
Cseq:
Require:
Content-Type:
Content-Length:

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

41. **200 OK (UE2 to P-CSCF2) - see example in table 17.5.2-41**

UE2 acknowledges the PRACK request with a 200 OK response.

Table 17.5.2-41: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907166275 0
m=audio 6544 RTP/AVP 97
b=AS:25.4 3
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
m=video 7544 RTP/AVP 31
b=AS:54.6
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=conf:qos remote sendrecv
a=rtpmap:31 H261/90000
```

42. **Resource Reservation**

After determining the final set of media streams for this additional media, UE2 initiates the reservation procedures for the additional resources needed for this new media.

43. **200 OK (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-43**

P-CSCF2 forwards the 200 OK response to I-CSCF2b.

Table 17.5.2-43: 200 OK (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

44. **200 OK (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-44**

I-CSCF2b forwards the 200 OK response to S-CSCF2.

Table 17.5.2-44: 200 OK (I-CSCF2b to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

45. **200 OK (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-45**

S-CSCF2 forwards the 200 OK response to I-CSCF2a.

Table 17.5.2-45: 200 OK (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

46. **200 OK (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-46**

I-CSCF2a forwards the 200 OK response to I-CSCF1b.

Table 17.5.2-46: 200 OK (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

47. **200 OK (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-47**

S-CSCF forwards the 200 OK response to S-CSCF1.

Table 17.5.2-47: 200 OK (I-CSCF1b to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

48. **200 OK (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-48**

S-CSCF1 forwards the 200 OK response to I-CSCF1a.

Table 17.5.2-48: 200 OK (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

49. **200 OK (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-49**

I-CSCF1 forwards the 200 OK response to P-CSCF1.

Table 17.5.2-49: 200 OK (I-CSCF1a to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

50. **200 OK (P-CSCF1 to UE1) - see example in table 17.5.2-50**

P-CSCF1 forwards the 200 OK response to the originator.

Table 17.5.2-50: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content=Type:
Content-Length:

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

51. **Resource Reservation**

After determining the final set of media streams for this additional media, UE1 initiates the reservation procedures for the additional resources needed for this new media.

52. **UPDATE (UE1 to P-CSCF1) - see example in table 17.5.2-52**

When the resource reservation is completed, UE sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request.

Table 17.5.2-52: UPDATE (UE1 to P-CSCF1)

```
UPDATE sip: [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 134 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
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
t=907166275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=curr:qos local sendrecv
a=curr:qos remote sendrecv
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
m=video 9544 RTP/AVP 31
b=AS:54.6
a=curr:qos local sendrecv
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
a=rtpmap:31 H261/90000
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

53. **UPDATE (P-CSCF1 to I-CSCF1a) - see example in table 17.5.2-53**

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

The UPDATE request is forwarded through this P-CSCF1 to the I-CSCF1a.

Table 17.5.2-53: UPDATE (P-CSCF1 to I-CSCF1a)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::4b4:3c3:2d2:1e1]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF723084371; auth-token=43876559; flow-id=({1,1},{1,2})flow-id=1[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

54. **UPDATE (I-CSCF1a to S-CSCF1) - see example in table 17.5.2-54**

The UPDATE request is forwarded through this I-CSCF1a to the S-CSCF1.

Table 17.5.2-54: UPDATE (I-CSCF1a to S-CSCF1)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

55. **UPDATE (S-CSCF1 to I-CSCF1b) - see example in table 17.5.2-55**

S-CSCF1 forwards the UPDATE request to I-CSCF1b.

Table 17.5.2-55: UPDATE (S-CSCF1 to I-CSCF1b)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net;
   term-ioi=home2.net
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

56. **UPDATE (I-CSCF1b to I-CSCF2a) - see example in table 17.5.2-56**

I-CSCF1b forwards the UPDATE request, to I-CSCF2a.

Table 17.5.2-56: UPDATE (I-CSCF1b to I-CSCF2a)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Route: <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

57. **UPDATE (I-CSCF2a to S-CSCF2) - see example in table 17.5.2-57**

I-CSCF2a forwards the UPDATE request to S-CSCF2.

Table 17.5.2-57: UPDATE (I-CSCF2a to S-CSCF2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

58. **UPDATE (S-CSCF2 to I-CSCF2b) - see example in table 17.5.2-58**

S-CSCF2 forwards the UPDATE request to I-CSCF2b.

Table 17.5.2-58: UPDATE (S-CSCF2 to I-CSCF2b)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Route: <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

59. **UPDATE (I-CSCF2b to P-CSCF2) - see example in table 17.5.2-59**

I-CSCF2b forwards the UPDATE request to P-CSCF2.

Table 17.5.2-59: UPDATE (I-CSCF2b to P-CSCF2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 63
Route: <sip:pcscf2.visited2.net;lr>
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

60. **UPDATE (P-CSCF2 to UE2) - see example in table 17.5.2-60**

P-CSCF2 forwards the UPDATE request to the UE2.

Table 17.5.2-60: UPDATE (P-CSCF2 to UE2)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 62
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

61. **200 OK (UE2 to P-CSCF2) - see example in table 17.5.2-61**

UE2 acknowledges the UPDATE request with a 200 OK response.

Table 17.5.2-61: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 134 UPDATE
Content-Type:
Content-Length: 0

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

62. **200 OK (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-62**

Table 17.5.2-62: 200 OK (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

63. **200 OK (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-63**

Table 17.5.2-63: 200 OK (I-CSCF2b to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

64. **200 OK (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-64**

Table 17.5.2-64: 200 OK (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

65. **200 OK (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-65**

Table 17.5.2-65: 200 OK (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

66. **200 OK (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-66**

Table 17.5.2-66: 200 OK (I-CSCF1b to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

67. **200 OK (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-67**

Table 17.5.2-67: 200 OK (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content_Type:
Content-Length:

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

68. **200 OK (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-68**

Table 17.5.2-68: 200 OK (I-CSCF1a to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

69. **200 OK (P-CSCF1 to UE1) - see example in table 17.5.2-69**

Table 17.5.2-69: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length:

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

70. **Alerting**

UE2 may optionally delay the session establishment in order to alert the subscriber to the incoming additional media.

71. **180 Ringing (UE2 to P-CSCF2) - see example in table 17.5.2-71**

If UE2 performs alerting, it sends a ringing indication to the originator via the signalling path. The response is sent first to P-CSCF2.

Table 17.5.2-71: 180 Ringing (UE2 to P-CSCF2)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 132 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Rseq: 9023
Content-Length: 0
```

72. **180 Ringing (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-72**

Table 17.5.2-72: 180 Ringing (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=1[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length:
```

73. **180 Ringing (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-73**

Table 17.5.2-73: 180 Ringing (I-CSCF2b to S-CSCF2)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
   <sip:token(<sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-
   by=home1.net>, <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length:
```

74. **180 Ringing (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-74**

Table 17.5.2-74: 180 Ringing (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd];branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length:
```

75. **180 Ringing (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-75**

Table 17.5.2-75: 180 Ringing (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Rseq:
Contact:
Content-Length:
```

76. **180 Ringing (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-76**

Table 17.5.2-76: 180 Ringing (I-CSCF1b to S-CSCF1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length:
```

77. **180 Ringing (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-77**

Table 17.5.2-77: 180 Ringing (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length: 0
```

78. **180 Ringing (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-78**

Table 17.5.2-78: 180 Ringing (I-CSCF1a to P-CSCF1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Rseq:
Content-Length:
```

79. **180 Ringing (P-CSCF1 to UE1) - see example in table 17.5.2-79**

Table 17.5.2-79: 180 Ringing (P-CSCF1 to UE1)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: The P-CSCF rewrites the Record-Route header to add the port number negotiated during the security agreement and the comp=sigcomp parameter to its own SIP URI.

80. **Ringback**

UE#1 indicates to the originator that the media addition is being delayed due to alerting. Typically this involves playing a ringback sequence.

81. **PRACK (UE1 to P-CSCF1) - see example in table 17.5.2-81**

The originator sends PRACK to the terminator for the Ringing response.

Table 17.5.2-81: PRACK (UE1 to P-CSCF1)

```
PRACK sip: [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 135 PRACK
Require: precondition, sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
RAck: 9023 132 INVITE
Content-Length:
```

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

82. **PRACK (P-CSCF1 to I-CSCF1a) - see example in table 17.5.2-82**

The PRACK request is forwarded through this I-CSCF 1to the S-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 17.5.2-82: PRACK (P-CSCF1 to I-CSCF1a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

83. **PRACK (I-CSCF1a to S-CSCF1) - see example in table 17.5.2-83**

The PRACK request is forwarded through this I-CSCF1a to the S-CSCF1.

Table 17.5.2-83: PRACK (I-CSCF1a to S-CSCF1)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

84. **PRACK (S-CSCF1 to I-CSCF1b) - see example in table 17.5.2-84**

S-CSCF1 forwards the PRACK request to I-CSCF1b.

Table 17.5.2-84: PRACK (S-CSCF1 to I-CSCF1b)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf1_shome1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

85. **PRACK (I-CSCF1b to I-CSCF2a) - see example in table 17.5.2-85**

I-CSCF1b forwards the PRACK request to I-CSCF2a.

Table 17.5.2-85: PRACK (I-CSCF1b to I-CSCF2a)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

86. **PRACK (I-CSCF2a to S-CSCF2) - see example in table 17.5.2-86**

I-CSCF2a forwards the PRACK request to S-CSCF2.

Table 17.5.2-86: PRACK (I-CSCF2a to S-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

87. **PRACK (S-CSCF2 to I-CSCF2b) - see example in table 17.5.2-87**

S-CSCF2 forwards the PRACK request to I-CSCF2b.

Table 17.5.2-87: PRACK (S-CSCF2 to I-CSCF2b)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Route: <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

88. **PRACK (I-CSCF2b to P-CSCF2) - see example in table 17.5.2-88**

I-CSCF1b forwards the PRACK request to P-CSCF2.

Table 17.5.2-88: PRACK (I-CSCF2b to P-CSCF2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 63
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

89. **PRACK (P-CSCF2 to UE2) - see example in table 17.5.2-89**

P-CSCF2 and forwards the PRACK request to the UE2.

Table 17.5.2-89: PRACK (P-CSCF2 to UE2)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 62
From:
To:
Call-ID:
Cseq:
Content-Length:
```

90. **200 OK (UE2 to P-CSCF2) - see example in table 17.5.2-90**

UE2 acknowledges the PRACK request with a 200 OK response.

Table 17.5.2-90: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 135 PRACK
Content-Length: 0
```

91. **200 OK (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-91**

P-CSCF2 forwards the 200 OK response to I-CSCF2b.

Table 17.5.2-91: 200 OK (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

92. **200 OK (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-92**

I-CSCF2b forwards the 200 OK response to S-CSCF2.

Table 17.5.2-92: 200 OK (I-CSCF2b to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

93. **200 OK (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-93**

S-CSCF2 forwards the 200 OK response to I-CSCF2a.

Table 17.5.2-93: 200 OK (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

94. **200 OK (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-94**

I-CSCF2a forwards the 200 OK response to I-CSCF1b.

Table 17.5.2-94: 200 OK (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

95. **200 OK (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-95**

S-CSCF forwards the 200 OK response to S-CSCF1.

Table 17.5.2-95: 200 OK (I-CSCF1b to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

96. **200 OK (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-96**

S-CSCF1 forwards the 200 OK response to I-CSCF1a.

