ETSI TS 124 228 V5.8.0 (2004-03)

Technical Specification

Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Signalling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP);
Stage 3
(3GPP TS 24.228 version 5.8.0 Release 5)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

Reference

RTS/TSGN-0124228v580

Keywords

GSM, UMTS

ETSI

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Sous-Préfecture de Grasse (06) N° 7803/88

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Contents

Foreword

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1 Scope

The present document gives examples of signalling flows for the the IP multimedia call control based on SIP and SDP.

These signalling flows demonstrate the interaction with the IP-connectivity network (GPRS), and with the protocol provided at the Cx interface.

These signalling flows provide detailed signalling flows, which expand on the overview information flows provided in 3GPP TS 23.228 [2].

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: "SIP: Locating SIP Servers"

[15A] draft-ietf-dhc-dhcpv6-23 (February 2002): "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): "DHCPv6 options for 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] RFC 3310 (September 2002): "Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

IM CN subsystem: (IP Multimedia CN subsystem) comprises of all CN elements for the provision of IP multimedia applications over IP multimedia sessions

IP multimedia session: set of multimedia senders and receivers and the data streams flowing from senders to receivers. IP multimedia sessions are supported by the IP multimedia CN Subsystem and are enabled by IP connectivity bearers (e.g. GPRS as a bearer). A user may invoke concurrent IP multimedia sessions.

Stateful proxy: logical entity that maintains state information at least for the duration of a SIP transaction, see RFC 3261 [3]

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BGCF	Breakout Gateway Control Function
CN	Core Network
COPS	Common Open Policy Service
CSCF	Call Session Control Function
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
FQDN	Fully-Qualified Domain Name
G-MSC	Gateway Mobile Switching Centre
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
HSS	Home Subscriber Server
I-CSCF	Interrogating-CSCF
IM	IP Multimedia
IP	Internet Protocol
IPv6	IP version 6
MEGACO	MEdia GAteway COntrol
MGCF	Media Gateway Control Function
MGW	Media Gateway
P-CSCF	Proxy-CSCF
PDF	Policy Decision Function
PDP	Packet Data Protocol
PSTN	Public Switched Telephone Network
QoS	Quality of Service
SBLP	Service-based local policy
S-CSCF	Serving-CSCF
SDP	Session Description Protocol
SGSN	Serving GPRS Support Node
SIP	Session Initiation Protocol
SS7	Signalling system no. 7
UAC	User Agent Client
UAS	User Agent Server

UE	User Equipment
URI	Uniform Resource Identifier
UMTS	Universal Mobile Telecommunications System
USIM	User Service Identity Module

4 Methodology

4.1 Key required to interpret signalling flows

4.1.1 Key required to interpret signalling flow contents tables

Contents tables are used to describe the contents of SIP methods. The following key (rules) have been applied to each contents table to improve readability, reduce errors and increase maintainability:

a) Where a header field in the SIP method contents tables show only the header name, the contents are identical to the received request/response. The received request/response is identified as follows:

- where a request is generated as a result of a received request (as at a proxy), then the received request is that with the same method name and Cseq header;

- where a response is generated as a result of a received response (as at a proxy), then the received response is that with the same method name and Cseq header;

- where the response is generated as a result of a received request or response (as at a UA), then the received request is that with the same method name and Cseq header;

- where the request is generated as a result of a received response (as at a UA) then the received response is that immediately previously received.

To enhance readability an indication of the received request/response is included in the method title, should the received request/response not be the immediate preceding request response.

b) The (…) sequence of characters is used to indicate that the Content-Length field needs to be filled in, with the appropriate value i.e. the number of bytes in the payload.

c) Repeated headers within a method are listed on a single line, with a comma used as delimiter. This convention is not mandatory but used in this specification for improved readability.

d) Headers are listed within a table in the following order:

1) hop by hop e.g. Via:

2) end to end e.g. To:

3) entity headers e.g. Content-Length:

This convention is not mandatory but used in this specification for improved readability.

4.1.2 Key required to interpret signalling flow figures

In order to differentiate between SIP methods and other protocol messages, the message name is preceded with the associated protocol for all *non-SIP* messages (e.g. GPRS: Activate PDP Context).

4.1.2a Key required to interpret the storage information tables

This document shows various instances of storage information tables. These tables show storage of information contained within the SIP protocol that the entity in which this information is stored can subsequently use to release a session. Therefore these tables do not show storage of information, such us the P-Charging-Vector header, that the entity may use to interact with other protocols.

4.1.3 Functional entities covered in example flows

The flows show the signalling exchanges between the following functional entities:

- User Equipment (UE);

- Proxy-CSCF (P-CSCF);

- Interrogating-CSCF (I-CSCF);

- Serving-CSCF (S-CSCF);

- Media Gateway Control Function (MGCF);

- Breakout Gateway Control Function (BGCF);

- Home Subscriber Server (HSS).

A number of the flows show a check against the filter criteria. A successful check against the filter criteria will involve the introduction of an application server into the path, operating in a number of different modes depending on the service provided. This could affect the example flows as follows:

- by the addition of extra URLs to a number of headers, e.g. Via, Record-Route, within the flow in which the evaluation of filter criteria occurs;

- by the addition of extra URLs to a number of headers, e.g. Via, Route in subsequent flows for the same dialog; and

- by the inclusion of functionality provided by the application server in this and subsequent flows.

For simplicity, flows including the application server are not shown. For this reason there is no example of the functionality which is used for correlation of flows to and from the application server.

For similar reasons, no functionality is shown for the Media Resource Function.

4.2 Notation conventions

4.2.1 Introduction

This subclause details the notation conventions used in the present document.

4.2.2 User Identities

UE#1's public user identities are:

user1_public1@home1.net

user1_public2@home1.net

etc.

UE#1's private user identity is:

user1_private@home1.net

UE#2's public user identities are:

user2_public1@home2.net

user2_public2@home2.net

etc.

UE#2's private user identity is:

user2_private@home2.net

4.2.3   Network Entities

a) UE#1's associated entities:

UE#1's home network is:

home1.net

The P-CSCF serving UE#1 in home1.net is:

pcscf1.home1.net

The S-CSCF serving UE#1 is:

scscf1.home1.net

The I-CSCF in UE#1's home network (between proxy and serving CSCF) is:

icscf1_p.home1.net

If there are two I-CSCFs in home1.net involved in the call flows, then they are (from the left side of the individual call flow to its right side):

icscf1_p.home1.net

icscf1_s.home1.net

NOTE 1: Typically, the second I-CCSF will be between two S-CSCFs (hence use of "s").

UE#1 is roaming in:

visited1.net

The P-CSCF serving UE#1 in visited1.net is:

pcscf1.visited1.net

The BGCF serving UE#1 is:

bgcf1.home1.net

The MGCF serving UE#1 is:

mgcf1.home1.net

b) UE#2's associated entities (where UE#2's home and/or visited network is different from that of UE#1):

UE#2's home network is:

home2.net

The P-CSCF serving UE#2 in home2.net is:

pcscf2.home2.net

The S-CSCF serving UE#2 is:

scscf2.home2.net

The I-CSCF in UE#2's home network (between proxy and serving CSCF) is:

icscf2_p.home2.net

If there are two I-CSCFs in home2.net involved in the call flows, then they are (from the left side of the individual call flow to its right side):

icscf2_p.home2.net

icscf2_s.home2.net

NOTE 2: Typically, the second I-CCSF will be between two S-CSCFs (hence use of "s").

UE#2 is roaming in:

visited2.net

The P-CSCF serving UE#2 in visited2.net is:

pcscf2.visited2.net

The BGCF serving UE#2 is:

bgcf2.home2.net

The MGCF serving UE#2 is:

mgcf2.home2.net

c) UE#2's associated entities (where UE#2's home and/or visited network is the same as that of UE#1):

UE#2's home network is:

home1.net

The P-CSCF serving UE#2 in home1.net is:

pcscf2.home1.net

The S-CSCF serving UE#2 is:

scscf2.home1.net

The I-CSCF in UE#2's home network (between proxy and serving CSCF) is:

icscf2_p.home1.net

If there are two I-CSCFs involved in the call flows, then they are (from the left side of the individual call flow to its right side):

icscf2_p.home1.net

icscf2_s.home1.net

NOTE 3: Typically, the second I-CCSF will be between two S-CSCFs (hence use of "s").

UE#2 is roaming in:

visited1.net

The P-CSCF serving UE#2 in visited2.net is:

pcscf2.visited1.net

The BGCF serving UE#2 is:

bgcf2.home1.net

The MGCF serving UE#2 is:

mgcf2.home1.net

d) UE#3's (i.e. target in call transfer scenario) associated entities (where UE#3's home and/or visited network is different from that of UE#1and UE#2):

If there is a Call Transfer, then the Transfer Target is UE#3

UE#3's home network is:

> home3.net

The S-CSCF serving UE#3 is:

> scscf3.home3.net

The I-CSCF in UE#3's home network (between proxy and serving CSCF) is:

> icscf3_p.home3.net

If there are two I-CSCFs in home3.net involved in the call flows, then they are (from the left side of the individual call flow to its right side):

> icscf3_p.home3.net

> icscf3_s.home3.net

NOTE 4: Typically, the second I-CCSF will be between two S-CSCFs (hence use of "s").

UE#3 is roaming in:

> visited3.net

The P-CSCF serving UE#3 in visited3.net is:

> pcscf3.visited3.net

The BGCF serving UE#3 is:

> bgcf3.home3.net

The MGCF serving UE#3 is:

> mgcf3.home3.net

4.2.4   Configuration hiding

Where the I-CSCF(THIG) provides configuration hiding, some headers are tokenized. The encoding caused by this tokenization, and its reverse operation is not explicitly shown, but is indicated by preceding the tokenized string by "Token" and enclosing the tokenized string within parentheses. An example is:

```
Via: SIP/2.0/UDP icscf1_s.home1.net,
        SIP/2.0/UDP Token(SIP/2.0/UDP scscf1.home1.net, SIP/2.0/UDP
        pcscf1.home1.net)@home1.net;tokenized-by=home1.net, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]
```

4.2.5   User Roaming Procedures

In this document, user roaming procedures apply to cases where P-CSCF is located in the visited network. Procedures for cases where the user is roaming and the P-CSCF is located in the home network are similar to procedures for a non-roaming user.

4.3   Document Structure

To improve readability, the document is structured at the highest level based on network configuration hiding. Each clause 'x' for the non-hiding scenario is mirrored for hiding, in a subsequent clause 'x+10'.

For example:

Clause 6: Signaling flows for REGISTER (non-hiding)   Clause 16: Signalling flows for REGISTER (hiding)

Clause 7: …(non hiding)   Clause 17: …(hiding)

etc.

5   Elements of signalling flows for provision of IP-connectivity network

Editor's note: The intent of this subclause is to provide set of subflows, that can be referred to from other flows, that show the creation of appropriate PDP contexts, and the maintenance and tearing down of those PDP contexts.

Editor's note: The mechanism for communicating the CSCF address that the proxy forwards INVITEs to in the 200 OK message is for further study.

Editor's note: Input is required from SA3 on the authentication of the user and which network entity does this.

5.1   Introduction

Prior to communication with the IM CN subsystem, a successful GPRS attach procedure must be performed. Further a PDP context to be used for the SIP signalling must be established. This PDP context is established towards the GGSN in the H-PLMN or V-PLMN according to the APN and GGSN selection criteria described in 3GPP TS 23.060. The PDP context will provide the UE with an IPv6 address, which will serve as the host address for the duration of the PDP context.

The PDP context where the SIP signalling is performed must be available as long as services from the IM CN subsystem are wanted.

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) [15A], the DHCPv6 options for SIP servers [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) [15A], the DCHPv6 option for SIP servers [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.
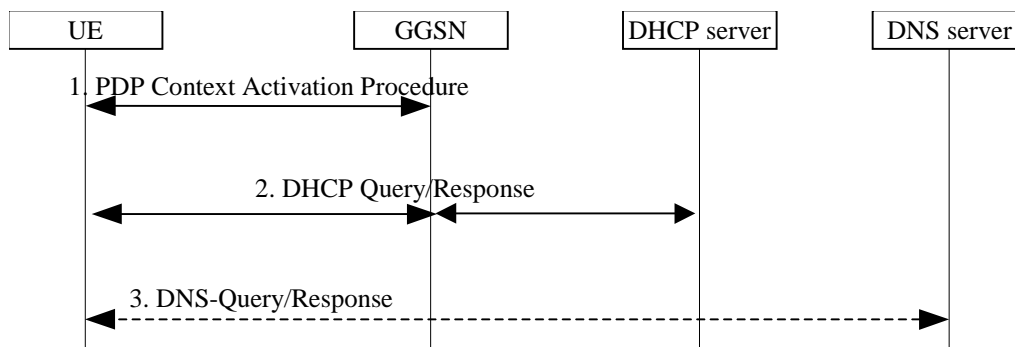
Figure 5.2.2-1: P-CSCF discovery using DHCP and DNS

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.

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 [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.

5.2.3 GPRS procedure for P-CSCF discovery

GPRS procedures for P-CSCF discovery using the procedure specified in 3GPP TS 24.008 for establishment of an appropriate PDP context for IM subsystem signalling. The request for P-CSCF address(es) and the response P-CSCF address(es) are transparent to the SGSN.
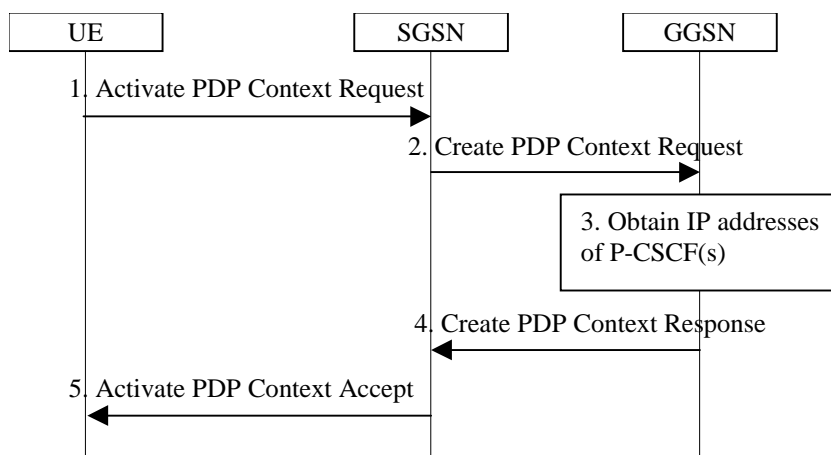
Figure 5.2.3-1: P-CSCF discovery using PDP Context Activation signalling

1. **Activate PDP Context Request (UE to SGSN)**

   UE requests establishment of a PDP context by using procedure as specified in 3GPP TS 24.008. The UE indicates that it requests a P-CSCF IP address(es).

2. **Create PDP Context Request (SGSN to GGSN)**

   The SGSN selects a GGSN according to the APN selection criteria and forward the request to the GGSN.

3. **Obtain P-CSCF address(es)**

   The GGSN obtains IP address(es) of P-CSCF(s) in the same network.

   NOTE: The mechanism to do this is a matter of internal configuration and is an implementation decision.

4. **Create PDP Context Response (GGSN to SGSN)**

   The GGSN forwards the P-CSCF address(es) to the SGSN.

5. **Activate PDP Context Accept (SGSN to UE)**

   The GGSN includes the IP address(es) of P-CSCF(s) in the response as specified in 3GPP TS 24.008.

5.3 End-to-End QoS and signalling call flows interactions

5.3.1 Mobile Originating with Service-based Local Policy, without resource reservation protocol, only GPRS procedures

Figure 5.3.1-1 shows an example of the GPRS and the COPS interactions during a session setup when SBLP is being applied. Because the S-CSCF is not involved in GPRS interaction, it is not shown in the flow, but it is assumed that the S-CSCF or I-CSCF is the next entity in the signalling flow.

This example is appropriate for a SIP session requesting the establishment of QoS preconditions, although only SBLP aspects are highlighted. It is assumed in this example that both the UAC and UAS have chosen to use the GPRS procedures to guarantee the QoS, which means both the UAC and UAS establish satisfactory PDP context on their respective accesses. It is assumed that the core network is DiffServ enabled and service based local policy (SBLP) decisions are taken by the PDF. The addition of the GPRS procedures in the access networks to the DiffServ enabled core network guarantees the end-to-end quality of service.

Figure 5.3.1-1: Interaction between SIP/SDP, GPRS and COPS, Mobile originating side

Only the relevant SIP, GPRS and COPS messages are mentioned in this subclause. The complete SIP messages are detailed in subclause 7.2.2. The GPRS messages are detailed in 3GPP TS 24.008 [12] and 3GPP TS 29.060 [10]. The COPS messages are detailed in 3GPP TS 29.207 [9].

6. **Authorise QoS Resources**

At the reception of the 183 (Session Progress) response at the P-CSCF, the P-CSCF obtains the Media Authorisation Token from the PDF.

7. **183 (Session Progress) (P-CSCF to UE)**

This message typically contains the P-Media Authorization header, which holds the Media Authorisation Token. Upon receipt of the Media Authorisation Token, the UE generates a flow identifier which identifies an IP media flow associated with the SIP session. The Flow Identifiers are based on the sequence of media flows in the SDP. A Flow Identifier combined with the Authorization Token is sufficient to uniquely identify an IP media flow.

12. **GPRS: Active PDP Context (UE to SGSN)**

The UE sends an Activate PDP Context message to the SGSN as defined in 3GPP TS 24.008 [12]. The UE associates the PDP context to the session by including the media authorisation token information and the flow identifier(s) information. The PDP context is bi-directional.

13. **GPRS: Create PDP Context (SGSN to GGSN)**

The SGSN checks the user profile to authorise the requested QoS and also the available resource, if both are granted, it sends the corresponding Create PDP Context message to the GGSN as defined in 3GPP TS 29.060 [10]. This message contains the media authorisation token information and the flow identifier(s) information.

14. **COPS: REQ (GGSN to PDF)**

When the Create PDP Context message is received in the GGSN containing the media authorisation token information and the flow identifier(s) information, the Policy Enforcement Point in the GGSN sends a COPS REQ message to the PDF as described in 3GPP TS 29.207 [9]. The PDF verifies that the media authorisation token information and the associated flow identifier(s) information are as expected.

15. **COPS: DEC (PDF to GGSN)**

The PDF sends a COPS DEC message back to the GGSN.

16. **COPS: RPT (GGSN to PDF)**

The GGSN sends a COPS RPT message back to the PDF, and includes an acknowledgement and/or an error response to the DEC message.

17. **GPRS: Create PDP Context Resp (GGSN to SGSN)**

The GGSN checks its own available resources and if enough resources are available, it sends a Create PDP Context Response message back to SGSN containing the negotiated value of the UMTS QoS IE as defined in 3GPP TS 29.060 [10].

18. **GPRS: Active PDP Context Accept (SGSN to UE)**

The SGSN sends an Activate PDP Context Accept message to UE containing the negotiated value of the UMTS QoS Information Element as defined in TS 24.008 [12].

19. **UPDATE request (UE to P-CSCF)**

As the confirmation of the preconditions are requested in the 183 (Session Progress) response, when the UE finishes the QoS reservation for both the uplink and downlink direction, according to the GPRS procedures as indicated by the GPRS: Active PDP Context Accept message, it sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request. The UPDATE request includes in the SDP the information about the successful QoS bi-directional mode, due to the successful bi-directional PDP context established. The SDP indicates that the QoS resource reservation for both send and receive mode was successful from the terminating endpoint side.

30. **COPS: DEC (PDF to GGSN)**

When the P-CSCF receives the 200 (OK) response to the INVITE request, the PDF sends a COPS DEC message to the GGSN to enable the use of the authorised QoS resources, i.e. to open the 'gate', and allow packet flow in both directions in accordance with the policy decision within the GGSN Policy Enforcement Point.

31. **COPS: RPT (GGSN to PDF)**

The GGSN receives the COPS DEC message and enables the use of the authorised QoS resources, i.e. opens the 'gate' within the GGSN, and sends a COPS RPT message back to the PDF.

5.3.2 Mobile Termination, with Service-based Local Policy, without resource reservation protocol, only GPRS procedures

Figure 5.3.2-1 shows an example of the GPRS and the COPS interactions during a session setup when SBLP is being applied. Because the S-CSCF is not involved in GPRS interaction, it is not shown in the, but it is assumed that the S-CSCF is the next entity in the signalling flow.

This example is appropriate for a SIP session requesting the establishment of QoS preconditions, although only SBLP aspects are highlighted. It is assumed in this example that both the UAC and UAS have chosen to use the GPRS procedures to guarantee the QoS, which means both the UAC and UAS establish satisfactory PDP context on their respective accesses. It is assumed that the core network is DiffServ enabled and service based local policy (SBLP) decisions are taken by the PDF. The addition of the GPRS procedures in the access networks to the DiffServ enabled core network guarantees the end-to-end quality of service.

Figure 5.3.2-1 Interaction between SIP/SDP, GPRS and COPS, Mobile terminating side

Only the relevant SIP, GPRS and COPS messages are mentioned in this subclause. The complete SIP messages are detailed in subclause 7.4.2. The GPRS messages are detailed in 3GPP TS 24.008 [12] and 3GPP TS 29.060 [10]. The COPS messages are detailed in 3GPP TS 29.207 [9].

3. **INVITE request (P-CSCF to UE)**

Upon receiving the INVITE request, the PDF generates the media authorisation token; the P-CSCF obtains the token from the PDF and puts it into the P-Media-Authorization header in the INVITE request and sends it to the UE.

5. **183 (Session Progress) (UE to P-CSCF)**

   The UE sends the 183 (Session Progress) response back to P-CSCF with the accepted SDP.

6. **Authorise QoS Resources**

   At the reception of the 183 (Session Progress) response at the P-CSCF, the P-CSCF authorizes the QoS resources needed for this session.

9. **PRACK (P-CSCF to UE)**

   This PRACK request may carry the SDP which will be used for this session. The P-CSCF forwards the PRACK request to the UE.

12. **GPRS: Active PDP Context (UE to SGSN)**

    The UE sends an Activate PDP Context message to the SGSN as defined in 3GPP TS 24.008 [12]. The UE associates the PDP context to the session by including the media authorisation token information and the flow identifier(s) information. The PDP Context is bi-directional.

13. **GPRS: Create PDP Context (SGSN to GGSN)**

    The SGSN checks the user profile to authorise the requested QoS and also the available resources, if both are granted, it sends the corresponding Create PDP Context message to the GGSN as defined in 3GPP TS 29.060 [10]. This message contains the media authorisation token information and the flow identifier(s) information.

14. **COPS: REQ (GGSN to PDF)**

    When the Create PDP Context message is received in the GGSN containing the media authorisation token information and the flow identifier(s) information, the Policy Enforcement Point in the GGSN sends a COPS REQ message to the PDF as described in 3GPP TS 29.207 [9]. The PDF verifies that the media authorisation token information and the associated flow identifier(s) information are as expected.

15. **COPS: DEC (PDF to GGSN)**

    The PDF sends a COPS DEC message back to the GGSN.

16. **COPS: RPT (GGSN to PDF)**

    The GGSN sends a COPS RPT message back to the PDF, and includes an acknowledgement and/or an error response to the DEC message.

17. **GPRS: Create PDP Context Response (GGSN to SGSN)**

    The GGSN checks its own available resources and if enough resources are available, it sends a Create PDP Context Response message back to SGSN containing the negotiated value of the UMTS QoS Information Element as defined in 3GPP TS 29.060 [10].

18. **GPRS: Active PDP Context Accept (SGSN to UE)**

    The SGSN sends an Activate PDP Context Accept message to UE containing the negotiated value of the UMTS QoS Information Element as defined in 3GPP TS 24.008 [12].

23. **180 (Ringing) (UE to P-CSCF)**

    As QoS preconditions are requested within the INVITE request, the UE waits for two events to occur. Firstly, the GPRS resource reservation must complete successfully as indicated by the GPRS: Active PDP Context Accept. Secondly, the resource reservation initiated by the originating endpoint must complete successfully. This is indicated by the SDP included in UPDATE request. The UE may now alert the subscriber of an incoming session attempt and send the 180 (Ringing) provisional response.

30. **COPS: DEC (PDF to GGSN)**

    When the P-CSCF receives the 200 (OK) response to the INVITE request, the PDF shall send a COPS DEC message to the GGSN to enable the use of the authorised QoS resources, i.e., to open the 'gate', and allow packet flow in both directions in accordance with the policy decision within the GGSN PEP.

31. **COPS: RPT (GGSN to PDF)**

> The GGSN receives the COPS DEC message and enables the use of the authorised QoS resources, i.e., opens the 'gate' within the GGSN, and sends a COPS RPT message back to the PDF.

5.3.3 Mobile originated sessions requesting the establishment of QoS preconditions and coordination with GPRS bearer level

Figure 5.3.3-1 shows an example of a SIP session requesting the establishment of QoS preconditions. Because the S-CSCF is not involved in the GPRS interaction, it is not shown in the flow, but it is assumed that the S-CSCF or I-CSCF is the next entity in the signalling flow.

It is assumed in this example that both the UAC and UAS have chosen to use the GPRS procedures to guarantee the QoS, which means both the UAC and UAS establish satisfactory PDP context on their respective accesses. It is further assumed that the core network is DiffServ enabled. The addition of the GPRS procedures in the access networks to the DiffServ enabled core network guarantees the end-to-end quality of service.
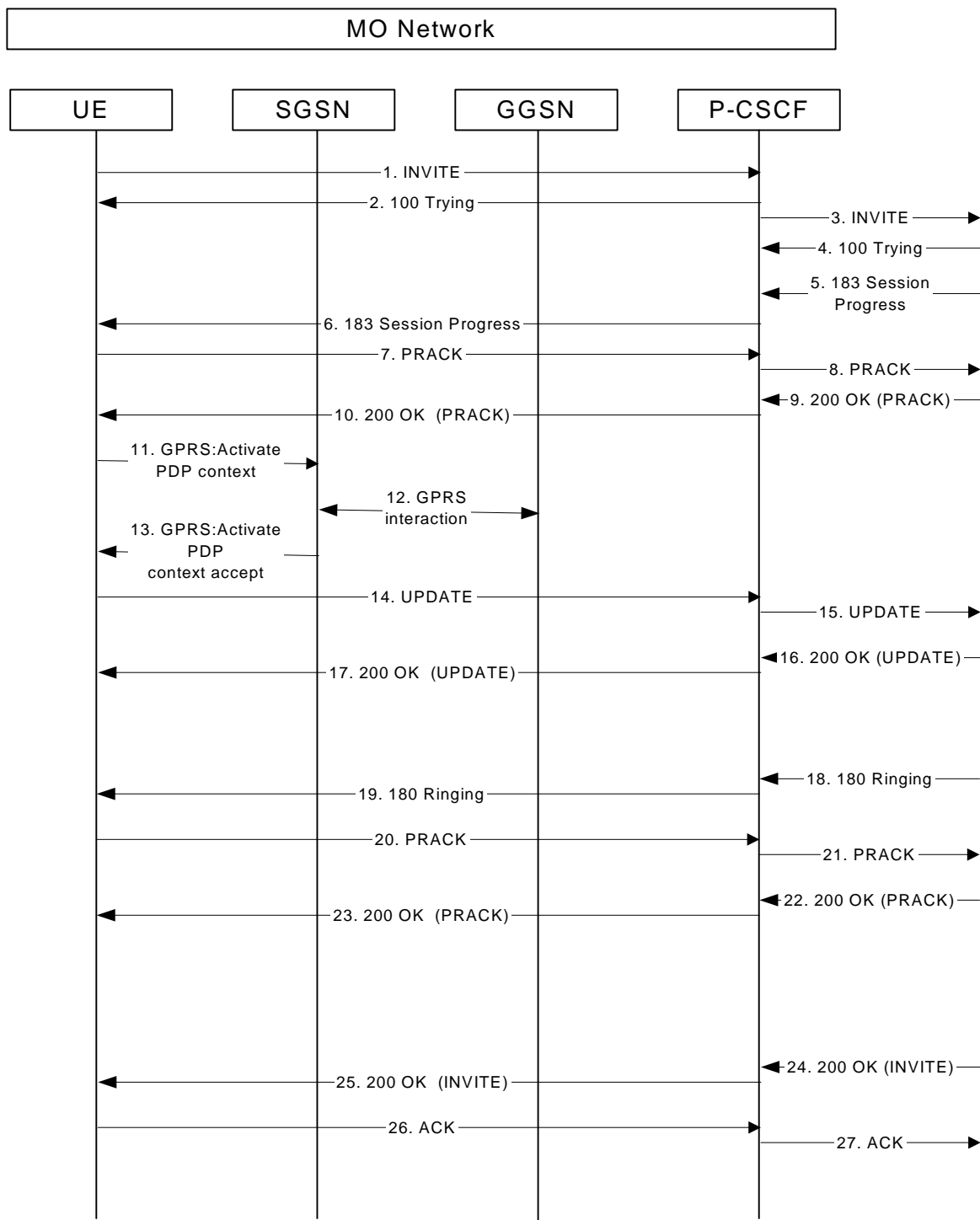
Figure 5.3.3-1: Interaction between SIP/SDP and GPRS, mobile originating side

Only the relevant SIP and GPRS messages are mentioned in this subclause. The complete SIP messages are detailed in subclause 7.2.2. The GPRS messages are detailed in 3GPP TS 24.008 [12] and 3GPP TS 29.060 [10].

1. **INVITE request (UE to P-CSCF)**

   The UE (UAC - the session originator) sends the INVITE request, containing an initial SDP, to the P-CSCF. The SDP contains the set of codecs supported by the UE and includes the SDP extensions required to establish sessions with QoS preconditions. The UE also requests to establish QoS preconditions for all the media streams, but it does not request confirmation of the establishment of the QoS preconditions from the terminating side (UAS).

6. **183 (Session Progress) (P-CSCF to UE)**

The P-CSCF forwards the 183 (Session Progress) response from the UAS to the originating endpoint. The SDP contains the set of codecs supported by the UAS and includes the SDP extensions required to establish sessions with QoS preconditions. The UAS supports the QoS preconditions and requests that UAC sends a confirmation when the QoS preconditions are met.

11. **GPRS: Activate PDP Context (UE to SGSN)**

The UE sends an Activate PDP Context message to the SGSN with the UMTS QoS parameters. The PDP context is bidirectional.

12. **GPRS interaction**

The GPRS interaction procedures to create a PDP context are specified in 3GPP TS 29.060 [10].

13. **GPRS: Activate PDP Context Accept (SGSN to UE)**

The SGSN sends an Activate PDP Context Accept message to the UE.

14. **UPDATE (UE to P-CSCF)**

When the UE finishes the QoS reservation for both the uplink and downlink direction, according to the GPRS procedures, it sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request. The UPDATE includes in the SDP the information about the successful QoS bidirectional mode, due to the successful bidirectional PDP context established. The request is sent first to the P-CSCF.

25. **200 (OK) (P-CSCF to UE)**

The P-CSCF forwards the 200 (OK) final response to the session originator. The SDP contains an indication that the UE successfully reserved the QoS in the send and receive directions.

5.3.4 Mobile Terminated sessions requesting the establishment of QoS preconditions and coordination with GPRS bearer level

Figure 5.3.4-1 shows an example of a SIP session requesting the establishment of QoS preconditions. Because the S-CSCF is not involved in the GPRS interaction, it is not shown in the flow, but it is assumed that the S-CSCF is the next entity in the signalling flow.

It is assumed in this example that both the UAC and UAS have chosen to use the GPRS procedures to guarantee the QoS, which means both the UAC and UAS establish satisfactory PDP context on their respective accesses. It is further assumed that the core network is DiffServ enabled. The addition of the GPRS procedures in the access networks to the DiffServ enabled core network guarantees the end-to-end quality of service.

MT Network

| P-CSCF | GGSN | SGSN | UE |

1. INVITE

2. 100 Trying

3. INVITE

4. 100 Trying

5. 183 Session Progress

6. 183 Session Progress

7. PRACK

8. PRACK

9. 200 OK (PRACK)

10. 200 OK (PRACK)

11. GPRS: Activate PDP context

12. GPRS interaction

13. GPRS:Activate PDP context accpet

14. UPDATE

15. UPDATE

16. 200 OK (UPDATE)

17. 200 OK (UPDATE)

18. 180 Ringing

19. 180 Ringing

20. PRACK

21. PRACK

22. 200 OK (PRACK)

23. 200 OK (PRACK)

24. 200 OK (INVITE)

25. 200 OK (INVITE)

26. ACK

27. ACK
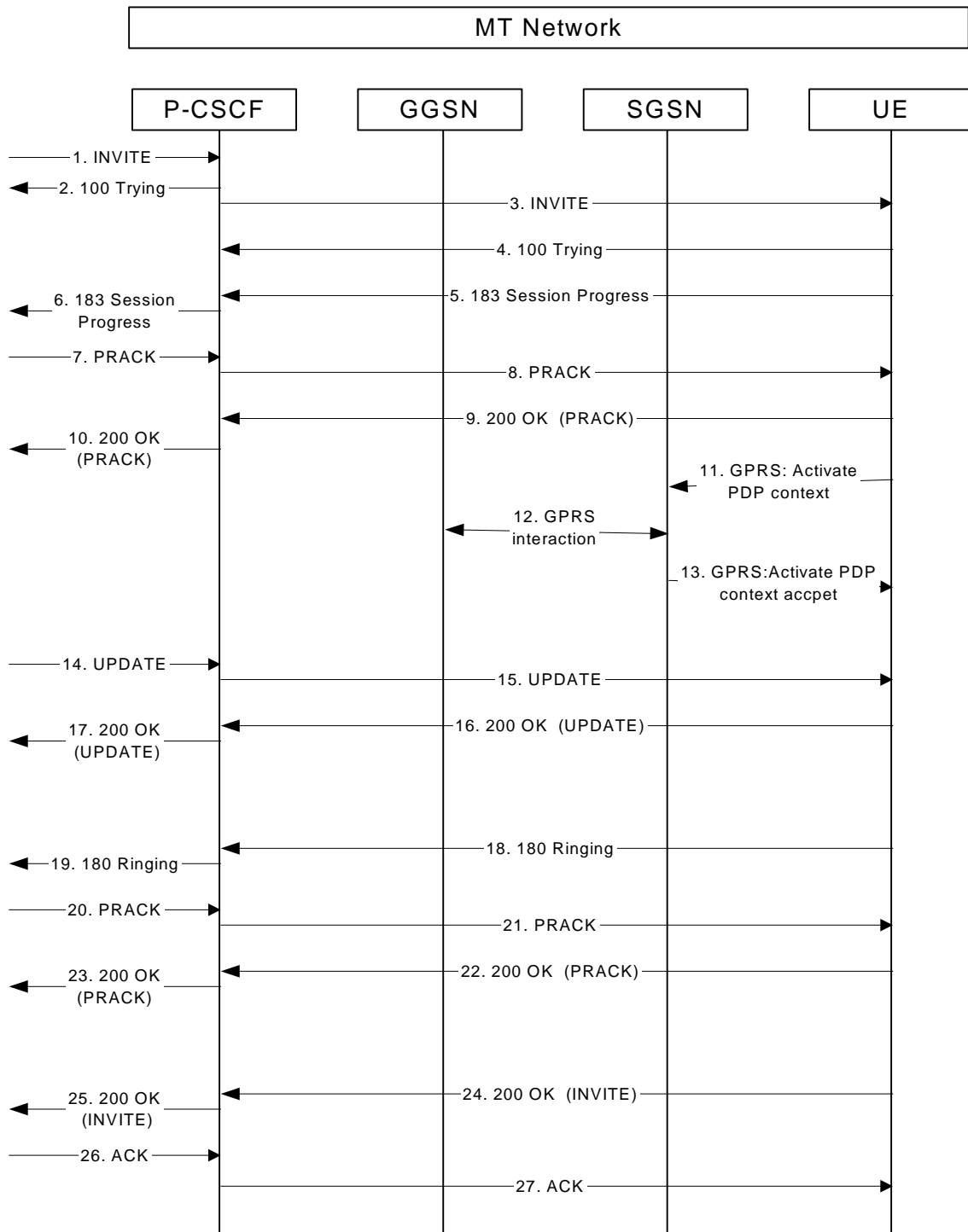
Figure 5.3.4-1: Interaction between SIP/SDP and GPRS, mobile terminating side

Only the relevant SIP and GPRS messages are mentioned in this subclause. The complete SIP messages are detailed in subclause 7.4.2. The GPRS messages are detailed in 3GPP TS 24.008 [12] and 3GPP TS 29.060 [10].

3. **INVITE request (P-CSCF to UE)**

The P-CSCF forwards the INVITE request, containing an initial SDP, to the terminating UE (UAS). The SDP contains the set of codecs and includes the SDP extensions required to establish sessions with QoS preconditions. The UAC also requests to establish QoS preconditions for all the media streams, but it does not request confirmation of the establishment of the QoS preconditions from the terminating side (UAS).

5. **183 (Session Progress) (UE to P-CSCF)**

   The UAS determines the complete set of codecs that it is capable and willing of supporting for this session. It determines the intersection with those appearing in the SDP in the INVITE request. The UAS responds with a 183 (Session Progress) response and sends this to the P-CSCF. The SDP contains the set of codecs supported by the UAS and includes the SDP extensions required to establish sessions with QoS preconditions. The UAS supports the QoS preconditions and requests that UAC sends a confirmation when the QoS preconditions are met.

11. **GPRS: Activate PDP Context (UE to SGSN)**

   The UE sends an Activate PDP Context message to the SGSN with the UMTS QoS parameters.

12. **GPRS: interaction**

   The GPRS interaction procedures to create a PDP context are specified in 3GPP TS 29.060 [10].

13. **GPRS: Active PDP Context Accept (SGSN to UE)**

   The SGSN sends an Activate PDP Context Accept message to the UE.

15. **UPDATE request (P-CSCF to UE)**

   The P-CSCF forwards the UPDATE request to the UE. The UPDATE request includes in the SDP the information about the successful QoS bidirectional mode, due to the successful bidirectional PDP context established.

18. **180 (Ringing) (UE to P-CSCF)**

   Before proceeding with session establishment, the UE waits for two events. First, the GPRS resource reservation must complete successfully. Second, the resource reservation initiated by the originating endpoint must complete successfully (which is indicated by SDP included in the UPDATE request). The UE may now immediately accept the session (and proceed with step #24), 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 the P-CSCF.

24. **200 (OK) (UE to P-CSCF)**

   When the called party answers, the terminating UE sends a 200 (OK) final response to the INVITE request to P-CSCF, and starts the media flow(s) for this session. The SDP contains an indication that the UE successfully reserved the QoS in the send and receive directions.