Table 17.5.2-96: 200 OK (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

97. **200 OK (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-97**

I-CSCF1 forwards the 200 OK response to P-CSCF1.

Table 17.5.2-97: 200 OK (I-CSCF1a to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

98. **200 OK (P-CSCF1 to UE1) - see example in table 17.5.2-98**

P-CSCF1 forwards the 200 OK response to the originator.

Table 17.5.2-98: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

99. **200 OK (UE2 to P-CSCF2) - see example in table 17.5.2-99**

UE acknowledges the INVITE request with a 200 (OK) response.

Table 17.5.2-99: 200 OK (UE2 to P-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net;lr>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq: 132 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-length: 0
```

100. **Approval of QoS Commet**

P-CSCF2 approves the commitment of the QoS resources for this additional media.

101. **UE2 can start the new media**

102. **200 OK (P-CSCF2 to I-CSCF2b) - see example in table 17.5.2-102**

P-CSCF2 forwards the 200 OK response to I-CSCF2b.

Table 17.5.2-102: 200 OK (P-CSCF2 to I-CSCF2b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024";
   ggsn=[5555::d6d:c7c:b8b:a9a]; auth-token=2A96B3AF30D1; pdp-info="pdp-item=1; pdp-sig=no;
   gcid=A93D238CAF309685742; auth-token=86243614; flow-id=({1,1},{1,2})flow-id=1[1], pdp-
   item=2; pdp-sig=no; gcid=F312D5E3BC730293842; auth-token=95567834; flow-
   id=({2,1},{2,2})flow-id=[2]"
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

103. **200 OK (I-CSCF2b to S-CSCF2) - see example in table 17.5.2-103**

I-CSCF2b forwards the 200 OK response to S-CSCF2.

Table 17.5.2-103: 200 OK (I-CSCF2b to S-CSCF2)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
P-Access-Network-Info:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

104. **200 OK (S-CSCF2 to I-CSCF2a) - see example in table 17.5.2-104**

S-CSCF2 forwards the 200 OK response to I-CSCF2a.

Table 17.5.2-104: 200 OK (S-CSCF2 to I-CSCF2a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

105. **200 OK (I-CSCF2a to I-CSCF1b) - see example in table 17.5.2-105**

S-CSCF forwards the 200 OK response to I-CSCF1b.

Table 17.5.2-105: 200 OK (I-CSCF2a to I-CSCF1b)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

106. **200 OK (I-CSCF1b to S-CSCF1) - see example in table 17.5.2-106**

I-CSCF1b forwards the 200 OK response to S-CSCF1.

Table 17.5.2-106: 200 OK (I-CSCF1b to S-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
Contact:
Content-length:
```

107. **200 OK (S-CSCF1 to I-CSCF1a) - see example in table 17.5.2-107**

S-CSCF1 forwards the 200 OK response to I-CSCF1a.

Table 17.5.2-107: 200 OK (S-CSCF1 to I-CSCF1a)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

108. **200 OK (I-CSCF1a to P-CSCF1) - see example in table 17.5.2-108**

I-CSCF1a forwards the 200 OK response to P-CSCF1.

Table 17.5.2-108: 200 OK (I-CSCF1a to P-CSCF1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

109. **Approval of QoS Commit**

P-CSCF1 approves the commitment of the QoS resources for this additional media.

110. **200 OK (P-CSCF1 to UE1) - see example in table 17.5.2-110**

S-CSCF forwards the 200 OK response to UE1.

Table 17.5.2-110: 200 OK (P-CSCF1 to UE1)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf2.visited2.net;lr>, <sip:icscf2_p.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
From:
To:
Call-ID:
CSeq:
Contact:
Content-length:
```

111. **UE1 can start new media**

112. **ACK (UE1 to P-CSCF1) - see example in table 17.5.2-112**

UE1 responds to the final response with a SIP ACK request, which is passed to the destination via the signalling path. The request is sent first to P-CSCF1.

Table 17.5.2-112: ACK (UE1 to P-CSCF1)

```
ACK sip: [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf1_s.home1.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_s.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 132 ACK
Content-Length: 0
```

113. **ACK (P-CSCF1 to I-CSCF1a) - see example in table 17.5.2-113**

Table 17.5.2-113: ACK (P-CSCF1 to I-CSCF1a)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>, <sip:token(<sip:scscf1.home1.net;lr>,
   <sip:icscf1_s.home1.net;lr>)@home1.net;tokenized-by=home1.net>,
   <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-length: 0
```

114. **ACK (I-CSCF1a to S-CSCF1) - see example in table 17.5.2-114**

Table 17.5.2-114: ACK (I-CSCF1a to S-CSCF1)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

115. **ACK (S-CSCF1 to I-CSCF1b) - see example in table 17.5.2-115**

Table 17.5.2-115: ACK (S-CSCF1 to I-CSCF1b)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
   <sip:token(<sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-
   by=home2.net>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

116. **ACK (I-CSCF1b to I-CSCF2a) - see example in table 17.5.2-116**

Table 17.5.2-116: ACK (I-CSCF1b to I-CSCF2a)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 66
Route: <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:scscf2.home2.net;lr>,
   <sip:icscf2_p.home2.net;lr>)@home2.net;tokenized-by=home2.net>,
   <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

117. **ACK (I-CSCF2a to S-CSCF2) - see example in table 17.5.2-117**

Table 17.5.2-117: ACK (I-CSCF2a to S-CSCF2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 65
Route: <sip:scscf2.home2.net;lr>, <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

118. **ACK (S-CSCF2 to I-CSCF2b) - see example in table 17.5.2-118**

Table 17.5.2-118: ACK (S-CSCF2 to I-CSCF2b)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 64
Route: <sip:icscf2_p.home2.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

119. **ACK (I-CSCF2b to P-CSCF2) - see example in table 17.5.2-119**

Table 17.5.2-119: ACK (S-CSCF2 to P-CSCF2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 63
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

120. **ACK (P-CSCF2 to UE2) - see example in table 17.5.2-120**

Table 17.5.2-120: ACK (P-CSCF2 to UE2)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, SIP/2.0/UDP
   icscf2_p.home2.net;branch=z9hG4bK556u87.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
   icscf2_s.home2.net;branch=z9hG4bK871y12.1)@home2.net;tokenized-by=home2.net, SIP/2.0/UDP
   icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
Cseq:
Content-Length:
```

3GPP TSG-CN1 Meeting #34 **Tdoc N1-040935**

Zagreb, Croatia 10 – 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ **24.228** **CR** **131** ⌘ **rev** **-** ⌘ Current version: **5.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Revisions due to published version of draft-ietf-sipping-reg-event
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14/04/2004
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	draft-ietf-sipping-reg-event has recently been published as RFC 3680, and as part of the publication process there have been some minor revisions to the XML schema, which result in some minor changes to the examples shown in 24.228. This contribution proposes those changes.
Summary of change:	⌘	In the XML document examples relating to the reg event package, all instances of contact addresses are preceded by a start element <uri> and a end element </uri>.
Consequences if not approved:	⌘	3GPP TS 24.228 will show examples that are not in alignment with the requirements of 24.229.

Clauses affected:	⌘	6.5, 6.6, 6.7.1, 6.7.2, 6.7.3, 6.8, 16.5, 16.6, 16.8			
Other specs affected:	⌘	Y: [Y] N: [ ]	Other core specifications	⌘	24.229
		Y: [ ] N: [X]	Test specifications		
		Y: [ ] N: [X]	O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

PROPOSED CHANGE

6.5 UE subscription for the registration state event package

This subclause describes the subscription procedure for the registration state event , whereby the UE requests to be notified by the S-CSCF when the event has occurred. This is done using the information structure as indicated in 3GPP TS 24.229 [16].

It is assumed that the user has registered prior to initiating subscription of an event. Also, the subscriber is considered to be roaming and the home network operator does not desire to keep its internal configuration hidden from the visited network. For this example the trigger point at the P-CSCF for sending out the SUBSCRIBE request is the 200 (OK) response of the user's registration.

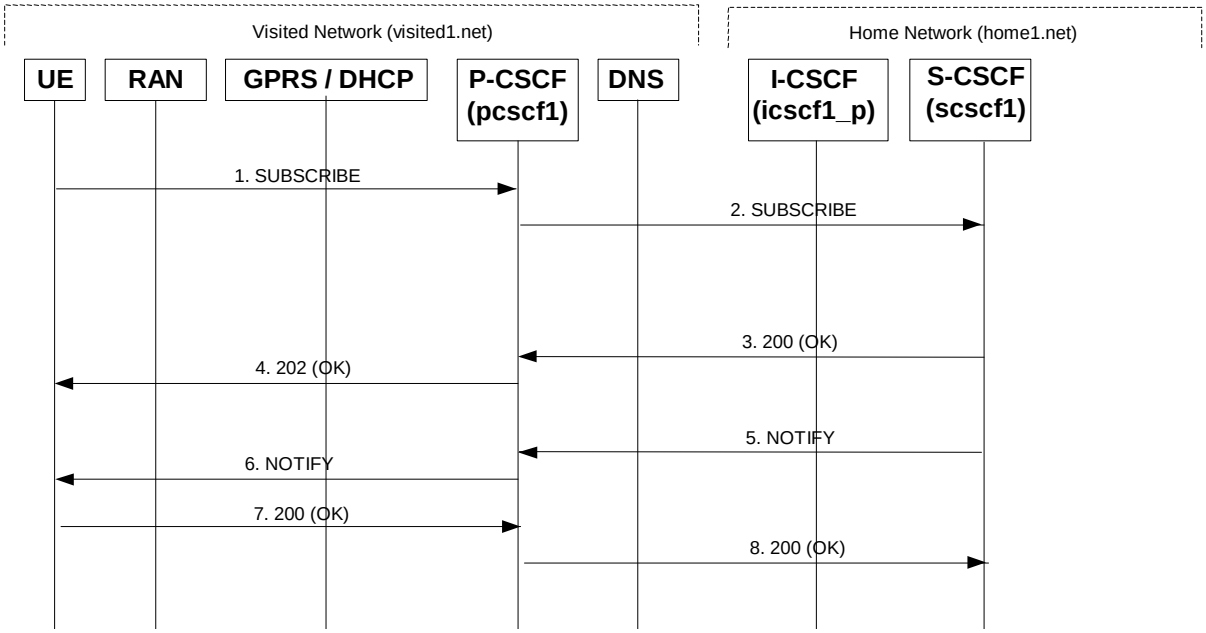

Figure 6.5-1: UE subscription for the registration state event package (without I-CSCF providing configuration independence)

1. **SUBSCRIBE request (UE to P-CSCF) - see example in table 6.5-1**

   The UE sends the SUBSCRIBE request for the reg event package.

Table 6.5-1: SUBSCRIBE request (UE to P-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:orig@scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=31415
To: <sip:user1_public@home1.net>
Call-ID: b89rjhnedlrfjflslj40a222
Require: sec-agree
Proxy-Require: sec-agree
CSeq: 61 SUBSCRIBE
Event: reg
Expires: 600000
Accept: application/reginfo+xml
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Content-Length: 0
```

From: The user does not require privacy, the From header contains the value requested by the user.

Privacy: The user does not require privacy, therefore the Privacy header is set to the value "none" as specified in RFC 3323 [13].

Route: contains the P-CSCF address learnt during P-CSCF discovery, plus the elements from the Service-Route header from registration. The P-CSCF URI contains the port number learnt during the security agreement negotiation.

P-Preferred-Identity: The user provides a hint about the identity to be used for this dialog.

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

Event: This field is populated with the value "reg" to specify the use of the registration state package.

Accept: This field is populated with the value "application/reginfo+xml".

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

2. **SUBSCRIBE request (P-CSCF to S-CSCF) - see example in table 6.5-2**

The SUBSCRIBE request is forwarded to the S-CSCF.

The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 6.5-2: SUBSCRIBE request (P-CSCF to S-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd].1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:orig@scscf1.home1.net;lr>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
From:
To:
Call-ID:
CSeq:
Event:
Expires:
Accept:
Contact:
Content-Length:
```

P-Asserted-Identity: P-CSCF inserts the SIP URI in the P-Asserted-Identity header field and it also removes P-Preferred-Identity header field.

P-Access-Network-Info: This header contains information from the UE.

P-Charging-Vector: The P-CSCF inserts this header and populates the icid parameters with a globally unique value.

3. **200 (OK) response (S-CSCF to P-CSCF) - see example in table 6.5-3**

The S-CSCF first authorizes the subscription. As S-CSCF can trust the content of the P-Asserted-Identity header and <sip:user1_public1@home1.net> is on the list of the authorized users for the "reg" event package stored by the S-CSCF, therefore the S-CSCF sends an acknowledgement towards the UE indicating that the subscription was successful. This response will traverse the path that the SUBSCRIBE request took as described in the Via list.

Table 6.5-3: 200 (OK) response (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: <sip:scscf1.home1.net>
Privacy: none
From:
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID:
CSeq:
Expires:
Contact: <sip:scscf1.home1.net>
Content-Length:
```

Expires: If the value of the Expires header in SUBSCRIBE request is different from the one received in REGISTER method, then the value of Expires header in the 200 (OK) response is set to match the value of Expires header in REGISTER method.

4. **200 (OK) response (P-CSCF to UE) - see example in table 6.5-4**

P-CSCF sends the response to UE.

Table 6.5-4: 200 (OK) response (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route:<sip:pcscf1.home1.net:7531;lr;comp=sigcomp>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Expires:
Contact:
Content-Length:
```

5. **NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.5-5**

The S-CSCF sends a first NOTIFY request towards the UE in order to inform the UE about the registration status of the monitored user.

In the example below, the NOTIFY request specifies the following public user identity as registered (i.e. status=open): sip:user1_public1@home1.net, tel:+358504821437.

The following public user identity has been deregistered (i.e. status=closed) sip:user1_public2@home1.net. They are arranged in the preferred order of priority in this example.

Table 6.5-5: NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:pcscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=31415
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID:
CSeq: 42 NOTIFY
Subscription-State: active;expires=600000
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="active">
         <contact id="76" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
         <contact id="77" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="tel:+358504821437" id="a9" state="active">
         <contact id="78" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
</reginfo>
```

From: The tag of this field matches that of the To; field in the received 200 (OK) response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in the NOTIFY request that carries the subscriber's registration state is formed as indicated in 3GPP TS 24.229 [16].

6. **NOTIFY request (P-CSCF to UE) - see example in table 6.5-6**

The P-CSCF forwards the NOTIFY request to the UE.

Table 6.5-6: NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 69
From:
To:
Call-ID:
CSeq:
Subscription-State:
Event:
Content-Type:
Contact:
Content-Length:
```

7. **200 (OK) response (UE to P-CSCF) – see example in table 6.5-7**

The UE generates a 200 (OK) response to the NOTIFY request.

Table 6.5-7 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

8. **200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.5-8**

P-CSCF forwards the 200 (OK) to the S-CSCF.

Table 6.5-8: 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

PROPOSED CHANGE

6.6 P-CSCF subscription for the registration state event package (without I-CSCF providing configuration independence)

This section describes the subscription procedure for the network initiated deregistration event, whereby the P-CSCF requests to be notified by the S-CSCF when the event has occurred. This is done using the 'reg' package as described in 3GPP TS 24.229 [16].

It is assumed that the user has registered prior to initiating subscription of an event. Also, the subscriber is considered to be roaming and the home network operator does not desire to keep its internal configuration hidden from the visited network. For this example the trigger point at the P-CSCF for sending out the SUBSCRIBE request is the 200 (OK) response of the user's registration.

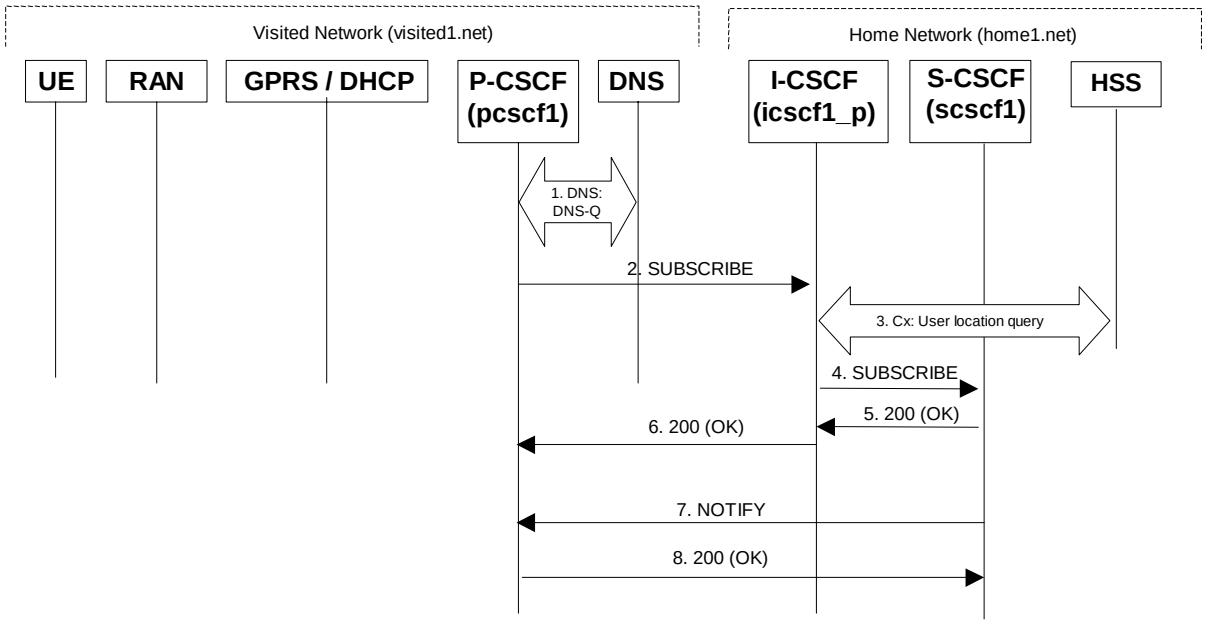

Figure 6.6-1: P-CSCF subscription for the registration state event package (without I-CSCF providing configuration independence)

1. **DNS: DNS-Q**

   The P-CSCF performs the DNS queries to locate the I-CSCF in the home network. The look up in the DNS is based on the address specified in the Request URI.

2. **SUBSCRIBE request (P-CSCF to I-CSCF) - see example in table 6.6-2**

   The P-CSCF sends the SUBSCRIBE request for the reg event package.

Table 6.6-2: SUBSCRIBE request (P-CSCF to I-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
P-Asserted-Identity: <sip:pcscf1.visited1.net>
Privacy: none
From: <sip:pcscf1.visited1.net>;tag=31415
To: <sip:user1_public1@home1.net>
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 61 SUBSCRIBE
Event: reg
Expires: 600000
Accept: application/reginfo+xml
Contact: <sip:pcscf1.visited1.net>
Content-Length: 0
```

From: This header is populated with the SIP URI that identifies the P-CSCF.

Contact: This is where the NOTIFY requests for this subscription will be sent.

Event: This field is set to the value 'reg' to specify the use of the reg event package.

Accept: This field is set to the value "application/reginfo+xml".

3. **Cx: User Location Query procedure**

   The I-CSCF sends a query to the HSS to find out the S-CSCF of the called user. The HSS responds with the address of the current S-CSCF for the terminating subscriber.

   For detailed message flows see 3GPP TS 29.228 [11].

Table 6.6-3a provides the parameters in the SIP SUBSCRIBE request (flow 2), which are sent to the HSS.

Table 6.6-3a Cx: User registration status query procedure (I-CSCF to HSS)

Message source & destination	Cx: Information element name	Information source in SIP INVITE	Description
I-CSCF to HSS	User Public Identity	Request-URI:	This information element indicates the public user identity

Table 6.6-3b provides the parameters sent from the HSS that need to be mapped to SIP SUBSCRIBE (flow 4) and sent to S-CSCF.

Table 6.6-3b Cx: User registration status query procedure (HSS to I-CSCF)

Message source & destination	Cx: Information element name	Mapping to SIP header in SIP INVITE	Description
HSS to I-CSCF	S-CSCF name	Route header field	This information indicates the serving CSCF's name of that user

4. **SUBSCRIBE request (I-CSCF to S-CSCF) - see example in table 6.6-4**

The I-CSCF forwards the SUBSCRIBE request to the S-CSCF.

Table 6.6-4: SUBSCRIBE request (I-CSCF to S-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 69
Route: <sip:scscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Event:
Expires:
Accept:
Contact:
Content-Length:
```

5. **200 (OK) response (S-CSCF to I-CSCF) - see example in table 6.6-5**

The S-CSCF first authorizes the subscription. As S-CSCF can trust the content of the P-Asserted-Identity header and <sip:pcscf1.visited1.net> is on the list of the authorized users for the "reg" event package stored by the S-CSCF, therefore the S-CSCF sends an acknowledgement towards the I-CSCF indicating that the subscription was successful.

Table 6.6-5: 200 (OK) response (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP
     pcscf1.visited1.net;branch=z9hG4bK240f34.1
P-Asserted-Identity: <sip:scscf1.home1.net>
Privacy:
From:
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID:
CSeq:
Contact: <sip:scscf1.home1.net>
Expires:
Content-Length:
```

Expires: If value of the Expires header in SUBSCRIBE request is different from the one received in REGISTER method, then the value of Expires header in the 200 (OK) response is set to match the value of Expires header in REGISTER method.

6. **200 (OK) response (I-CSCF to P-CSCF) - see example in table 6.6-6**

The I-CSCF forwards the 200 (OK) response to the P-CSCF.

Table 6.6-6: 200 (OK) response (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Contact:
Expires:
Content-Length:
```

7. **NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.6-7**

The S-CSCF sends a first NOTIFY request towards the P-CSCF in order to inform the P-CSCF about the registration status of monitored user.

Table 6.6-7: NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:user1_public1@pcscf1.visited1.net>;tag=31415
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 42 NOTIFY
Subscription-State: active;expires=600000
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                 version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="active">
         <contact id="76" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
         <contact id="77" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="tel:+358504821437" id="a9" state="active">
         <contact id="78" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
</reginfo>
```

From: The tag of this field matches that of the To; field in the received 200 (OK) response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in the NOTIFY request that carries the subscriber's registration state is formed as indicated in 3GPP TS 24.229 [16].

8. 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.6-8

P-CSCF forwards the 200 (OK) response to the S-CSCF.