5.3.5 P-CSCF Functionalities in End-to-End QoS and Signalling Mobile Originating Interactions with service-based local policy
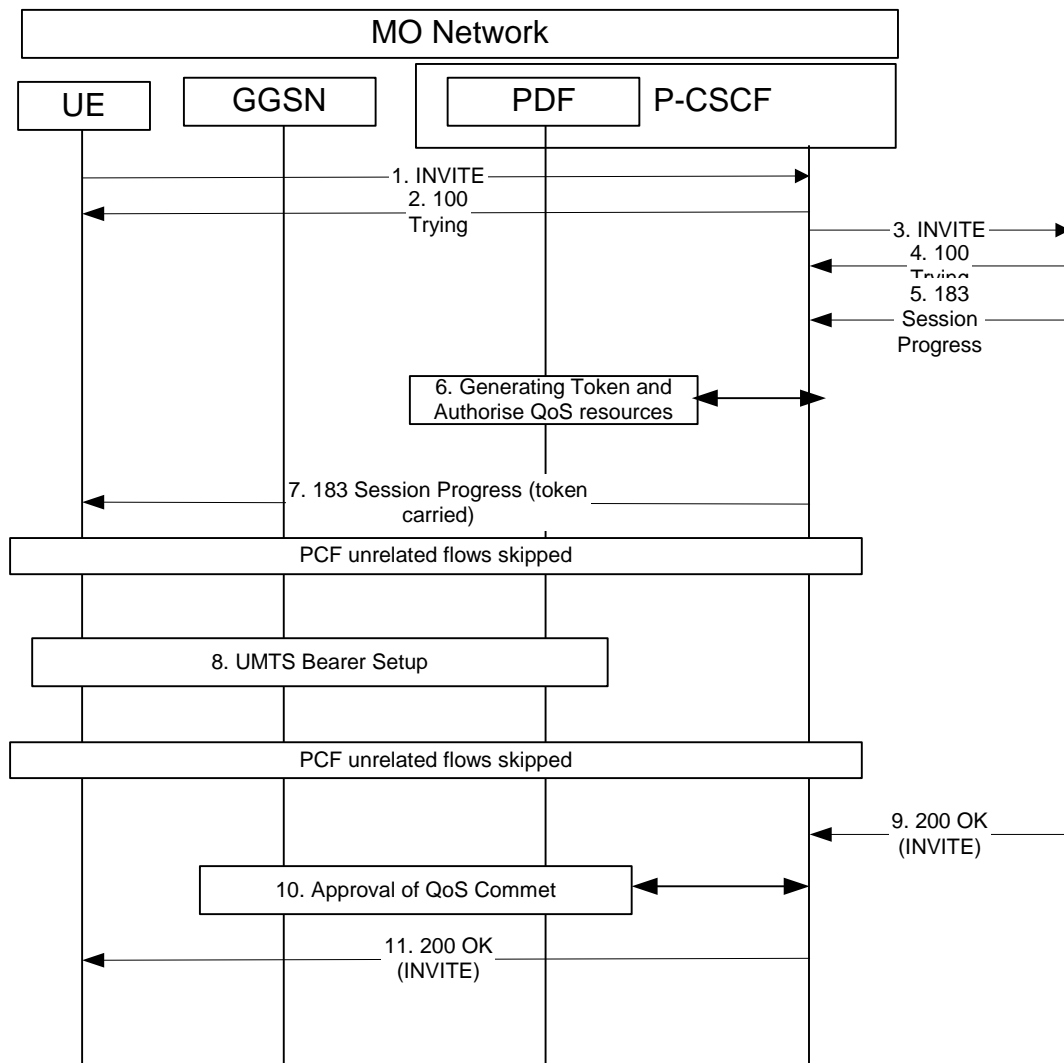
Figure 5.3.5-1: Interaction between P-CSCF and PDF, Mobile originating side

6. **PDF Generates Token and Authorise QoS Resource**

The Authorize QoS Resources procedure is triggered by the P-CSCF receiving a 183 (Session Progress) response. Based on the SDP information from INVITE and 183 (Session Progress) response, the PDF has sufficient information about this session, such as the end-points, bandwidth requirements, and the characteristics of the media exchange.

The PDF shall authorize the required QoS resources for the session and install the IP bearer level policy based on information from the P-CSCF. In order to ensure that the IP bearer flow correlates to the one approved during the SIP session establishment, the SIP extensions for media authorization are used.

Based on local policy, QoS resources may also be enabled at the time they are authorised by the PDF.

The Authorization-Token is generated by the PDF and sent to the UE.

7. **183 (Session Progress) (P-CSCF to UE)**

This message contains the P-Media-Authorization header, which holds the Media Authorisation Token. Upon receipt of the Media Authorisation Token, the UE generates a flow identifier which identifies an IP media flow associated with the SIP session. The Flow Identifiers are based on the sequence of media flows in the SDP. A Flow Identifier combined with the Authorization Token is sufficient to uniquely identify an IP media flow.

8. **UMTS Bearer Setup**

The UE uses that token to activate PDP Context from GGSN network. The PDF makes final decision to enforce GGSN network to accept or reject PDP Context activation based service based local policy.

10. **Approval of QoS Commit**

The Approval of QoS Commit procedure is triggered by the P-CSCF receiving a 200 (OK) message. The PDF will interact with GGSN network to open the "gate" for the IP bearer.

5.3.6 P-CSCF Functionalities in End-to-End QoS and Signalling Mobile Terminating Interactions with service-based local policy
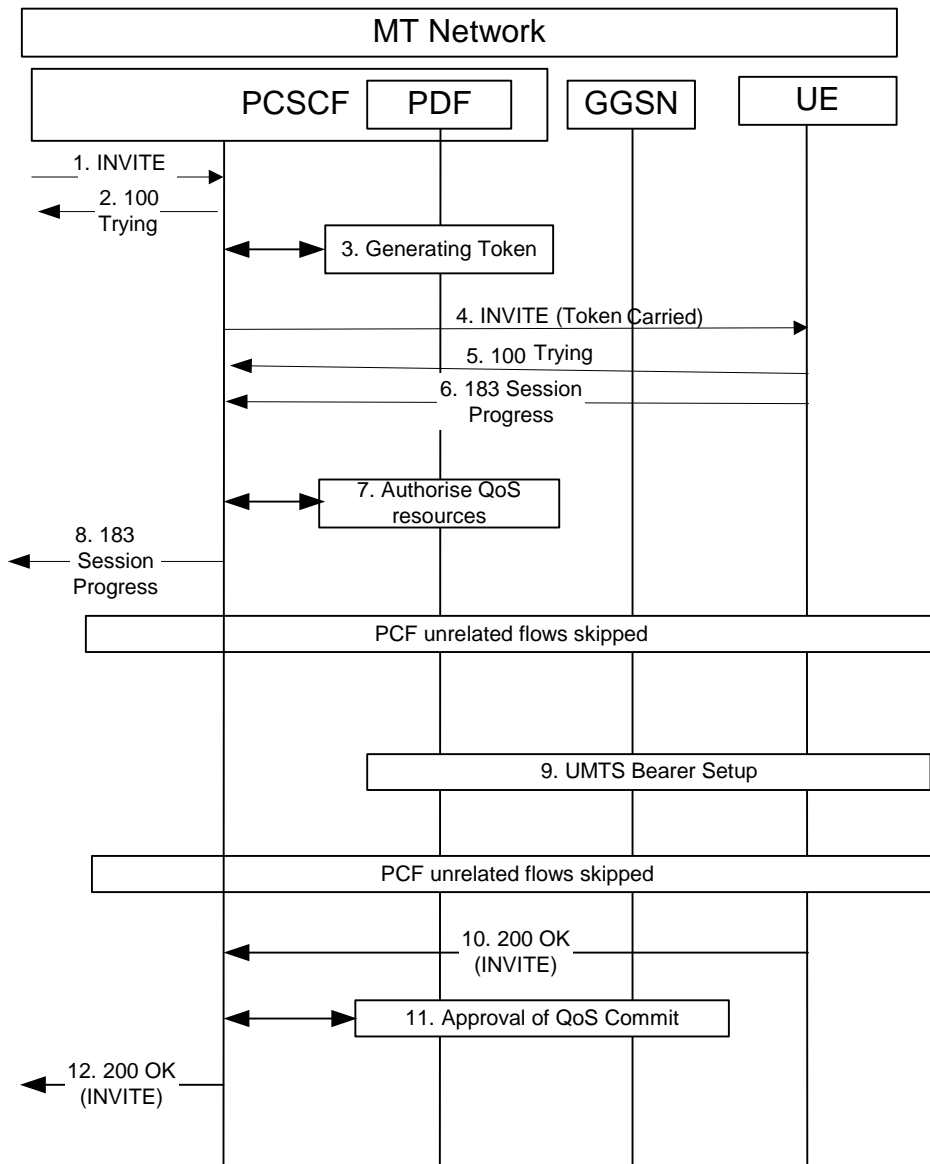
Figure 5.3.6-1: Interaction between P-CSCF and PDF, Mobile terminating side

3. **Token Generation**

Based on the information got from the P-CSCF, the PDF generates an authorization token. Since PDF has not received all the information about end points yet, so QoS resource has not been authorized.

4. **INVITE request (P-CSCF to UE)**

The INVITE request contains the P-Media-Authorization header, which holds the Media Authorisation Token.

7. **QoS Authorization**

The Authorize QoS Resources procedure is triggered by the P-CSCF receiving a 183 (Session Progress) response. Based on the SDP information from INVITE request and 183 (Session Progress) response, the PDF has sufficient information about this session, such as the end-points, bandwidth requirements, and the characteristics of the media exchange.

The PDF authorizes the required QoS resources for the session and installs the IP bearer level policy based on information from the P-CSCF. In order to ensure that the IP bearer flow correlates to the one approved during the SIP session establishment, the SIP extensions for media authorization are used.

Based on local policy, QoS resources may also be enabled at the time they are authorised by the PDF.

8. **183 (Session Progress) (P-CSCF to UE)**

Upon receipt of this message, the UE generates a flow identifier which identifies an IP media flow associated with the SIP session. The Flow Identifiers are based on the sequence of media flows in the SDP. A Flow Identifier combined with the Authorization Token are sufficient to uniquely identify an IP media flow.

9. **UMTS Bearer Setup**

UE uses that token to activate PDP Context from GGSN network. The PDF makes final decision to enforce GGSN network to accept or reject PDP Context activation based service based local policy.

11. **Approval of QoS Commit**

The Approval of QoS Commit procedure is triggered by the P-CSCF receiving a 200 (OK) response. The PDF will interact with GGSN network to open the "gate" for the IP bearer.

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.
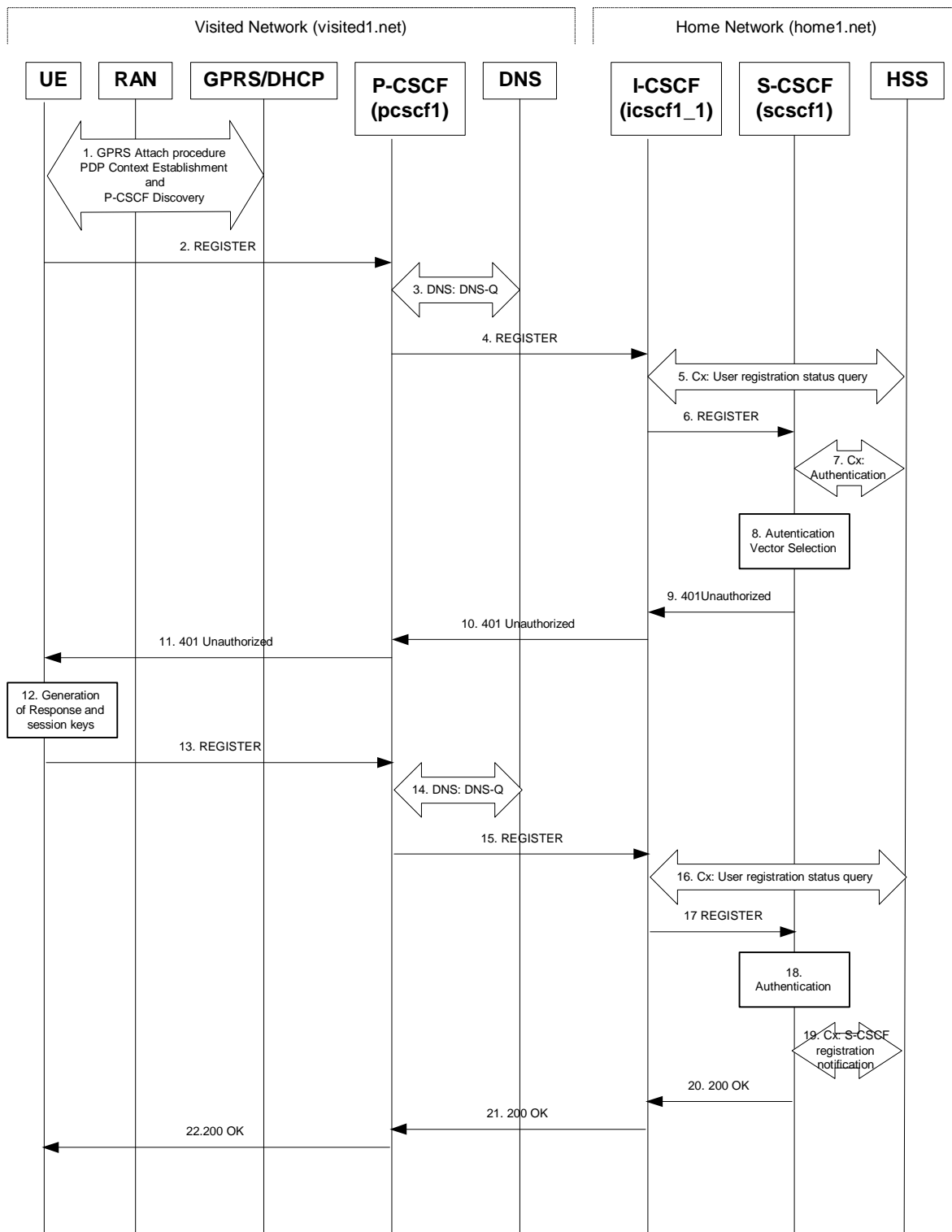
Figure 6.2-1: Registration signalling: user not registered

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:
```

6.3 Registration signalling: reregistration - user currently registered

For the purpose of the reregistration signalling flow shown in figure 6.3-1, the subscriber is considered to be roaming. The HSS information indicates that the subscriber is registered and authenticated, and that the S-CSCF has been allocated to this subscriber. In this signalling flow, the home network does not have network configuration hiding active. This flow also shows the authentication of the private user identity.

This signalling flow assumes:

1. That the same PDP Context allocated during the initial registration scenario is still used for reregistration. For the case when the UE does not still have an active PDP context then PDP context procedures from subclause 16.2 is completed first.

2. The DHCP procedure employed for P-CSCF discovery is not needed.

3. The S-CSCF selection procedure invoked by the I-CSCF is not needed.
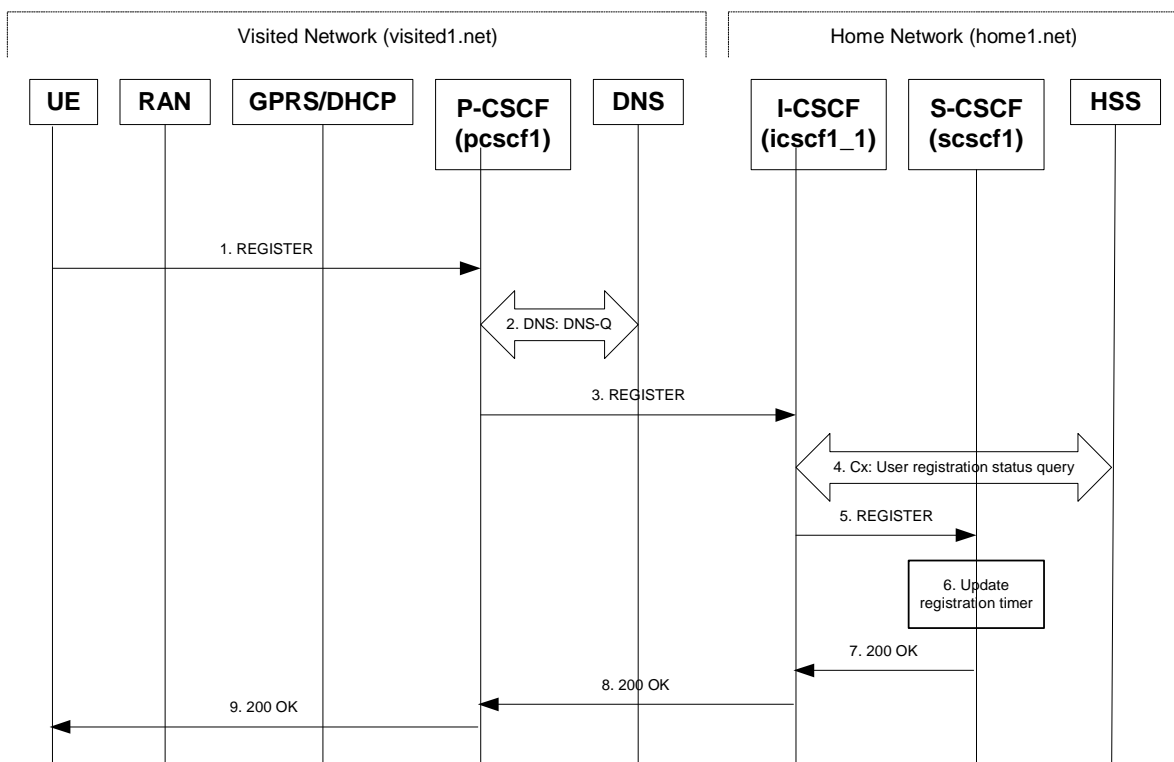
Figure 6.3-1: Reregistration when UE roaming

1. **REGISTER request (UE to P-CSCF) - see example in table 6.3-1**

    The registration expires in the UE. The UE reregisters by sending a new REGISTER request. This request is sent to the same P-CSCF with which the UE initially registered.

Table 6.3-1: 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", integrity-
protected="yes"
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: 3 REGISTER
Supported: path
Content-Length: 0
```

The header field usage is the same as for the initial registration scenario:

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 public user identity being registered. This is the identity by which other parties know this subscriber.

Contact: This indicates the point-of-presence for the subscriber – the IP address of the UE. This is the temporary identifier 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 the username field of the Digest AKA protocol. As this is a re-registration process, the cached information (realm, nonce, algorithm, uri, response) is also sent.

NOTE 1: The actual nonce value in the WWW-Authenticate header field is encoded in base64, and it may look like: nonce="A34Cm+Fva37UYWpGNB34JP"

Security-Client: Lists the supported algorithm(s) by the UE. The values spi-c, spi-s, port-c and port-s are new parameter values and will not be used for security association setup in case the request is answered with 200 (OK).

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

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 ("home1.net") into an address or entry point into the home operator's network (the I-CSCF). This information is stored in the USIM.

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 detect that it already has a registration record for this UE and will reset it's SIP registration timer for this UE to the Expires time in this request.

2. **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 DNS provides the P-CSCF with the address of the I-CSCF in the home network. The P-CSCF must not use the I-CSCF address cached as a result of the previous registration.

3. **REGISTER request (P-CSCF to I-CSCF) - see example in table 6.3-3**

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 6.3-3 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
P-Access-Network-Info:
Max-Forwards: 69
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 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 the same globally unique value that was used in the previous registration.

4. **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. Because the user has registered, the HSS returns the I-CSCF with the S-CSCF address for the subscriber.

For detailed message flows see 3GPP TS 29.228.

For the parameters in the REGISTER request (flow 3) which need to be sent to HSS, see table 6.2-5a.

Table 6.3-4a provides the parameters in the REGISTER request (flow 5), which are obtained from the information sent back from the HSS.

Table 6.3-4a Cx: User registration status query procedure (HSS to I-CSCF)

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

5. **REGISTER request (I-CSCF to S-CSCF) - see example in table 6.3-5**

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected. The Request-URI is changed to the address of the S-CSCF.

Table 6.3-5: 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
P-Access-Network-Info:
Max-Forwards: 68
```

```
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 this URI for routing mobile terminated requests.

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

Upon receiving this request the S-CSCF will detect that it already has a registration record for this UE and will reset it's SIP registration timer for this UE to the Expires time in this request.

6. **Update registration timer**

As the REGISTER request arrived integrity protected, the S-CSCF does not need to challenge the user, but just update the registration timer to the value requested by the user (if the policy of the network allows it).

NOTE: The S-CSCF is allowed to challenge the user. If S-CSCF decides to challenge the user, the call flow will be similar to the one presented in section 6.2.

7. **200 OK response (S-CSCF to I-CSCF) – see example in Table 6.3-7**

The S-CSCF sends a 200 (OK) response to the I-CSCF indicating that Registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 6.3-7 200 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:
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.

8. **200 OK response (I-CSCF to P-CSCF) – see example in Table 6.3-8**

The I-CSCF forwards the 200 (OK) response from the S-CSCF to the P-CSCF indicating that the registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 6.3-8 200 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:
```

9. **200 OK response (P-CSCF to UE) – see example in Table 6.3-9**

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

Table 6.3-9 200 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:
```

6.4 Registration signalling: mobile initiated deregistration (not provided)

An example of this flow is not shown in the present document.

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.
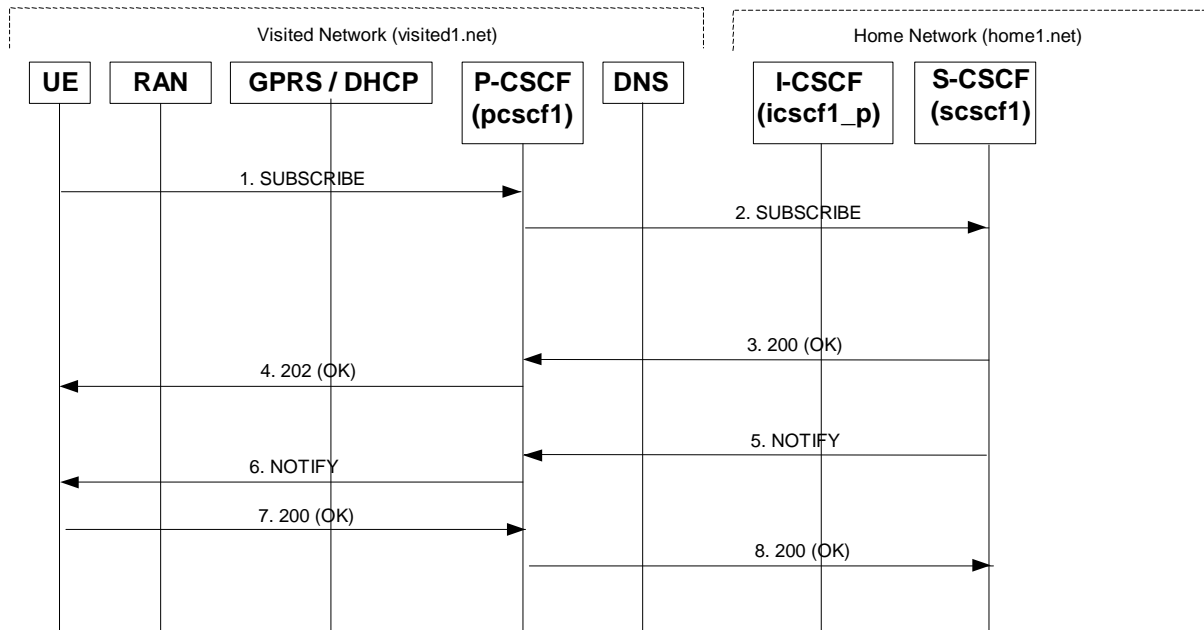
**Figure 6.5-1: UE subscription for the registration state event package
(without I-CSCF providing configuration independence)**

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">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
        <contact id="77" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="tel:+358504821437" id="a9" state="active">
        <contact id="78" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </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:
```

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.
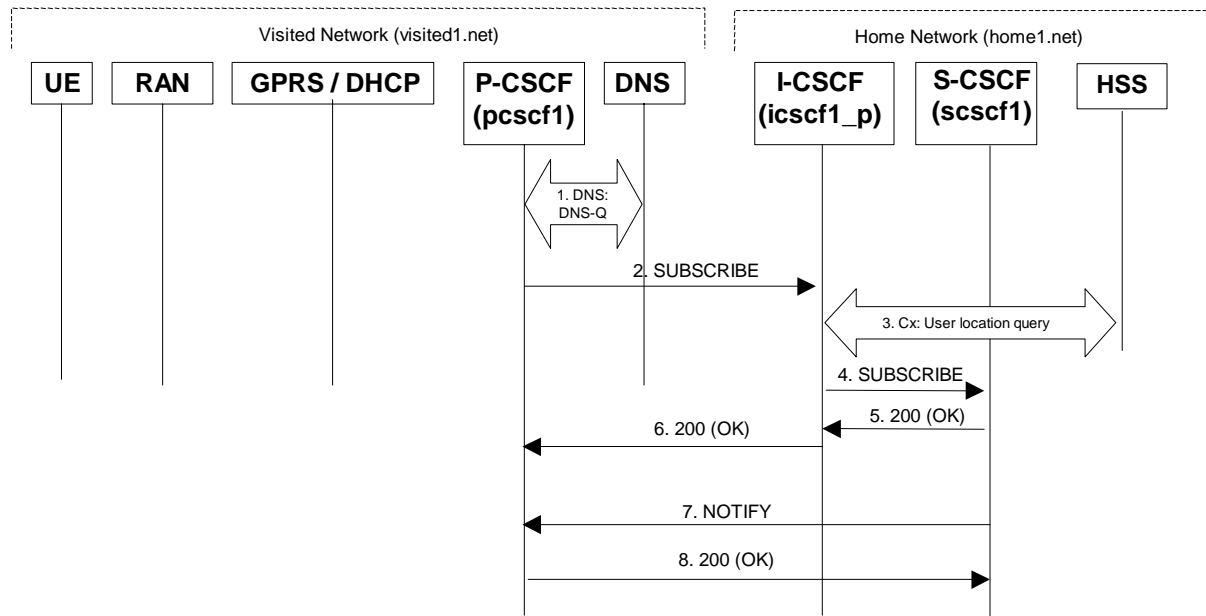
**Figure 6.6-1: P-CSCF subscription for the registration state event package
(without I-CSCF providing configuration independence)**

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">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
        <contact id="77" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="tel:+358504821437" id="a9" state="active">
        <contact id="78" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </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
```

6.7 Notifying of the network-initiated deregistration event

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.
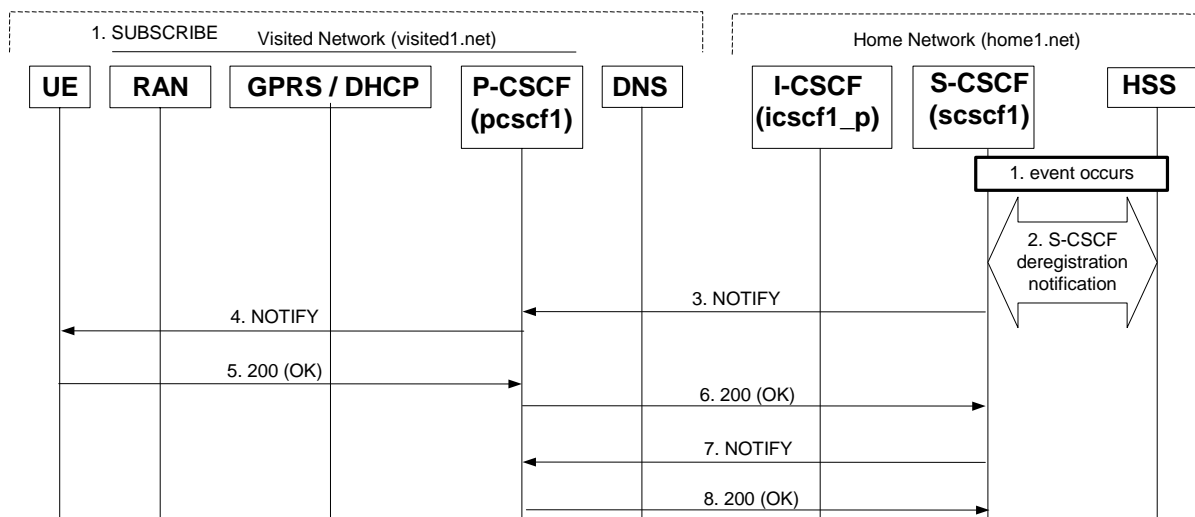
Figure 6.7.1-1: Network Initiated Deregistration event occurs in the S-CSCF

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">sip:[5555::aaa:bbb:ccc:ddd]
      </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="as10"
                  state="terminated">
     <contact id="77" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
      </contact>
    </registration>
    <registration aor="tel:+358504821437" id="as11"
                  state="terminated">
     <contact id="78" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
      </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">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="as10"
                 state="terminated">
     <contact id="77" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="tel:+358504821437" id="as11"
                 state="terminated">
     <contact id="78" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </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
```

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.
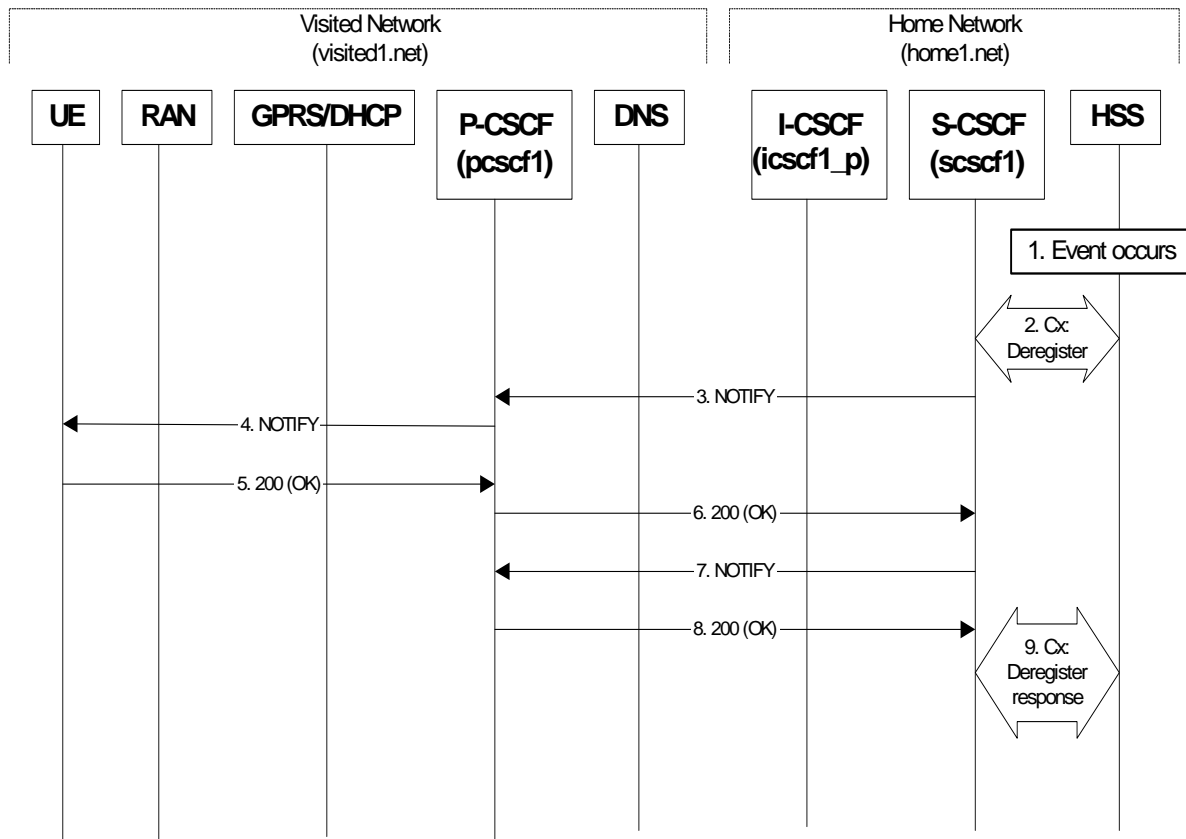
Figure 6.7.2-1: Network-initiated deregistration event occurs in the HSS

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">sip:[5555::aaa:bbb:ccc:ddd]
      </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="as10"
                  state="terminated">
      <contact id="77" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
      </contact>
    </registration>
    <registration aor="tel:+358504821437" id="as11"
                  state="terminated">
      <contact id="78" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
      </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">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="as10"
                state="terminated">
     <contact id="77" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="tel:+358504821437" id="as11"
                state="terminated">
     <contact id="78" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </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].

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.
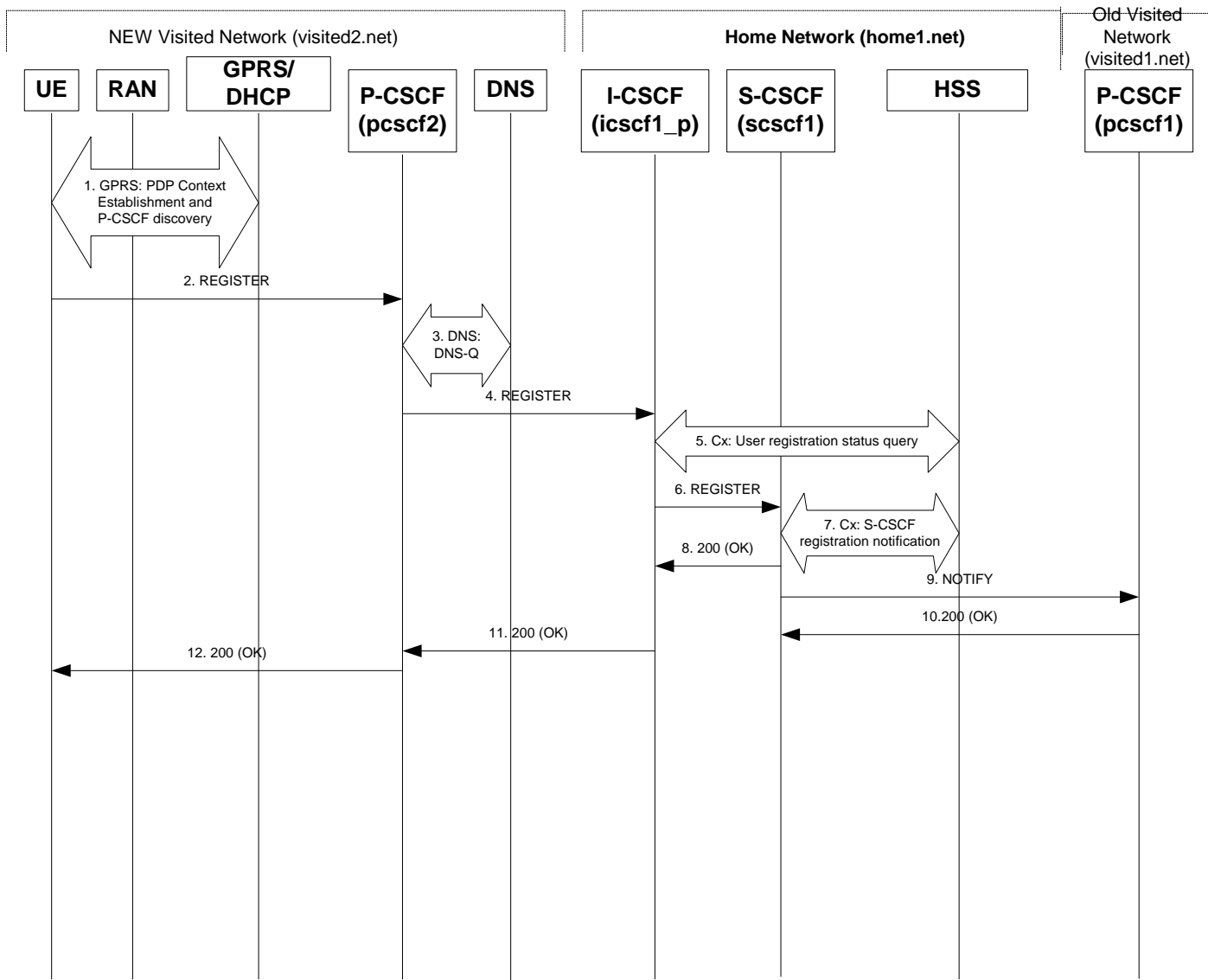
Figure 6.7.3-1: Network-initiated deregistration upon UE roaming without deregistration

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">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="as10"
                 state="terminated">
     <contact id="77" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </contact>
    </registration>
    <registration aor="tel:+358504821437" id="as11"
                 state="terminated">
     <contact id="78" state="terminated" event="deactivated">sip:[5555::aaa:bbb:ccc:ddd]
     </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
```

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.
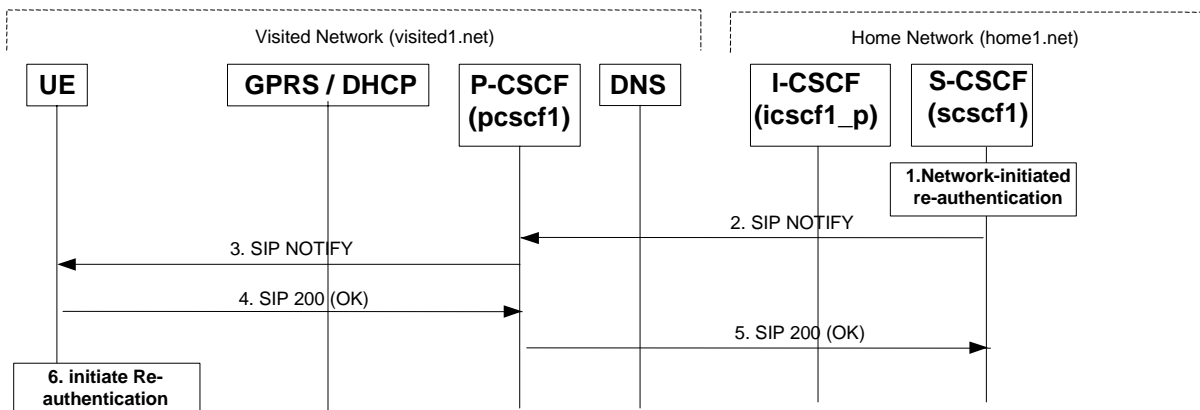
Figure 6.8-1: S-CSCF informs UE about network-initiated re-authentication event (without I-CSCF providing configuration independence)

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">sip:[5555::aaa:bbb:ccc:ddd]
```

```
        </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.

6.9 Registration error conditions

6.9.1 Reregistration - failure of reregistration

See subclause 16.9.1.