Table 6.6-8: 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Type:
Content-Length: 0
```

PROPOSED CHANGE

6.7.1 Network-initiated deregistration event occurs in the S-CSCF

Figure 6.7.1-1 assumes that the UE and the P-CSCF both have subscribed for the user's registration state event package according to subclause 6.5 and shows how the UE and the P-CSCF are notified when the network-initiated deregistration event occurs in the S-CSCF.

Also, it is assumed that the home network does not have network configuration hiding active.

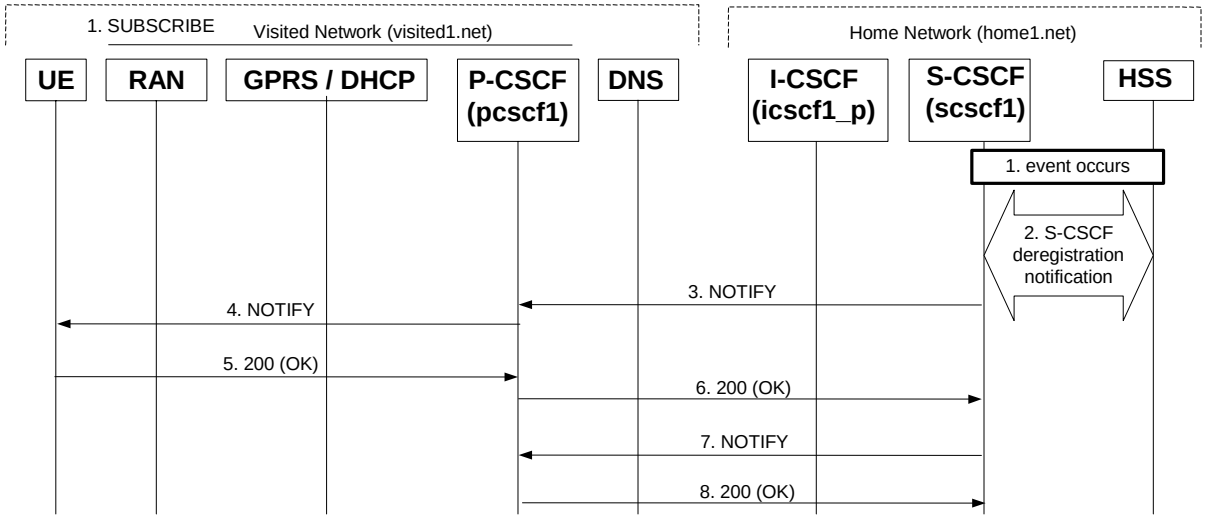

Figure 6.7.1-1: Network Initiated Deregistration event occurs in the S-CSCF

1. **Network Initiated Deregistration event occurs in the S-CSCF**

2. **S-CSCF deregistration notification**

   When the Network Initiated Deregistration Event occurs in the S-CSCF, the S-CSCF informs the HSS that the user is no longer registered. The S-CSCF either notifies the HSS to clear or requests to keep its location information for that subscriber. The HSS then either clears or keeps the S-CSCF name for that subscriber according to request. In both cases the state of the subscriber identity is stored as unregistered in the HSS and the S-CSCF. The HSS acknowledges the request.

   For detailed message flows see 3GPP TS 29.228 [11].

3 **SIP NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.7.1-3**

   After the S-CSCF deregistration notification procedure the S-CSCF immediately sends a NOTIFY request towards the UE in order to inform about the network initiated deregistration and the subscription termination.

The same Request URI, To, From, Call-ID are used as in the first NOTIFY request. CSeq is incremented since this is the second NOTIFY request sent towards the UE.

Table 6.7.1-3: SIP NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net;lr>
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:user1_public1@home1.net>;tag=31415
Call-ID: b89rjhnedlrfjflslj40a222
CSeq: 43 NOTIFY
Subscription-State: terminated
Event: reg
Content-Type: application/reginfo+xml
Contact: sip:scscf1.home1.net
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="terminated">
       <contact id="76" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="as10"
                   state="terminated">
       <contact id="77" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="tel:+358504821437" id="as11"
                   state="terminated">
       <contact id="78" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
   </reginfo>
```

4. **SIP NOTIFY request (P-CSCF to UE) - see example in table 6.7.1-4**

P-CSCF forwards the NOTIFY request to the UE.

Table 6.7.1-4: SIP NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 69
From:
To:
Call-ID:
CSeq:
Subscription-State:
Event:
Content-Type:
Contact:
Content-Length:
```

5. **200 (OK) response (UE to P-CSCF) - see example in table 6.7.1-5**

Table 6.7.1-5: SIP 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

6. **SIP 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.7.1-6**

Table 6.7.1-6: SIP 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

7 **SIP NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.7.1-7**

The S-CSCF also sends a NOTIFY request towards the P-CSCF to which the UE is attached to, in order to inform about the network initiated deregistration. The same Request URI, To, From, Call-ID are used as in the first NOTIFY request. CSeq is incremented since this is the second NOTIFY request sent towards the P-CSCF.

Table 6.7.1-7: SIP NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:pcscf1.visited1.net>;tag=31415
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 43 NOTIFY
Subscription-State: terminated
Event: reg
Content-Type: application/reginfo+xml
Contact: sip:scscf1.home1.net
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="terminated">
       <contact id="76" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="as10"
                   state="terminated">
       <contact id="77" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="tel:+358504821437" id="as11"
                   state="terminated">
       <contact id="78" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
   </reginfo>
```

8. **SIP 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.7.1-8**

Table 6.7.1-8: SIP 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

PROPOSED CHANGE

6.7.2 Network-initiated deregistration event occurs in the HSS

Figure 6.7.2-1 assumes that the UE and the P-CSCF both have subscribed for the user's registration state event package according to subclause 6.5 and shows how the UE and the P-CSCF are notified when the Network Initiated Deregistration event occurs in the HSS.

Also, it is assumed that the home network does not have network configuration hiding active.

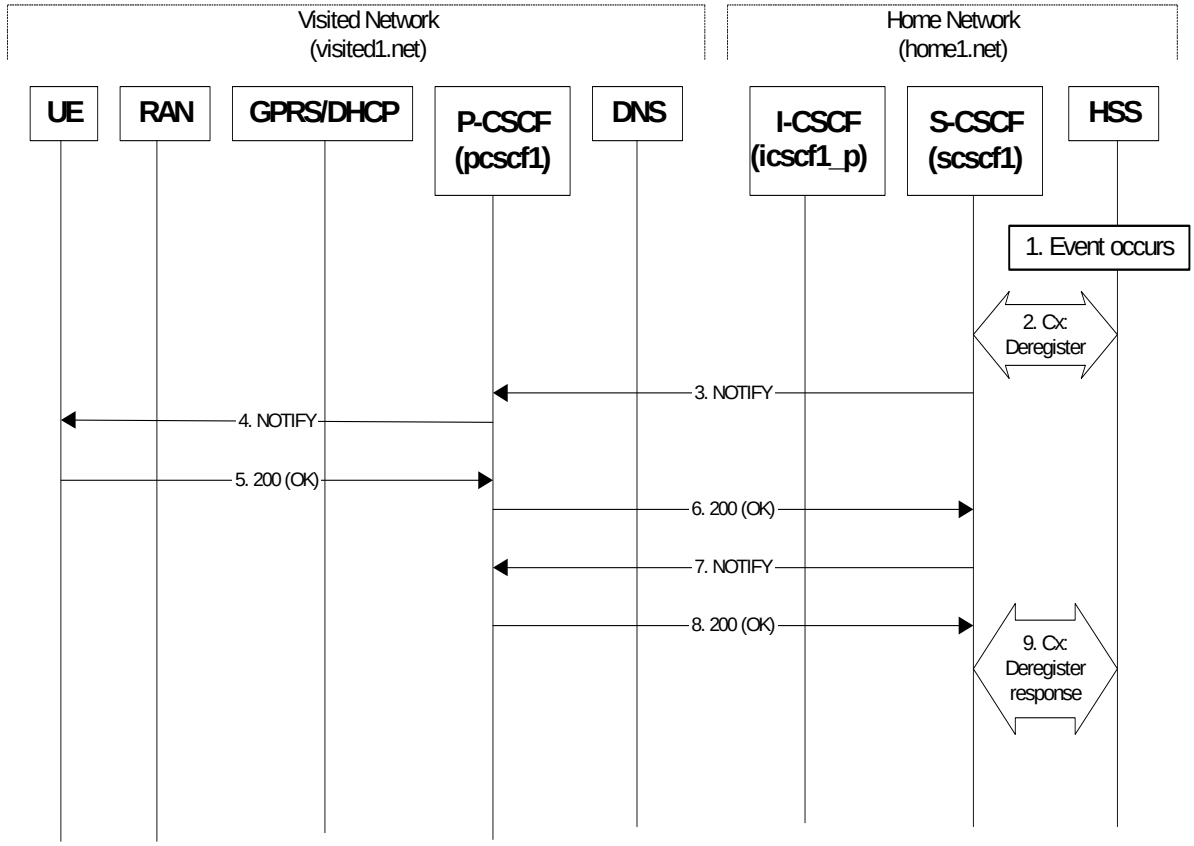

Figure 6.7.2-1: Network-initiated deregistration event occurs in the HSS

1. **Network-initiated deregistration event occurs in the HSS**

2. **Cx-Deregister**

   HSS initiates the deregistration, sending a Cx-Deregister (subscriber identity). For detailed message flows see 3GPP TS 29.228 [11].

3. **SIP NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.7.2-3**

   After getting the Cx-Deregister message the S-CSCF immediately sends a NOTIFY request towards the UE order to inform about the network initiated deregistration and the subscription termination. The same Request URI, To, From, Call-ID are used as in the first NOTIFY request. CSeq is incremented since this is the second NOTIFY request sent towards the UE.

Table 6.7.2-3: SIP NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net;lr>
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:user1_public1@home1.net>;tag=31415
Call-ID: b89rjhnedlrfjflslj40a222
CSeq: 43 NOTIFY
Subscription-State: terminated
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="terminated">
       <contact id="76" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="as10"
                   state="terminated">
       <contact id="77" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="tel:+358504821437" id="as11"
                   state="terminated">
       <contact id="78" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
   </reginfo>
```

4. **SIP NOTIFY request (P-CSCF to UE) - see example in table 6.7.2-4**

   P-CSCF forwards the NOTIFY request to the UE.

Table 6.7.2-4: SIP NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 69
From:
To:
Call-ID:
CSeq:
Subscription-State:
Event:
Content-Type:
Contact:
Content-Length:
```

5. **SIP 200 (OK) response (UE to P-CSCF) - see example in table 6.7.2-5**

Table 6.7.2-5: SIP 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

6. **SIP 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.7.2-6**

Table 6.7.2-6: SIP 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

7 **SIP NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.7.2-7**

The S-CSCF also sends a NOTIFY request towards the P-CSCF to which the UE is attached to, in order to inform about the network initiated deregistration. The same Request URI, To, From, Call-ID are used as in the first NOTIFY request. CSeq is incremented since this is the second NOTIFY request sent towards the P-CSCF.