6.9.2 User not registered, user not allowed to roam / user unknown
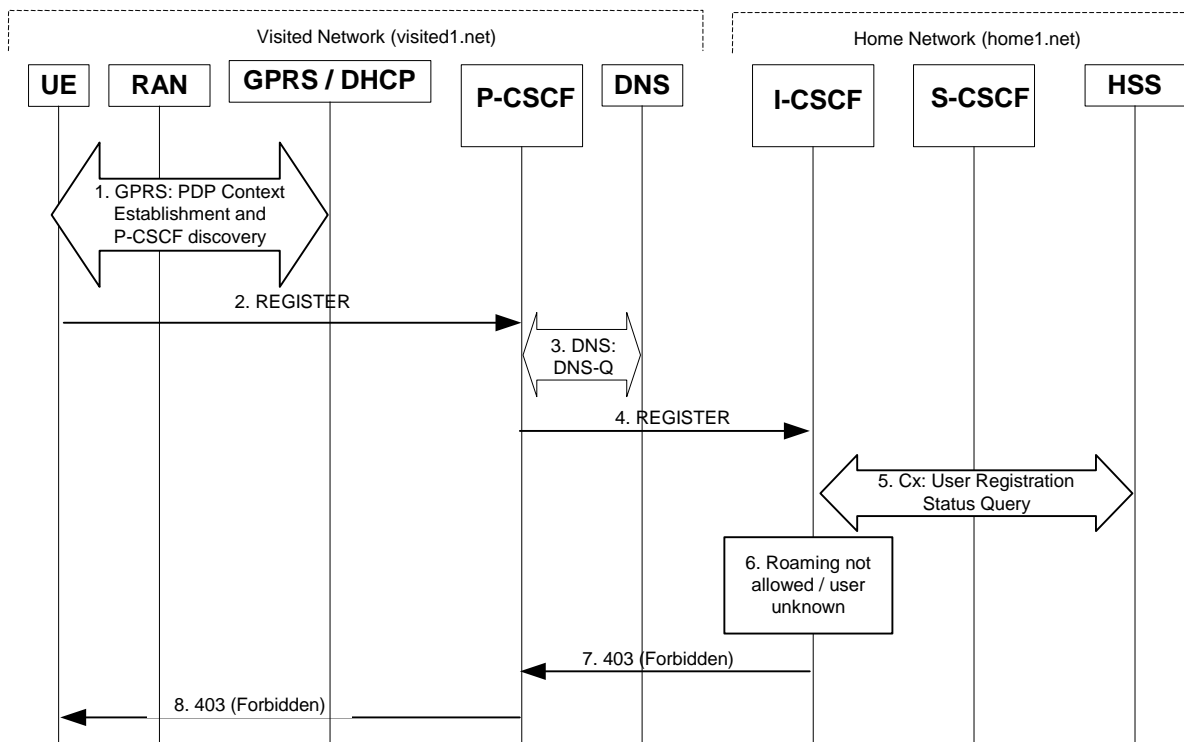
Figure 6.9.2-1: Registration failure: User not registered, user not allowed to roam

The first five steps are similar with the regular Registration signalling flows described in subclause 6.2.

The "Roaming not allowed" and "User unknown" error conditions would result in the same signalling flow (only the actions taken by I-CSCF will differ), thus the signalling flows are merged and only the I-CSCF action is described depending on the error condition.

6. **Roaming not allowed / User unknown**

> The information received as a response to the Cx-Query may indicate that "Roaming is not allowed" for the subscriber from the visited1.net network. In this case I-CSCF needs to send a 403 (Forbidden) response back to the UE. I-CSCF will insert a warning header in the response, indicating to the UE the reason of refusing the Registration request. Warning header will contain the name of the network inserting the warning header (warn-agent = home1.net) and in addition it may contain a warn-text.The warn-code inserted into the Warning header is 399.

> When the information received as a response to the Cx-Query indicates that the subscriber is unknown to the network or the subscriber does not have a valid subscription, the I-CSCF needs to send a 403 (Forbidden) response back to the UE. I-CSCF will insert a warning header in the response, indicating to the UE the reason of refusing the Registration request. Warning header will contain the name of the network inserting the warning header (warn-agent = home1.net) and in addition it may contain a warn-text. The warn-code inserted into the Warning header is 399.

7. **403 (Forbidden) response (I-CSCF to P-CSCF) - see example in table 6.9.2-7**

Table 6.9.2-7: 403 (Forbidden) response (I-CSCF to P-CSCF)

```
SIP/2.0 403 Forbidden
   Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
      [5555::aaa:bbb:ccc:ddd];comp=sigcomp;branch=z9hG4bKnashds7
   Warning: 399 home1.net "Roaming not allowed from this network"
   From:
To:
Call-ID:
Cseq:
Content-Length: 0
```

8. **403 (Forbidden) response (P-CSCF to UE) - see example in table 6.9.2-8**

Table 6.9.2-8: 403 (Forbidden) response (P-CSCF to UE)

```
SIP/2.0 403 Forbidden
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd];comp=gigcomp;branch=z9hG4bKnashds7
Warning: 399 home1.net "Roaming not allowed from this network"
From:
To:
Call-ID:
Cseq:
Content-Length:
```

6.9.3   Registration failure – user authentication failure

This clause (see figure 6.9.3-1) shows the signalling flow with user authentication failure at step 19 of subclause 6.2 "Signalling flows for REGISTER".
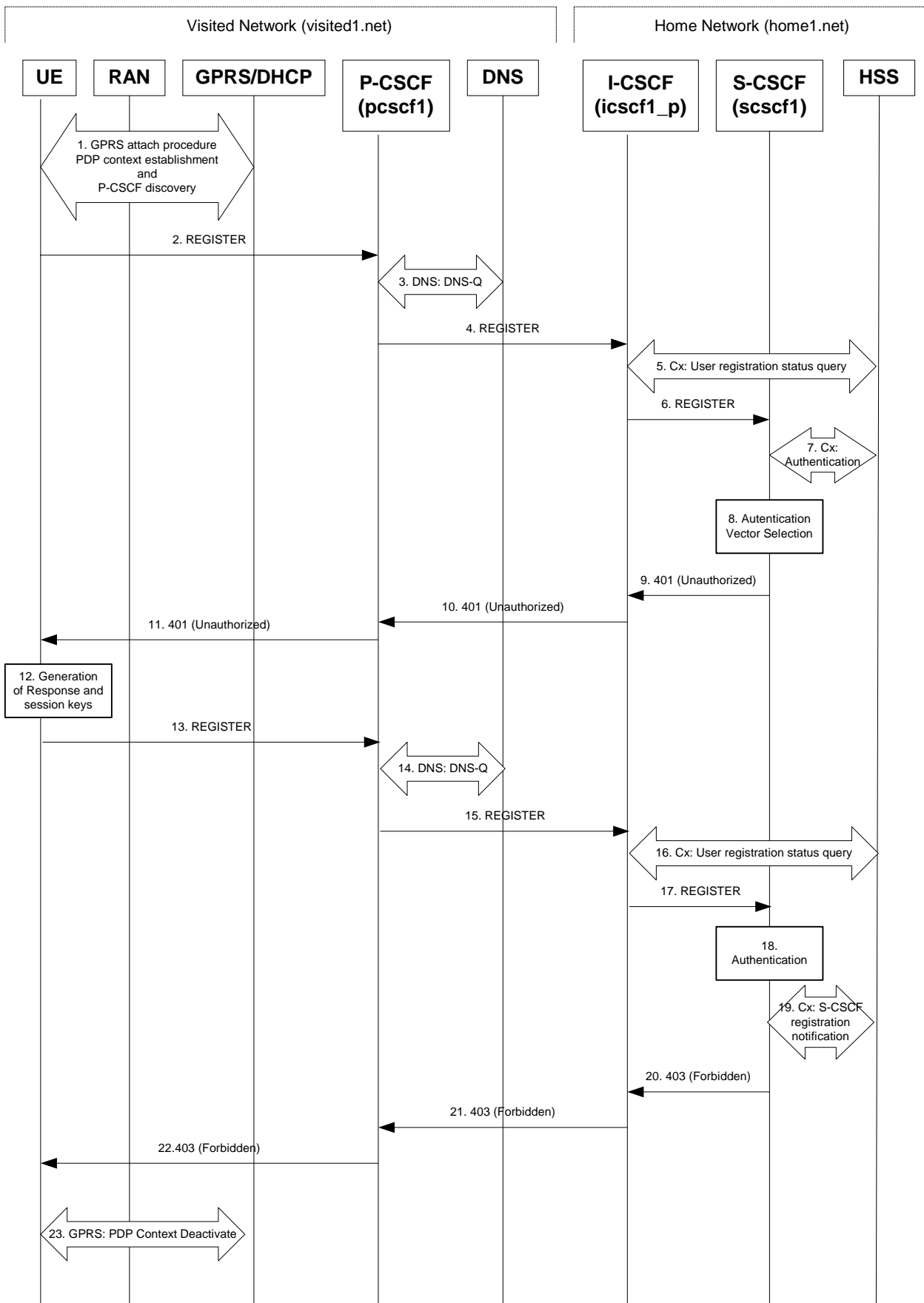
Figure 6.9.3-1: User authentication failure

Steps 1 through 17 are the same as the signalling flow in subclause 6.2.

18. **Authentication: User authentication fails**

Upon receiving the REGISTER request carrying the authentication challenge response, the S-CSCF checks that the expected response (calculated bt the S-CSCF using XRES and other parameters as defined in RFC 3310 [18]) matches the received challenge response. If the check is unsuccessful then this authentication challenge fails and the public user identity is not registered in the S-CSCF.

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

Upon user authentication failure the S-CSCF informs the HSS that the user has not been registered at this instance. The HSS clears the S-CSCF name for that subscriber.

For detailed message flows see 3GPP TS 29.229.

Table 6.9.3-30 provides the parameters in the REGISTER request (flow 18) which needs to be sent to HSS.

Table 6.9.3-30 Cx: S-CSCF registration notification procedure (S-CSCF to HSS)

Message source & destination	Cx Information element name	Information Source in REGISTER request	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. **403 (Forbidden) response (S-CSCF to I-CSCF) - see example in table 6.9.3-31**

The S-CSCF sends an 403 (Forbidden) response to the I-CSCF indicating that authentication failed. No security parameters are included in this response.The S-CSCF will insert a warning header in the response, indicating to the UE the reason of refusing the Registration request. The Warning header will contain the name of the network inserting the warning header (warn-agent = home1.net) and in addition it may contain a warn-text.The warn-code inserted into the Warning header is 399.

Table 6.9.3-31: 403 (Forbidden) response (S-CSCF to I-CSCF)

```
SIP/2.0 403 Forbidden
    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
    Warning: 399 home1.net "Authentication failed"
From: <sip:user1_public1@home1.net>;tag=4fa3
To: <sip:user1_public1@home1.net>; tag=5ef4
Call-ID: apb03a0s09dkjdfglkj49111
CSeq: 3 REGISTER
Content-Length: 0
```

21. **403 (Forbidden) response (I-CSCF to P-CSCF) - see example in table 6.9.3-32**

The I-CSCF forwards the 403 (Forbidden) response from the S-CSCF to the P-CSCF indicating that authentication was unsuccessful.

Table 6.9.3-32: 403 (Forbidden) response (I-CSCF to P-CSCF)

```
SIP/2.0 403 Forbidden
    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
    Warning: 399 home1.net "Authentication failed"
    From:
To:
```

```
Call-ID:
CSeq:
Content-Length:
```

22. **403 (Forbidden) response (P-CSCF to UE) - see example in table 6.9.3-33**

> The P-CSCF forwards the 403 (Forbidden) response to the UE.

Table 6.9.3-33: 403 (Forbidden) response (P-CSCF to UE)

```
SIP/2.0 403 Forbidden
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Warning: 399 home1.net "Authentication failed"
From:
To:
Call-ID:
CSeq:
Content-Length:
```

23. **PDP Context Deactivate**

> On receiving the 403 (Forbidden) response the UE ceases registration and authentication attempts. In this case, if the PDP context on which the SIP signalling was being conducted is not being used for other purposes, the UE deactivates the signalling PDP context.

7 Signalling flows for session initiation (non hiding)

7.1 Introduction

This subclause breaks down the signalling flows for establishing sessions into a number of individual procedures, following the same principles as 3GPP TS 23.228 [2] subclause 5.4.9.

For the purposes of this document, a further breakdown has been necessary, and therefore a number of signalling flows have been given an (a) or (b) suffix, so that the signalling flows for establishing sessions where configuration independence is applied may be distinguished from those where it is not, e.g.:

- (MO#1a) Mobile origination, roaming, without I-CSCF providing configuration independence.

- (MO#1b) Mobile origination, roaming, with I-CSCF in home network providing configuration independence.

7.2 Origination procedures

7.2.1 Introduction

This subclause presents the detailed signalling flows to define the procedures for session originations.

The session origination procedures specify the signalling path between the UE initiating a session attempt and the S-CSCF that is assigned to perform the session origination service. This signalling path is determined at the time of UE registration, and remains fixed for the life of the registration.

A UE always has a proxy (P-CSCF) associated with it. This P-CSCF performs resource authorization. The P-CSCF is determined by the CSCF discovery process.

As a result of the registration procedure, the P-CSCF determines the next hop toward the S-CSCF. This next hop may be directly to the S-CSCF (MO#1a for the roaming case, MO#2 for the home case), or to an I-CSCF who forwards the request to the S-CSCF (MO#1b). These next-hop addresses could be IPv6 addresses, or could be names that are translated via DNS to an IPv6 address.

Sessions originated in the PSTN to a mobile destination are a special case of the Origination procedures and three possibilities to route such sessions are detailed. In the first one, all sessions originated in the PSTN are routed towards the IM CN subsystem. The MGCF uses H.248/MEGACO to control a Media Gateway, and communicates with the SS7 network. In case of interworking between IP based and SS7 based signalling network is required, a SGW would be used [2]. The MGCF initiates the SIP request, and subsequent nodes consider the signalling as if it came from a S-CSCF. In the second one, all sessions originated in the PSTN are routed towards the CS domain. The entry point of the network is then a G-MSC. In the third one, the operator can choose to handle simultaneously the first two routing possibilities and a way to handle this flexibility is detailed.

These flows assume that both the UE and the P-CSCF are willing to compress the signalling by using SigComp.

7.2.2 MO#1a

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.
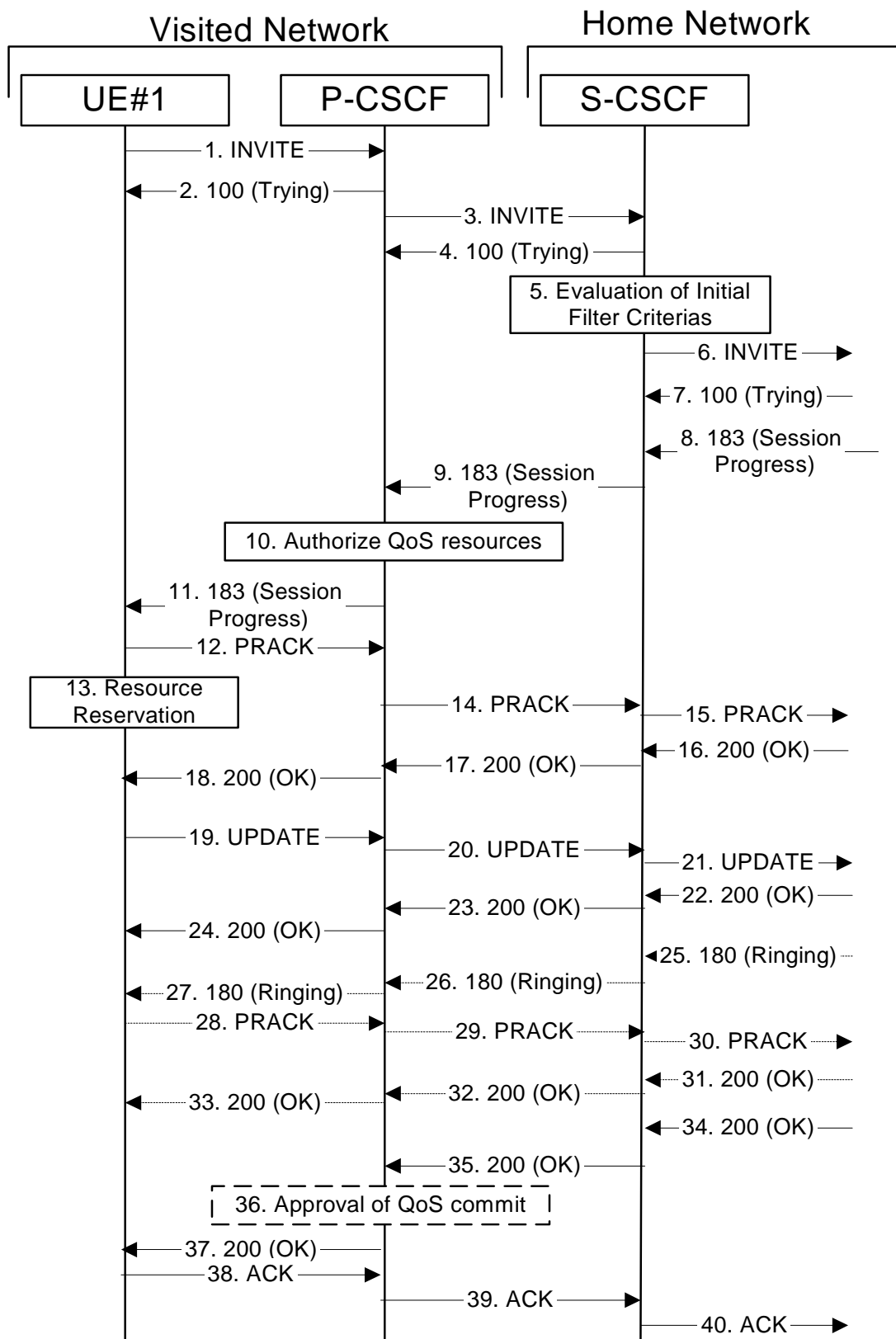
Figure 7.2.2.1-1: MO#1a

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:
0020000100100101706466322e76697369746564322e6e6574000c020139425633303732
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=
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=
```

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=
m=
b=
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
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:
```

7.2.2.2   Failure in termination procedure

The roaming subscriber that initiated a session with procedure MO#1a had the attempt fail due to an error detected in the Termination procedure or in the S-CSCF-to-S-CSCF procedure. This could be due to, for example, destination busy (error code 486), destination service denied (error code 403), destination currently out of coverage (error code 480), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, UE#1 could be at many different stages in the session establishment procedure. This is shown in figure 7.2.2.2-1, as optional messages 7-33 that may appear in this error procedure.

```
To:
Call-ID:
Cseq:
Content-Length:
```
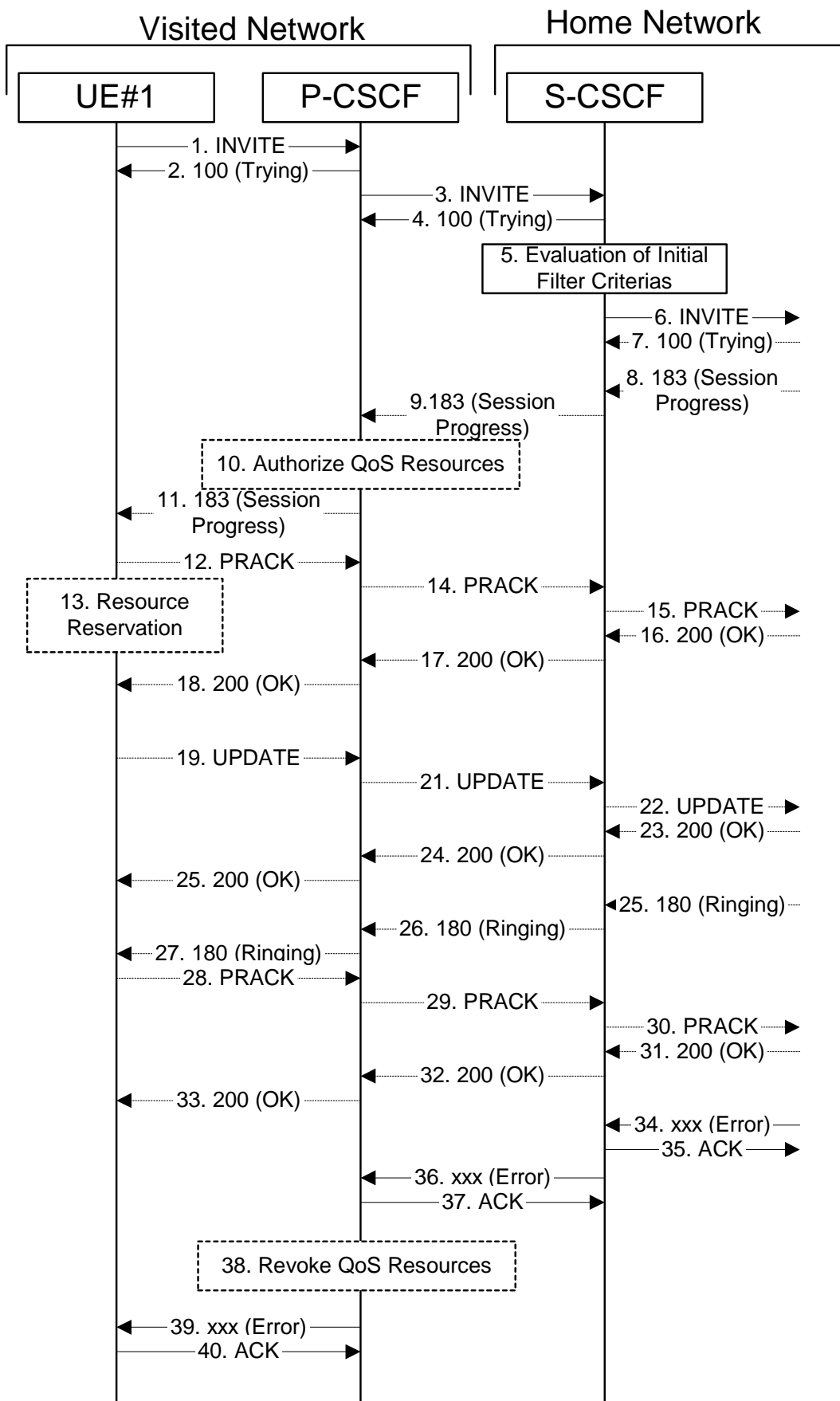
Figure 7.2.2.2-1: Failure in termination procedure

1-6. **INVITE (UE to P-CSCF) et seq**

> UE#1 initiated a session, as described in subclause 7.2.2.1.

7-33. **100 Trying (S-S to MO#1a) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.2.1.

34. **xxx Error (S-S to MO#1a) – see example in table 7.2.2.2-34**

> The termination procedure detected some error situation, and returned a SIP error response.

NOTE 1: The error response may be, for example, "486 (Busy Here)', '403 (Forbidden)', '480 (Temporarily Unavailable)', or others. For this example, '486 (Busy Here)' is shown.

Table 7.2.2.2-34: 486 Busy Here (S-S to MO#1a)

```
SIP/2.0 486 Busy Here
   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: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

35. **ACK (MO#1a to S-S) - see example in table 7.2.2.2-35**

> Upon receive the 486 response from the S-S procedure, S-CSCF sends ACK.

Table 7.2.2.2-35: ACK (MO#1a to S-S)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

36. **xxx Error (S-CSCF to P-CSCF) – see example in table 7.2.2.2-36 (related to table 7.2.2.2-34)**

> The S-CSCF returned a SIP error response to P-CSCF.

NOTE 2: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.2.2.2-36: 486 Busy Here (S-CSCF to P-CSCF)

```
SIP/2.0 486 Busy Here
   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:
Retry-After: 3600
Content-Length: 0
```

37. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.2.2-37**

> Upon receive the 486 response from the S-CSCF procedure, P-CSCF sends ACK.

Table 7.2.2.2-37: ACK (P-CSCF to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

38. **Revoke QoS authorization**

    P-CSCF removes the QoS authorization, if any, for this session.

39. **xxx Error (P-CSCF to UE) – see example in table 7.2.2.2-39 (related to table 7.2.2.2-36)**

    The P-CSCF returned a SIP error response to UE.

NOTE 3: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.2.2.2-39: 486 Busy Here (P-CSCF to UE)

```
SIP/2.0 486 Busy Here
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

40. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.2.2-40**

    Upon receive the 486 response from the P-CSCF, UE sends ACK.

Table 7.2.2.2-40: 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
Route: <sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.2.2.3   Session abandoned, or resource failure

The roaming subscriber that initiated a session with procedure MO#1a either abandoned the attempt, or was unable to obtain the resources necessary for the session. The signalling flow for this error handling is shown in figure 7.2.2.3-1.

If the session is aborted due to failure to obtain resources, it will occur at step #18 in the signalling flow; steps 19-33 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 8-33.
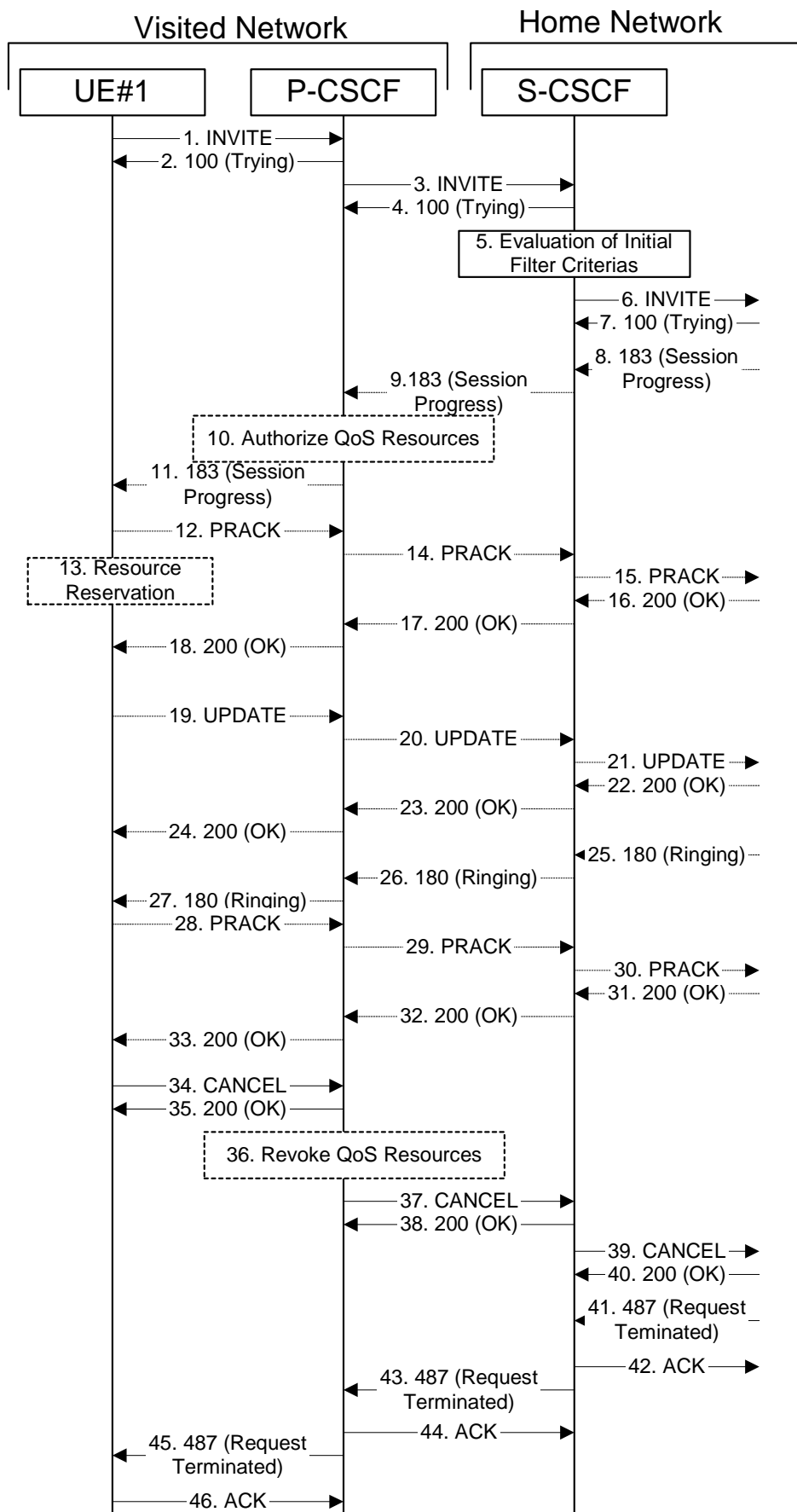
Figure 7.2.2.3-1: Session abandoned or resource failure

1-7. **INVITE (UE to P-CSCF) et seq**

> UE#1 initiated a session, as described in subclause 7.2.2.1.

8-33. **183 Session Progress (S-S to MO#1a) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.2.1.

34. **CANCEL (UE to P-CSCF) – see example in table 7.2.2.3-34**

> The UE cancelled the original INVITE request.

Table 7.2.2.3-34: CANCEL (UE to P-CSCF)

```
CANCEL 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>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

35. **200 OK (P-CSCF to UE) – see example in table 7.2.2.3-35**

> Upon receive the CANCEL request from the UE, P-CSCF sends 200 OK.

Table 7.2.2.3-35: 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: 0
```

36. **Revoke QoS authorization**

> P-CSCF removes the QoS authorization, if any, for this session.

37. **CANCEL (P-CSCF to S-CSCF) – see example in table 7.2.2.3-37**

> The P-CSCF forwards the CANCEL request to S-CSCF.

Table 7.2.2.3-37: CANCEL (P-CSCF to S-CSCF) (related to table 7.2.2.3-34)

```
CANCEL tel:+1-212-555-2222 SIP/2.0
   Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
   Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

38. **200 OK (S-CSCF to P-CSCF) – see example in table 7.2.2.3-38**

> Upon receiving the CANCEL request from the P-CSCF, S-CSCF sends 200 OK.

Table 7.2.2.3-38: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
   Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
From:
```

```
To:
Call-ID:
CSeq:
Content-Length: 0
```

39. **CANCEL (S-CSCF to S-S) – see example in table 7.2.2.3-39 (related to table 7.2.2.3-37)**

The S-CSCF forwards the CANCEL request to the appropriate S-CSCF-to-S-CSCF procedure.

Table 7.2.2.3-39: CANCEL (S-CSCF to S-S)

```
CANCEL sip:user2_public1@home2.net SIP/2.0
   Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
   Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

40. **200 OK (S-S to S-CSCF) – see example in table 7.2.2.3-40**

Upon receive the CANCEL request from the S-CSCF, the next hop (whatever it is) sends 200 OK.

Table 7.2.2.3-40: 200 OK (S-S 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
```

41. **487 Request Terminated (S-S to MO#1a) – see example in table 7.2.2.3-41**

The termination procedure cancelled the request, and returned a SIP error response to the original INVITE request.

Table 7.2.2.3-41: 487 Request Terminated (S-S to MO#1a)

```
SIP/2.0 487 Request Terminated
   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: 127 INVITE
Content-Length: 0
```

42. **ACK (MO#1a to S-S) - see example in table 7.2.2.3-42**

Upon receive the 487 response from the S-S procedure, S-CSCF sends ACK.

Table 7.2.2.3-42: ACK (MO#1a to S-S)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

43. **487 Request Terminated (S-CSCF to P-CSCF) - see example in table 7.2.2.3-43 (related to table 7.2.2.3-41)**

The S-CSCF returned the SIP error response to P-CSCF.

Table 7.2.2.3-43: 487 Request Terminated (S-CSCF to P-CSCF)

```
SIP/2.0 487 Request Terminated
   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
```

44. **ACK (P-CSCF to S-CSCF) - see example in table 7.2.2.3-44**

Upon receive the 487 response from the S-CSCF, P-CSCF sends ACK.

Table 7.2.2.3-44: ACK (P-CSCF to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

45. **487 Request Terminated (P-CSCF to UE) - see example in table 7.2.2.3-45 (related to table 7.2.2.3-43)**

The P-CSCF returned a SIP response to UE.

Table 7.2.2.3-45: 487 Request Terminated (P-CSCF to UE)

```
SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

46. **ACK (UE to P-CSCF) – see example in table 7.2.2.3-46**

Upon receive the 487 response from the P-CSCF, UE sends ACK.

Table 7.2.2.3-46: 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.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.2.3   MO#2

7.2.3.1   (MO#2) Mobile origination, located in home network (S-S#2, MT#2 assumed)

Figure 7.2.3.1-1 shows an origination 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 an S-CSCF in the home network.

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

NOTE: Although S-S#2 flow is assumed, home2.net is used in the 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.
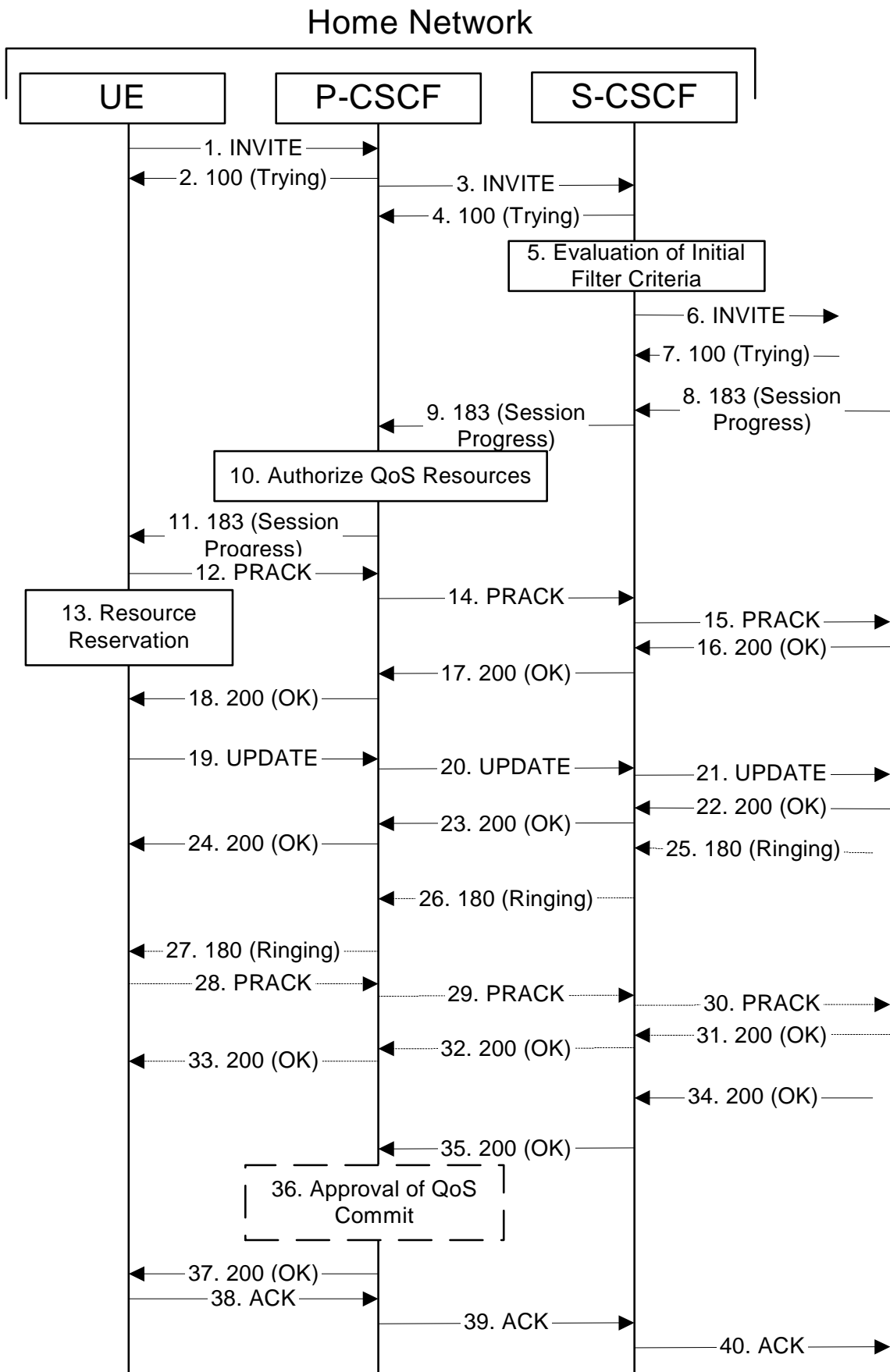
Figure 7.2.3.1-1: MO#2

Procedure MO#2 is as follows:

1. **INVITE (UE to P-CSCF) - see example in table 7.2.3.1-1**

    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.

Table 7.2.3.1-1: 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.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
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 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=rtpmap:99 MP4V-ES
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 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. This is specified by the UE as <tel:E.164_number>. This is in accordance to standard IETF procedures for specifying dialled digits.

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

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

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.

Cseq: A random starting number.

Contact: is a SIP URI that contains the IP address or FQDN of the originating UE. It also contains the port number where the UE wants to receive protected messages.

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

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 7.2.3.1-1b:

Table 7.2.3.1-1b: 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 7.2.3.1-2**

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

Table 7.2.3.1-2: 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 7.2.3.1-3**

The P-CSCF adds itself to the Record-Route header and 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 7.2.3.1-3: INVITE (P-CSCF to S-CSCF)

```
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
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:
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 TEL 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 unique globally 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 7.2.3.1-3b:

Table 7.2.3.1-3b: 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.home1.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 7.2.3.1-4**

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

Table 7.2.3.1-4: 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
```

5. **Evaluation of initial filter criterias**

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

6. **INVITE (MO#2 to S-S) – see example in table 7.2.3.1-6**

> 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 7.2.3.1-6: INVITE (MO#2 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.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:
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=
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-Charging-Vector:** The S-CSCF adds the identifier of its own network to the originating Inter Operator Identifier (IOI) parameter of this header.

7. **100 Trying (S-S to MO#2) – see example in table 7.2.3.1-7**

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

Table 7.2.3.1-7: 100 Trying (S-S to MO#2)

```
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
```

8. **183 Session Progress (S-S to MO#2) – see example in table 7.2.3.1-8**

> 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 7.2.3.1-8: 183 Session Progress (S-S to MO#2)

```
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: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>, <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"; 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
> 7.2.3.1-8b.

Table 7.2.3.1-8b: 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(2dest): <sip:scscf2.home2.net;lr>,<sip:pcscf2.home2.net;lr>
Route(2orig): <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. **183 Session Progress (S-CSCF to P-CSCF) – see example in table 7.2.3.1-9**

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

Table 7.2.3.1-9: 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:
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 7.2.3.1-9b:

Table 7.2.3.1-9b: 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.home2.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 7.2.3.1-11**

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

Table 7.2.3.1-11: 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-Media-Authorization: 0020000100100101706466312e686f6d65312e6e6574000c02013942563330373200
P-Asserted-Identity:
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=
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.home1.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 7.2.3.1-12**

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 include a new SDP offer in the PRACK request 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 7.2.3.1-12: 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.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: 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 7.2.3.1-14**

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 7.2.3.1-14: 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.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:
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#2 to S-S) – see example in table 7.2.3.1-15**

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

Table 7.2.3.1-15: PRACK (MO#2 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.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:
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#2) – see example in table 7.2.3.1-16**

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

Table 7.2.3.1-16: 200 OK (S-S to MO#2)

```
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: 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 7.2.3.1-17**

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

Table 7.2.3.1-17: 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=
a=
a=
m=
b=
```

```
a=
a=
a=
a=
a=
a=
a=
a=
```

18. **200 OK (P-CSCF to UE) – see example in table 7.2.3.1-18**

P-CSCF forwards the 200 OK response to UE.