Table 6.7.2-7: SIP NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:pcscf1.visited1.net>;tag=31415
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 43 NOTIFY
Subscription-State: terminated
Event: reg
Contact: <sip:scscf1.home1.net>
Content-Type: application/reginfo+xml
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="terminated">
       <contact id="76" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="as10"
                   state="terminated">
       <contact id="77" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="tel:+358504821437" id="as11"
                   state="terminated">
       <contact id="78" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
   </reginfo>
```

8. **SIP 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.7.2-8**

Table 6.7.2-8 SIP 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

9. **Cx-Deregister Resp**

   After receiving the 200 (OK) response from the P-CSCF, the S-CSCF sends Cx-Deregister Resp to the HSS. For detailed message flows see 3GPP TS 29.228 [11].

PROPOSED CHANGE

6.7.3 Network-initiated deregistration upon UE roaming and registration to a new network - assumes that the previous registration has not expired

This shows the registration signalling flow for the scenario that the UE loses the GPRS attachment in current visited access network and roams to makes a new GPRS attachment in a new visited access network without deregistration from its previous network. The GGSN and P-CSCF are assumed to be in the visited network. When the UE starts registration in via the new visited access network and P-CSCF, the home S-CSCF in the home IMS network initiates the deregistration to the P-CSCF in the previous visited network. It is assumed that the old P-CSCF has subscribed the

event package to the S-CSCF and the subscription has not expired. For the reason of simplicity, the authentication procedure is not shown because it has no technical impact on this flow.

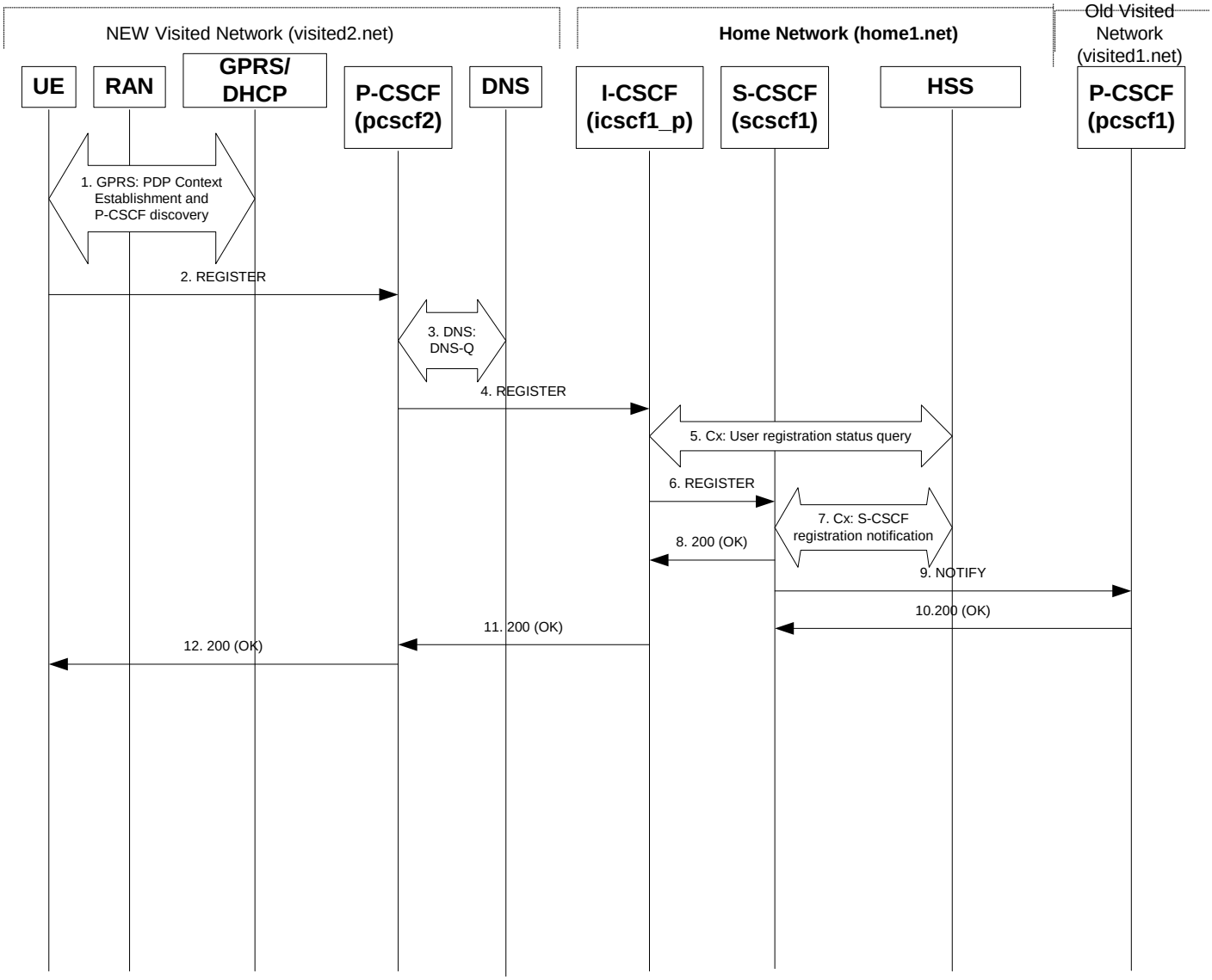

Figure 6.7.3-1: Network-initiated deregistration upon UE roaming without deregistration

Flows from 1 to 4 are the same as those in subclause 6.2.

5. **Cx: User Registration Status Query**

   The I-CSCF sends the Cx-Query signalling flow to the HSS (Visited Network Identifier, subscriber identity, home domain name,). Because user has not deregistered with its previous network, so that HSS finds a S-CSCF assigned for that user and treats this as a re-registration procedure. Therefore, the HSS returns the S-CSCF name to the I-CSCF.For detailed message flows see 3GPP TS 29.228 [11].

   For the parameters in the REGISTER request (flow 4) which need to be sent to HSS, see table 6.2-4a.

   Table 6.3-4a provides the parameters in the REGISTER request (flow 6) which are obtained from the information sent back from the HSS.

6. **REGISTER request (I-CSCF to S-CSCF)**

   The I-CSCF forwards the REGISTER request to the S-CSCF assigned to that user.

7. **Cx-S-CSCF Registration Notification**

The S-CSCF notifies the HSS to update its location information for that subscriber. The HSS sends a response to the S-CSCF to acknowledge the update of location information and also with the user profile.

9. **NOTIFY request (S-CSCF to Old P-CSCF) - see example in table 6.7.3-9**

As there was a change in the user's registration status and the old P-CSCF is still subscribed to the registration event package for that user, therefore, the S-CSCF sends a NOTIFY request to that P-CSCF.

Table 6.7.3-9: SIP NOTIFY request (S-CSCF to Old P-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:pcscf1.visited1.net>;tag=31415
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 43 NOTIFY
Subscription-State: terminated
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:scscf1.home1.net>
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="terminated">
       <contact id="76" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="as10"
                   state="terminated">
       <contact id="77" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
     <registration aor="tel:+358504821437" id="as11"
                   state="terminated">
       <contact id="78" state="terminated" event="deactivated">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
   </reginfo>
```

10. **SIP 200 (OK) response (Old P-CSCF to S-CSCF) - see example in table 6.7.3-10**

Upon receiving the NOTIFY request, the P-CSCF discards any information related to that user.

Table 6.7.3-10: SIP 200 (OK) response (Old P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

PROPOSED CHANGE

6.8 Network initiated re-authentication

This subclause describes the notification of a UE that occurs when the S-CSCF assigned to that user requests re-authentication.

It is assumed that user has registered and also subscribed to the registration state event before. Also, the subscriber is considered to be roaming and the home network operator does not desire to keep its internal configuration hidden from the visited network.

After this procedure the user's UE might automatically initiate re-registration procedures. If the user fails to re-register, the public user identity for which re-authentication is requested, the public user identity may be deregistered by S-CSCF.

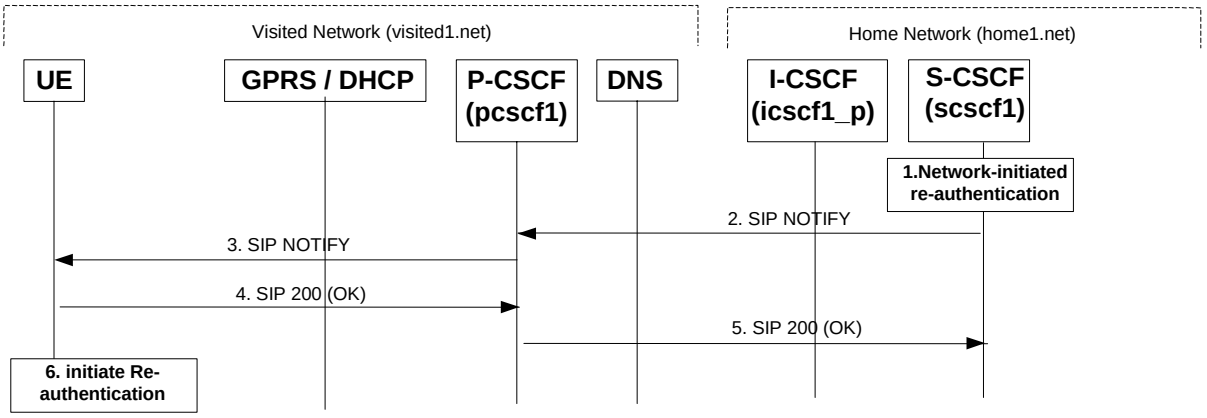

Figure 6.8-1: S-CSCF informs UE about network-initiated re-authentication event (without I-CSCF providing configuration independence)

1. **Network initiated re-authentication (S-CSCF)**

   The network initiated re-authentication event for the private user identity of the user occurs at the S-CSCF. As the user has subscribed to the registration state event package this is the trigger point for the S-CSCF to notify the user about the event occurrence. For simplicity, the NOTIFY request towards the P-CSCF is not shown.

2. **SIP NOTIFY request (S-CSCF to P-CSCF) - see example in table 6.8-2**

   The S-CSCF sends a NOTIFY request towards the UE in order to inform the UE about the occurrence of the network initiated re-authentication event.

Table 6.8-2: SIP NOTIFY request (S-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net;lr>
From: <sip:user1_public1@home1.net>;tag=31415
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID: b89rjhnedlrfjflslj40a222
CSeq: 43 NOTIFY
Subscription-State: active;expires=3200
Event: reg
Content-Type: application/reginfo+xml
Contact: sip:scscf1.home1.net
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                 version="1" state="partial">
     <registration aor="sip:user1_public1@home1.net" id="as9"
                   state="active">
       <contact id="76" state="active" event="shortened"
              expires="600">
           <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
       </contact>
     </registration>
</reginfo>
```

From: The tag of this field matches that of the To; field in the received 200 (OK) response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in NOTIFY request that carries the subscriber's registration state is formed as indicated in 3GPP TS 24.229 [16].

3. **SIP NOTIFY request (P-CSCF to UE) - see example in table 6.8-3**

The P-CSCF forwards the NOTIFY request to UE.

Table 6.8-3: SIP NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 69
From:
To:
Call-ID:
CSeq:
Subscription-State:
Event:
Content-Type:
Contact:
Content-Length:
```

4. **SIP 200 (OK) response (UE to P-CSCF) - see example in table 6.8-4**

The UE generates a 200 (OK) response to the NOTIFY request.

Table 6.8-4: SIP 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

5. **SIP 200 (OK) response (P-CSCF to S-CSCF) - see example in table 6.8-5**

P-CSCF forwards the 200 (OK) response to the S-CSCF.

Table 6.8-5: SIP 200 (OK) response (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

6. **Re-authentication (UE)**

The UE now initiates re-authentication procedures.

PROPOSED CHANGE

16.5 UE subscription for the registration state event package

This section describes the subscription procedure for the registration states event package, whereby the UE requests to be notified by the S-CSCF when the event has occurred. This is done using the information structure as indicated in 3GPP TS 24.229 [16].