Table 7.2.3.1-18: 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 7.2.3.1-19**

When the resource reservation is completed, UE sends the UPDATE request to the terminating endpoint, via the signalling path established by the INVITE request. The request is sent first to P-CSCF.

Table 7.2.3.1-19: 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
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:
To:
Call-ID:
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 7.2.3.1-20**

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.

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

Table 7.2.3.1-20: 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.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:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; ggsn=[5555::4b4:3c3:2d2:1e1];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.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=
```

Upon receiving the UPDATE, the S-CSCF stores the following information about this session, for use in charging - see example in table 7.2.3.1-20b.

Table 7.2.3.1-20b: 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>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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#2 to S-S) – see example in table 7.2.3.1-21**

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

Table 7.2.3.1-21: UPDATE (MO#2 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.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:
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#2) – see example in table 7.2.3.1-22**

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

Table 7.2.3.1-22: 200 OK (S-S to MO#2)

```
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: 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 7.2.3.1-23**

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

Table 7.2.3.1-23: 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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
```

```
a=
```

24. **200 OK (P-CSCF to UE) – see example in table 7.2.3.1-24**

P-CSCF forwards the 200 OK response to UE.

Table 7.2.3.1-24: 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#2) - see example in table 7.2.3.1-25**

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 7.2.3.1-25: 180 Ringing (S-S to MO#2)

```
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: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.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 7.2.3.1-26**

S-CSCF forwards the 180 Ringing response to P-CSCF.

Table 7.2.3.1-26: 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:
Allow:
RSeq:
Content-Length:
```

27. **180 Ringing (P-CSCF to UE) – see example in table 7.2.3.1-27**

> P-CSCF forwards the 180 Ringing response to UE.

Table 7.2.3.1-27: 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 port number negotiated during the security agreement and the comp=sigcomp parameter to its own SIP URI

28. **PRACK (UE to P-CSCF) – see example in table 7.2.3.1-28**

> UE indicates to the originating subscriber that the destination is ringing. It acknowledges the 180 Ringing provisional response (27) with a PRACK request.

Table 7.2.3.1-28: 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.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: 130 PRACK
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi=87654321; port1=7531
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.
>
> **Cseq:** Takes a higher value than in the previous request.
>
> **Security-Verify:** Contains the security agreement as represented by the received Security-Server header.

29. **PRACK (P-CSCF to S-CSCF) – see example in table 7.2.3.1-29**

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 7.2.3.1-29: 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.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>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

30. **PRACK (MO#2 to S-S) – see example in table 7.2.3.1-30**

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

Table 7.2.3.1-30: PRACK (MO#2 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.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:
```

31. **200 OK (S-S to MO#2) – see example in table 7.2.3.1-31**

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

Table 7.2.3.1-31: 200 OK (S-S to MO#2)

```
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
```

32. **200 OK (S-CSCF to P-CSCF) – see example in table 7.2.3.1-32**

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

Table 7.2.3.1-32: 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:
```

33. **200 OK (P-CSCF to UE) – see example in table 7.2.3.1-33**

P-CSCF forwards the 200 OK response to UE.

Table 7.2.3.1-33: 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#2) – see example in table 7.2.3.1-34**

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 S-CSCF.

Table 7.2.3.1-34: 200 OK (S-S to MO#2)

```
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:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.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 7.2.3.1-35**

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

Table 7.2.3.1-35: 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:
Allow:
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 7.2.3.1-37**

P-CSCF indicates the resources reserved for this session should now be committed, and forwards the 200 OK final response to the session originator. UE can start media flow(s) for this session.

Table 7.2.3.1-37: 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:
Allow:
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.

38. **ACK (UE to P-CSCF) – see example in table 7.2.3.1-38**

> UE starts the media flow for this session, and responds to the 200 OK (39) with an ACK request sent to P-CSCF.

Table 7.2.3.1-38: 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.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: 127 ACK
Content-Length: 0
```

> **Cseq:** Is required to be the same value as Cseq is original INVITE request [3].

39. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.3.1-39**

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

Table 7.2.3.1-39: 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.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:
```

40. **ACK (MO#2 to S-S) – see example in table 7.2.3.1-40**

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

Table 7.2.3.1-40: ACK (MO#2 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.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:
To:
Call-ID:
Cseq:
Content-Length:
```

7.2.3.2 Failure in termination procedure

The roaming subscriber that initiated a session with procedure MO#2 had the attempt fail due to an error detected in the Termination procedure or in the S-CSCF-to-S-CSCF procedure. This could be due to, for example, destination busy

(error code 486), destination service denied (error code 403), destination currently out of coverage (error code 480), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, UE#1 could be at many different stages in the session establishment procedure. This is shown in figure 7.2.3.2-1, as optional messages 7-33 that may appear in this error procedure.
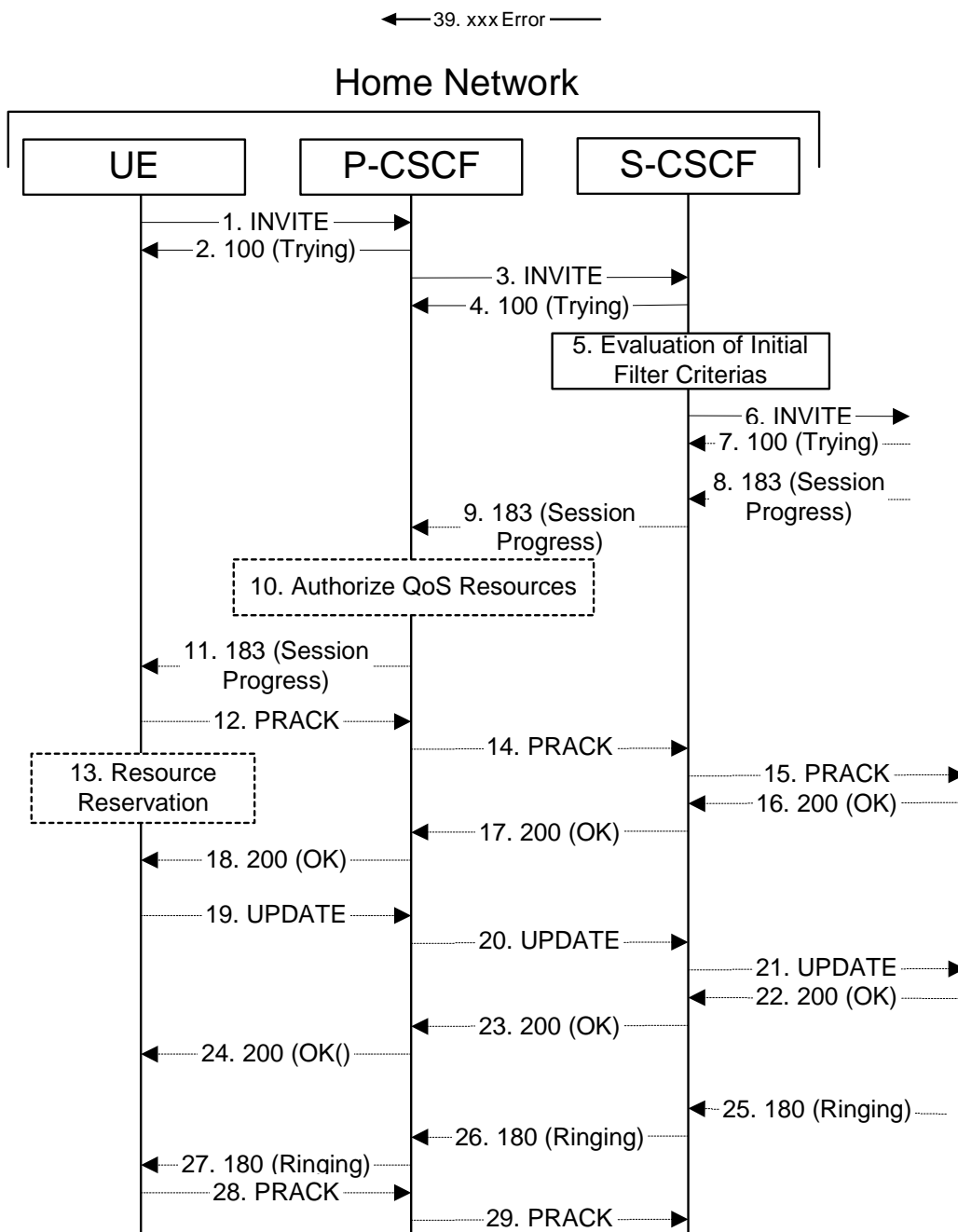
Figure 7.2.3.2-1: Failure in termination procedure

1-6. **INVITE (UE to P-CSCF) et seq**

UE#1 initiated a session, as described in subclause 7.2.3.1.

7-33. **100 Trying (S-S to MO#2) et seq**

Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.3.1.

34. **xxx Error (S-S to MO#2) – see example in table 7.2.3.2-34**

The termination procedure detected some error situation, and returned a SIP error response.

NOTE 1: The error response may be, for example, "486 Busy", "403 Service Denied", "480 Temporarily Unavailable", or others. For this example, "486 Busy" is shown.

Table 7.2.3.2-34: 486 Busy Here (S-S to MO#2)

```
SIP/2.0 486 Busy Here
   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: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

35. **ACK (MO#2 to S-S) – see example in table 7.2.3.2-35**

Upon receive the 486 response from the S-S procedure, S-CSCF sends ACK.

Table 7.2.3.2-35: ACK (MO#2 to S-S)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

36. **xxx Error (S-CSCF to P-CSCF) – see example in table 7.2.3.2-36 (related to table 7.2.3.2-34)**

The S-CSCF returned a SIP error response to P-CSCF.

NOTE 2: The error response may be, for example, "486 Busy", "403 Service Denied", "480 Temporarily Unavailable", or others. For this example, "486 Busy" is shown.

Table 7.2.3.2-36: 486 Busy Here (S-CSCF to P-CSCF)

```
   SIP/2.0 486 Busy Here
   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:
Retry-After: 3600
Content-Length: 0
```

37. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.3.2-37**

Upon receive the 486 response from the S-CSCF procedure, P-CSCF sends ACK.

Table 7.2.3.2-37: 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: 127 ACK
Content-Length: 0
```

38. **Revoke QoS authorization**

   P-CSCF removes the QoS authorization, if any, for this session.

39. **xxx Error (P-CSCF to UE) – see example in table 7.2.3.2-39 (related to table 7.2.3.2-36)**

   The P-CSCF returned a SIP error response to UE.

NOTE 3: The error response may be, for example, "486 Busy", "403 Service Denied", "480 Temporarily Unavailable", or others. For this example, "486 Busy" is shown.

Table 7.2.3.2-39: 486 Busy Here (P-CSCF to UE)

```
SIP/2.0 486 Busy Here
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

40. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.3.2-40**

   Upon receive the 486 response from the P-CSCF, UE sends ACK.

Table 7.2.3.2-40: 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: 127 ACK
Content-Length: 0
```

7.2.3.3   Session abandoned, or resource failure

The roaming subscriber that initiated a session with procedure MO#2 either abandoned the attempt, or was unable to obtain the resources necessary for the session. The signalling flow for this error handling is shown in figure 7.2.3.3-1.

If the session is aborted due to failure to obtain resources, it will occur at step #18 in the signalling flow; steps 19-33 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 8-33.

Home Network
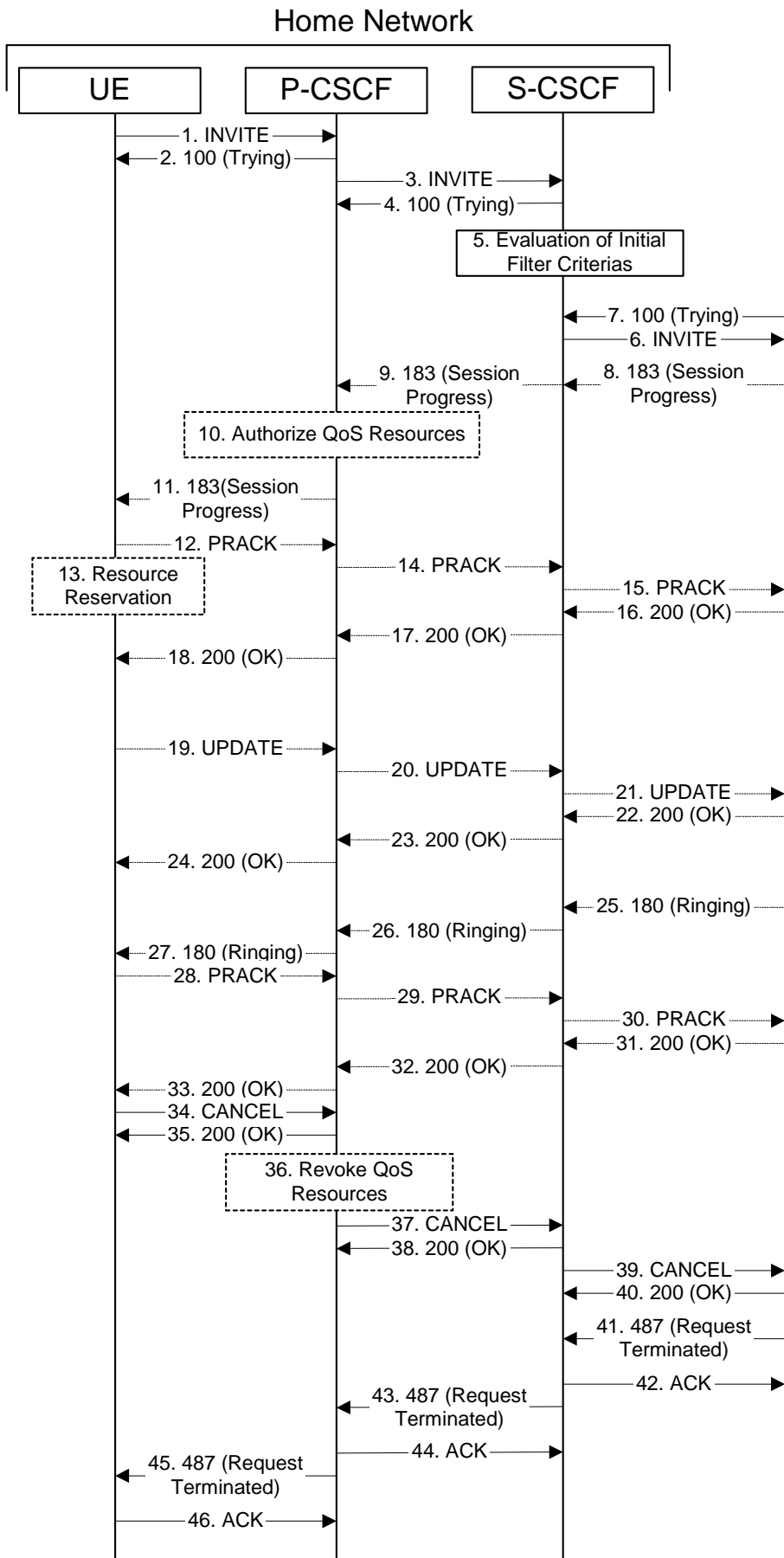
Figure 7.2.3.3-1: Session abandoned or resource failure

1-7. **INVITE (UE to P-CSCF) et seq**

UE#1 initiated a session, as described in subclause 7.2.3.1.

8-33. **183 Session Progress (S-S to MO#2) et seq**

Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.3.1.

34. **CANCEL (UE to P-CSCF) – see example in table 7.2.3.3-34**

The UE cancelled the original INVITE request.

Table 7.2.3.3-34: CANCEL (UE to P-CSCF)

```
CANCEL 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>
   From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

35. **200 OK (P-CSCF to UE) – see example in table 7.2.3.3-35**

Upon receive the CANCEL request from the UE, P-CSCF sends 200 OK.

Table 7.2.3.3-35: 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: 0
```

36. **Revoke QoS authorization**

P-CSCF removes the QoS authorization, if any, for this session.

37. **CANCEL (P-CSCF to S-CSCF) – see example in table 7.2.3.3-37 (related to table 7.2.3.3-34)**

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

Table 7.2.3.3-37: CANCEL (P-CSCF to S-CSCF)

```
CANCEL tel:+1-212-555-2222 SIP/2.0
   Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1
   Max-Forwards: 70
Route: <sip:scfcf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

38. **200 OK (S-CSCF to P-CSCF) – see example in table 7.2.3.3-38**

Upon receiving the CANCEL request from the P-CSCF, S-CSCF sends 200 OK.

Table 7.2.3.3-38: 200 OK (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
   Via: SIP/2.0/UDP pcscf1.home1.net;branch=z9hG4bK431h23.1
From:
```

```
To:
Call-ID:
CSeq:
Content-Length: 0
```

39. **CANCEL (S-CSCF to S-S) – see example in table 7.2.3.3-39 (related to table 7.2.3.3-37)**

The S-CSCF forwards the CANCEL request to the appropriate S-CSCF-to-S-CSCF procedure.

Table 7.2.3.3-39: CANCEL (S-CSCF to S-S)

```
CANCEL sip:user2_public1@home2.net SIP/2.0
   Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
   Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Contact:
Content-Length:
```

40. **200 OK (S-S to S-CSCF) – see example in table 7.2.3.3-40**

Upon receive the CANCEL request from the S-CSCF, the next hop (whatever it is) sends 200 OK.

Table 7.2.3.3-40: 200 OK (S-S 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
```

41. **487 Request Terminated (S-S to MO#2) – see example in table 7.2.3.3-41**

The termination procedure cancelled the request, and returned a SIP error response to the original INVITE request.

Table 7.2.3.3-41: 487 Request Terminated (S-S to MO#2)

```
SIP/2.0 487 Request Terminated
   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: 127 INVITE
Content-Length: 0
```

42. **ACK (MO#2 to S-S) – see example in table 7.2.3.3-42**

Upon receive the 487 response from the S-S procedure, S-CSCF sends ACK.

Table 7.2.3.3-42: ACK (MO#2 to S-S)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

43. **487 Request Terminated (S-CSCF to P-CSCF) – see example in table 7.2.3.3-43 (related to table 7.2.3.3-41)**

The S-CSCF returned the SIP error response to P-CSCF.

Table 7.2.3.3-43: 487 Request Terminated (S-CSCF to P-CSCF)

```
SIP/2.0 487 Request Terminated
   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:
Contact:
Call-ID:
CSeq:
Content-Length: 0
```

44. **ACK (P-CSCF to S-CSCF) – see example in table 7.2.3.3-44**

Upon receive the 487 response from the S-CSCF, P-CSCF sends ACK.

Table 7.2.3.3-44: 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: 127 ACK
Content-Length: 0
```

45. **487 Request Terminated (P-CSCF to UE) – see example in table 7.2.3.3-45 (related to table 7.2.3.3-43)**

The P-CSCF returned a SIP response to UE.

Table 7.2.3.3-45: 487 Request Terminated (P-CSCF to UE)

```
SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Contact:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

46. **ACK (UE to P-CSCF) – see example in table 7.2.3.3-46**

Upon receive the 487 response from the P-CSCF, UE sends ACK.

Table 7.2.3.3-46: 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.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.2.4   (CS-O) CS Networks origination

The MGCF in the IM subsystem is a SIP endpoint that initiates requests on behalf of the CS Networks origination and Media Gateway. The subsequent nodes consider the signalling as if it came from a S-CSCF. The MGCF incorporates the network security functionality of the S-CSCF. This MGCF does not invoke Service Control, as this may be carried out in the CS Networks or at the terminating S-CSCF. This origination procedure can be used for any of the MT procedures.

Due to routing of sessions within the CS Networks, this origination procedure will only occur in the home network of the destination subscriber. However, the destination subscriber may be roaming in a different operator's network. Further, due to cases of session forwarding and electronic surveillance, the destination of the session through the IM subsystem may actually be another CS Networks termination.

7.2.4.1   CS Networks originated sessions routed towards IM CN subsystem (through MGCF) (S-S#2, MT#2 assumed)

This clause and figure 7.2.4.1-1 presents only the case of CS Networks originated sessions routed towards the IM CN subsystem reaching first a MGCF.
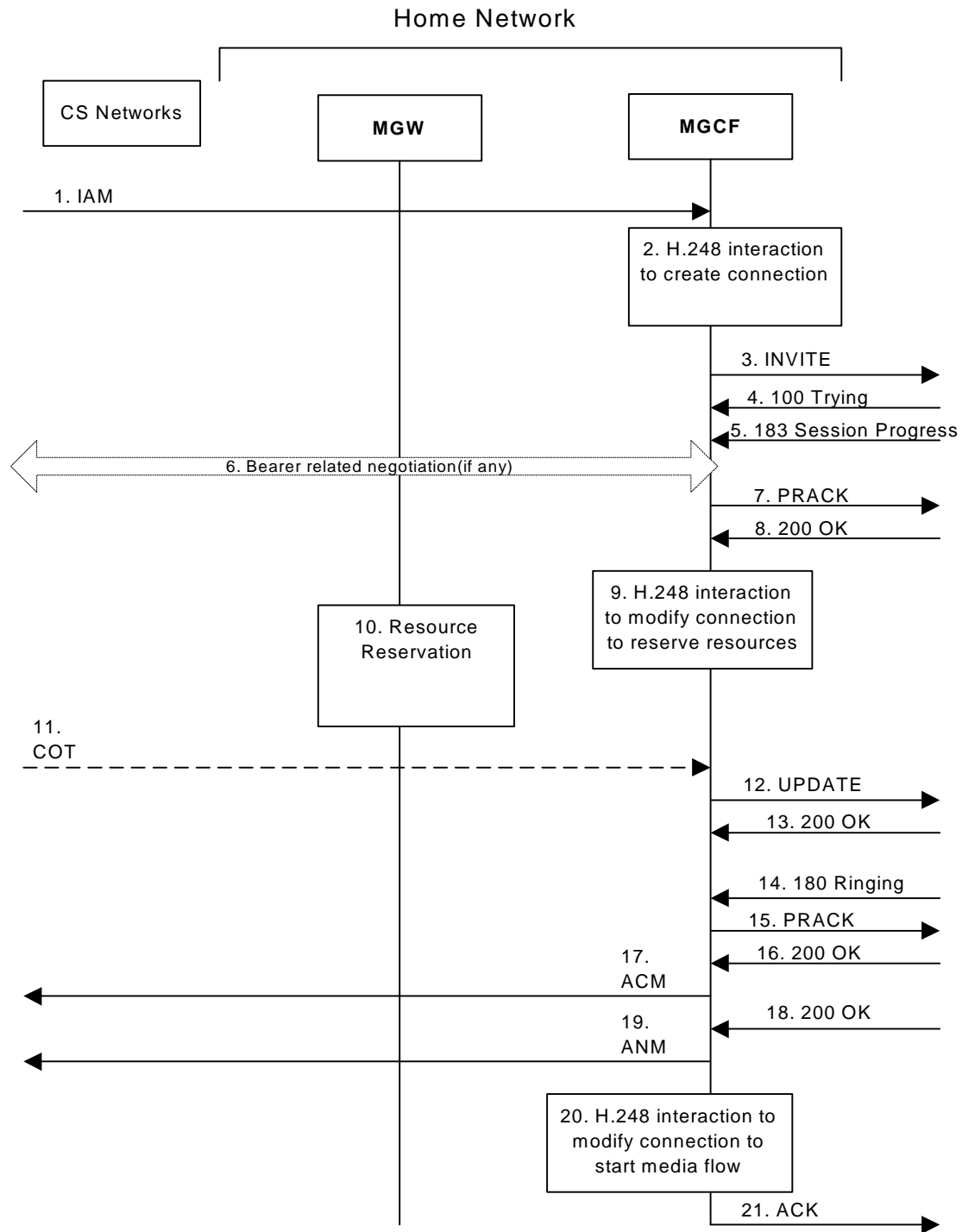
Figure 7.2.4.1-1: CS Networks origination

The CS Networks Origination procedure is as follows:

1. **SS7: IAM**

   The CS Network establishes a bearer path to the MGW, and signals to the MGCF with a IAM message, giving the trunk identity, destination information and optionally the continuity indication.

2. **H.248 Interaction**

   The MGCF initiates a H.248 command, to seize the trunk and an IP port.

3. **INVITE (CS-O to S-S) – see example in table 7.2.4.1-3**

The MGCF initiates an INVITE request, containing an initial SDP, as per the proper S-CSCF to S-CSCF procedure.

Table 7.2.4.1-3: INVITE (CS-O to S-S)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
Route: <sip:icscf1_s.home1.net;lr>
P-Asserted-Identity: <tel:+1-212-555-1111>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy: none
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
Supported: 100rel
Contact: <sip:mgcf1.home1.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
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=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, as obtained from CS Networks signalling.
Via:	Contains the IP address or FQDN of the originating MGCF.
P-Asserted-Identity:	The MGCF inserts the TEL URL containing the subscriber number, as received from the CS network.
P-Charging-Vector:	The MGCF inserts this header and populates the icid parameters with a globally unique value.
Cseq:	A random starting number.
Contact:	Is the SIP URI that contains the IP address or FQDN of the MGCF.
SDP	The SDP contains a preconfigured set of codecs supported by the MGW.

4. **100 Trying (S-S to CS-O) – see example in table 7.2.4.1-4**

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

Table 7.2.4.1-4: 100 Trying (S-S to CS-O)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

5. **183 Session Progress (S-S to CS-O) – see example in table 7.2.4.1-5**

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

Table 7.2.4.1-5: 183 Session Progress (S-S to CS-O)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>
P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net; term-
ioi=visit1.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: 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=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-Charging-Function-Addresses: The S-CSCF passes this header to the MGCF for charging.

Upon receiving the 183 Session Progress, the MGCF stores the following information about this session – see example in table 7.2.4.1-6b.

Table 7.2.4.1-6b: Storage of information at MGCF

```
Request-URI: tel:+1-212-555-2222
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
```

6. **Possible bearer related negotiation takes place**

   Steps 6 and 7 can be done in an arbitrary order.

7. **PRACK (CS-O to S-S) – see example in table 7.2.4.1-7**

   MGCF sends a PRACK request without SDP, because there is not another set of codecs to the original SDP offer.

Table 7.2.4.1-7: PRACK (CS-O to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
```

```
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
Require: preconditions
RAck: 9021 127 INVITE
Content-Length: 0
```

Via: Takes the value of either the IP address or FQDN of the originating MGCF.

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.

8. **200 OK (S-S to CS-O) – see example in table 7.2.4.1-8**

    The destination responds to the PRACK request (7) with a 200 OK response.

Table 7.2.4.1-8: 200 OK (S-S to CS-O)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

9. **H.248 Interaction**

    MGCF initiates a H.248 command to modify the connection parameters and instruct the MGW to reserve the resources needed for the session.

10. **Reserve Resources**

    MGW reserves the resources needed for the session.

11. **COT**

    In case the IAM had contained a continuity indication, the COT message arrives to the MGCF.

12. **UPDATE (CS-O to S-S) – see example in table 7.2.4.1-12**

    When the resource reservation is completed and the possible COT message is received, MGCF sends the UPDATE request to the terminating endpoint, per the S-S procedures.

Table 7.2.4.1-12: UPDATE (CS-O to S-S)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From: <tel:+1-212-555-1111>;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=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
```

Via:	Contains the IP address or FQDN of the originating MGCF.
Route:	Takes the saved Route header without the first component.
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.

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

13. **200 OK (S-S to CS-O) – see example in table 7.2.4.1-13**

The destination endpoint responds to the UPDATE request (12) with a 200 OK response.

Table 7.2.4.1-13: 200 OK (S-S to CS-O)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933624 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 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=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.

14. **180 Ringing (S-S to CS-O) – see example in table 7.2.4.1-14**

The destination endpoint may optionally perform alerting. If so, it signals this to the calling party by a 180 Ringing provisional response. This response is sent to MGCF per the S-CSCF to S-CSCF procedure.

Table 7.2.4.1-14: 180 Ringing (S-S to CS-O)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>
Require: 100rel
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
RSeq: 9022
Content-Length: 0
```

15. **PRACK (CS-O to S-S) – see example in table 7.2.4.1-15**

MGCF acknowledges the 180 Ringing provisional response (14) with a PRACK request. MGCF adds the Route header corresponding to the session.

Table 7.2.4.1-15: PRACK (CS-O to S-S)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

16. **200 OK (S-S to CS-O) – see example in table 7.2.4.1-16**

The destination endpoint responds to the PRACK request (15) with a 200 OK response.

Table 7.2.4.1-16: 200 OK (S-S to CS-O)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

17. **SS7: ACM**

If alerting is being performed, the MGCF forwards an ACM message.

18. **200 OK (S-S to CS-O) – see example in table 7.2.4.1-18**

When the called party answers, the terminating and S-S procedures result in a 200 OK final response being sent to MGCF.

Table 7.2.4.1-18: 200 OK (S-S to CS-O)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>
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
```

19. **SS7: ANM**

MGCF forwards an ANM message to the CS Networks.

20. **H.248: Interaction**

MGCF initiates a H.248 command to alter the connection at MGW to make it bidirectional.

21. **ACK (CS-O to S-S) – see example in table 7.2.4.1-21**

MGCF acknowledges the 200 OK final response (18) with an ACK request.

Table 7.2.4.1-21: ACK (CS-O to S-S)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
```

```
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

> **Cseq:** is required to be the same value as Cseq is original INVITE request [3]

7.2.4.2 CS Networks originated sessions routed towards CS domain (through G-MSC) (not provided)

An example of this flow is not shown in the present document.

7.2.4.3 CS Networks originated sessions routed either towards IM CN subsystem or towards CS domain (not provided)

An example of this flow is not shown in the present document.

7.2.4.4 Failure in termination procedure

The PSTN subscriber that initiated a session with procedure CS-O had the attempt fail due to an error detected in the Termination procedure or in the S-CSCF-to-S-CSCF procedure. This could be due to, for example, destination busy (error code 486), destination service denied (error code 403), destination currently out of coverage (error code 480), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, the originator could be at many different stages in the session establishment procedure. This is shown in figure 7.2.4.4-1, as optional messages 5-17 that may appear in this error procedure.
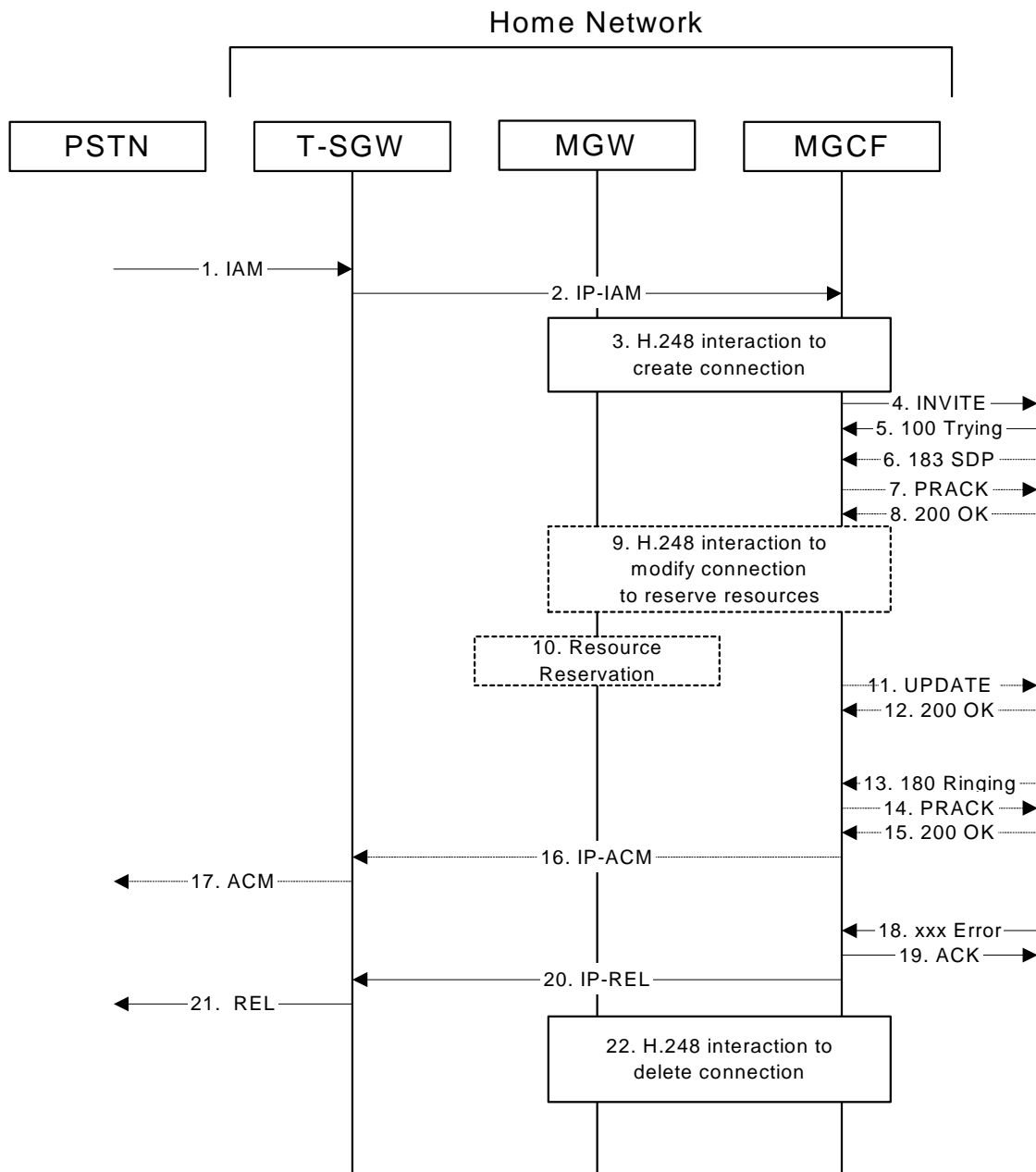
Figure 7.2.4.4-1: Failure in termination procedure

4. **INVITE (MGCF to S-S) et seq**

> The PSTN originator initiated a session, as described in subclause 7.2.4.1.

5-17. **100 Trying (S-S to CS-O) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.4.1.

18. **xxx Error (S-S to CS-O) – see example in table 7.2.4.4-18**

> The termination procedure detected some error situation, and returned a SIP 4xx response.

NOTE 1: The error response may be, for example, "486 Busy", "403 Service Denied", "480 Temporarily Unavailable", or others. For this example, "486 Busy" is shown.

Table 7.2.4.4-18: 486 Busy Here (S-S to CS-O)

```
SIP/2.0 486 Busy Here
```

```
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

19. **ACK (CS-O to S-S) – see example in table 7.2.4.4-19**

> Upon receive the 486 response from the S-S procedure, S-CSCF sends ACK.

Table 7.2.4.4-19: ACK (CS-O to S-S)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
Route: <sip:icscf1_s.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

20. **H.248 Interaction**

> MGCF initiates a H.248 interaction with MGW to delete the connection.

7.2.4.5   Session abandoned, or resource failure

The PSTN subscriber that initiated a session with procedure CS-O either abandoned the attempt, or was unable to obtain the resources necessary for the session. The signalling flow for this error handling is shown in figure 7.2.4.5-1.

If the session is aborted due to failure to obtain resources, it will occur at step #10 in the signalling flow; steps 11-17 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 5-17.

Home Network
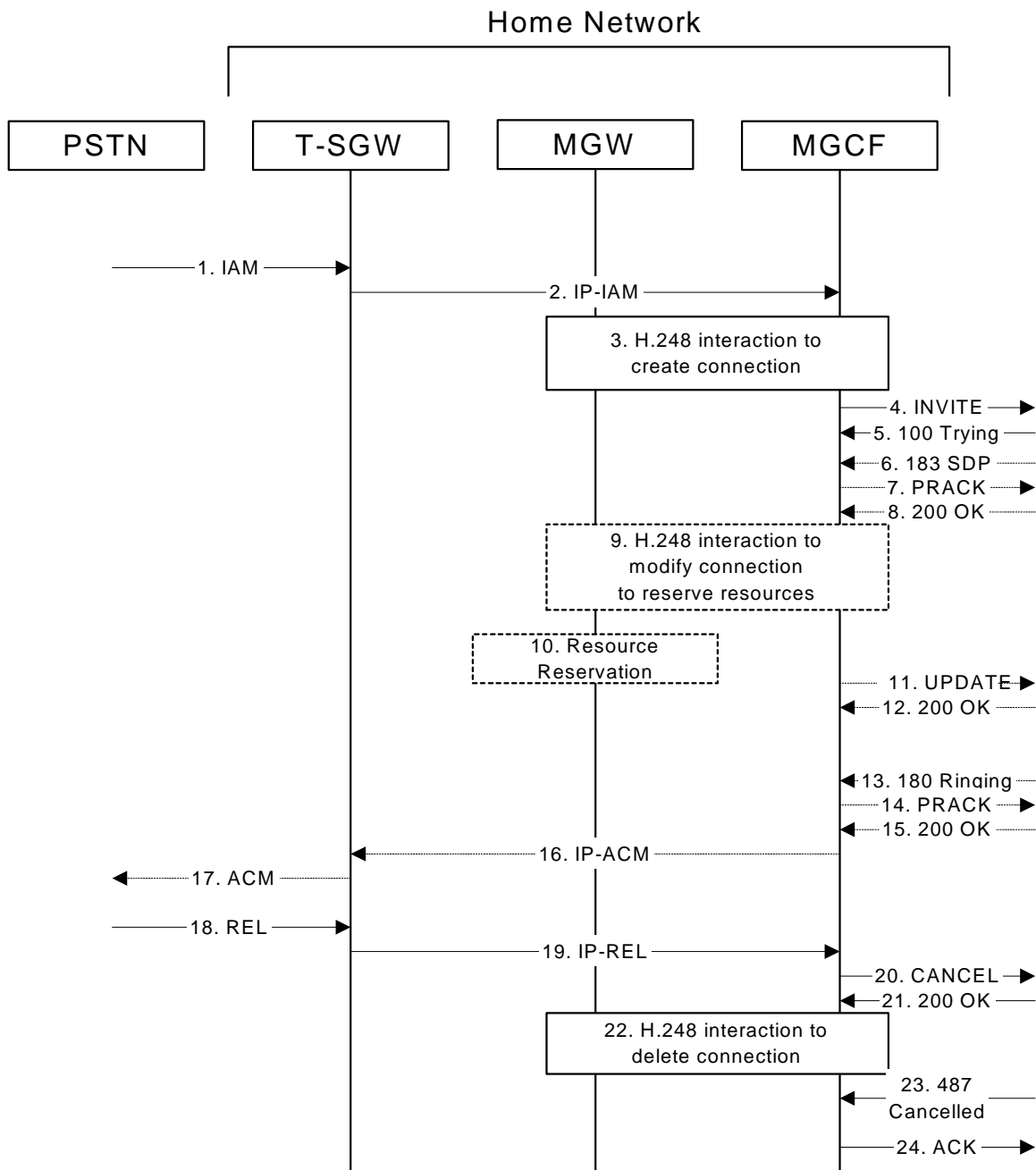
Figure 7.2.4.5-1: Session abandoned or resource failure

4. **INVITE (CS-O to S-S) et seq**

   CS-O initiated a session, as described in subclause 7.2.4.1.

5-15. **183 SDP (S-S to CS-O) et seq**

   Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.2.4.1.

20. **CANCEL (CS-O to S-S) – see example in table 7.2.4.5-20**

   The PSTN cancelled the original INVITE request.

Table 7.2.4.5-20: CANCEL (CS-O to S-S)

```
CANCEL tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Max-Forwards: 70
```

```
Route: <sip:icscf1_s.home1.net;lr>
From: <tel:+1-212-555-1111>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

21. **200 OK (S-S to CS-O) – see example in table 7.2.4.5-21**

    Upon receive the CANCEL request from CS-O, the S-S procedure sends 200 OK.

Table 7.2.4.5-21: 200 OK (S-S to CS-O)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

22. **H.248 Interaction**

    MGCF initiates a H.248 interaction with MGW to delete the connection

23. **487 Request Terminated (S-S to CS-O) – see example in table 7.2.4.5-23**

    The termination procedure processed the CANCEL request, and returned a SIP error response.

Table 7.2.4.5-23: 487 Request Terminated (S-S to CS-O)

```
SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
From:
To:
Call-ID:
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

24. **ACK (CS-O to S-S) – see example in table 7.2.4.5-24**

    Upon receive the 487 response from the S-S procedure, MGCF sends ACK.

Table 7.2.4.5-24: ACK (CS-O to S-S)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP mgcf1.home1.net;branch=z9hG4bK779s24.0
Route: <sip:icscf1_s.home1.net;lr>
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.2.5 Error handling: origination procedures (not provided)

An example of this flow is not shown in the present document.

7.3   S-CSCF (MGCF) to S-CSCF (MGCF) procedures

7.3.1   Introduction

This subclause presents the detailed signalling flows to define the procedures for S-CSCF to S-CSCF.

This subclause contains four signalling flow procedures, showing variations on the signalling path between the S-CSCF (or MGCF) that handles session origination, and the S-CSCF (or MGCF) that handles session termination. This signalling path depends on:

- whether the originator and destination are served by the same network operator;

- agreements between operators for optimum PSTN gateway location.

In the case a MGCF handles the session origination (respectively session termination), some actions performed by a S-CSCF handling the session origination (respectively session termination) will not be performed. As example, evaluation of initial filter criteria is not done by a MGCF.

In the case a MGCF handles the session origination, it belongs to the same network operator as the S-CSCF handling the session termination.

Between separate operators, there are additional sub-cases covering the optional network configuration hiding – hiding required by both operators, neither operator, or just one operator.

The S-CSCF handling session origination performs an analysis of the destination address, and determines whether it is a PSTN destination, a subscriber of the same network operator or a subscriber of a different operator.

If the analysis of the destination address determined that it belongs to a subscriber of a different operator, the request is forwarded (optionally through an I-CSCF within the originating operator's network) to a well-known entry point in the destination operator's network, the I-CSCF. The I-CSCF queries the HSS for current location information. The I-CSCF then forwards the request to the S-CSCF. This is signalling flow procedure S-S#1.

If the analysis of the destination address determines that it belongs to a subscriber of the same operator, the S-CSCF forwards the request to a local I-CSCF, who queries the HSS for current location information. The I-CSCF then forwards the request to the S-CSCF. This is signalling flow procedure S-S#2.

If the analysis of the destination address determines that it is a PSTN destination, the S-CSCF forwards the request to a local BGCF. Based on further analysis of the destination address, and on agreements between operators for PSTN termination, the BGCF will either select a local MGCF to perform the termination (procedure S-S#3) or will forward the request to a BGCF in another operator's network who will select the MGCF to perform the termination (procedures S-S#4).

These flows assume that both the UE and the P-CSCF are willing to compress the signalling by using SigComp.

7.3.2   S-S#1a

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.
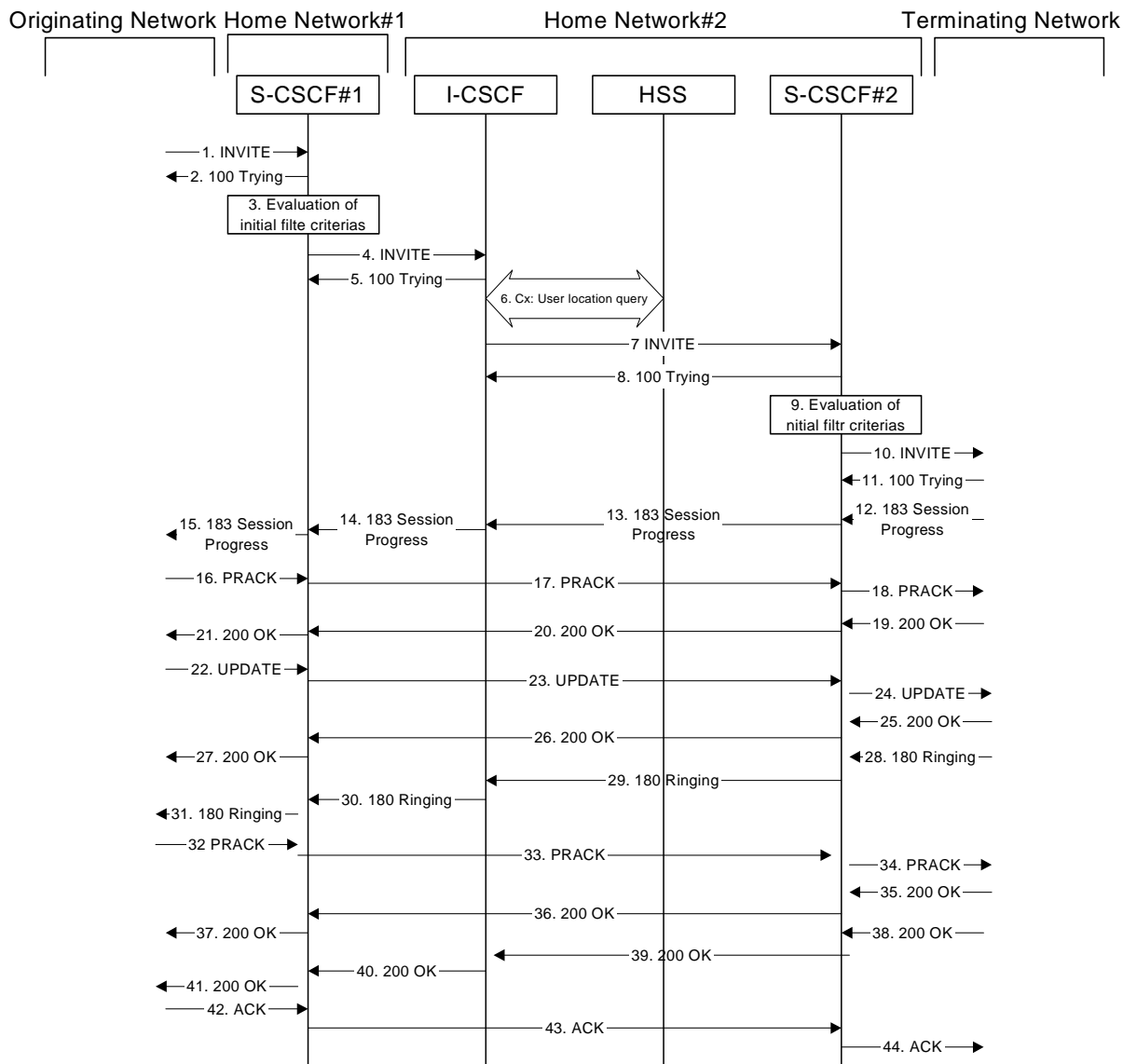
Figure 7.3.2.1-1: S-S#1a

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=
```

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=
m=
b=
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=
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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:
```

7.3.2.2 Termination failure

The subscriber that originated a session with one of the MO procedures had the attempt fail due to an error detected in the termination procedure. This could be due to, for example, destination busy (error code 486), resource failure (error code 580), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, the S-CSCF-to-S-CSCF procedure could be at many different stages in the session establishment procedure. This is shown in figure 7.3.2.2-1, as optional messages 12-38 that may appear in this error procedure.
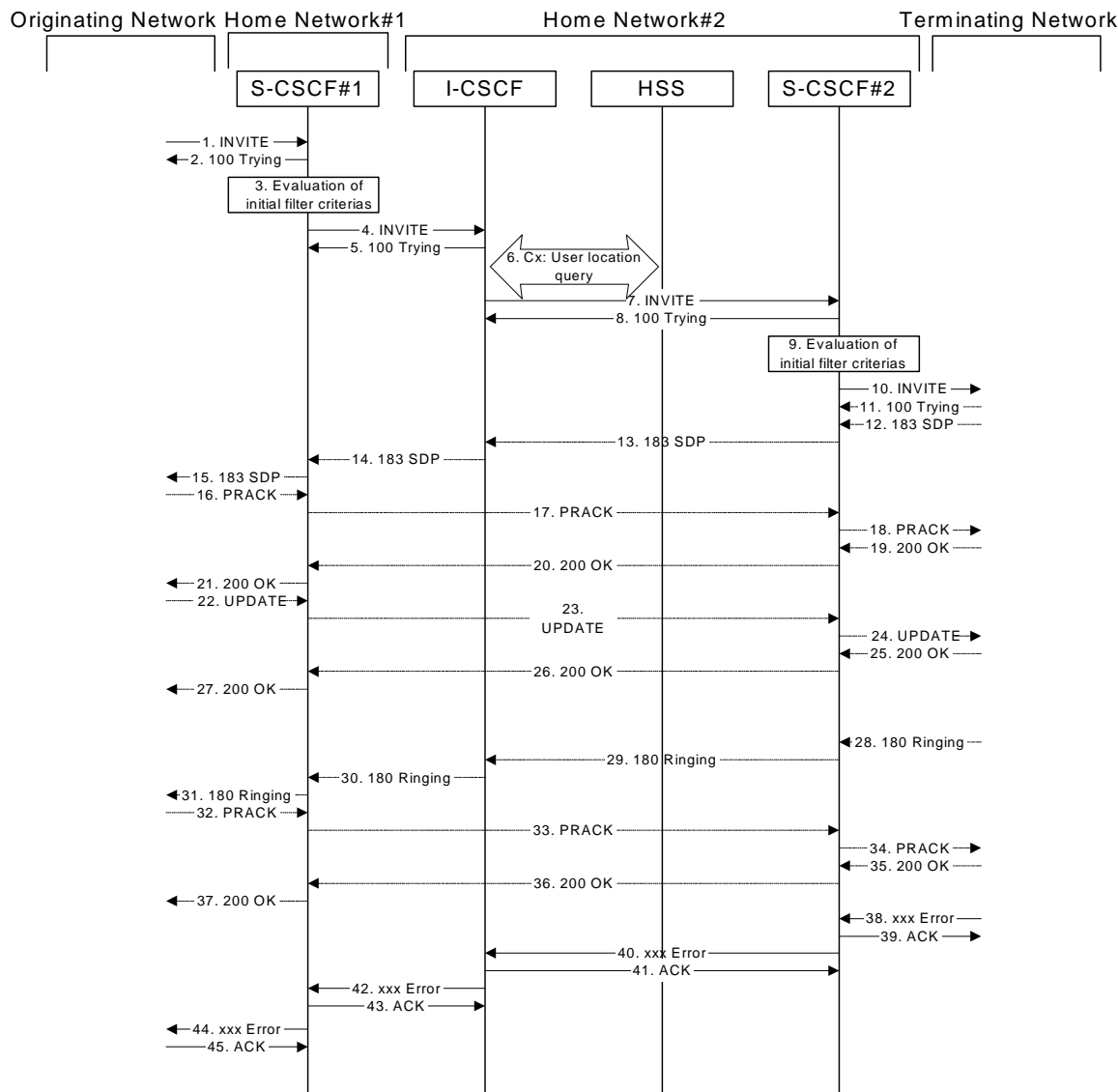
Figure 7.3.2.2-1: Failure in termination procedure

1-10. INVITE (MO to S-CSCF) et seq

A subscriber of the originating network initiated a session, as described in subclause 7.3.2.1.

11-37. 100 Trying (MT to S-CSCF) et seq

Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.3.2.1.

38. xxx Error (MT to S-CSCF) – see example in table 7.3.2.2-38

The termination procedure detected some error situation, and returned a SIP 4xx response.

NOTE 1: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", "580 (Precondition Failure)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.3.2.2-38: 486 Busy Here (MT to S-CSCF)

```
SIP/2.0 486 Busy Here
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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
```

ETSI

```
    From: <sip:user1_public1@home1.net>;tag=171828
    To: <tel:+1-212-555-2222>;tag=314159
    Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

39. **ACK (S-CSCF to MT) – see example in table 7.3.2.2-39**

> Upon receive the 486 response from the MT procedure, S-CSCF sends ACK.

Table 7.3.2.2-39: ACK (S-CSCF 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
    Max-Forwards: 70
    Route: <sip:pcscf2.visited2.net;lr>
    From:
    To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

40. **xxx Error (S-CSCF to I-CSCF) – see example in table 7.3.2.2-40 (related to table 7.3.2.2-38)**

> The S-CSCF returned a SIP error response to I-CSCF.

NOTE 2: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.3.2.2-40: 486 Busy Here (S-CSCF to I-CSCF)

```
    SIP/2.0 486 Busy Here
    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:
Retry-After: 3600
Content-Length: 0
```

41. **ACK (I-CSCF to S-CSCF) – see example in table 7.3.2.2-41**

> Upon receive the 486 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.2.2-41: ACK (I-CSCF to S-CSCF)

```
    ACK sip:user2_public1@home2.net SIP/2.0
    Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK332b23.1
    Max-Forwards: 70
    Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

42. **xxx Error (I-CSCF to S-CSCF) – see example in table 7.3.2.2-42 (related to table 7.3.2.2-40)**

> The I-CSCF returned a SIP 4xx response to S-CSCF.

NOTE 3: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.3.2.2-42: 486 Busy Here (I-CSCF to S-CSCF)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

43. **ACK (S-CSCF to I-CSCF) – see example in table 7.3.2.2-43**

Upon receive the 486 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.2.2-43: ACK (S-CSCF to I-CSCF)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

44. **xxx Error (S-CSCF to MO) – see example in table 7.3.2.2-44 (related to table 7.3.2.2-42)**

The S-CSCF returned a SIP error response to the appropriate MO procedure.

NOTE 4: The error response may be, for example, "486 (Busy Here)", "403 (Forbidden)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 7.3.2.2-44: 486 Busy Here (S-CSCF to MO)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

45. **ACK (MO to S-CSCF) – see example in table 7.3.2.2-45**

Upon receiving the 486 response from the S-CSCF, the MO procedure sends ACK.

Table 7.3.2.2-45: ACK (MO to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.3.2.3 Origination failure

The subscriber that initiated a session with one of the MO procedures either abandoned the attempt, or was unable to obtain the resources necessary for the session. The signalling flow for this error handling is shown in figure 7.3.2.3-1.

If the session is aborted due to failure to obtain resources, it will occur at step #23 in the signalling flow; steps 23-38 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 13-38.
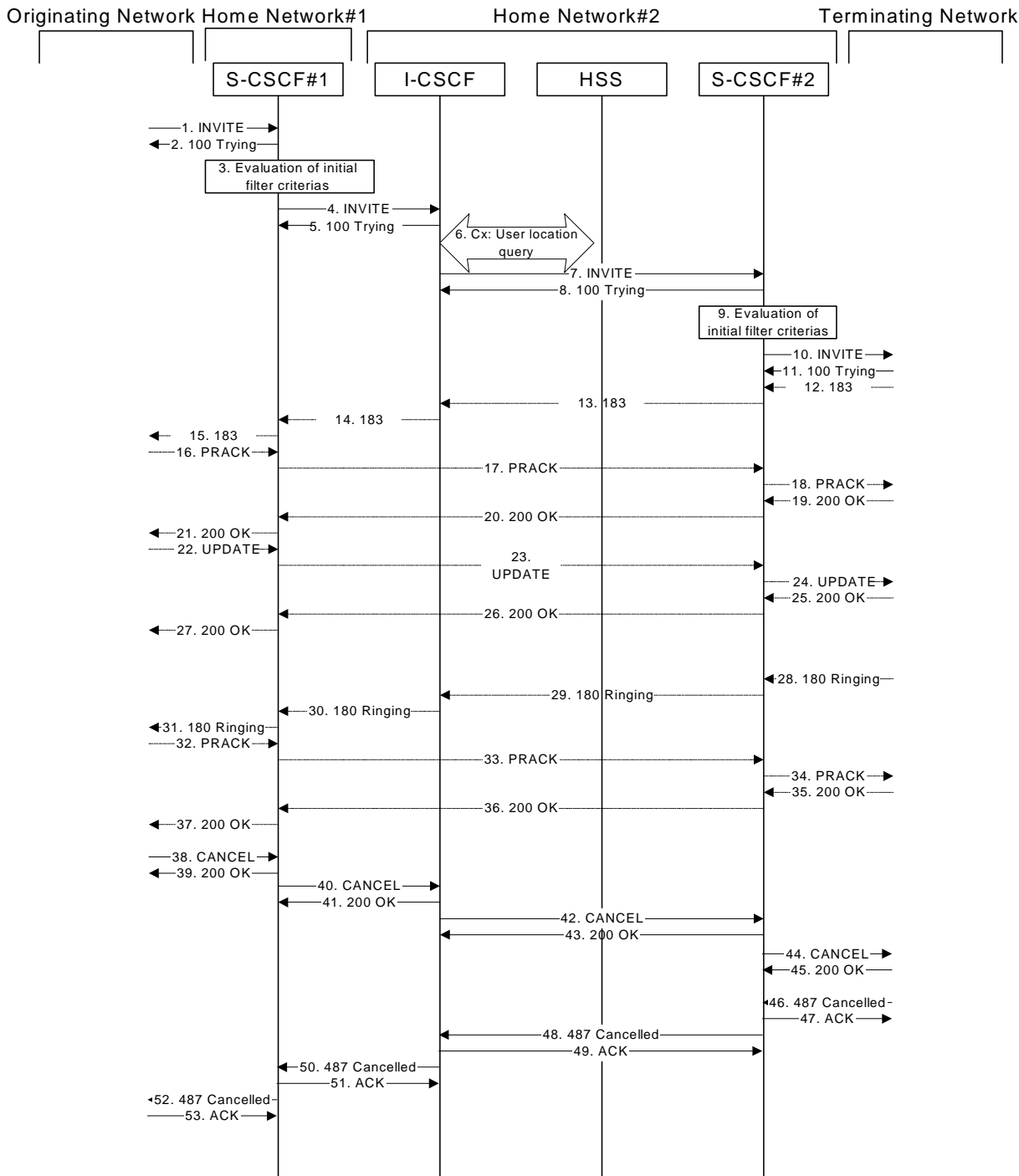
Figure 7.3.2.3-1: Failure in origination procedure

1-11. **INVITE (MO to S-CSCF) et seq**

UE#1 initiated a session, as described in subclause 7.3.2.1.

12-37. **183 Session Progress (MT to S-CSCF) et seq**

Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.3.2.1.

38. **CANCEL (MO to S-CSCF) – see example in table 7.3.2.3-38**

The originator, through the MO procedure, cancelled the original INVITE request.

Table 7.3.2.3-38: CANCEL (MO to S-CSCF)

```
    CANCEL tel:+1-212-555-2222 SIP/2.0
    Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
    Max-Forwards: 70
    Route: <sip:scscf1.home1.net;lr>
    From: <sip:user1_public1@home1.net>;tag=171828
    To: <tel:+1-212-555-2222>
    Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

39. **200 OK (S-CSCF to S-S) – see example in table 7.3.2.3-39**

Upon receive the CANCEL request from the MO procedure, S-CSCF sends 200 OK.

Table 7.3.2.3-39: 200 OK (S-CSCF to MO)

```
    SIP/2.0 200 OK
    Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
    From:
    To:
Call-ID:
CSeq: 127 CANCEL
Content-Length: 0
```

40. **CANCEL (S-CSCF to I-CSCF) – see example in table 7.3.2.3-40 (related to table 7.3.2.3-38)**

The S-CSCF forwards the CANCEL request to I-CSCF.

Table 7.3.2.3-40: CANCEL (S-CSCF to I-CSCF)

```
    CANCEL sip:user2_public1@home2.net SIP/2.0
    Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
    Max-Forwards: 70
    From:
    To:
    Call-ID:
Cseq:
Content-Length:
```

41. **200 OK (I-CSCF to S-CSCF) – see example in table 7.3.2.3-41**

Upon receiving the CANCEL request from the S-CSCF, P-CSCF sends 200 OK.

Table 7.3.2.3-41: 200 OK (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: 127 CANCEL
Content-Length: 0
```

42. **CANCEL (I-CSCF to S-CSCF) – see example in table 7.3.2.3-42 (related to table 7.3.2.3-40)**

The I-CSCF forwards the CANCEL request to S-CSCF.

Table 7.3.2.3-42: CANCEL (I-CSCF to S-CSCF)

```
CANCEL sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

43. **200 OK (S-CSCF to I-CSCF) – see example in table 7.3.2.3-43**

Upon receiving the CANCEL request from the I-CSCF, S-CSCF sends 200 OK.

Table 7.3.2.3-43: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1
From:
To:
Call-ID:
CSeq: 127 CANCEL
Content-Length: 0
```

44. **CANCEL (S-CSCF to MT) – see example in table 7.3.2.3-44 (related to table 7.3.2.3-42)**

The P-CSCF forwards the CANCEL request to the appropriate MT procedure.

Table 7.3.2.3-44: CANCEL (S-CSCF to MT)

```
CANCEL sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1
Max-Forwards: 70
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

45. **200 OK (MT to S-CSCF) – see example in table 7.3.2.3-45**

Upon receive the CANCEL request from the S-CSCF, the MT procedure sends 200 OK.

Table 7.3.2.3-45: 200 OK (MT to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1
From:
To:
Call-ID:
CSeq: 127 CANCEL
Content-Length: 0
```

46. **487 Request Terminated (MT to S-CSCF) – see example in table 7.3.2.3-46**

The termination procedure detected some error situation, and returned a SIP error response.

Table 7.3.2.3-46: 487 Request Terminated (MT to S-CSCF)

```
SIP/2.0 487 Request Terminated
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: <tel:+1-212-555-2222>;tag=314159
Call-ID:
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

47. **ACK (S-CSCF to MT) – see example in table 7.3.2.3-47**

> Upon receive the 487 response from the MT procedure, S-CSCF sends ACK.

Table 7.3.2.3-47: ACK (S-CSCF 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
    Max-Forwards: 70
    Route: <sip:pcscf2.visited2.net;lr>
    From:
    To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

48. **487 Request Terminated (S-CSCF to I-CSCF) – see example in table 7.3.2.3-48 (related to table 7.3.2.3-46)**

> The S-CSCF returned a SIP error response to I-CSCF.

Table 7.3.2.3-48: 487 Request Terminated (S-CSCF to I-CSCF)

```
    SIP/2.0 487 Request Terminated
    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:
Retry-After: 3600
Content-Length: 0
```

49. **ACK (I-CSCF to S-CSCF) – see example in table 7.3.2.3-49**

> Upon receive the 487 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.2.3-49: ACK (I-CSCF to S-CSCF)

```
    ACK sip:user2_public1@home2.net SIP/2.0
    Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
    Max-Forwards: 70
    Route: <sip:scscf2.home2.net;lr>
    From:
    To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

50. **487 Request Terminated (I-CSCF to S-CSCF) – see example in table 7.3.2.3-50 (related to table 7.3.2.3-48)**

> The I-CSCF returns the SIP error response to S-CSCF.

Table 7.3.2.3-50: 487 Request Terminated (I-CSCF to S-CSCF)

```
    SIP/2.0 487 Request Terminated
    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:
Retry-After: 3600
Content-Length: 0
```

51. **ACK (S-CSCF to I-CSCF) – see example in table 7.3.2.3-51**

   Upon receive the 487 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.2.3-51: ACK (S-CSCF to I-CSCF)

```
    ACK sip:user2_public1@home2.net SIP/2.0
    Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
    Max-Forwards: 70
    From:
    To:
    Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

52. **487 Request Terminated (S-CSCF to MO) – see example in table 7.3.2.3-52 (related to table 7.3.2.3-50)**

   The S-CSCF returns the SIP error response to the appropriate MO procedure.

Table 7.3.2.3-52: 487 Request Terminated (S-CSCF to MO)

```
    SIP/2.0 487 Request Terminated
    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:
Retry-After: 3600
Content-Length: 0
```

53. **ACK (MO to S-CSCF) – see example in table 7.3.2.3-53**

   Upon receive the 487 response from the S-CSCF, the MO procedure sends ACK.

Table 7.3.2.3-53: ACK (MO to S-CSCF)

```
    ACK tel:+1-212-555-2222 SIP/2.0
    Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
    Max-Forwards: 70
    Route: <sip:scscf1.home1.net;lr>
    From:
    To:
    Call-ID:
    CSeq: 127 ACK
    Content-Length: 0
```

7.3.3   Not applicable

7.3.4   Not applicable

7.3.5   S-S#2

7.3.5.1   (S-S#2) Single network operator performing origination and termination (MO#2, MT#2 assumed)

Figure 7.3.5.1-1 shows a S-CSCF handling session origination, which performs an analysis of the destination address, and determines that it belongs to a subscriber of the same operator. The request is therefore forwarded to a local I-

CSCF. The 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.

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#2 is therefore a visited network.

MO#1b   Mobile origination, roaming, with a THIG in home network. The "Originating Network" of S-S#2 is therefore a visited network.

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

CS-O   CS Networks origination. The "Originating Network" of S-S#2 is the home network. The element labeled S-CSCF#1 is the MGCF of the CS-O procedure with the exception that all actions performed by the labelled S-CSCF#1 handling the session origination will not be performed by the MGCF: It does not perform the evaluation of initial filter criteria and the destination address translation. The details of the flow do not show the CS-O case..

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#2 is a visited network.

MT#1b   Mobile termination, roaming, with a THIG in home network. The "Terminating Network" of S-S#2 is a visited network.

MT#2   Mobile termination, located in home service area. The "Terminating Network" of S-S#2 is the home network.
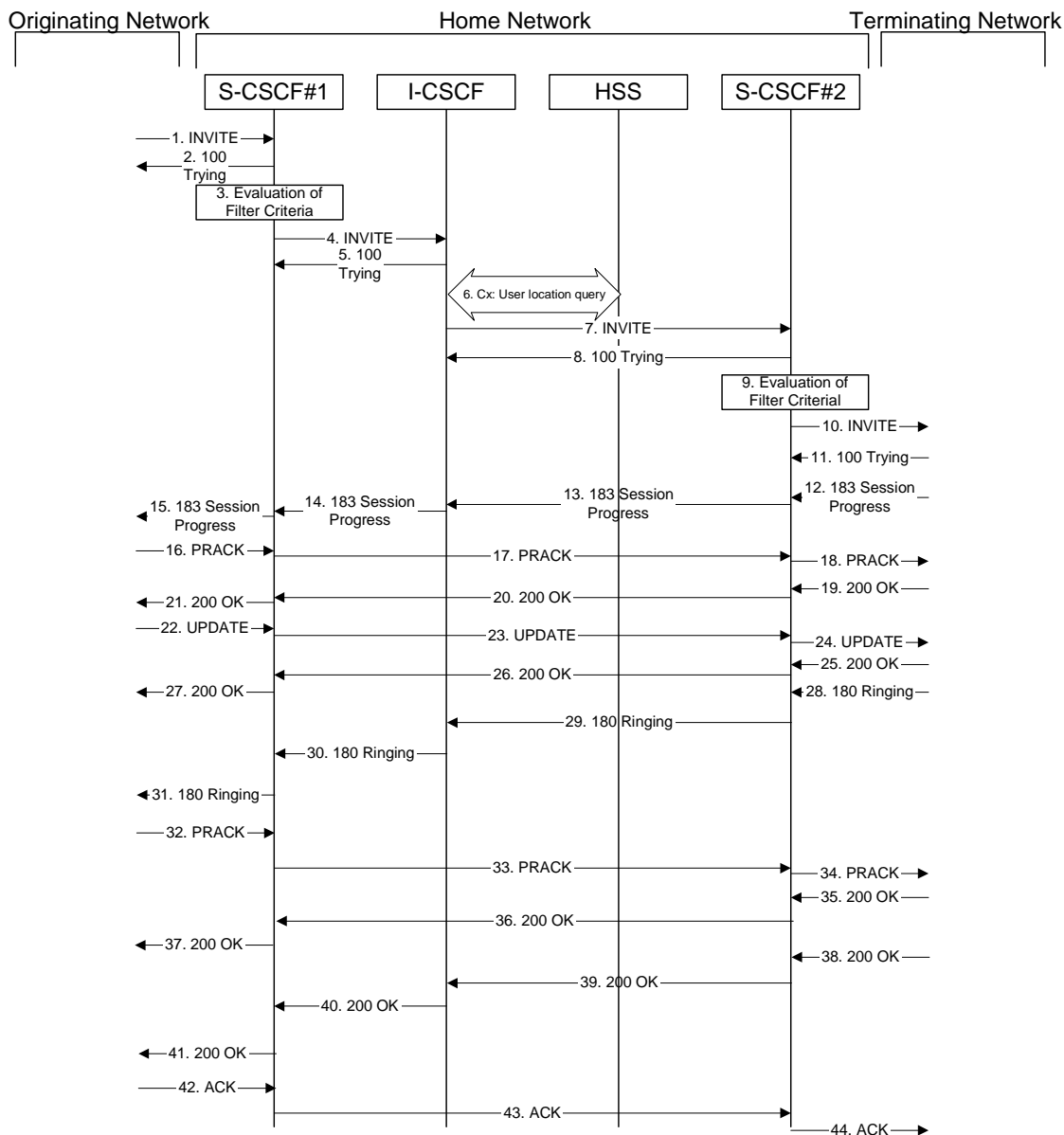
Figure 7.3.5.1-1: S-S#2

Procedure S-S#2 is as follows:

1. **INVITE (MO to S-S#2) – see example in table 7.3.5.1-1**

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

Table 7.3.5.1-1: INVITE (MO to S-S#2)

```
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#2 to MO) – see example in table 7.3.5.1-2**

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

Table 7.3.5.1-2: 100 Trying (S-S#2 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 I-CSCF) – see example in table 7.3.5.1-4**

    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 knows that the next hop I-CSCF is in the same home network (and therefore, a loose router), it includes a Route header.

Table 7.3.5.1-4: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user2_public1@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
Route: <sip:icscf2_s.home1.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
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=
    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-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 7.3.5.1-5**

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

Table 7.3.5.1-5: 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.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. **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 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 4), which are sent to the HSS.

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

7. **INVITE (I-CSCF to S-CSCF) – see example in table 7.3.5.1-7**

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

Table 7.3.5.1-7: INVITE (I-CSCF to S-CSCF)

```
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>
Supported:
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 7.3.5.1-8**

S-CSCF#2 responds to the INVITE request (8) with a 100 Trying provisional response.

Table 7.3.5.1-8: 100 Trying (S-CSCF to I-CSCF)

```
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
```

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#2 to MT) – see example in table 7.3.5.1-10**

> 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 7.3.5.1-10: INVITE (S-S#2 to MT)

```
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:pcscf2.home1.net;lr>
Record-Route: <sip:scscf2.home1.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@home1.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#2) – see example in table 7.3.5.1-11 (related to table 7.3.5.1-10)**

> S-CSCF#2 receives a 100 Trying provisional response to the INVITE request (11), as specified by the termination procedures.

Table 7.3.5.1-11: 100 Trying (MT to S-S#2)

```
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: 0
```

12. **183 Session Progress (MT to S-S#2) – see example in table 7.3.5.1-12 (related to table 7.3.5.1-10)**

> The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response, as per the termination procedure.

Table 7.3.5.1-12: 183 Session Progress (MT to S-S#2)

```
   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,
       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;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
       <sip:pcscf1.home1.net;lr>
   P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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 7.3.5.1-13**

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

Table 7.3.5.1-13: 183 Session Progress (S-CSCF to I-CSCF)

```
   SIP/2.0 183 Session Progress
   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:
   P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net; term-
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]
   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=
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.

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 7.3.5.1-14**

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

Table 7.3.5.1-14: 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.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=
b=
a=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

15. **183 Session Progress (S-S#2 to MO) – see example in table 7.3.5.1-15**

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

Table 7.3.5.1-15: 183 Session Progress (S-S#2 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:
   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#2) – see example in table 7.3.5.1-16**

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 7.3.5.1-16: PRACK (MO to S-S#2)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.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-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 7.3.5.1-17**

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

Table 7.3.5.1-17: 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.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: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=
```

18. **PRACK (S-S#2 to MT) – see example in table 7.3.5.1-18**

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

Table 7.3.5.1-18: PRACK (S-S#2 to MT)

```
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:
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#2) – see example in table 7.3.5.1-19 (related to table 7.3.5.1-18)**

The terminating endpoint responds to the PRACK request (19) with a 200 OK response.

Table 7.3.5.1-19: 200 OK (MT to S-S#2)

```
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: 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 (S-CSCF to S-CSCF) – see example in table 7.3.5.1-20**

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

Table 7.3.5.1-20: 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.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=
a=
```

21. **200 OK (S-S#2 to MO) – see example in table 7.3.5.1-21**

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

Table 7.3.5.1-21: 200 OK (S-S#2 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=
b=
a=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

22. **UPDATE (MO to S-S#2) – see example in table 7.3.5.1-22**

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

Table 7.3.5.1-22: UPDATE (MO to S-S#2)

```
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
Route: <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: 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
```

ETSI

```
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 7.3.5.1-23**

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

Table 7.3.5.1-23: 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.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: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=
```

24. **UPDATE (S-S#2 to MT) – see example in table 7.3.5.1-24**

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

Table 7.3.5.1-24: UPDATE (S-S#2 to MT)

```
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: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=
```

25. **200 OK (MT to S-S#2) – see example in table 7.3.5.1-25 (related to table 7.3.5.1-24)**

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

Table 7.3.5.1-25: 200 OK (MT to S-S#2)

```
   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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
   From:
   To:
   Call-ID:
   CSeq:
   Content-Type:
   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 7.3.5.1-26**

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

Table 7.3.5.1-26: 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.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=
```

27. **200 OK (S-S#2 to MO) – see example in table 7.3.5.1-27**

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

Table 7.3.5.1-27: 200 OK (S-S#2 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=
b=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

28. **180 Ringing (MT to S-S#2) – see example in table 7.3.5.1-28 (related to table 7.3.5.1-10)**

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 7.3.5.1-28: 180 Ringing (MT to S-S#2)

```
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=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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
     <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Allow:
RSeq: 9022
Content-Length: 0
```

29. **180 Ringing (S-CSCF to I-CSCF) – see example in table 7.3.5.1-29**

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

Table 7.3.5.1-29: 180 Ringing (S-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
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:
Require:
Contact:
Allow:
RSeq:
Content-Length:
```

30. **180 Ringing (I-CSCF to S-CSCF) – see example in table 7.3.5.1-30**

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

Table 7.3.5.1-30: 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.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:
```

31. **180 Ringing (S-S#2 to MO) – see example in table 7.3.5.1-31**

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

Table 7.3.5.1-31: 180 Ringing (S-S#2 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:
```

32. **PRACK (MO to S-S#2) – see example in table 7.3.5.1-32**

   The originator acknowledges the 180 Ringing provisional response (34) with a PRACK request.