It is assumed that the user has registered prior to initiating subscription of an event. Also, the subscriber is considered to be roaming and the home network has network configuration hiding active. For this example the trigger point at the UE for sending out the SUBSCRIBE request is the 200 (OK) response of the user's registration.

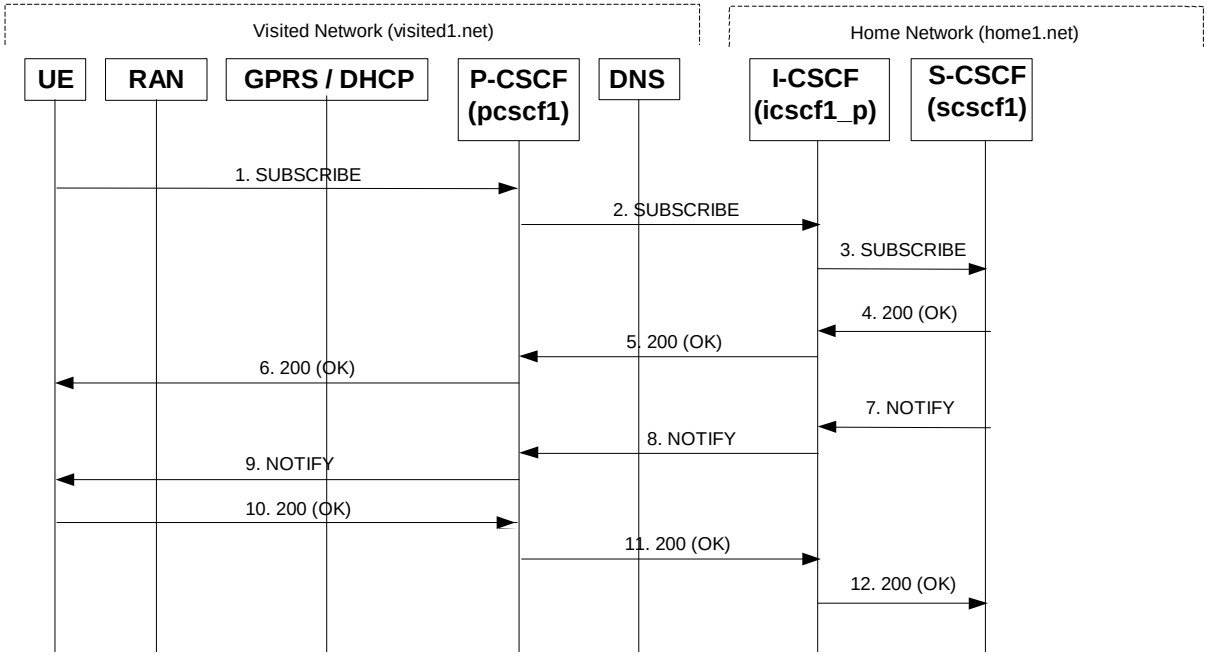

Figure 16.5-1: UE subscription for the registration state event package (with I-CSCF providing configuration independence)

1. **SUBSCRIBE request (UE to P-CSCF) – see example in table 16.5-1**

   The UE generates a SUBSCRIBE request in order to subscribe for the reg event package.

   The From and To fields both will contain the UE's public address.

Table 16.5-1 SUBSCRIBE request (UE to P-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 70
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:orig@scscf1.home1.net;lr>
P-Preferred-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <sip:user1_public1@home1.net>;tag=31415
To: <sip: user1_public1@home1.net>
Call-ID: b89rjhnedlrfjflslj40a222
Require: sec-agree
Proxy-Require: sec-agree
CSeq: 61 SUBSCRIBE
Event: reg
Expires: 600000
Accept: application/reginfo+xml
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c=98765432; spi-s=87654321; port-
   c=8642; port-s=7531
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Content-Length: 0
```

Request URI: Public user identity whose events the subscriber subscribes to. In this case the subscribing user and the monitored user are identical.

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

From: This field is populated with logical representation (FQDN) for the entity sending the SUBSCRIBE request.

Privacy: The user does not require privacy, therefore the Privacy header is set to the value "none" as specified in RFC 3323 [13].

Route: contains the P-CSCF address learnt during P-CSCF discovery, plus the elements from the Service-Route header from registration. The P-CSCF URI contains the port number learnt during the security agreement negotiation.

P-Preferred-Identity: The user provides a hint about the identity to be used for this dialog.

Event: This field is populated with the value "reg" to specify the use of the presence package.

Accept: This field is populated with the value "application/reginfo+xml".

To: Same as the Request-URI.

Security-Verify: Contains the security agreement as represented by the received Security-Server header.

Contact: The contact information of the subscribing user.

2. **SUBSCRIBE request (P-CSCF to I-CSCF) – see example in table 16.5-2**

   The SUBSCRIBE request is forwarded to the I-CSCF.

   The P-CSCF removes the Security-Verify header and associated "sec-agree" option-tags prior to forwarding the request. As the Require and Proxy-Require headers are empty, it removes these headers completely.

Table 16.5-2 SUBSCRIBE request (P-CSCF to I-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 69
Route: <sip:icscf1_p.home1.net;lr>,
   <sip:token(<sip:orig@scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
Record-Route: <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info:
Privacy:
From:
To:
Call-ID:
CSeq:
Event:
Expires:
Accept:
Contact:
Content-Length:
```

P-Asserted-Identity: P-CSCF inserts the SIP URI in the P-Asserted-Identity header field and it also removes P-Preferred-Identity header field.

3. **SUBSCRIBE (I-CSCF to S-CSCF) – see example in table 16.5-3**

I-CSCF determines the S-CSCF name in the Route header field to retrieve the routeing information. I-CSCF then forwards the SUBSCRIBE request to the S-CSCF.

Table 16.5-3 SUBSCRIBE (I-CSCF to S-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:orig@scscf1.home1.net;lr>
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
P-Access-Network-Info:
Privacy:
From:
To:
Call-ID:
CSeq:
Event:
Expires:
Accept:
Contact:
Content-Length:
```

Record-Route: The I-CSCF adds itself to the Record-Route header as it wants to stay on the routeing path for network hiding purposes.

4. **200 (OK) response (S-CSCF to I-CSCF) – see example in table 16.5-4**

The S-CSCF first authorizes the subscription. As S-CSCF can trust the content of the P-Asserted-Identity header and <sip:user1_public1@home1.net> is on the list of the authorized users for the "reg" event package stored by the S-CSCF, therefore the S-CSCF sends an acknowledgement towards the UE indicating that the subscription was successful. This response will traverse the path that the SUBSCRIBE request took as described in the Via list.

Table 16.5-4 200 (OK) response (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity: <sip:scscf1.home1.net>
Privacy: none
From:
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID:
CSeq:
Contact: <sip:scscf1.home1.net>
Expires:
Content-Length: 0
```

Expires: If value of the Expires header in SUBSCRIBE request is different from the one received in REGISTER method, then the value of Expires header in 200 (OK) response is set to match the value of Expires header in REGISTER method.

5. **200 (OK) response (I-CSCF to P-CSCF) – see example in table 16.5-5**

The I-CSCF forwards the 200 (OK) response to the P-CSCF.

Table 16.5-5 200 (OK) response (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Contact: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Expires:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

6. **200 (OK) response (P-CSCF to UE) – see example in table 16.5-6**

The P-CSCF sends the 200 (OK) response to the UE.

Table 16.5-6 200 (OK) response (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Contact
Expires:
Content-Length:
```

7. **NOTIFY request (S-CSCF to I-CSCF) – see example in table 16.5-7**

The S-CSCF sends a first NOTIFY request towards the UE in order to inform the UE about the registration status of the monitored user.

In the example below, the NOTIFY request specifies the following public user identities as registered (i.e. status=open): sip:user1_public1@home1.net, tel:+358504821437.

The following public user identity has been deregistered (i.e. status=closed) sip:user1_public2@home1.net. They are arranged in the preferred order of priority in this example.

Table 16.5-7 NOTIFY request (S-CSCF to I-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:user1_public1@home1.net>;tag=31415
Call-ID:
CSeq: 42 NOTIFY
Contact: <sip:scscf1.home1.net>
Subscription-State: active;expires=600000
Event: reg
Content-Type: application/reginfo+xml
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                 version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="active">
         <contact id="76" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
         <contact id="77" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="tel:+358504821437" id="a9" state="active">
         <contact id="78" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
</reginfo>
```

From: The tag of this field matches that of the To; field in the received 200 (OK) response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in the NOTIFY request that carries the subscriber's registration state is described as indicated in 3GPP TS 24.229 [16].

8. **NOTIFY request (I-CSCF to P-CSCF) – see example in table 16.5-8**

The I-CSCF translates the S-CSCF address in the Via header and forwards the NOTIFY request to the P-CSCF.

Table 16.5-8 NOTIFY request (I-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
Max-Forwards: 69
Route: <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
Cseq:
Contact: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Subscription-State:
Event:
Content-Type:
Content-Length:
```

9. **NOTIFY request (P-CSCF to UE) – see example in table 16.5-9**

The P-CSCF sends the NOTIFY request to the UE.

Table 16.5-9 NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
Max-Forwards: 68
From:
To:
Call-ID:
CSeq:
Contact:
Subscription-State:
Event:
Content-Type:
Content-Length:
```

10. **200 (OK) response (UE to P-CSCF) – see example in table 16.5-10**

UE responds with 200 (OK) response to the NOTIFY request.

Table 16.5-10 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

11. **200 (OK) response (P-CSCF to I-CSCF) – see example in table 16.5-11**

P-CSCF forwards the 200 (OK) response to the I-CSCF.

Table 16.5-11 200 (OK) response (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

12. **200 (OK) response (I-CSCF to S-CSCF) – see example in table 16.5-12**

I-CSCF determines the request and forwards response to S-CSCF. This confirms that notification is reached to the user.

Table 16.5-12 200 (OK) response (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

PROPOSED CHANGE

16.6 P-CSCF subscription for the registration state event package

This subclause describes the subscription procedure for the registration state event package, whereby the P-CSCF requests to be notified by the S-CSCF when the event has occurred. This is done using the 'reg' package.

It is assumed that the user has registered prior to initiating subscription of an event. Also, the subscriber is considered to be roaming and the home network has network configuration hiding active. For this example the trigger point at the P-CSCF for sending out the SUBSCRIBE request is the 200 (OK) response of the user's registration.