Table 7.3.5.1-32: PRACK (MO to S-S#2)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:pcscf2.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
```

33. **PRACK (S-CSCF to S-CSCF) – see example in table 7.3.5.1-33**

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

Table 7.3.5.1-33: 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.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:pcscf2.home1.net;lr>
   From:
   To:
   Call-ID:
   Cseq:
RAck:
Content-Length:
```

34. **PRACK (S-S#2 to MT) – see example in table 7.3.5.1-34**

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

Table 7.3.5.1-34: PRACK (S-S#2 to MT)

```
   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:
RAck:
Content-Length:
```

35. **200 OK (MT to S-S#2) – see example in table 7.3.5.1-35 (related to table 7.3.5.1-34)**

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

Table 7.3.5.1-35: 200 OK (MT to S-S#2)

```
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: 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 7.3.5.1-36**

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

Table 7.3.5.1-36: 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.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:
```

37. **200 OK (S-S#2 to MO) – see example in table 7.3.5.1-37**

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

Table 7.3.5.1-37: 200 OK (S-S#2 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:
```

38. **200 OK (MT to S-S#2) – see example in table 7.3.5.1-38 (related to table 7.3.5.1-10)**

The final response, 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 7.3.5.1-38: 200 OK (MT to S-S#2)

```
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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Record-Route: <sip:pcscf2.home1.net;lr>, <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>,
    <sip:pcscf1.home1.net;lr>
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 7.3.5.1-39**

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

Table 7.3.5.1-39: 200 OK (S-CSCF to I-CSCF)

```
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:
Allow:
Content-Length:
```

40. **200 OK (I-CSCF to S-CSCF) – see example in table 7.3.5.1-40**

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

Table 7.3.5.1-40: 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.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:
```

41. **200 OK (S-S#2 to MO) – see example in table 7.3.5.1-41**

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

Table 7.3.5.1-41: 200 OK (S-S#2 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:
```

42. **ACK (MO to S-S#2) – see example in table 7.3.5.1-42**

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

Table 7.3.5.1-42: ACK (MO to S-S#2)

```
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.home1.net;lr>, <sip:pcscf2.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
```

43. **ACK (S-CSCF to S-CSCF) – see example in table 7.3.5.1-43**

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

Table 7.3.5.1-43: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
     [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:scsf2.home1.net;lr>, <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

44. **ACK (S-S#2 to MT) – see example in table 7.3.5.1-44**

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

Table 7.3.5.1-44: ACK (S-S#2 to MT)

```
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
Max-Forwards: 67
Route: <sip:pcscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

7.3.5.2 (S-S#2) Single network operator performing origination and termination, terminating UE is busy, and not able or not willing to answer the call (MO#2, MT#2 assumed)

Figure 7.3.5.2-1 shows the subscriber that originated a session with one of the MO procedures had the attempt fail due to an error detected in the termination procedure. In this flow, 486 error response is shown as the example.
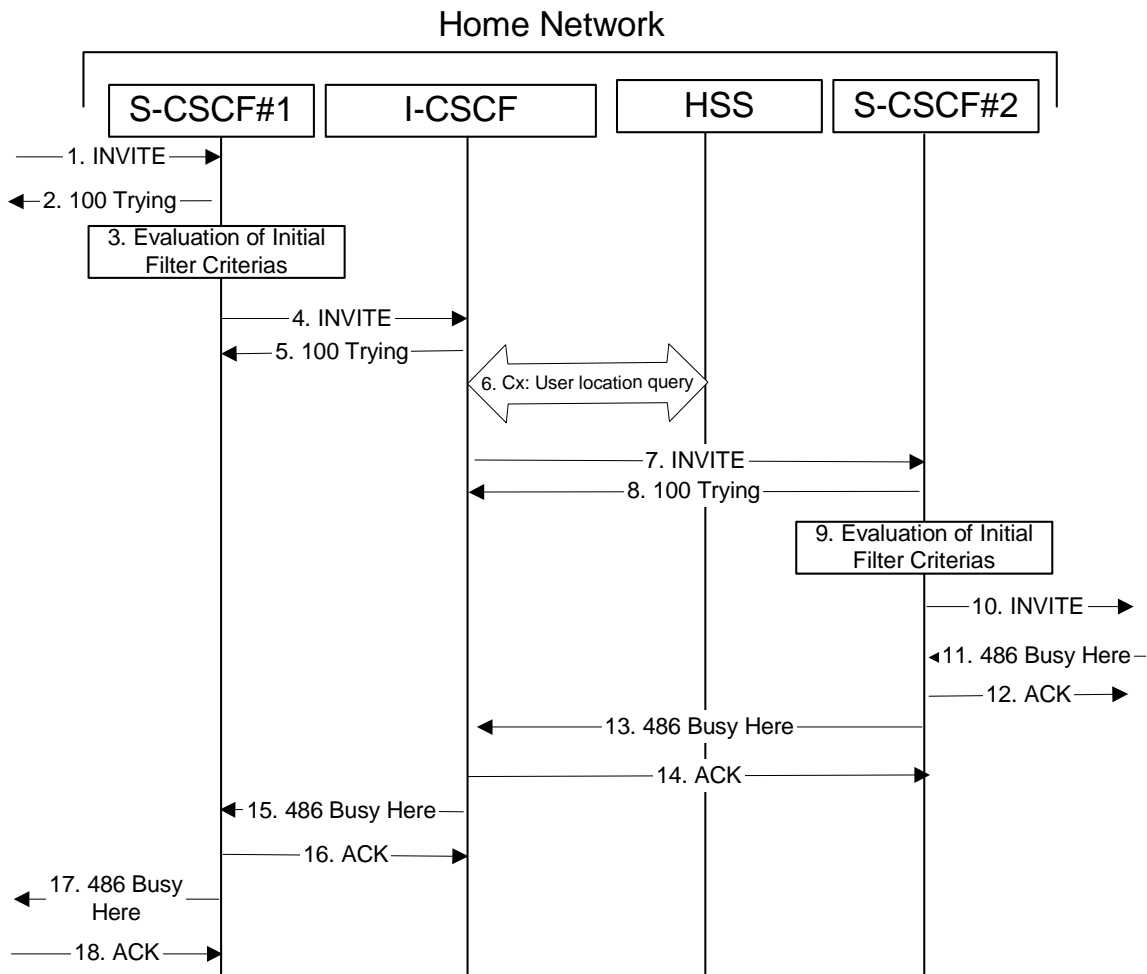
Figure 7.3.5.2: (S-S#2) Single network operator performing origination and termination, terminating UE is busy, and not able or not willing to answer the call (MO#2, MT#2 assumed)

1-10. The same as described in flow 1-8 in subclause 7.3.5

11. **486 Busy Here (MT to S-CSCF) – see example in table 7.3.5.2-11**

 The termination procedure detected some error situation, and returned a SIP 486 Busy Here response.

NOTE: The error response may be other error responses like "403 Service Denied", "480 Temporarily Unavailable", "580 Precondition Failure", or others. For this example, "486 Busy" is shown.

Table 7.3.5.2-11: 486 Busy Here (MT to S-CSCF)

```
SIP/2.0 486 Busy Here
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)
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: 127 INVITE
Retry-After:3600
Content-Length: 0
```

12. **ACK (S-CSCF to MT) – see example in table 7.3.5.2-12**

 Upon receive the 486 response from the MT procedure, S-CSCF sends ACK.

Table 7.3.5.2-12: ACK (S-CSCF to MT)

```
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: 127 ACK
Content-Length: 0
```

13. **486 Busy Here (S-CSCF to I-CSCF) – see example in table 7.3.5.2-13**

   The S-CSCF returned a SIP error response to I-CSCF.

Table 7.3.5.2-13: 486 Busy Here (S-CSCF to I-CSCF)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

14. **ACK (I-CSCF to S-CSCF) – see example in table 7.3.5.2-14**

   Upon receive the 486 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.5.2-14: ACK (I-CSCF to S-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via:  SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK871y12.1
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

15. **486 Busy Here (I-CSCF to S-CSCF) – see example in table 7.3.5.2-15 (related to table 7.3.5.2-42)**

   The I-CSCF returned a SIP error response to S-CSCF.

Table 7.3.5.2-15: 486 Busy Here (I-CSCF to S-CSCF)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

16. **ACK (S-CSCF to I-CSCF) – see example in table 7.3.5.2-16**

   Upon receive the 486 response from the S-CSCF procedure, I-CSCF sends ACK.

Table 7.3.5.2-16: ACK (S-CSCF to I-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

17. **486 Busy Here (S-CSCF to MO) – see example in table 7.3.5.2-17**

The S-CSCF returned a SIP error response to the appropriate MO procedure.

Table 7.3.5.2-17: 486 Busy Here (S-CSCF to MO)

```
SIP/2.0 486 Busy Here
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:
Contact:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

18. **ACK (MO to S-CSCF) – see example in table 7.3.5.2-18**

Upon receiving the 486 response from the S-CSCF, the MO procedure sends ACK.

Table 7.3.5.2-18: ACK (MO to S-CSCF)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.3.5.3   Origination failure (not provided)

An example of this flow is not shown in the present document.

7.3.6   S-S#3

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.
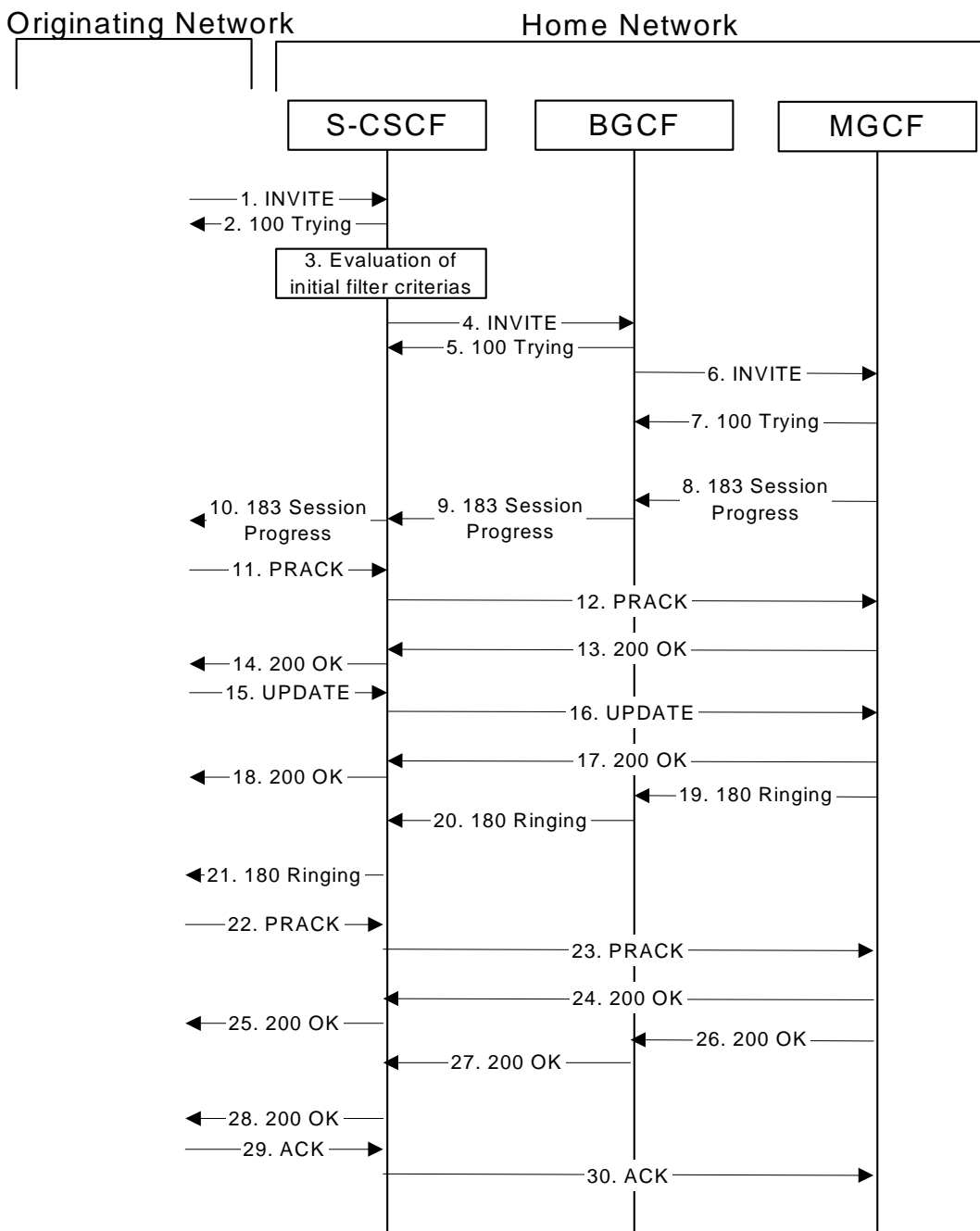
Figure 7.3.6.1-1: S-S#3

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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
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:
```

7.3.7 S-S#4

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.
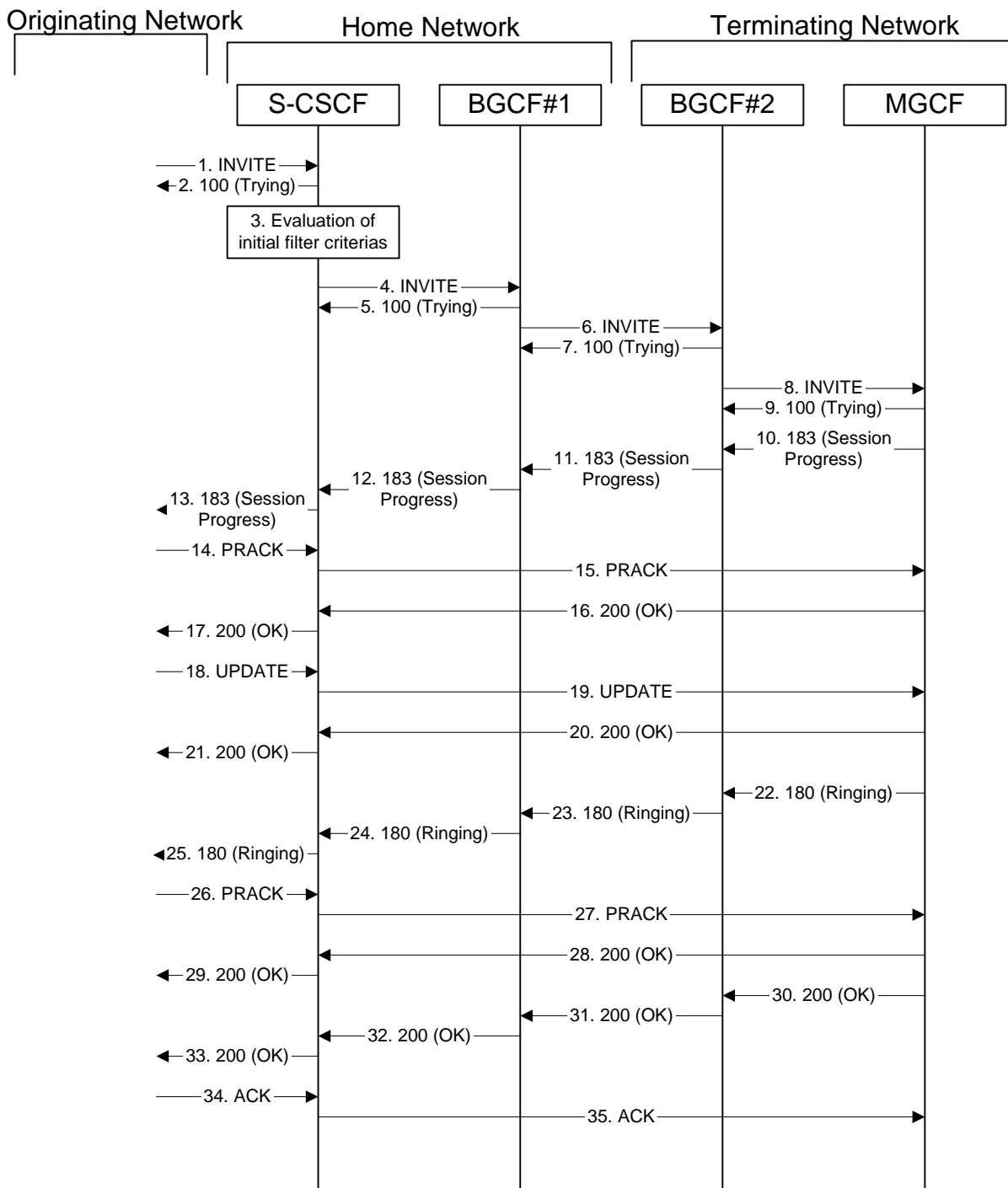
Figure 7.3.7.1-1: S-S#4

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=
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 7.3.7.1-5**

    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=
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=
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
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:
```

7.4 Termination procedures

7.4.1 Introduction

This subclause presents the detailed signalling flows to define the procedures for session terminations.

The session termination procedures specify the signalling path between the S-CSCF assigned to perform the session termination service and the UE. This signalling path is determined at the time of UE registration, and remains fixed for the life of the registration. This signalling path is the reverse of the session initiation signalling path of subclause 7.2. Therefore there is a one-to-one correspondence between the origination procedures of subclause 7.2 and the termination procedures of this subclause.

A UE always has a proxy (P-CSCF) associated with it. This P-CSCF is located in the same network as the UE, and performs resource authorization for the sessions to the UE. The P-CSCF is determined by the CSCF discovery process, described in subclause 5.2.1.

As a result of the registration procedure, the S-CSCF knows the address of the UE and the name/address of the P-CSCF. If the network operator owning the S-CSCF wants to keep their configuration private, the S-CSCF will have chosen an Interrogating-CSCF, I-CSCF, who will perform the THIG functions and pass messages to the P-CSCF (procedure MT#1b).

Sessions destined to the PSTN are a special case of the Termination procedures. Two of the S-CSCF to S-CSCF procedures deal specifically with PSTN termination, and route the session signalling through a BGCF that allocates a MGCF. The MGCF uses H.248/MEGACO to control a Media Gateway, and communicates with SS7 network. In case of interworking between IP based and SS7 based signalling network is required, a SGW would be used [2]. The MGCF receives and processes SIP requests, and subsequent nodes consider the signalling as if it came from a S-CSCF.

These flows assume that both the UE and the P-CSCF are willing to compress the signalling by using SigComp.

7.4.2 MT#1a

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.
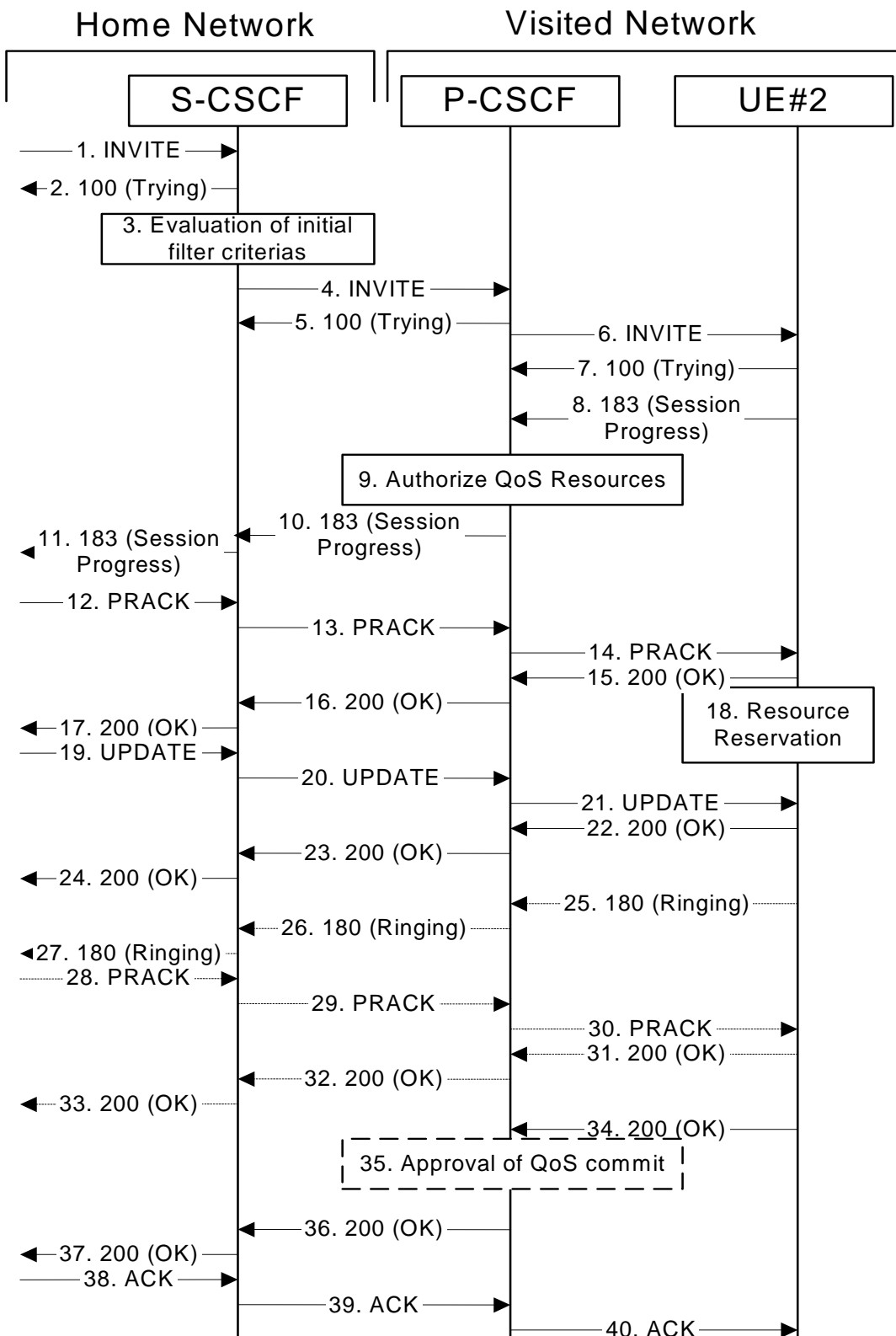
Figure 7.4.2.1-1: MT#1a

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.

<div align="center">

Table 7.4.2.1-1: INVITE (S-S to MT#1a)

</div>

```
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.

<div align="center">

Table 7.4.2.1-1b: Storage of information at S-CSCF

</div>

```
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: 00200001001001017064663312e686f6d65312e6e6574000c02013331533134363231
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=
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=
m=
b=
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=
```

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=
m=
b=
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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:
```

7.4.2.2   UE-detected failure/resource failure

The subscriber that initiated a session with one of the MO procedures had the attempt fail due to an error detected in the Termination procedure. This could be due to, for example, destination busy (error code 486), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, MT#1a could be at many different stages in the session establishment procedure. This is shown in figure 7.4.2.2-1, as optional messages 7-33 that may appear in this error procedure.

This subclause also includes the procedures for the terminating UE to indicate a failure to allocate required resources for the session. This is detected in step #18 and reported with a 580-Precondition-Failure error response.
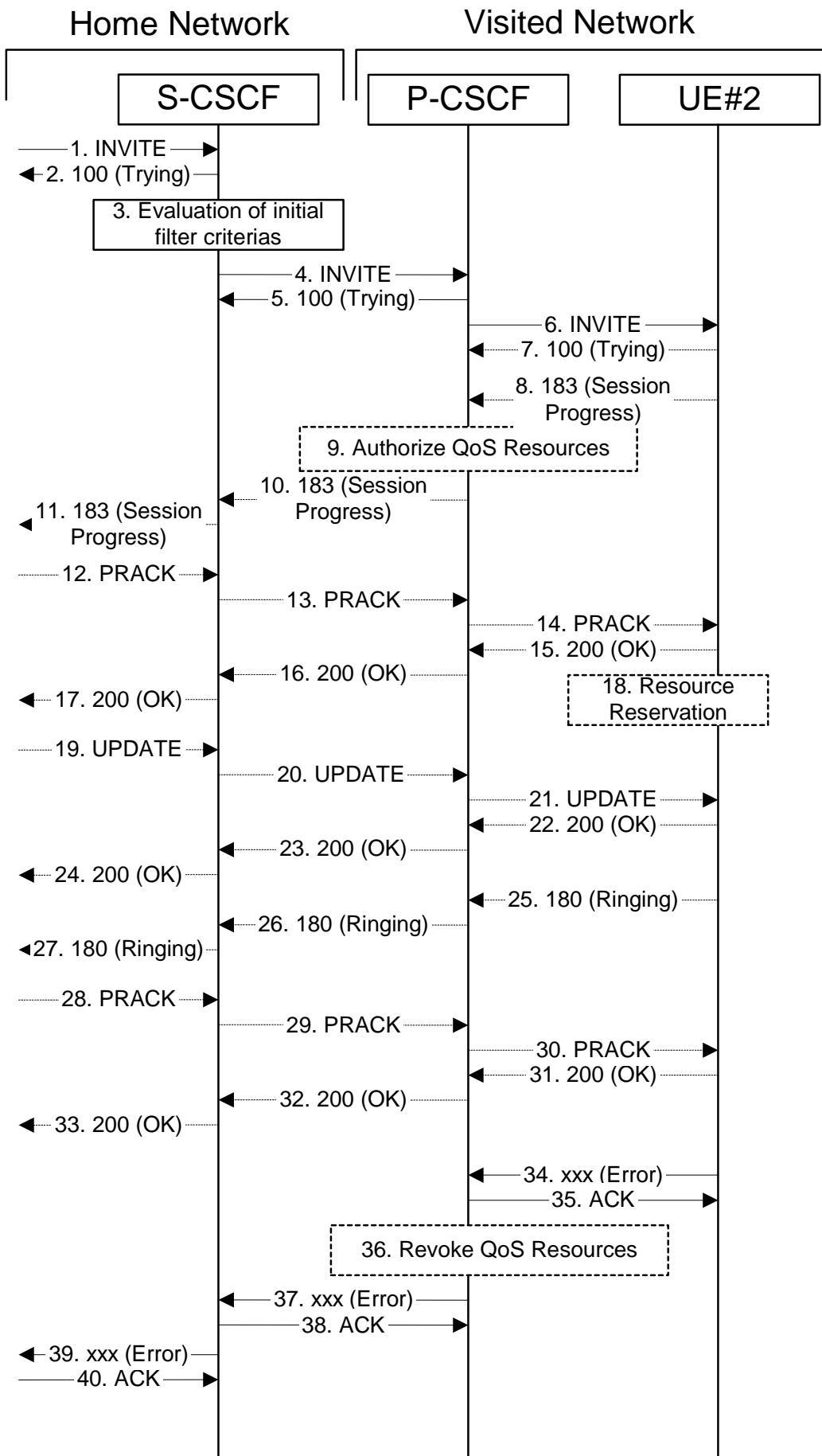
Figure 7.4.2.2-1: Failure in termination procedure

1-6. **INVITE (S-S to S-CSCF) et seq**

> UE#1 initiated a session, as described in subclause 7.4.2.1.

7-33. **100 Trying (S-CSCF to S-S) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.4.2.1.

34. **xxx Error (UE to P-CSCF) – see example in table 7.4.2.2-34**

> The termination procedure detected some error situation, and returned a SIP error response.

NOTE 1: The error response may be, for example, "486 Busy", "403 Service Denied", "480 Temporarily Unavailable", "580 Precondition Failure", or others. For this example, "486 Busy" is shown.

Table 7.4.2.2-34: 486 Busy Here (UE to P-CSCF)

```
SIP/2.0 486 Busy Here
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
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: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

35. **ACK (P-CSCF to UE) – see example in table 7.4.2.2-35**

> Upon receive the 486 response from the UE, P-CSCF sends ACK.

Table 7.4.2.2-35: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

36. **Revoke QoS authorization**

> P-CSCF removes the QoS authorization, if any, for this session.

37. **xxx Error (P-CSCF to S-CSCF) – see example in table 7.4.2.2-37 (related to table 7.4.2.2-34)**

> The P-CSCF returned a SIP error response to S-CSCF.

NOTE 2: The error response may be, for example, '486 (Busy Here)', '403 (Forbidden)', '480 (Temporarily Unavailable)', or others. For this example, '486 (Busy Here)' is shown.

Table 7.4.2.2-37: 486 Busy Here (P-CSCF to S-CSCF)

```
SIP/2.0 486 Busy Here
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
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
```

```
Retry-After: 3600
Content-Length: 0
```

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

38. **ACK (S-CSCF to P-CSCF) – see example in table 7.4.2.2-38**

      Upon receive the 486 response from the P-CSCF procedure, S-CSCF sends ACK.

Table 7.4.2.2-38: 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
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

39. **xxx Error (S-CSCF to S-S) – see example in table 7.4.2.2-39 (related to table 7.4.2.2-37)**

      The S-CSCF returned a SIP error response to the appropriate S-S procedure.

NOTE 3: The error response may be, for example, '486 (Busy Here)', '403 (Forbidden)', '480 (Temporarily Unavailable)', or others. For this example, '486 (Busy Here)' is shown.

Table 7.4.2.2-39: 486 Busy Here (S-CSCF to S-S)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

40. **ACK (S-S to S-CSCF) – see example in table 7.4.2.2-40**

      Upon receive the 486 response from the S-CSCF, the S-S procedure sends ACK.

Table 7.4.2.2-40: ACK (S-S to S-CSCF)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.4.2.3   Origination failure

After sending the initial INVITE for a multimedia session, the originating endpoint either abandoned the attempt or was unable to obtain the resources necessary for the session. The termination procedure is informed of this by a CANCEL request from the originator, which is shown in figure 7.4.2.3-1.

If the session is aborted due to failure to obtain resources by the originator, it will occur prior to step #19; steps 19-33 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 8-33.
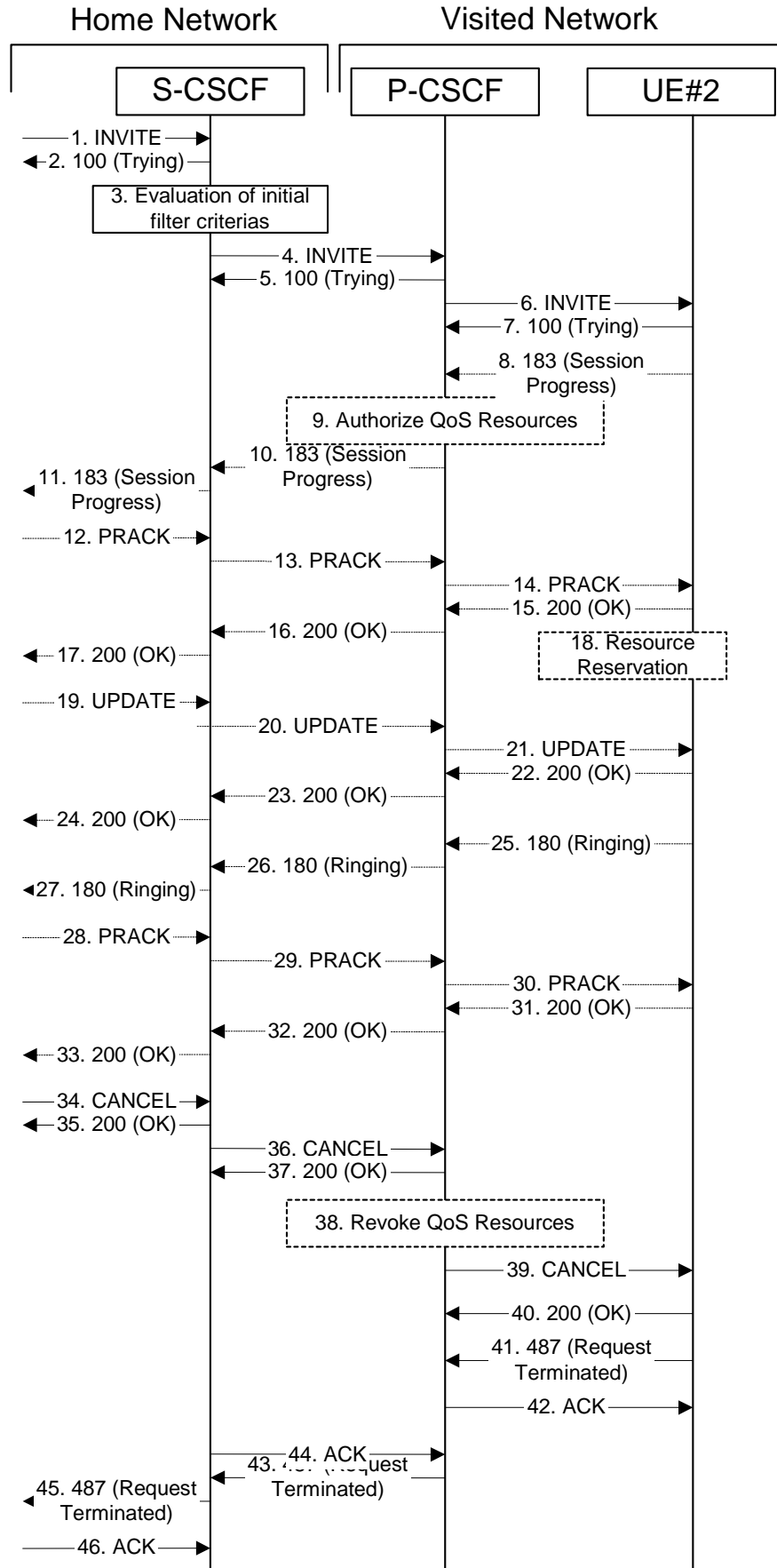
Figure 7.4.2.3-1: Failure in origination procedure

1-7. **INVITE (S-S to S-CSCF) et seq**

> UE#1 initiated a session, as described in subclause 7.4.2.1.

8-33. **183 Session Progress (UE to S-CSCF) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 7.4.2.1.

34. **CANCEL (S-S to S-CSCF) – see example in table 7.4.2.3-34**

> The originator, through the S-S procedure, cancelled the original INVITE request.

Table 7.4.2.3-34: CANCEL (S-S to S-CSCF)

```
CANCEL sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

35. **200 OK (S-CSCF to S-S) – see example in table 7.4.2.3-35**

> Upon receive the CANCEL request from the S-S procedure, S-CSCF sends 200 OK.

Table 7.4.2.3-35: 200 OK (S-CSCF to S-S)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

36. **CANCEL (S-CSCF to P-CSCF) – see example in table 7.4.2.3-36**

> The S-CSCF forwards the CANCEL request to P-CSCF.

Table 7.4.2.3-36: CANCEL (S-CSCF to P-CSCF) (related to 7.4.2.3-34)

```
CANCEL sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

37. **200 OK (P-CSCF to S-CSCF) – see example in table 7.4.2.3-37**

> Upon receiving the CANCEL request from the S-CSCF, P-CSCF sends 200 OK.

Table 7.4.2.3-37: 200 OK (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

38. **Revoke QoS authorization**

> P-CSCF removes the QoS authorization, if any, for this session.

39. **CANCEL (P-CSCF to UE) – see example in table 7.4.2.3-39 (related to table 7.4.2.3-36)**

> The P-CSCF forwards the CANCEL request to the UE.

Table 7.4.2.3-39: CANCEL (P-CSCF to UE)

```
CANCEL 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
From:
To:
Call-ID:
Cseq:
Content-Length:
```

40. **200 OK (UE to P-CSCF) – see example in table 7.4.2.3-40**

> Upon receive the CANCEL request from the P-CSCF, the UE sends 200 OK.

Table 7.4.2.3-40: 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
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

41. **487 Request Terminated (UE to P-CSCF) – see example in table 7.4.2.3-41**

> The termination procedure performed the cancel operation, and returned a SIP error response to the initial
> INVITE request.

Table 7.4.2.3-41: 487 Request Terminated (UE to P-CSCF)

```
SIP/2.0 487 Request Terminated
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
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: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

42. **ACK (P-CSCF to UE) – see example in table 7.4.2.3-42**

> Upon receive the 487 response from the UE, P-CSCF sends ACK.

Table 7.4.2.3-42: 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
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

43. **487 Request Terminated (P-CSCF to S-CSCF) – see example in table 7.4.2.3-43 (related to table 7.4.2.3-41)**

The P-CSCF returns the SIP error response to S-CSCF.

Table 7.4.2.3-43: 487 Request Terminated (P-CSCF to S-CSCF)

```
SIP/2.0 487 Request Terminated
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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

44. **ACK (S-CSCF to P-CSCF) – see example in table 7.4.2.3-44**

Upon receive the 487 response from the P-CSCF procedure, S-CSCF sends ACK.

Table 7.4.2.3-44: 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
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

45. **487 Request Terminated (S-CSCF to S-S) – see example in table 7.4.2.3-45 (related to table 7.4.2.3-43)**

The S-CSCF returns the SIP error response to the appropriate S-S procedure.

Table 7.4.2.3-45: 487 Request Terminated (S-CSCF to S-S)

```
SIP/2.0 487 Request Terminated
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:
Retry-After: 3600
Content-Length: 0
```

46. **ACK (S-S to S-CSCF) – see example in table 7.4.2.3-46**

Upon receive the 487 response from the S-CSCF, the S-S procedure sends ACK.

Table 7.4.2.3-46: ACK (S-S to S-CSCF)

```
ACK sip:user2_public1@home2.net  SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

7.4.2.4 Mobile termination, roaming, terminal is out of radio coverage (MO#2, S-S#2 assumed)

An example of this flow is not shown in the present document.

7.4.3 MT#2

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.

Home Network
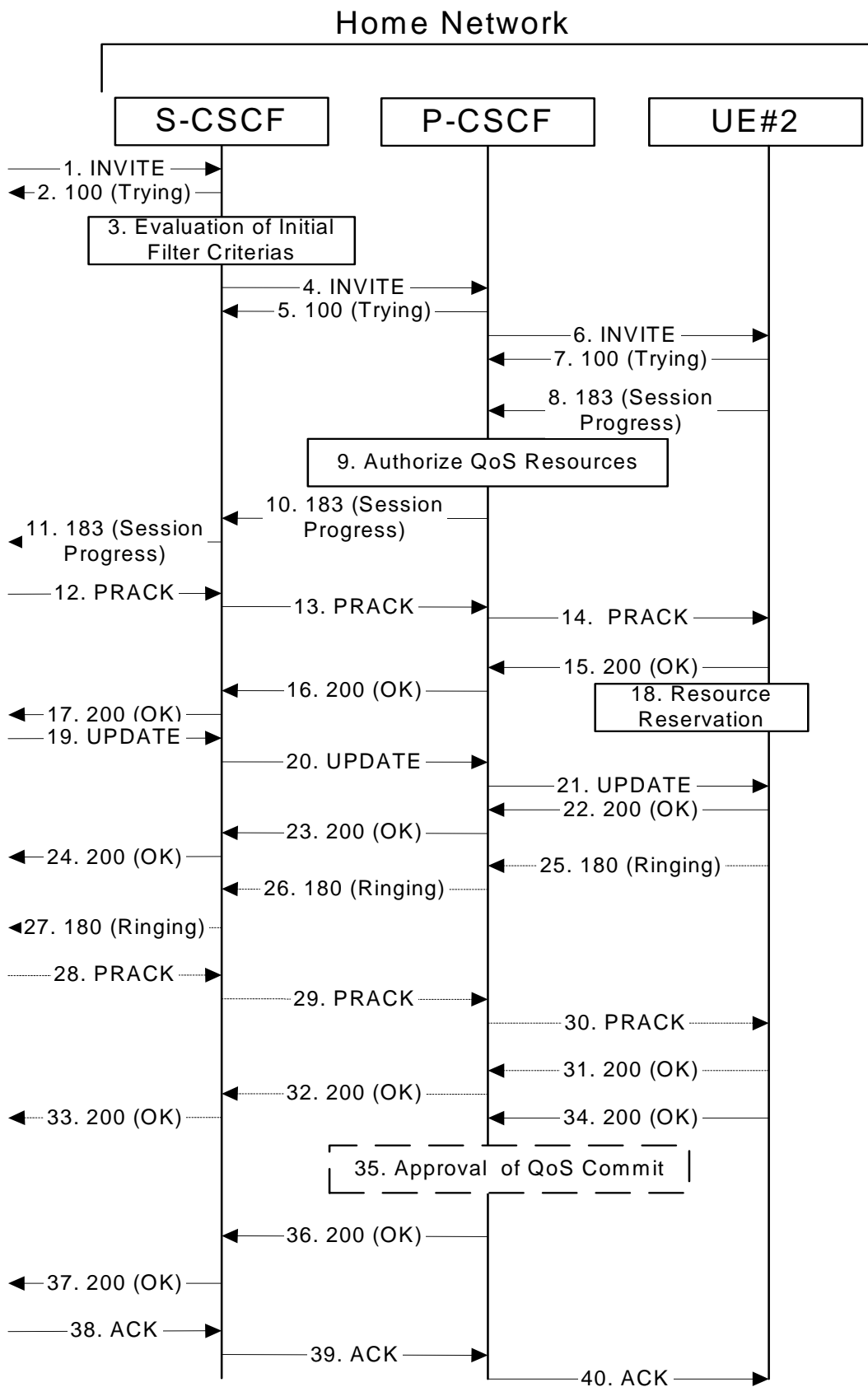
Figure 7.4.3.1-1: MT#2

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=
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 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: 00200001001001017064663322e686f6d65312e6e6574000c02013331533134363231
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=
```

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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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:
```

7.4.3.2 UE-detected failure/resource failure (not provided)

An example of this flow is not shown in the present document.

7.4.3.3 Origination failure (not provided)

An example of this flow is not shown in the present document.

7.4.4 CS-T

7.4.4.1 (CS-T) CS Networks termination (MO#2, S-S#3 assumed)

Figure 7.4.4.1-1 shows the MGCF in the IM CN subsystem, which is a SIP endpoint that initiates and receives requests on behalf of the CS Networks and Media Gateway (MGW). Other nodes consider the signalling as if it came from a S-CSCF. The MGCF incorporates the network security functionality of the S-CSCF.

Agreements between network operators may allow CS Networks termination in a network other than the originator's home network. This may be done, for example, to avoid long distance or international tariffs.