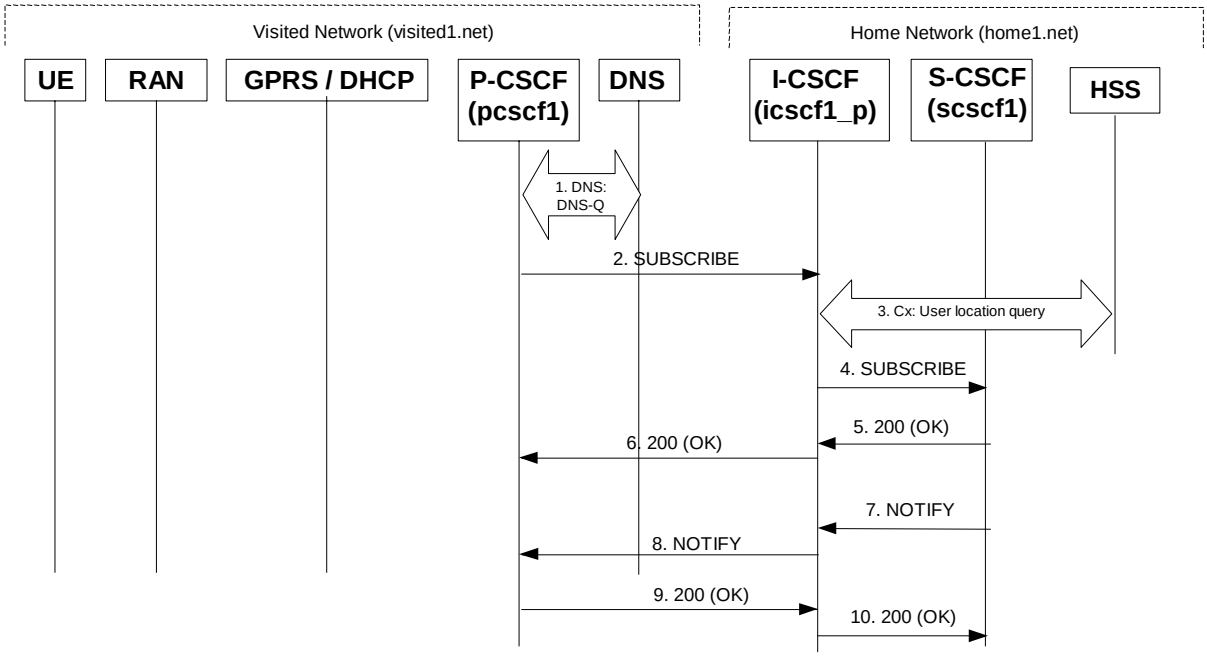

Figure 16.6-1: P-CSCF subscription for the registration state event package (with I-CSCF providing configuration independence)

1. **DNS: DNS-Q**

   The P-CSCF performs the DNS queries to locate the I-CSCF in the home network. The look up in the DNS is based on the address specified in the Request URI.

2. **SUBSCRIBE request (P-CSCF to I-CSCF) – see example in table 16.6-2**

   The P-CSCF generates a SUBSCRIBE request in order to subscribe for the reg event package.

Table 16.6-2 SUBSCRIBE request (P-CSCF to I-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
P-Asserted-Identity: <sip:pcscf1.visited1.net>
Privacy: none
From: <sip:pcscf1.visited1.net>;tag=31415
To: <sip:user1_public1@home1.net>
Call-ID: dre36d2v32gnlgiiomm72445
CSeq: 61 SUBSCRIBE
Event: reg
Expires: 600000
Accept: application/reginfo+xml
Contact: <sip:pcscf1.visited1.net>
Content-Length: 0
```

From: This header is populated with the SIP URI that identifies the P-CSCF.

To: The SIP-URI of the resource to which the subscription is sent..

Contact: This is where the NOTIFY requests for this subscription will be sent.

Event: This field is set to the value 'reg' to specify the use of the reg event package

Accept: This field is set to the value "application/reginfo+xml".

3. **Cx: User Location Query procedure**

The I-CSCF sends a query to the HSS to find out the S-CSCF of the called user. The HSS responds with the address of the current S-CSCF for the terminating subscriber.

For detailed message flows see 3GPP TS 29.228 [11].

Table 16.6-3a provides the parameters in the SIP SUBSCRIBE request (flow 2), which are sent to the HSS.

Table 16.6-3a Cx: User registration status query procedure (I-CSCF to HSS)

Message source & destination	Cx: Information element name	Information source in SIP INVITE	Description
I-CSCF to HSS	User Public Identity	Request-URI:	This information element indicates the public user identity

Table 16.6-3b provides the parameters sent from the HSS that need to be mapped to SIP SUBSCRIBE (flow 4) and sent to S-CSCF.

Table 16.6-3b Cx: User registration status query procedure (HSS to I-CSCF)

Message source & destination	Cx: Information element name	Mapping to SIP header in SIP INVITE	Description
HSS to I-CSCF	S-CSCF name	Route header field	This information indicates the serving CSCF's name of that user

4. **SUBSCRIBE request (I-CSCF to S-CSCF) – see example in table 16.6-4**

The I-CSCF forwards the SUBSCRIBE request to S-CSCF.

Table 16.6-4 SUBSCRIBE request (I-CSCF to S-CSCF)

```
SUBSCRIBE sip:user1_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 69
Record-Route: <sip:icscf1_p.home1.net;lr>
Route: <sip:scscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
CSeq:
Event:
Expires:
Accept:
Contact:
Content-Length:
```

Record-Route: The I-CSCF adds itself to the Record-Route header as it wants to stay on the routeing path for network hiding purposes.

5. **200 (OK) response (S-CSCF to I-CSCF) – see example in table 16.6-5**

The S-CSCF first authorizes the subscription. As S-CSCF can trust the content of the P-Asserted-Identity header and <sip:pcscf1.visited1.net> is on the list of the authorized users for the "reg" event package stored by the S-CSCF, therefore the S-CSCF sends an acknowledgement towards the P-CSCF indicating that the subscription was successful.

Table 16.6-5 200 (OK) response (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP
   pcscf1.visited1.net;branch=z9hG4bK240f34.1
P-Asserted-Identity: <sip:scscf1.home1.net>
Privacy:
Record-Route: <sip:icscf1_p.home1.net;lr>
From:
To: <sip:user1_public1@home1.net>;tag=151170
Call-ID:
CSeq:
Contact: <sip:scscf1.home1.net>
Expires:
Content-Length: 0
```

6. **200 (OK) response (I-CSCF to P-CSCF) – see example in table 16.6-6**

The I-CSCF forwards 200 (OK) response to the P-CSCF.

Table 16.6-6 200 (OK) response (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Record-Route: <sip:icscf1_p.home1.net;lr>
P-Asserted-Identity: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Privacy:
From:
To:
Call-ID:
CSeq:
Contact: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Expires:
Content-Length:
```

7. **NOTIFY request (S-CSCF to I-CSCF) – see example in table 16.6-7**

The S-CSCF sends a first NOTIFY request towards the P-CSCF in order to inform the P-CSCF about the registration status of the monitored user.

The Route header is constructed from the Record-Route header as constructed during subscription.

Table 16.6-7 NOTIFY request (S-CSCF to I-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:pcscf1.visited1.net>;tag=31415
Call-ID:
CSeq: 42 NOTIFY
Contact: <sip:scscf1.home1.net>
Subscription-State: active;expires=600000
Event: reg
Content-Type: application/reginfo+xml
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="full">
     <registration aor="sip:user1_public1@home1.net" id="a7" state="active">
         <contact id="76" state="active" event="registered">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
         <contact id="77" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
     <registration aor="tel:+358504821437" id="a9" state="active">
         <contact id="78" state="active" event="created">
             <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
         </contact>
     </registration>
</reginfo>
```

From: The tag of this field matches that of the To; field in the received 200 (OK) response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in the NOTIFY request that carries the subscriber's registration state is described as indicated in 3GPP TS 24.229 [16].

8. **NOTIFY request (I-CSCF to P-CSCF) – see example in table 16.6-8**

The I-CSCF translates the S-CSCF address in the Via header and forwards the NOTIFY request to the P-CSCF.

Table 16.6-8 NOTIFY request (I-CSCF to P-CSCF)

```
NOTIFY sip:pcscf1.visited1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
Max-Forwards: 69
From:
To:
Call-ID:
Cseq:
Contact: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Subscription-State:
Event:
Content-Type:
Content-Length:
```

9. **200 (OK) response (P-CSCF to I-CSCF) – see example in table 16.6-9**

P-CSCF forwards the 200 (OK) response to the I-CSCF.

Table 16.6-9 200 (OK) response (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

10. **200 (OK) response (I-CSCF to S-CSCF) – see example in table 16.6-10**

    I-CSCF determines the request and forwards response to S-CSCF. This confirms that notification is reached to the user.

Table 16.6-10 200 (OK) response (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Length:
```

PROPOSED CHANGE

16.8 Network initiated re-authentication

This subclause describes the notification that occurs when the S-CSCF assigned to that user requests re-authentication in the case where the user's home network provides network configuration hiding.

It is assumed that user has registered and also subscribed to the registration state event before. Also, the subscriber is considered to be roaming and the home network operator does not desire to keep its internal configuration hidden from the visited network.

After this procedure the user's UE might automatically initiate re-registration procedures. If the user fails to re-register the public user identity for which re-authentication was requested, the public user identity may be deregistered by S-CSCF.

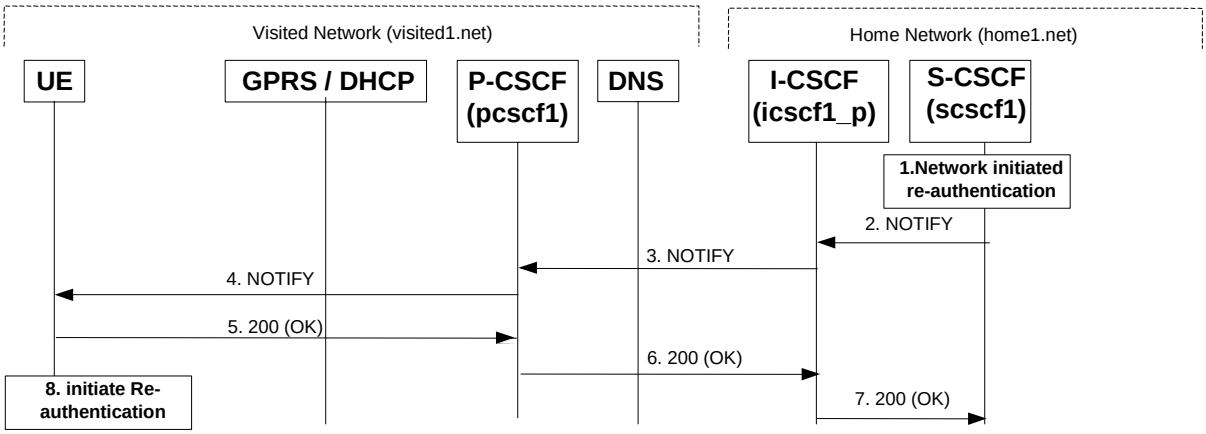

Figure 16.8-1: S-CSCF informs UE that network initiated re-authentication is needed (with I-CSCF providing configuration independence)

1. **Network initiated re-authentication (S-CSCF)**

The network-initiated re-authentication event for the private user identity user occurs at the S-CSCF. As the user has subscribed to the registration state event package this is the trigger point for the S-CSCF to notify the user about the event occurrence. For simplicity, the NOTIFY request towards the P-CSCF is not shown.

2. **SIP NOTIFY request (S-CSCF to I-CSCF) – see example in table 16.8-2**

The S-CSCF sends a NOTIFY request towards the UE in order to inform the UE about the occurrence of the network initiated re-authentication event.

Table 16.8-2 SIP NOTIFY request (S-CSCF to I-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From: <sip:user1_public1@home1.net>;tag=151170
To: <sip:user1_public1@home1.net>;tag=31415
Call-ID: b89rjhnedlrfjflslj40a222
CSeq: 43 NOTIFY
Subscription-State: active;expires=3200
Event: reg
Contact: sip:scscf1.home1.net
Content-Type: application/reginfo+xml
Content-Length: (...)

<?xml version="1.0"?>
<reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
                version="1" state="partial">
    <registration aor="sip:user1_public1@home1.net" id="as9"
                  state="active">
      <contact id="76" state="active" event="shortened"
             expires="600">
          <uri>sip:[5555::aaa:bbb:ccc:ddd]</uri>
      </contact>
    </registration>
  </reginfo>
```

From: The tag of this field matches that of the To; field in the received 200/202 response for the SUBSCRIBE request.

Content-Type: Set to the value of the Accept header received in the SUBSCRIBE request or "application/reginfo+xml" if the Accept header was not present in the SUBSCRIBE request.

The message body in the NOTIFY request that carries the subscriber's registration state is described as indicated in 3GPP TS 24.229 [16].

3. **SIP NOTIFY request (I-CSCF to P-CSCF) – see example in table 16.8-3**

The I-CSCF translates the S-CSCF address in the Via header and forwards the NOTIFY request to the P-CSCF.

Table 16.8-3 SIP NOTIFY request (I-CSCF to P-CSCF)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
Max-Forwards: 69
Route: <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
Cseq:
Subscription-State:
Event:
Contact: <sip:token(<sip:scscf1.home1.net>)@home1.net;tokenized-by=home1.net>
Content-Type:
Content-Length:
```

4. **SIP NOTIFY request (P-CSCF to UE) – see example in table 16.8-4**

The P-CSCF sends the NOTIFY request to the UE.

Table 16.8-4 SIP NOTIFY request (P-CSCF to UE)

```
NOTIFY sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
Max-Forwards: 68
From:
To:
Call-ID:
CSeq:
Subscription-State:
Event:
Contact:
Content-Type:
Content-Length:
```

5. **SIP 200 (OK) response (UE to P-CSCF) – see example in table 16.8-5**

UE responds with a 200 (OK) response to the NOTIFY request.

Table 16.8-5 SIP 200 (OK) response (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.visited1.net:7531;comp=sigcomp;branch=z9hG4bK240f34.1, SIP/2.0/UDP
   icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

P-Access-Network-Info: the UE provides the access-type and access-info, related to the serving access network.

6. **SIP 200 (OK) response (P-CSCF to I-CSCF) – see example in table 16.8-6**

P-CSCF forwards the 200 (OK) response to the I-CSCF.

Table 16.8-6 SIP 200 (OK) response (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1, SIP/2.0/UDP Token(SIP/2.0/UDP
   scscf1.home1.net;branch=z9hG4bK332b23.1)@home1.net;tokenized-by=home1.net
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

7. **SIP 200 (OK) response (I-CSCF to S-CSCF) – see example in table 16.8-7**

I-CSCF determines the request and forwards response to S-CSCF. This confirms that notification has reached the UE.

Table 16.8-7 SIP 200 (OK) response (I-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Content-Length:
```

P-Access-Network-Info: This header contains information from the UE.

8. **Re-authentication (UE)**

   The UE now initiates the re-authentication procedures.

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was Tdoc N1-040938

CR-Form-v7

CHANGE REQUEST

⌘ **24.228** **CR** **132** ⌘ **rev** **1** ⌘ Current version: **5.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Revision of IETF references to published versions
Source:	⌘	Lucent Technologies
Work item code:	⌘	IMS-CCR
Date:	⌘	14/04/2004
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	draft-ietf-dhc-dhcpv6-23 has been published as RFC 3315 and it is appropriate to change the reference currently made in 24.228 to be that of a published document rather than an unpublished document. draft-ietf-sip-dhcpv6 has recently been published as RFC 3319 and it is appropriate to change the reference currently made in 24.228 to be that of a published document rather than an unpublished document. The corresponding changes have already been made to 24.229, but for some reason equivalent changes have been omitted from 24.228.
Summary of change:	⌘	References to draft-ietf-dhc-dhcpv6-23 changed to RFC 3315. References to draft-ietf-sip-dhcpv6 changed to RFC 3319. Minor corrections are made to the titles of some RFCs. Associated editor's notes are removed as being no longer applicable. Study as indicated by the editor's note in 5.2.2 is complete.
Consequences if not approved:	⌘	It is inappropriate for 3GPP technical specifications to refer to documents that are no longer generally available.

Clauses affected:	⌘	2, 5.2.1, 5.2.2

Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	

Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

PROPOSED CHANGE

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.228: "IP multimedia subsystem; Stage 2".

[3] IETF RFC 3261: "SIP: Session Initiation Protocol".

[4] IETF RFC 2782: "A DNS RR for specifying the location of services (DNS SRV)".

[5] IETF RFC 2806: "URLs for Telephone Calls".

[6] IETF RFC 2916: "E.164 number and DNS".

[7] 3GPP TS 33.203: "Access security for IP based services".

[8] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[9] 3GPP TS 29.207: "End to end Quality of Service (QoS); stage 3".

[10] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

[11] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx Interface; Signalling flows and message contents".

[12] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 3".

[13] IETF RFC 3323: "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

[14] IETF RFC 3263: "Session Initiation Protocol (SIP): Locating SIP Servers".

[15A] ~~draft-ietf-dhc-dhcpv6-23 (February 2002)~~IETF RFC 3315: "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)"

~~Editor's note: The above document cannot be formally referenced until it is published as an RFC.~~

[15B] ~~draft-ietf-sip-dhcpv6-00 (April 2002)~~IETF RFC 3319: " Dynamic Host Configuration Protocol (DHCPv6) options for Session Initiation Protocol (SIP) servers".

~~Editor's note: The above document cannot be formally referenced until it is published as an RFC.~~

[16] 3GPP TS 24.229: " IP Multimedia Call Control Protocol based on SIP and SDP; Stage3".

[17] IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Network Asserted Identity within Trusted Networks".

[18] IETF RFC 3310 ~~(September 2002)~~: "Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)".

PROPOSED CHANGE

5.2 PDP context activation and P-CSCF discovery procedures

5.2.1 Introduction

The Proxy-CSCF discovery shall be performed after GPRS attach and after or as part of a successful activation of a PDP context using one of the following mechanisms:

- Employ Dynamic Host Configuration Protocol for IPv6 (DHCPv6) (RFC 3315 [15A]), the DHCPv6 options for SIP servers (RFC 3319 [15B]) and if needed DNS to obtain the P-CSCF address as described in subclause 5.2.2.

- Obtain the Proxy-CSCF address from the PDP Context Activation signalling as described in subclause 5.2.3.The UE can freely decide which of the described mechanisms it will use to acquire the P-CSCF address. In case several P-CSCF addresses are provided to the UE without sufficient priority indication, the selection of which P-CSCF address to use by the UE is implementation specific.

5.2.2 DHCP procedure for P-CSCF discovery

In DHCP procedures for P-CSCF discovery, the UE employs Dynamic Host Configuration Protocol for IPv6 (DHCPv6) (RFC 3315 [15A]), the DCHPv6 option for SIP servers (RFC 3319 [15B]) and if needed DNS to obtain the P-CSCF address.

~~Editor's Note: This approach needs further study on the interactions with the restrictions on the Signalling PDP Context, TS 23.228 subclause 4.2.6.~~

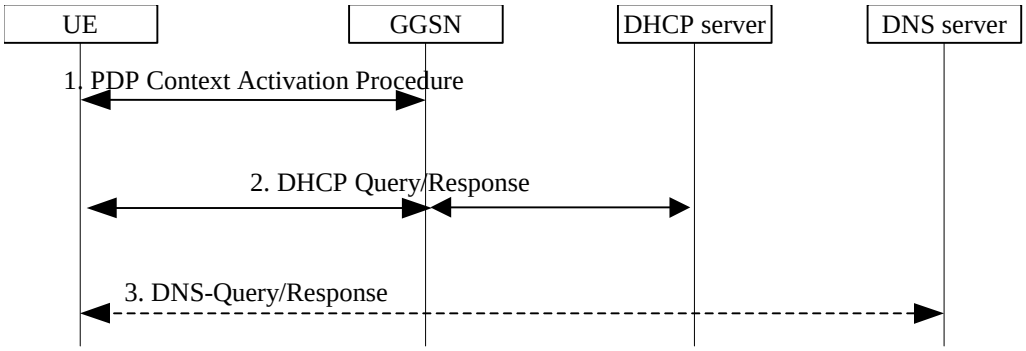

Figure 5.2.2-1: P-CSCF discovery using DHCP and DNS

1. **PDP Context Establishment Procedure (UE to GPRS)**

   Establishment of appropriate PDP context bearer by using the PDP Context Establishment procedure as specified in 3GPP TS 24.008 [12].

2. **DHCP Query/Response (UE to DHCP)**

   The UE sends a request to a DHCP server. It may requesta list of fully qualified domain names of P-CSCF(s) and the IP addresses of the DNS servers, or it may request a list of P-CSCF(s) IP address(es) as described in clause 4 of the DHCPv6 options for SIP servers (RFC 3319 [15B]). Multiple DHCP Query/Response message exchange may be required to retrieve the requested information.

3. DNS Query/Response (UE to DNS)

If P-CSCF address(es) are not received in the DHCP Query/Response, and the transport protocol and port number are not known to UE, the UE performs a NAPTR query (for the domain returned in DHCP response) to select the transport protocol. Subsequently, the UE performs a SRV DNS query to retrieve a list of P-CSCF(s) IP addresses from which one is selected. If the response does not contain the IP addresses an additional AAAA DNS query is needed to resolve a Fully Qualified Domain Name (FQDN) to an IP address.

Table 5.2.2-3a DNS: DNS Query (UE to DNS)

```
OPCODE=SQUERY
QNAME=pcscf.visited1.net, QCLASS=IN, QTYPE=NAPTR
```

The DNS records are retrieved according to RFC 3263 [14].

Table 5.2.2-3b DNS Query Response (DNS to UE)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=pcscf.visited1.net,  QCLASS=IN, QTYPE=NAPTR

pcscf.visited1.net       0 IN NAPTR 50   50 "s" "SIP+D2U"    ""  _sip._udp.
   pcscf.visited1.net
                0 IN NAPTR 90   50 "s" "SIP+D2T"    ""  _sip._tcp. pcscf.visited1.net
                         0 IN NAPTR 100  50 "s" "SIPS+D2T"   ""  _sips._tcp.
   pcscf.visited1.net
```

Based on the order and preference of the NAPTR record, and the local preference, UDP is preferred and the UE performs a DNS SRV lookup according to RFC 2782 [4].

Table 5.2.2-3c DNS: DNS Query (UE to DNS)

```
OPCODE=SQUERY
QNAME=_sip._udp.pcscf.visited1.net, QCLASS=IN, QTYPE=SRV
```

The DNS records are retrieved according to RFC 2782 [4].

Table 5.2.2-3d DNS Query Response (DNS to UE)

```
OPCODE=SQUERY, RESPONSE, AA
QNAME=_sip._udp.pcscf.visited1.net, QCLASS=IN, QTYPE=SRV

_sip._udp.pcscf.visited1.net         0 IN SRV 1 10 5060 pcscf1.visited1.net
                                     0 IN SRV 1  0 5060 pcscf7.visited1.net

pcscf1.visited1.net                 0 IN AAAA     5555::aba:dab:aaa:daa
pcscf7.visited1.net                 0 IN AAAA     5555::a1a:b2b:c3c:d4d
```

In the Answer field of the query-response each P-CSCF is identified by its host domain name. The returned SRV Resource Records (RRs) are merged and ordered, and the selection technique (employing the Priority and Weight parameters returned in the RRs) as specified in RFC 2782 [4] is used to select the P-CSCF (i.e. the pcscf1.visited1.net). Since the Additional Data field of the query-response also contains the IP address of the selected P-CSCF (i.e. 5555::aba:dab:aaa:daa), a new query to the DNS is not required.