This termination procedure can be used in either S-S#3 or S-S#4.
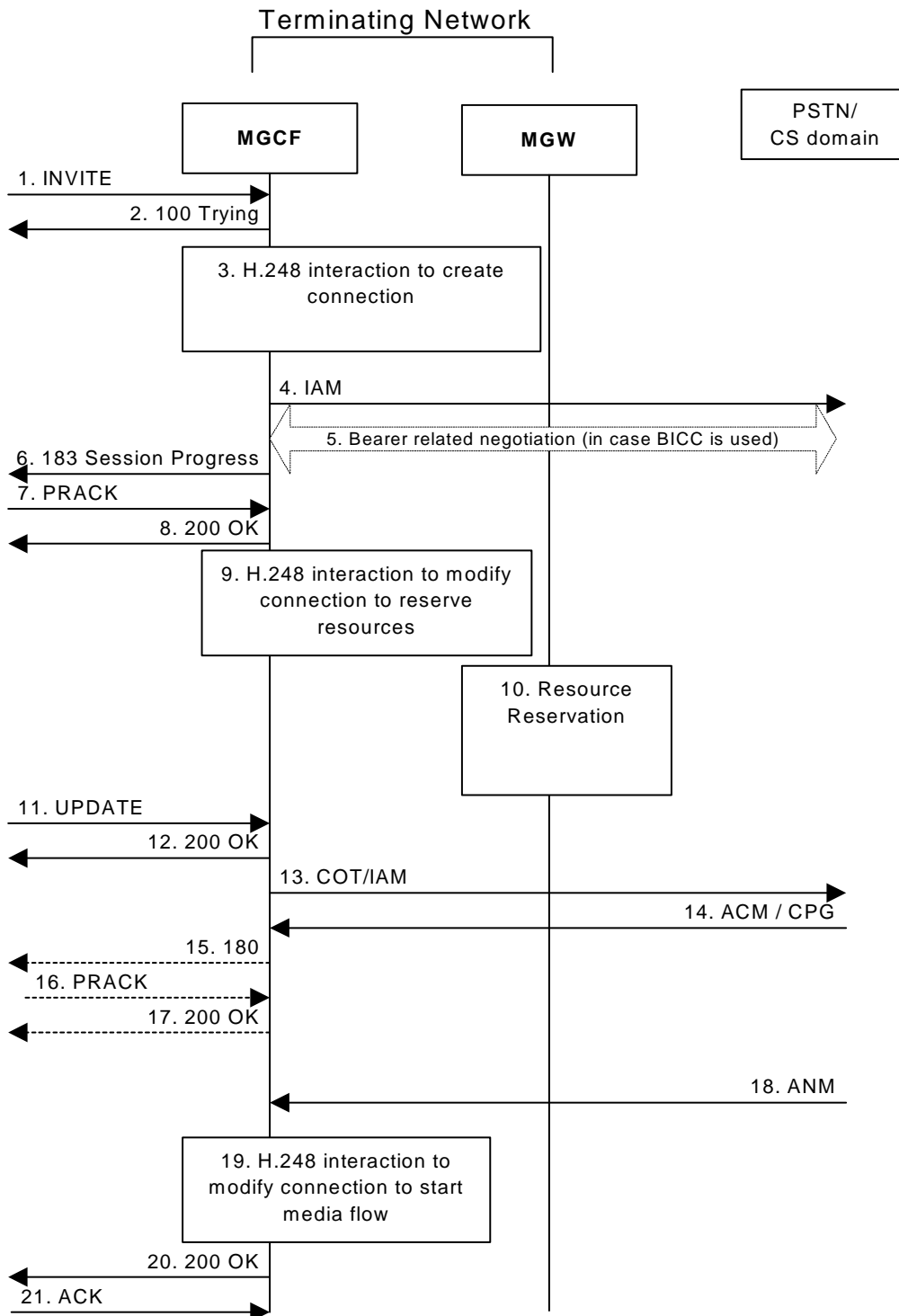
Figure 7.4.4.1-1: CS Networks termination

The CS Networks termination procedure is as follows:

1. **INVITE (S-S to CS-T) – see example in table 7.4.4.1-1**

MGCF receives an INVITE request, through one of the origination procedures and via one of the S-CSCF to S-CSCF procedures.

Table 7.4.4.1-1: INVITE (S-S to CS-T)

```
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
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"
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: 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
```

P-Charging-Vector: The S-CSCF passes this header to the MGCF for charging. If S-CSCF and MGCF are in different networks (S-S#4), then orig-ioi is included here and the term-ioi would be included in the 183 response.

P-Charging-Function-Addresses: The S-CSCF inserts this header to provide the charging function addresses to the MGCF if S-CSCF and MGCF are in the same network (S-S#3). This header is not present when S-CSCF and MGCF are in different networks (S-S#4).

Upon receiving the INVITE, the MGCF stores the following information about this session – see example in table 7.4.4.1-1b.

Table 7.4.4.1-1b: Storage of information at MGCF

```
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: 127 INVITE
Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

2. **100 Trying (CS-T to S-S) – see example in table 7.4.4.1-2**

   MGCF may respond to the INVITE request with a 100 Trying provisional response.

Table 7.4.4.1-2: 100 Trying (CS-T to S-S)

```
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
```

3. **H.248 Interaction to Create Connection**

   MGCF initiates a H.248 interaction to pick an outgoing channel and determine media capabilities of the MGW.

4. **SS7: IAM**

   Based on the continuity support of the outgoing channel selected, MGCF may decide to send an IAM message out to the CS Networks at this point. In case the outgoing channel does not support continuity indication, MGCF sends out an IAM message only in step 14.

5. **Possible bearer related negotiation takes place (in case BICC is used)**

6. **183 Session Progress (CS-T to S-S) – see example in table 7.4.4.1-6**

   MGCF determines the subset of the media flows proposed by the originating endpoint that it supports, and responds with a 183 Session Progress response back to the originator. This response is sent via the S-CSCF to S-CSCF procedure.

NOTE: in order to be able to send the IAM message at step 4, the MGCF has to select one media from the SDP received in INVITE.

Table 7.4.4.1-6: 183 Session Progress (CS-T to S-S)

```
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: <tel:+1-212-555-2222>
P-Charging-Vector:
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 none 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
```

7. **PRACK (S-S to CS-T) – see example in table 7.4.4.1-7**

> The originating endpoint sends a PRACK request. This request does not contain SDP because there was only one media flow with one codec in the first SDP offer/answer negotiation.

Table 7.4.4.1-7: PRACK (S-S to CS-T)

```
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: <sip:user1_public1@home1.net>;tag=171828
To: <tel:+1-212-555-2222>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 PRACK
RAck: 9021 127 INVITE
Content-Length: 0
```

8. **200 OK (CS-T to S-S) – see example in table 7.4.4.1-8**

> MGCF acknowledges the PRACK request (8) with a 200 OK response.

Table 7.4.4.1-8: 200 OK (CS-T 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: 0
```

9. **H.248 Interaction to Modify Connection**

> MGCF initiates a H.248 interaction to modify the connection established in step #3 and instruct MGW to reserve the resources necessary for the media streams.

10. **Resource Reservation**

> MGW reserved the resources necessary for the media streams.

11. **UPDATE (S-S to CS-T) – see example in table 7.4.4.1-11**

> When the originating endpoint has completed its resource reservation, it sends the UPDATE request to MGCF, via the S-CSCF to S-CSCF procedures.

Table 7.4.4.1-11: UPDATE (S-S to CS-T)

```
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
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
```

12. **200 OK (CS-T to S-S) – see example in table 7.4.4.1-12**

MGCF acknowledges the UPDATE request (11) with a 200 OK response.

Table 7.4.4.1-12: 200 OK (CS-T 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: application/sdp
Content-Length: (…)

v=0
o=- 2987933623 2987933623 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 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
```

13. **SS7: COT/IAM**

Based on the continuity support of the outgoing channel selected MGCF sends a IAM or COT message to the CS Networks. In case the outgoing channel supports continuity indication, MGCF has already sent out the IAM message in step 4, and at this point sends out a COT message.

14. **SS7: ACM/CPG**

The CS Networks establishes the path to the destination. In the present case the CS Networks responds with an ACM message containing a "subscriber free" indication, implying that the called party is being alerted.

15. **180 (CS-T to S-S) – see example in table 7.4.4.1-15**

If the CS Network is alerting the destination user, MGCF indicates this to the calling party by a 180 Ringing provisional response. This response is sent via the S-CSCF to S-CSCF procedures.

As the indication of called party being alerted ("subscriber free" indication) may not be available in ACM, the 180 Ringing is only sent when the indication is available. An ACM without the "subscriber free" indication will not trigger any SIP message.

Table 7.4.4.1-15: 180 Ringing (CS-T to S-S)

```
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>
Require: 100rel
From:
To:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:mgcf1.home1.net>
Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE
RSeq: 9022
Content-Length: 0
```

The 180 Ringing is used when the ACM has indicated that the called party is being alerted.

16. **PRACK (S-S to CS-T) – see example in table 7.4.4.1-16**

The originator acknowledges the 180 Ringing provisional response (15) with a PRACK request.

Table 7.4.4.1-16: PRACK (S-S to CS-T)

```
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: <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
```

17. **200 OK (CS-T to S-S) – see example in table 7.4.4.1-17**

MGCF acknowledges the PRACK request (16) with a 200 OK response.

Table 7.4.4.1-17: 200 OK (CS-T 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: 0
```

18. **SS7: ANM**

When the called party answers, the CS Network sends an ANM message to the MGCF.

19. **H.248:Interaction to Modify Connection**

MGCF initiates a H.248 interaction to make the connection in the MGW bi-directional.

20. **200 OK (CS-T to S-S) – see example in table 7.4.4.1-20**

MGCF sends a 200 OK final response along the signalling path back to the session originator.

Table 7.4.4.1-20: 200 OK (CS-T to S-S)

```
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
```

21. **ACK (S-S to CS-T) – see example in table 7.4.4.1-21**

The Calling party acknowledges the final response (20) with an ACK request.

Table 7.4.4.1-21: ACK (S-S to CS-T)

```
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: 127 ACK
Content-Length: 0
```

7.4.4.2 MGCF-detected failure/resource failure (not provided)

An example of this flow is not shown in the present document.

7.4.4.3 Origination failure (not provided)

An example of this flow is not shown in the present document.

7.4.5 MT#1c

7.4.5.1 (MT#1c) Mobile termination, roaming, without I-CSCF in home network providing configuration independence, terminating UE is busy, and not able or not willing to answer the call (MO#2, S-S#2 assumed)

Figure 7.4.5.1 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 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 P-CSCF knows the name/address of the UE.
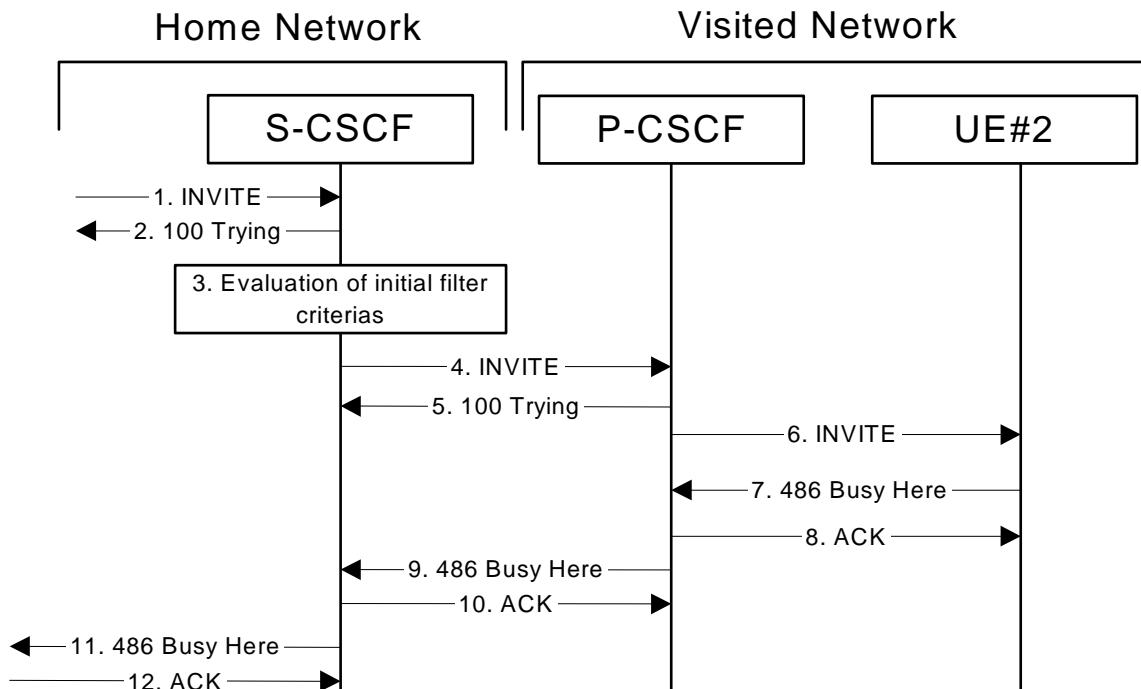
Figure 7.4.5.1-1: MT#1c

Procedure MT#1c is as follows:

1. **INVITE (S-S to MT#1a) – see example in table 7.4.5.1-1**

   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 7.4.5.1-1: INVITE (S-S to MT#1c)

```
INVITE sip:user2_public1@home2.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.home2.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>
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: 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
```

ETSI

```
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 (MT#1c to S-S) – see example in table 7.4.5.1-2**

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

Table 7.4.5.1-2: 100 Trying (MT#1c 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 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 7.4.5.1-4**

     S-CSCF remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE to the P-CSCF.

Table 7.4.5.1-4: 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.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:pcscf2.visited2.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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

P-Called-Party-ID: Includes the received URI with its parameters

Route: Built from the Path header.

Via:, Record-Route: S-CSCF adds itself

5. **100 Trying (P-CSCF to S-CSCF) – see example in table 7.4.5.1-5**

P-CSCF responds to the INVITE request (4) with a 100 Trying provisional response.

Table 7.4.5.1-5: 100 Trying (P-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: 0
```

6. **INVITE (P-CSCF to UE) – see example in table 7.4.5.1-6**

P-CSCF forwards the INVITE request to the UE.

Table 7.4.5.1-6: 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.home1.net;branch=z9hG4bK764z87.1, 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: 65
Record-Route: <sip:pcscf2.visited2.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: 0020000100100101706466322e76697369746564322e6e6574000c02013331533134363231
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-Media-Authorization: A P-CSCF generated authorization token. This particular example shows a Policy-Element generated by "pdf2.visited2.net" with credentials "31S14621".

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

7. **486 Busy Here (UE to P-CSCF) – see example in table 7.4.5.1-7**

UE is contacted successfully but it is currently not willing or able to take additional sessions. The response MAY indicate a better time later to call in the Retry-After header.

Table 7.4.5.1-7: 486 Busy Here (UE to P-CSCF)

```
SIP/2.0 486 Busy Here
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1, 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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

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

8. **ACK (P-CSCF to UE) – see example in table 7.4.5.1-8**

Upon receive the 486 response from the UE, P-CSCF sends ACK back to the UE.

Table 7.4.5.1-8: 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
Max-Forwards: 70
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

9. **486 Busy Here (P-CSCF to S-CSCF) – see example in table 7.4.5.1-9**

P-CSCF forwards the 486 response to the S-CSCF.

Table 7.4.5.1-9: 486 Busy Here (P-CSCF to S-CSCF)

```
SIP/2.0 486 Busy Here
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)
P-Access-Network-Info:
```

```
From:
To: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

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

10. **ACK (S-CSCF to P-CSCF) – see example in table 7.4.5.1-10**

S-CSCF sends ACK to the P-CSCF.

Table 7.4.5.1-10: 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
From:
Route: <sip:pcscf2.visited2.net;lr>
To:
Call-ID:
CSeq:
Content-Length: 0
```

11. **486 Busy Here (MT#1c to S-S) – see example in table 7.4.5.1-11**

S-CSCF forwards the 486 Busy Here response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.5.1-11: 486 Busy Here (MT#1c to S-S)

```
SIP/2.0 486 Busy Here
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:
Retry-After: 3600
Content-Length: 0
```

12. **ACK (S-S to MT#1c) – see example in table 7.4.5.1-12**

The S-CSCF of calling party responds to the 486 Busy Here response with an ACK request that is sent to S-CSCF via the S-CSCF to S-CSCF procedure.

Table 7.4.5.1-12: ACK (S-S to MT#1c)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

7.4.6 MT#2a

7.4.6.1 (MT#2a) Mobile termination, located in home network, terminating UE is busy, and not able or not willing to answer the call (MO#2, S-S#2 assumed)

MT#2a flow is the same scenario as MT#1c with the difference that in MT#2a S-CSCF and P-CSCF are in the same network. For simplicity the detailed flow is not provided.

7.4.7 MT#1e

7.4.7.1 (MT#1e) Mobile termination, roaming, without I-CSCF in home network providing configuration independence, service is refused by S-CSCF when receiving INVITE request (MO#2, S-S#2 assumed)

Figure 7.4.7.1-1 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 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 P-CSCF knows the name/address of the UE.
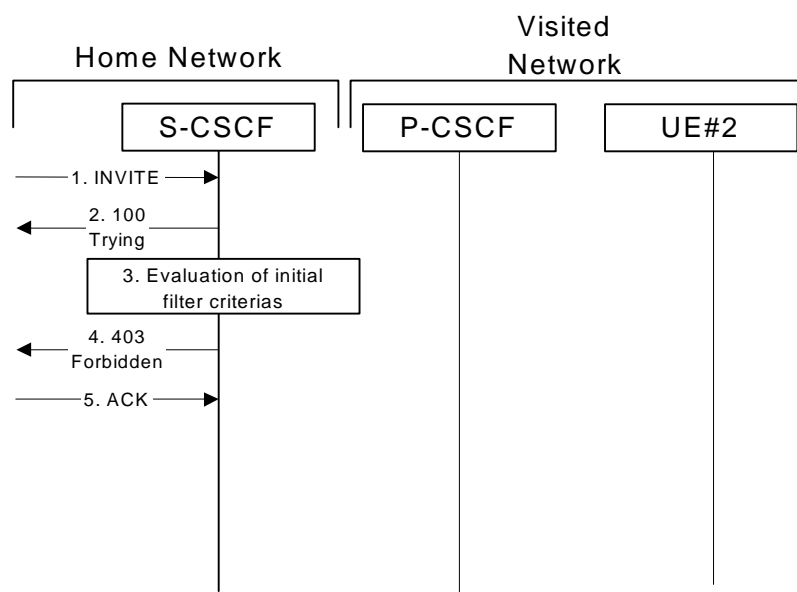
Figure 7.4.7.1-1: Mobile termination, roaming, without I-CSCF in home network providing configuration independence, service is refused by S-CSCF when receiving INVITE request

1. **INVITE (S-S to MT#1e) - see example in table 7.4.7.1-1**

    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 7.4.7.1-1: INVITE (S-S to MT#1e)

```
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.home2.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>
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: 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 (MT#1e to S-S) - see example in table 7.4.7.1-2**

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

Table 7.4.7.1-2: 100 Trying (MT#1e 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. **403 Forbidden (MT#1e to S-S) - see example in table 7.4.7.1-4**

     S-CSCF forwards the 403 Forbidden response to the originator, per the S-CSCF to S-CSCF procedure.

Table 7.4.7.1-4: 403 Forbidden (MT#1e to S-S)

```
SIP/2.0 403 Forbidden
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: <tel:+1-212-555-2222>;tag=314159
Call-ID:
CSeq:
Content-Length: 0
```

5. **ACK (S-S to MT#1e) - see example in table 7.4.7.1-5**

     The S-CSCF of calling party responds to the 403 Forbidden response with an ACK request that is sent to S-CSCF via the S-CSCF to S-CSCF procedure.

Table 7.4.7.1-5: ACK (S-S to MT#1e)

```
ACK 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
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

7.4.8 Mobile termination, roaming, terminal is out of radio coverage (MO#2, S-S#2 assumed)

Void.

7.4.9 Mobile termination, unregistered subscriber

7.4.9.1 Introduction

In the example information flows in the following sections, the subscriber receiving a terminating call is unregistered. Therefore, when the I-CSCF in the home network of the called subscriber queries the HSS for the location of the called subscriber, the HSS indicates that the subscriber is unregistered.

In subclause 7.4.9.2, call setup does not proceed, as the subscriber does not have services related to unregistered state.

In subclause 7.4.9.3, call setup proceeds and a temporary call instance is created at the callee's S-CSCF for the life of the call. This is to support services related to the unregistered state of the callee.

7.4.9.2 Mobile termination, unregistered subscriber, no services related to unregistered state

In the example information flow the subscriber is unregistered and the subscriber has no services related to unregistered state. This is shown in the following information flow (figure 7.4.9.2-1).
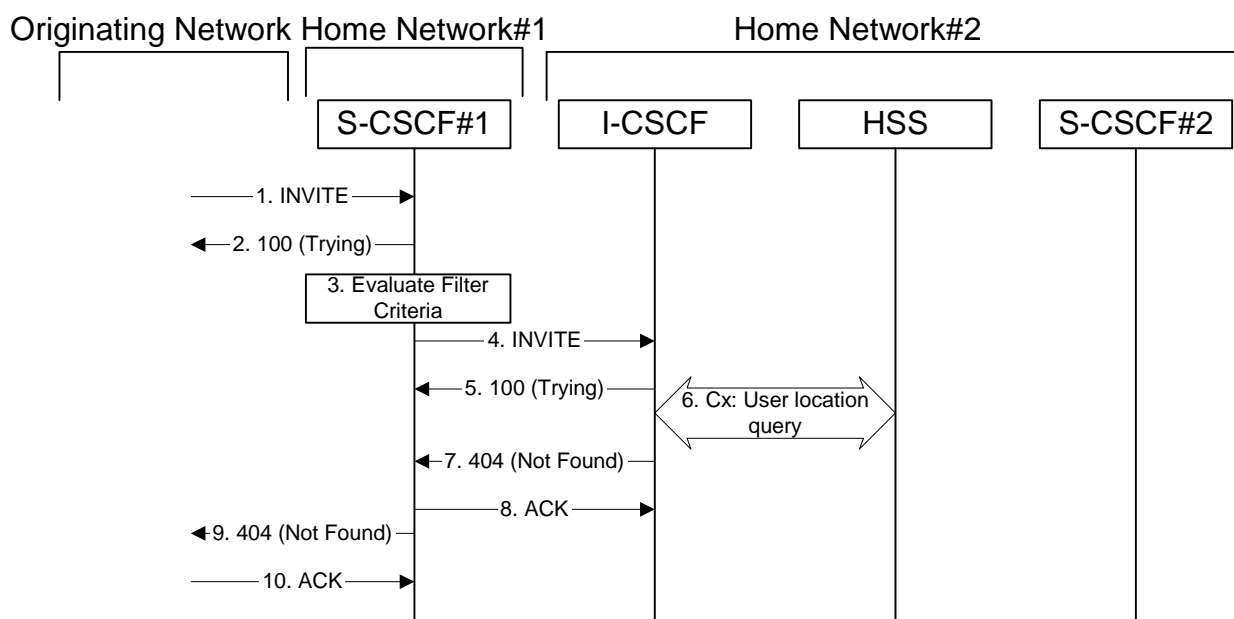
Figure 7.4.9.2-1: Mobile termination, unregistered subscriber

1. **INVITE (MO to S-S#1a) – see example in table 7.4.9.2-1**

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

Table 7.4.9.2-1: 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-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: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
```

2. **100 Trying (S-S#1a to MO) – see example in table 7.4.9.2-2**

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

Table 7.4.9.2-2: 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 7.4.9.2-4**

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 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 7.4.9.2-4: 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=
```

5. **100 Trying (I-CSCF to S-CSCF) – see example in table 7.4.9.2-5**

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

Table 7.4.9.2-5: 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 information that the subscriber is not currently registered and it does not have any service when the user is unregistered.

For detailed message flows see 3GPP TS 29.228.

Table 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 4), which are sent to the HSS.

7. **404 Not Found (I-CSCF to S-CSCF) – see example in table 7.4.9.2-7**

I-CSCF initiates a 404 (Not Found) response to S-CSCF#1.

Table 7.4.9.2-7: 404 Not Found (I-CSCF to S-CSCF)

```
SIP/2.0 404 Not Found
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. **ACK (S-CSCF to I-CSCF) – see example in table 7.4.9.2-8**

S-CSCF#1 responds to the I-CSCF with ACK.

Table 7.4.9.2-8: ACK (S-CSCF to I-CSCF)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

9. **404 Not Found (S-S#1a to MO) – see example in table 7.4.9.2-9**

S-CSCF#1 forwards the 404 (Not Found) to the originator, as per the originating procedure.

Table 7.4.9.2-9: 404 Not Found (S-S#1a to MO)

```
SIP/2.0 404 Not Found
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
```

10. **ACK (MO to S-S#1a) – see example in table 7.4.9.2-10**

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

Table 7.4.9.2-10: ACK (MO to S-S#1a)

```
ACK tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

7.4.9.3 Mobile termination, unregistered subscriber, services related to unregistered state

In the example information flow the subscriber is unregistered and the subscriber has services related to unregistered state. This is shown in the following information flow (figure 7.4.9.3-1).
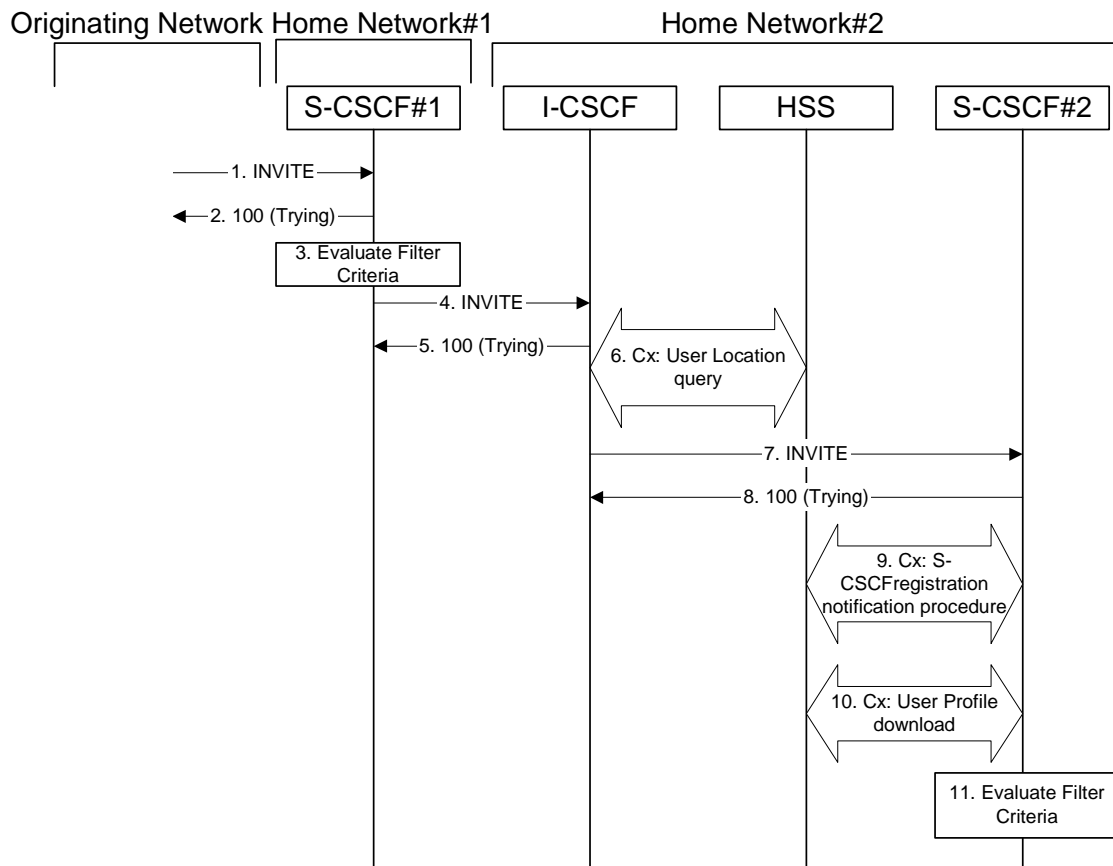
Figure 7.4.9.3-1: Mobile termination, unregistered subscriber with services

1. **INVITE (MO to S-S#1a) – see example in table 7.4.9.3-1**

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

Table 7.4.9.3-1: 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-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=rtpmap:99 MP4V-ES
a=ftmp: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 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 7.4.9.3-2**

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

Table 7.4.9.3-2: 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 7.4.9.3-4**

   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 7.4.9.3-4: 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=
```

5. **100 Trying (I-CSCF to S-CSCF) – see example in table 7.4.9.3-5**

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

Table 7.4.9.3-5: 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 information that the user is not currently registered, but the user has services when the user is not registered.

   For detailed message flows see 3GPP TS 29.228.

   Table 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 4), which are sent to the HSS.

   Based on the CX response the I-CSCF selects an appropriate S-CSCF.

7. **INVITE (I-CSCF to S-CSCF) – see example in table 7.4.9.3-7**

   The I-CSCF forwards the REGISTER request to the S-CSCF selected.

Table 7.4.9.3-7: 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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

8. **100 Trying (S-CSCF to I-CSCF) – see example in table 7.4.9.3-8**

    The S-CSCF#2 responds to the INVITE request (4) by sending a 100 Trying provisional response to I-CSCF.

Table 7.4.9.3-8: 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. **Cx: S-CSCF registration notification procedure**

    The S-CSCF#2 sends a query to the HSS to record the S-CSCF of the called user.

    For detailed message flows see 3GPP TS 29.228.

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

10. **Cx: User Profile Download procedure**

    The S-CSCF#2 sends a query to the HSS to determine the subscriber profile of the callee. The HSS responds with the profile.

    For detailed message flows see 3GPP TS 29.228.

    Table 6.2-9a provides the parameters in the SIP INVITE request (flow 7), which are sent to the HSS.

11. **Evaluation of initial filter criterias**

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

12. **Successful session setup continues (not shown in the flow)**

> The rest of the terminating session is setup as described in subclause 7.4.2 with the INVITE being transmitted from the S-CSCF#2 to the appropriate network entity (e.g. the INVITE may be forwarded to an application server).

7.5 Sample multimedia signalling flows: addition of further media streams

7.5.1 Introduction

These flows assume that both the UE and the P-CSCF are willing to compress the signalling by using SigComp.

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.
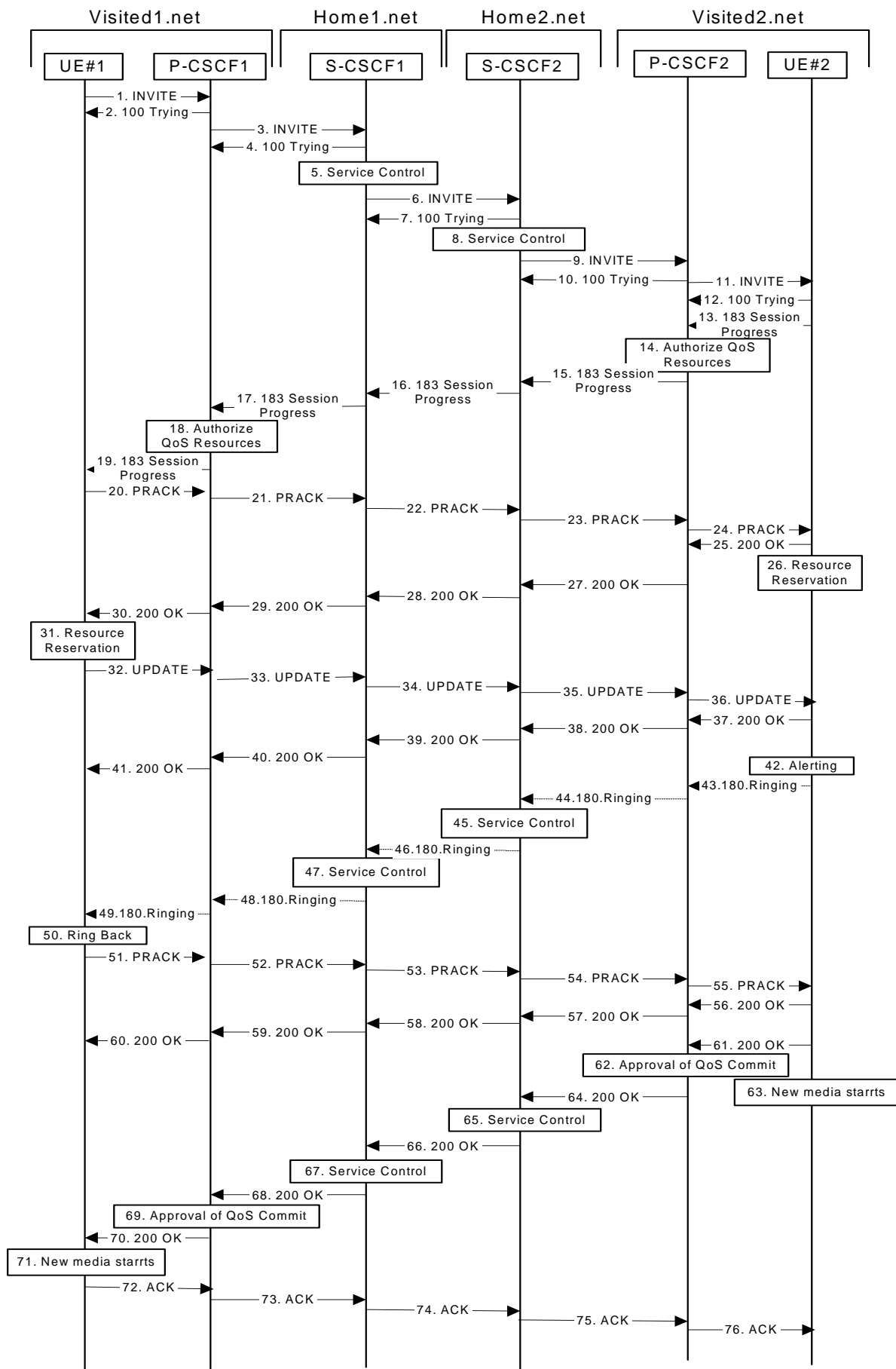
Figure 7.5.2-1: Sample multimedia signalling flow - addition of further media

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=
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=
m=
b=
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: 0020000100100101706466312e76697369746564312e6e6574000c02013942563330373400
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=3
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=
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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:
```

7.5.3 Session attempt rejected by the network due to unauthorized media parameters
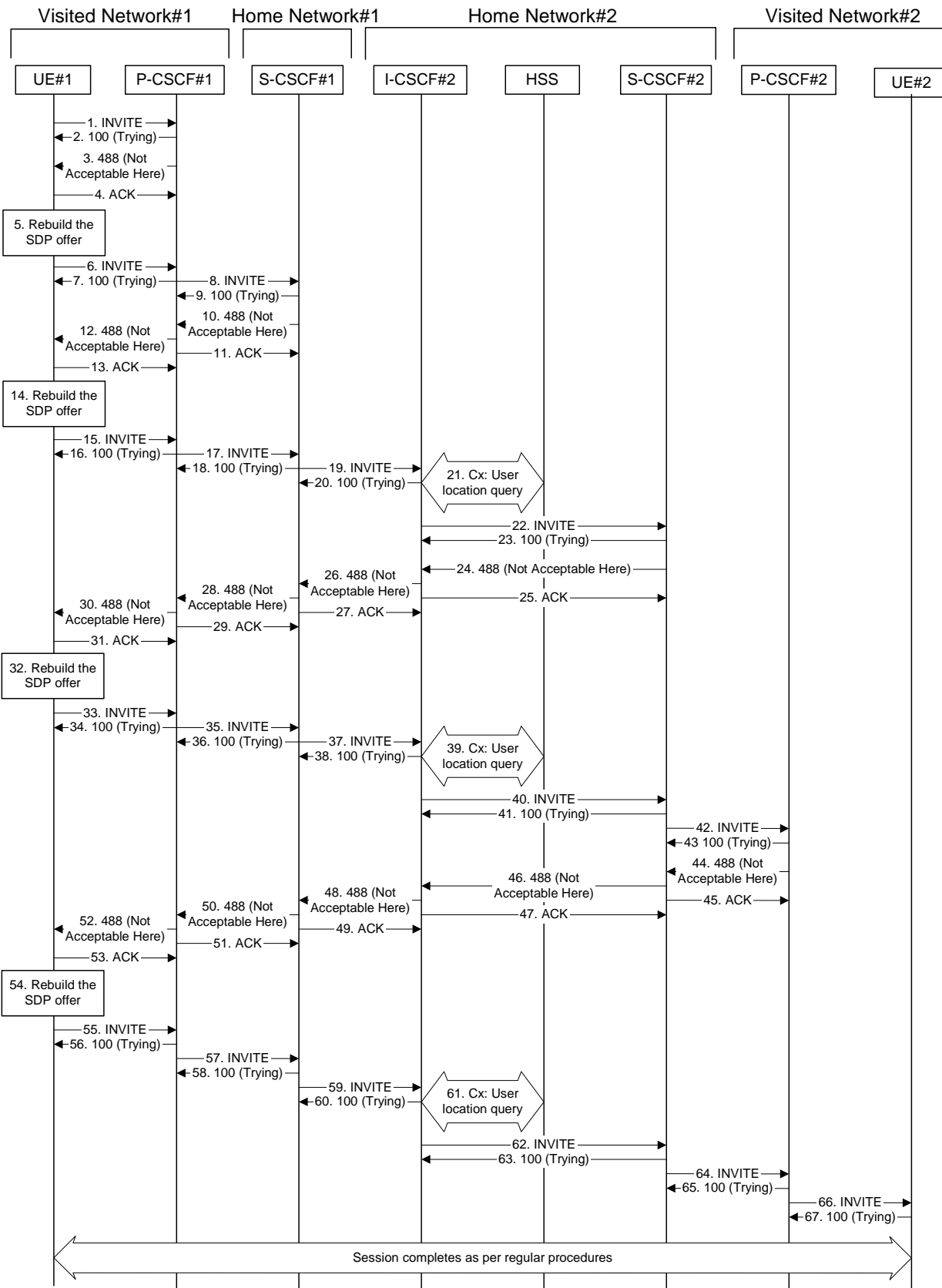
Figure 7.5.3-1: Session rejected by the network due to unauthorized media parameters

Figure 7.5.3-1 shows an example of how the network entities, such as the P-CSCF or the S-CSCF can reject a session attempt due to unauthorized media parameters.

This example shows the worst case scenario, where both P-CSCFs (originating and terminating) and both S-CSCFs (originating and terminating) involved in the session setup reject some part of the media.

For this example, we assume that the UE initiates the session attempt requiring a relatively large amount of media streams and codecs.

1. **INVITE (UE1 to P-CSCF1) - see example in table 7.5.3-1**

   The UE sends the INVITE request, containing an initial SDP, to the P-CSCF1. The initial SDP offer includes three media streams: video, audio and whiteboard. Each media stream contains support for several codecs.

Table 7.5.3-1: 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: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: <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>
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 31 32
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
a=rtpmap:31 H261/90000
a=rtpmap:32 MPV/90000
m=audio 3456 RTP/AVP 97 0 8 100 96
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:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:0 PCMU/8000
a=rtpmap:8 PCMA/8000
a=rtpmap:100 iLBC
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
```

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

2. **100 Trying (P-CSCF1 to UE1) - No example provided**

3. **488 Not Acceptable Here (P-CSCF1 to UE1) – see example in table 7.5.3-3**

   The P-CSCF inspects the media parameters in the SDP offer, and finds that, according to the local policy in the network, users are not allowed to use G.711 audio codecs (payload types 0 and 8 in the SDP audio media stream line). Therefore the P-CSCF1 builds a 488 (Not Acceptable Here) response that includes all the media parameters supported by the visited network in the SDP.

   This SDP does not constitute an answer, because it is sent in a non 100-class or 200-class response. This SDP contains the list of media parameters allows by the visited network according to the local policy.

Table 7.5.3-3: 488 Not Acceptable Here (P-CSCF1 to UE1)

```
SIP/2.0 488 Not Acceptable Here
   Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=223432
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 127 INVITE
Content-Type: application/sdp
Warning: 305 pcscf1.visited1.net "Incompatible media format"
Content-Length: (…)

v=0
o=- 3087933623 3087933623 IN IP6 pcscf1.visited1.net
s=-
c=IN IP6 pcscf1.visited1.net
t=0 0
m=video 0 RTP/AVP 98 99 26
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=fmtp:98 profile-level-id=0
a=rtpmap:26 JPEG/90000
m=audio 0 RTP/AVP 97 2 3 100 96
a=rtpmap:97 AMR
a=rtpmap:100 iLBC
a=rtpmap:2 G721/8000
a=rtpmap:3 GSM/8000
a=rtpmap:96 telephone-event
m=application 0 udp wb
```

4. **ACK (UE1 to P-CSCF1) – see example in table 7.3.5-4**

   The UE sends an ACK request to the 488 (Not Acceptable Here) response.

Table 7.3.5-4: ACK (UE1 to P-CSCF1)

```
ACK sip:user2_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:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq: 127 ACK
Content-Length: 0
```

5. **Rebuild the SDP offer**

   Based on the SDP received in the 488 (Not Acceptable Here) response (4), and based on the initial SDP sent in the INVITE request (1), the UE creates a new SDP offer that does not contain the G711 codecs not allowed by pcscf1.visited.net.

6. **INVITE (UE1 to P-CSCF1) - see example in table 7.5.3-6**

   The UE sends the INVITE request, containing an SDP offer, to the P-CSCF1. This SDP offer is based on the initial SDP offer, but it does not contain the G711 codecs.

Table 7.5.3-6: 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: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: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 128 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 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 31 32
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
a=rtpmap:31 H261/90000
a=rtpmap:32 MPV/90000
m=audio 3456 RTP/AVP 97 100 96
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:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:100 iLBC
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
```

7-9. **100 Trying (P-CSCF1 to UE) et seq.**

The session continues as per normal procedures.

10. **488 Not Acceptable Here (S-CSCF1 to P-CSCF1) - see example in table 7.5.3-10**

The S-CSCF1 inspects the media parameters in the SDP offer, and finds that, according to the local policy or subscription, the subscriber is not allowed to use the whiteboard media stream. Therefore the S-CSCF1 builds a 488 (Not Acceptable Here) response that includes all the media parameters supported by the local policy and the subscriber policy. This SDP does not include the whiteboard media stream.

This SDP does not constitute an answer, because it is sent in a non 100-class or 200-class response. This SDP contains the list of media parameters allows by the originating home network according to the local policy and the originating subscriber policy.

Table 7.5.3-10: 488 Not Acceptable Here (S-CSCF1 to P-CSCF1)

```
SIP/2.0 488 Not Acceptable Here
   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: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=223432
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 127 INVITE
Content-Type: application/sdp
Warning: 304 scscf1.home1.net "Media type not available"
Content-Length: (…)

v=0
o=- 4087933666 4087933666 IN IP6 scscf1.home1.net
s=-
c=IN IP6 scscf1.home1.net
t=0 0
m=video 0 RTP/AVP 98 99 26
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=rtpmap:26 JPEG/90000
m=audio 0 RTP/AVP 97 2 3 9 100 0 8 96
a=rtpmap:97 AMR
a=rtpmap:2 G721/8000
a=rtpmap:3 GSM/8000
a=rtpmap:9 G722/8000
a=rtpmap:100 iLBC
a=rtpmap:0 PCMU/8000
a=rtpmap:8 PCMA/8000
a=rtpmap:96 telephone-event
```

11-13. **ACK (S-CSCF1 to P-CSCF1) et seq.**

The session continues as per normal procedures.

14. **Rebuild the SDP offer**

Based on the SDP received in the 488 (Not Acceptable Here) response (12), and based on the SDP sent in the INVITE request (6), the UE creates a new SDP offer that does not contain the whiteboard media stream not allowed by scscf1.home1.net.

15. **INVITE (UE1 to P-CSCF1) - see example in table 7.5.3-15**

The UE sends the INVITE request, containing an SDP offer, to the P-CSCF determined via the CSCF discovery mechanism. This SDP offer is based on the previous SDP offer, but it does not contain the whiteboard media streams.

Table 7.5.3-15: 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: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: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 129 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 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 99 31 32
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
a=rtpmap:31 H261/90000
a=rtpmap:32 MPV/90000
m=audio 3456 RTP/AVP 97 100 96
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:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:100 iLBC
a=rtpmap:96 telephone-event
```

16-23. **100 Trying (P-CSCF1 to UE) et seq.**

The session continues as per normal procedures,

24. **488 Not Acceptable Here (S-CSCF2 to I-CSCF2) - see example in table 7.5.3-24**

The S-CSCF2 inspects the media parameters in the SDP offer, and finds that, according to the local policy or the terminating user subscription, the user is not allowed to use the video media stream. Therefore the S-CSCF1 builds a 488 (Not Acceptable Here) response that includes all the media parameters supported by the local policy and the subscriber policy. This SDP does not include the video media stream.

This SDP does not constitute an answer, because it is sent in a non 100-class or 200-class response. This SDP contains the list of media parameters allows by the terminating home network according to the local policy and the terminating subscriber policy.

Table 7.5.3-24: 488 Not Acceptable Here (S-CSCF2 to I-CSCF2)

```
SIP/2.0 488 Not Acceptable Here
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: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=678358
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 127 INVITE
Content-Type: application/sdp
Warning: 304 scscf2.home1.net "Media type not available"
Content-Length: (…)

v=0
o=- 561363252345 561363252345 IN IP6 scscf2.home2.net
s=-
c=IN IP6 scscf2.home2.net
t=0 0
m=audio 0 RTP/AVP 97 2 3 9 100 96
a=rtpmap:97 AMR
a=rtpmap:2 G721/8000
a=rtpmap:3 GSM/8000
a=rtpmap:9 G722/8000
a=rtpmap:100 iLBC
a=rtpmap:96 telephone-event
m=application 0 udp wb
```

25-31. **ACK (I-CSCF2 to S-CSCF2) et seq.**

The session continues as per normal procedures.

32. **Rebuild the SDP offer**

Based on the SDP received in the 488 (Not Acceptable Here) response (24), and based on the SDP sent in the INVITE request (15), the UE creates a new SDP offer that does not contain the whiteboard media stream not allowed by scscf2.home2.net.

33. **INVITE (UE1 to P-CSCF1) - see example in table 7.5.3-33**

The UE sends the INVITE request, containing an SDP offer, to the P-CSCF1. This SDP offer is based on the previous SDP offer, but it does not contain the video media stream.

Table 7.5.3-33: 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: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=667788
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 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 2987933618 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=audio 3456 RTP/AVP 97 100 96
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:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:100 iLBC
a=rtpmap:96 telephone-event
```

34-43. **100 Trying (P-CSCF1 to UE) et seq.**

The session continues as per normal procedures,

44. **488 Not Acceptable Here (P-CSCF2 to S-CSCF2) - see example in table 7.5.3-44**

The P-CSCF2 inspects the media parameters in the SDP offer, and finds that, according to the local policy, the iBLC codec is not allowed. Therefore the P-CSCF2 builds a 488 (Not Acceptable Here) response that includes all the media parameters supported by the local policy.

This SDP does not constitute an answer, because it is sent in a non 100-class or 200-class response. This SDP contains the list of media parameters allows by the terminating visited network according to the local policy.

Table 7.5.3-44: 488 Not Acceptable Here (S-CSCF2 to I-CSCF2)

```
SIP/2.0 488 Not Acceptable Here
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: <sip:user1_public1@home1.net>;tag=667788
To: <sip:user2_public1@home2.net>;tag=987654
Call-ID: cb03a0s09a2sdfglkj490333
CSeq: 130 INVITE
Content-Type: application/sdp
Warning: 305 pcscf2.visited2.net "Incompatible media format"
Content-Length: (…)

v=0
o=- 4087933666 4087933666 IN IP6 pcscf2.visited2.net
s=-
c=IN IP6 pcscf2.visited2.net
t=0 0
m=audio 0 RTP/AVP 97 2 3 9 96
a=rtpmap:97 AMR
a=rtpmap:2 G721/8000
a=rtpmap:3 GSM/8000
a=rtpmap:9 G722/8000
a=rtpmap:96 telephone-event
m=application 0 udp wb
m=video 0 RTP/AVP 98 99 26
a=rtpmap:98 H263
a=rtpmap:99 MP4V-ES
a=fmtp:98 profile-level-id=0
a=rtpmap:26 JPEG/90000
```

45-53. **ACK (S-CSCF2 to P-CSCF2) et seq.**

>The session continues as per normal procedures.

54. **Rebuild the SDP offer**

>Based on the SDP received in the 488 (Not Acceptable Here) response (52), and based on the SDP sent in the INVITE request (33), the UE creates a new SDP offer that does not contain the iBLC coded not allowed by pcscf2.visited.net.

55. **INVITE (UE1 to P-CSCF1) - see example in table 7.5.3-55**

>The UE sends the INVITE request, containing an SDP offer, to the P-CSCF1. This SDP offer is based on the previous SDP offer, but it does not contain the video media stream.

Table 7.5.3-55: 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: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=667788
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 131 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 2987933619 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=0 0
m=audio 3456 RTP/AVP 97 96
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:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
a=rtpmap:96 telephone-event
```

56 onwards. 100 Trying (P-CSCF1 to UE) et seq.

The session continues and completes as per normal procedures,

7.6 Error handling: session initiation (not provided)

An example of this flow is not shown in the present document.

8 Signalling flows for session release (non hiding)

8.1 Introduction

Void.

8.2 Mobile terminal initiated session release

Figure 8.2-1 shows a mobile terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the Home network in either or both cases).
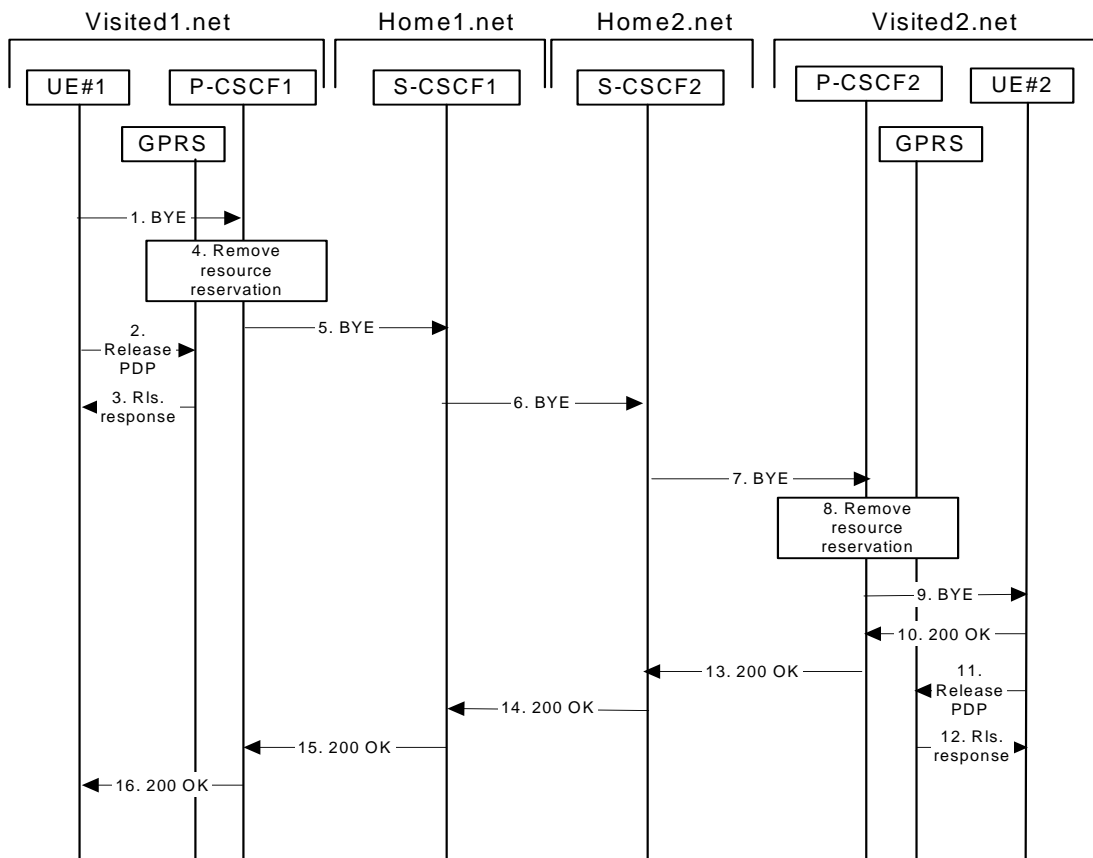
Figure 8.2-1: Mobile initiated session release

1 **SIP BYE (UE to P-CSCF) - see example in table 8.2-1**

One mobile party hangs up, which generates a SIP BYE request from the UE to the P-CSCF.

Table 8.2-1: SIP BYE (UE to P-CSCF)

```
BYE 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
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: 153 BYE
Content-Length: 0
```

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

Via: takes the value of either the IP address or the 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: the example contents of the From header, the To header and Call-ID header are used to identify the session being cleared, and therefore are identical to those of the previously received response for that session, so that they include any tag parameters.

CSeq: the content of the Cseq header must have a higher sequence number than the previous transaction. Here it is assumed that a Cseq value no greater than 152 has been previously used.

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

2 **Release PDP**

Steps 2 and 3 may take place before or after Step 1 and in parallel with Step 4. The UE initiates the release of the bearer PDP context. The GPRS subsystem releases the PDP context. The IP network resources that had were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

3 **Rls. Response**

The GPRS subsystem responds to the UE.

4 **Remove resource reservation**

The P-CSCF removes the authorization for resources that had previously been issued for this endpoint for this session. This step will also result in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted.

5 **SIP BYE (P-CSCF to S-CSCF) - see example in table 8.2-5**

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 sends a SIP BYE request to the S-CSCF of the releasing party.

Table 8.2-5: SIP BYE (P-CSCF to S-CSCF)

```
BYE 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:
Content-Length: 0
```

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

6 **SIP BYE (S-CSCF to S-CSCF) see example in table 8.2-6**

The SIP BYE request is sent from the S-CSCF to the S-CSCF of the network of the other party.

Table 8.2-6: SIP BYE (S-CSCF to S-CSCF)

```
BYE 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:
```

7 **SIP BYE (S-CSCF to P-CSCF) - see example in table 8.2-7**

The SIP BYE request is forwarded directly to the P-CSCF.

Table 8.2-7: SIP BYE (S-CSCF to P-CSCF)

```
BYE 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: 0
```

8 **Remove resource reservation**

The P-CSCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.

9 **SIP BYE (P-CSCF to UE) - see example in table 8.2-9**

The P-CSCF forwards the SIP BYE request on to the UE.

Table 8.2-9: SIP BYE (P-CSCF to UE)

```
BYE 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
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: 0
```

10 **200 OK (UE to P-CSCF) - see example in table 8.2-10**

The mobile responds with a 200 OK response, which is sent back to the P-CSCF.

Table 8.2-10: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;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
```

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

11 **Release PDP**

Steps 12 and 13 may be done in parallel with step 11. The Mobile initiates the release of the bearer PDP context.

12 **Rls response**

The GPRS subsystem releases the PDP context. The IP network resources that had were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

13 **200 OK (P-CSCF to S-CSCF) - see example in table 8.2-13**

The P-CSCF sends a 200 OK response to the S-CSCF directly.

Table 8.2-13: 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-Length: 0
```

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

14 **200 OK (S-CSCF to S-CSCF) - see example in table 8.2-14**

The S-CSCF of the other party forwards the 200 OK response to its local S-CSCF.

Table 8.2-14: 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.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
```

15 **200 OK (S-CSCF to P-CSCF) - see example in table 8.2-15**

The S-CSCF of the releasing party forwards the 200 OK response to the P-CSCF of the releasing party.

Table 8.2-15: 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: 0
```

16 **200 OK (P-CSCF to UE) - see example in table 8.2-16**

The P-CSCF of the releasing party forwards the 200 OK response to the UE.

Table 8.2-16: 200 OK (P-CCSF 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: 0
```

8.3 PSTN initiated session release (not provided)

An example of this flow is not shown in the present document.

8.4 Error handling: session release (not provided)

An example of this flow is not shown in the present document.

9 Network initiated procedures (non hiding)

An example of this flow is not shown in the present document.

10 Procedures to enable enhanced multimedia services (non hiding)

10.1 Session hold and resume procedures

10.1.1 Introduction

This subclause gives signalling flows for the procedures for placing sessions on hold that were previously established by the mechanisms of clause 8, and resuming the session afterwards. Two cases are presented: mobile-to-mobile (UE-UE), and a UE-initiated hold of a UE-PSTN session.

For a multimedia session, it is possible to place a subset of the media streams on hold while maintaining the others.

10.1.2 Mobile-to-mobile session hold and resume procedures

A session was previously established between an initiating UE and a terminating UE. Each of these UEs has an associated P-CSCF in the same network where they are currently located (either home or roaming), and a S-CSCF assigned in their home network . These functional elements co-operate to clear the session, and the procedures are independent of whether they are located in the home or visited networks.

The hold and resume procedures are identical whether the UE that initiated the session also initiates the session-hold, or whether the UE that terminated the session initiates the session-hold.

When a media stream has been placed on hold, it should not be resumed by any endpoint other than the one that placed it on hold.

These procedures show only one combination of Mobile-Originated, Serving-to-Serving, and Mobile-Terminated procedures, MO#2, S-S#2, and MT#2. These procedures do not show the use of optional I-CSCFs. If an I-CSCF was included in the signalling path during the session establishment procedure, it would continue to be used in any subsequent signalling flows such as the ones described in this clause. 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 does not require a user interaction at the remote end, it is realized with an UPDATE request.

The procedures for placing a media stream on hold, and later resuming the media stream, are as shown in figure 10.1.2-1:
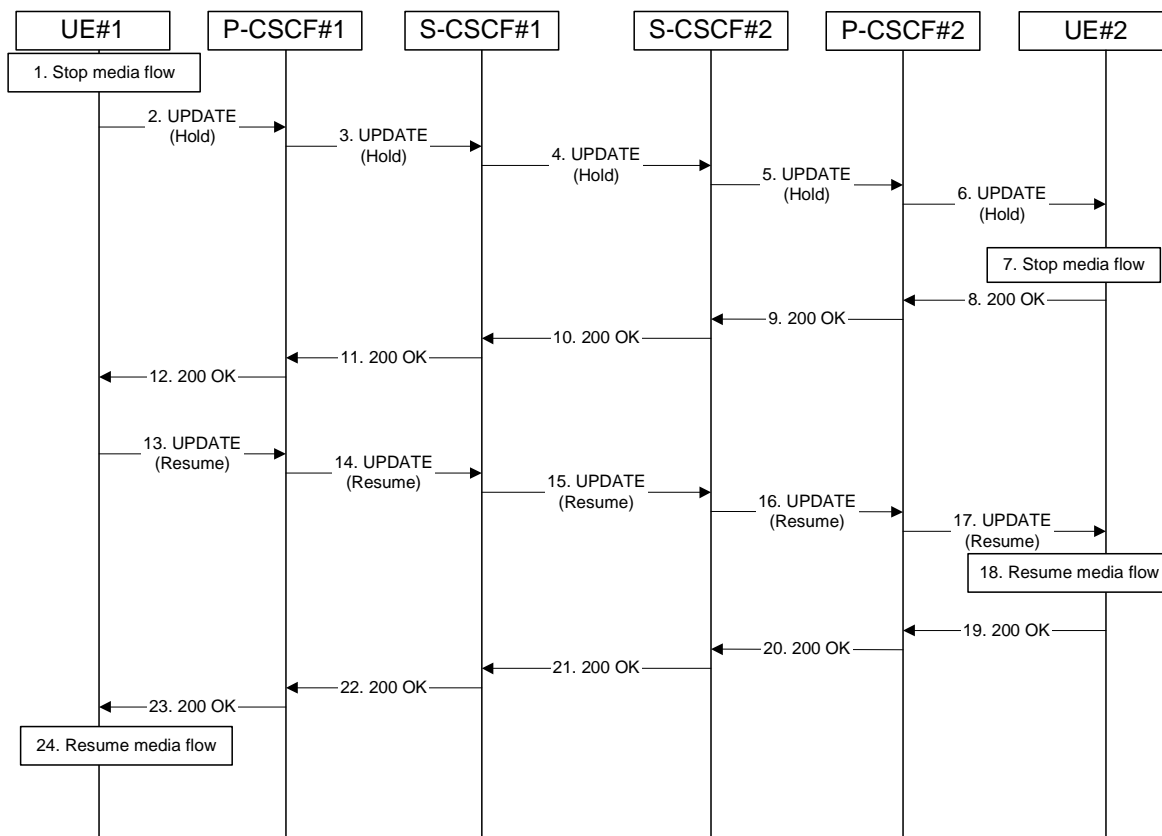
Figure 10.1.2-1: Mobile to mobile session hold and resume

Signalling flow procedures are as follows:

1. **Stop Media Flow**

    UE#1 detects a request from the subscriber to place a media stream on hold. UE#1 stops sending the media stream to the remote endpoint, but keeps the resources for the session reserved.

2. **UPDATE(Hold) (UE to P-CSCF) – see example in table 10.1.2-2**

    UE#1 sends a Hold request to its proxy, P-CSCF#1.

Table 10.1.2-2: UPDATE(Hold) (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.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: 130 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 2987933616 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
```

```
b=AS:25.4
a=inactive
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

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.

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

SDP The sendrecv media stream is placed on hold by changing it to inactive media stream, and no media is sent to the far end.

3. **UPDATE (Hold) (P-CSCF to S-CSCF) – see example in table 10.1.2-3**

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#1 forwards the Hold request to S-CSCF#1.

Table 10.1.2-3: UPDATE(Hold) (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"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

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.

4. **UPDATE(Hold) (S-CSCF to S-CSCF) – see example in table 10.1.2-4**

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

Table 10.1.2-4: UPDATE(Hold) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

P-Charging-Vector: If the two S-CSCF entities are located in different networks, then the orig-ioi parameter would be included (not shown).

5. **UPDATE(Hold) (S-CSCF to P-CSCF) – see example in table 10.1.2-5**

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

Table 10.1.2-5: UPDATE(Hold) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

6. **UPDATE(Hold) (P-CSCF to UE) – see example in table 10.1.2-6**

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

Table 10.1.2-6: UPDATE(Hold) (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=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
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:
```

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

7. **Stop Media flow**

UE#2 stops sending the media stream to the remote endpoint, but keeps the resources for the session reserved.

8. **200-OK (UE to P-CSCF) – see example in table 10.1.2-8**

UE#2 acknowledges receipt of the Hold request (6) with a 200 (OK) final response, sent to P-CSCF#2.

Table 10.1.2-8: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
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
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615 2987933616 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=907165275 0
m=audio 6402 RTP/AVP 97
b=AS:25.4
a=inactive
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

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

SDP: Since the media stream was offered as inactive, it is marked as inactive in the response.

9. **200-OK (P-CSCF to S-CSCF) – see example in table 10.1.2-9**

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

Table 10.1.2-9: 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=
```

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

10. **200-OK (S-CSCF to S-CSCF) – see example in table 10.1.2-10**

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

Table 10.1.2-10: 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=
```

11. **200-OK (S-CSCF to P-CSCF) – see example in table 10.1.2-11**

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

Table 10.1.2-11: 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=
```

12. **200-OK (P-CSCF to UE) – see example in table 10.1.2-12**

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

Table 10.1.2-12: 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=
```

13. **UPDATE(Resume) (UE to P-CSCF) – see example in table 10.1.2-13**

UE#1 detects a request from the subscriber to resume the media stream previously placed on hold. UE#1 sends a Resume request to its proxy, P-CSCF#1.

Table 10.1.2-13: UPDATE(Resume) (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.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 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=907165275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

Request-URI:	Contains the value of the Contact header from the 200 (OK) response to the initial INVITE.
Via:	Contains the IP address or FQDN of the originating UE.
From:/To:/Call-ID:	Contain the values previously used to establish the session, including the tag value from the response.
Cseq:	Next higher sequential value.
Security-Verify:	Contains the security agreement as represented by the received Security-Server header.
SDP:	Same SDP as negotiated during the session setup, restores the sendrecv media stream.

14. **UPDATE(Resume) (P-CSCF to S-CSCF) – see example in table 10.1.2-14**

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#1 forwards the Resume request to S-CSCF#1.

Table 10.1.2-14: UPDATE(Resume) (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"
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

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

15. **UPDATE(Resume) (S-CSCF to S-CSCF) – see example in table 10.1.2-15**

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

Table 10.1.2-15: UPDATE(Resume) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

16. **UPDATE(Resume) (S-CSCF to P-CSCF) – see example in table 10.1.2-16**

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

Table 10.1.2-16: UPDATE(Resume) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

17. **UPDATE(Resume) (P-CSCF to UE) – see example in table 10.1.2-17**

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

Table 10.1.2-17: UPDATE(Resume) (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=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
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

18. **Resume media flow**

UE#2 resumes sending the media stream to the remote endpoint.

19. **200-OK (UE to P-CSCF) – see example in table 10.1.2-19**

UE#2 acknowledges receipt of the Resume request (17) with a 200 (OK) final response, sent to P-CSCF#2.

Table 10.1.2-19: 200 OK (UE to P-CSCF)

```
SIP/2.0 200 OK
```

```
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
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (…)

v=0
o=- 2987933615  2987933617 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=907165275 0
m=audio 6402 RTP/AVP 97
b=AS:25.4
a=sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

20. **200-OK (P-CSCF to S-CSCF) – see example in table 10.1.2-20**

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

Table 10.1.2-20: 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=
```

21. **200-OK (S-CSCF to S-CSCF) – see example in table 10.1.2-21**

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

Table 10.1.2-21: 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=
```

22. **200-OK (S-CSCF to P-CSCF) – see example in table 10.1.2-22**

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

Table 10.1.2-22: 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=
```

23. **200-OK (P-CSCF to UE) – see example in table 10.1.2-23**

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

Table 10.1.2-23: 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=
```

24. **UE Resume Media Flow**

10.1.3   Mobile-initiated hold and resume of a mobile-PSTN session

An IM session was previously established between an initiating UE and a MGCF acting as a gateway for a session terminating on the PSTN, or between an initiating MGCF acting as a gateway for a session originating on the PSTN to a terminating UE. The UE has an associated P-CSCF in the same network where it is currently located (either home or roaming), an S-CSCF assigned in its home network, and a BGCF that chooses the MGCF. These functional elements co-operate to clear the session, and the procedures are independent of whether they are located in the subscriber's home or visited networks. Therefore there is no distinction in this clause of home network vs. visited network.

The session hold and resume procedure is similar whether the UE initiated the session to the PSTN, or if the PSTN initiated the session to the UE. The only difference is the optional presence of the BGCF in the case of a session initiated by the UE. The BGCF might or might not be present in the signalling path after the first INVITE is routed.

These procedures show only one combination of Mobile-Originated, Serving-to-Serving, and Mobile-Terminated procedures, MO#2, S-S#3, and CS-T. These procedures do not show the use of optional I-CSCFs, or the use of the BGCF in achieving network configuration independence. If an I-CSCF/BGCF was included in the signalling path during the session establishment procedure, it would continue to be used in any subsequent signalling flows such as the ones described in this clause. 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 does not require a user interaction at the remote end, it is realized with an UPDATE request.

The procedures for placing a media stream on hold, and later resuming the media stream, are as shown in figure 10.1.3-1:
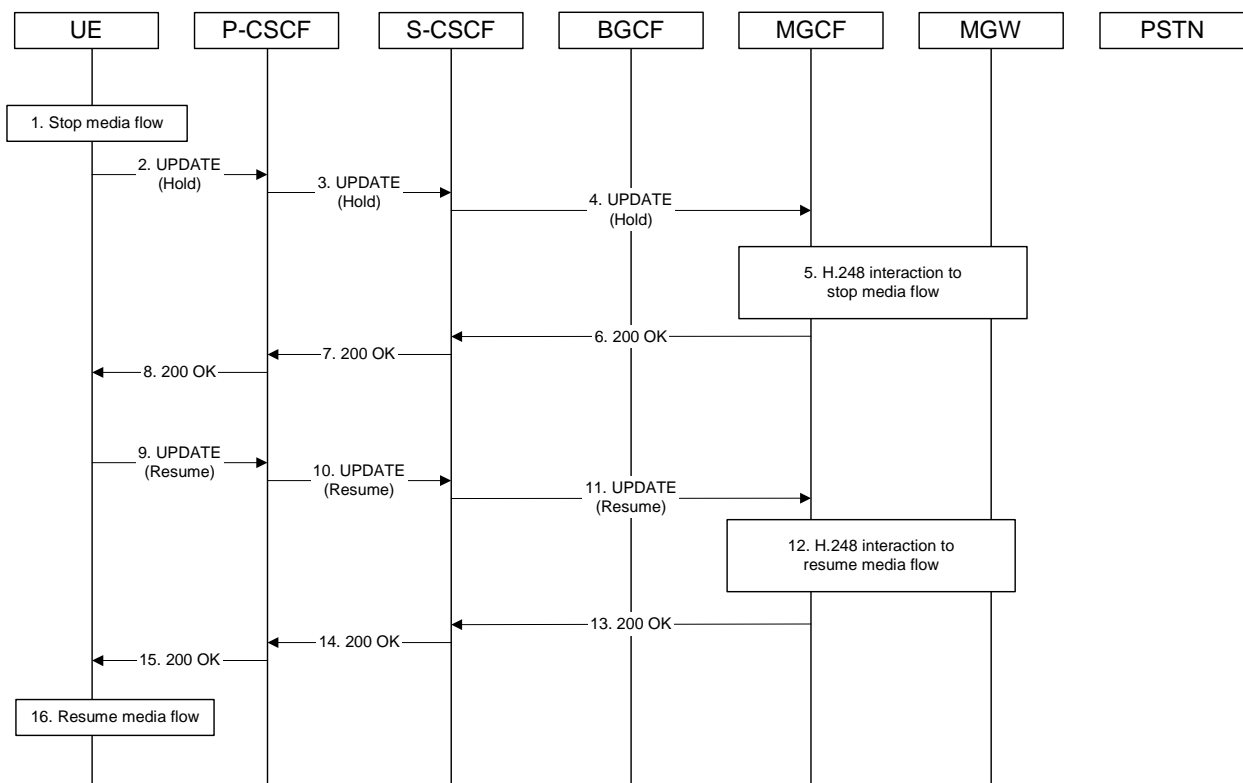
Figure 10.1.3-1: Mobile to PSTN session hold and resume

Signalling flow procedures are as follows:

1. **Stop Media Flow**

   UE#1 detects a request from the subscriber to place a media stream on hold. UE#1 stops sending the media stream to the remote endpoint, but keeps the resources for the session reserved.

2. **UPDATE (Hold) (UE to P-CSCF) – see example in 10.1.3-2**

   UE sends a Hold request to its proxy, P-CSCF.

Table 10.1.3-2: UPDATE (Hold) (UE to P-CSCF)

```
UPDATE sip:mgcf1.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
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <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 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  2987933616 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
b=AS:25.4
a=inactive
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

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.

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

SDP The sendrecv media stream is placed on hold by changing it to inactive media stream, and no media is sent to the far end.

3. **UPDATE (Hold) (P-CSCF to S-CSCF) – see example in table 10.1.3-3**

   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 Hold request to S-CSCF.

Table 10.1.3-3: UPDATE (Hold) (P-CSCF to S-CSCF)

```
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:
Route: <sip:scscf1.home1.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=
```

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.

4. **UPDATE (Hold) (S-CSCF to MGCF) – see example in table 10.1.3-4**

S-CSCF forwards the Hold request to MGCF.

Table 10.1.3-4: UPDATE (Hold) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

5. **H.248 Interaction to Stop Media flow**

MGCF initiates a H.248 interaction with MGW instructing it to stop sending the media stream, but to keep the resources for the session reserved.

6. **200-OK (MGCF to S-CSCF) – see example in table 10.1.3-6**

MGCF acknowledges receipt of the Hold request (4) with a 200 (OK) final response, sent to S-CSCF.

Table 10.1.3-6: 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: application/sdp
Content-Length: (…)

v=0
o=- 2987933615  2987933616 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=907165275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=inactive
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

SDP: Since the media stream was offered as inactive, it is marked as inactive in the response.

7. **200-OK (S-CSCF to P-CSCF) – see example in table 10.1.3-7**

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

Table 10.1.3-7: 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=
```

8. **200-OK (P-CSCF to UE) – see example in table 10.1.3-8**

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

Table 10.1.3-8: 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=
```

9. **UPDATE (Resume) (UE to P-CSCF) – see example in table 10.1.3-9**

   UE detects a request from the subscriber to resume the media stream previously placed on hold. UE sends a Resume request to its proxy, P-CSCF.

Table 10.1.3-9: UPDATE (Resume) (UE to P-CSCF)

```
UPDATE sip:mgcf1.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
Route: <sip:pcscf1.home1.net;lr>, <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: 131 UPDATE
Require: sec-agree
Proxy-Require: sec-agree
```

ETSI

```
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=907165275 0
m=audio 3456 RTP/AVP 97
b=AS:25.4
a=sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

Request-URI:	Contains the value of the Contact header from the 200 (OK) response to the initial INVITE.
Via:	Contains the IP address or FQDN of the originating UE.
From:/To:/Call-ID:	Contain the values previously used to establish the session, including the tag value from the response.
Cseq:	Next higher sequential value.
Security-Verify:	Contains the security agreement as represented by the received Security-Server header.
SDP	Same SDP as negotiated during the session setup, restores the sendrecv media stream.

10. **UPDATE (Resume) (P-CSCF to S-CSCF) – see example in table 10.1.3-10**

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 Resume request to S-CSCF.

Table 10.1.3-10: UPDATE(Resume) (P-CSCF to S-CSCF)

```
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:
Route: <sip:scscf1.home1.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=
```

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

11. **UPDATE(Resume) (S-CSCF to MGCF) – see example in table 10.1.3-11**

S-CSCF forwards the Resume request to MGCF.

Table 10.1.3-11: UPDATE(Resume) (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:
From:
To:
Call-ID:
Cseq:
Content-Type:
Content-Length:

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

12. **H.248 Interaction to Resume media flow**

MGCF initiates a H.248 interaction with MGW instructing it to resume sending the media stream.

13. **200 OK (MGCF to S-CSCF) – see example in table 10.1.3-13**

MGCF acknowledges receipt of the Resume request (11) with a 200 (OK) final response, sent to S-CSCF.

Table 10.1.3-13: 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-Type:
Content-Length:

v=0
o=- 2987933615  2987933617 IN IP6 5555::eee:fff:aaa:bbb
s=-
c=IN IP6 5555::aaa:bbb:ccc:ddd
t=907165275 0
m=audio 6402 RTP/AVP 97
b=AS:25.4
a=sendrecv
a=rtpmap:97 AMR
a=fmtp:97 mode-set=0,2,5,7; maxframes=2
```

14. **200 OK (S-CSCF to P-CSCF) – see example in table 10.1.3-14**

Table 10.1.3-14: 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=
```

15. **200 OK (P-CSCF to UE) – see example in table 10.1.3-15**

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

Table 10.1.3-15: 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=
```

16. **Resume Media Flow**

    UE resumes sending the media stream to the remote endpoint.

10.2 Initiating and destination party identification

10.2.1 Introduction

When the UE (or MGCF) initiates a session in the IM CN subsystem, it determines, based on preferences of the initiating user, whether its identity is to be made available to the destination, or to remain anonymous. Three cases are distinguished:

1. The initiating user desires his/her identity to be anonymous.

2. The initiating user desires to be identified as the initiator of the session.

3. The initiating user did not state a preference for this session.

The values of the headers "From", "To" and "Privacy" are based on the decision above.

When the UE (or MGCF) receives an incoming session request in the IM CN subsystem, it determines, based on preferences of the destination user, whether its identity is to be made available to the initiator or to remain anonymous. Three cases are distinguished:

1. The destination user desires his/her identity to be anonymous.

2. The destination user desires to be identified as the destination of the session.

3. The destination user did not state a preference for this session.

The values of the "Privacy" and "P-Asserted-Identity" headers are based on the decision above.

The rules for processing the header values at a proxy are given in RFC 3323 [13] and RFC 3325 [17].

10.2.2   Session originator desiring privacy in asserted identity

If the initiating user desires the session privacy for the asserted identity, the following rules are followed in generating header values:

From:	UE provides an anonymous username.
To:	If a telephone number is used in the addr-spec, the UE provides a tel URL containing a full E.164 number including the country code.
Privacy:	UE includes the tag "id"

An example of an initial INVITE request following the rules for a private asserted identity is given in table 10.2.2-1. This revised information would appear as step #1 of MO#1a (subclause 7.2.2), MO#1b (subclause 17.2.2), MO#2 (subclause 7.2.3), and step #4 of CS-O (subclause 7.2.4).

Table 10.2.2-1: 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: id
From: "Anonymous" <sip:anonymous@anonymous.invalid>
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
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
```

> **From:**   Contains an anonymous SIP URI.
>
> **To:**   Contains the destination TEL URL in international format.

When the destination P-CSCF forwards the INVITE request to the destination UE, it removes the P-Asserted-Identity and Privacy headers. An example is given in table 10.2.2-2

Table 10.2.2-2: 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.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.visited2.net:5088;comp=sigcomp;lr>, <sip:scscf2.home2.net;lr>,
<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Media-Authorization: 0020000100100101706466312e686f6d65312e6e6574000c02013331533134363231
From:
To:
Call-ID:
Cseq:
Supported:
Require: precondition
Contact:
Content-Type:
Content-Length:

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

The UE does not receive a P-Asserted-Identity that can identify the originating of the call.

10.2.3   Session originator without indication of privacy preference

If the initiating user did not state a preference for privacy, local policies and regulations may force the network operator to make the session private for the asserted identity. Therefore, the following rules are followed in generating header values:

From:	UE provides any of the registered public user identities allocated to the user.
To:	If a telephone number is used in the addr-spec, the UE provides a tel URL containing an E.164 number. Otherwise, the UE provides the URI of the destination user.
Privacy:	The UE does not include a Privacy header expressing the user's preferences

An example of an initial INVITE request following the rules for a session that does not include any privacy preferences is given in table 10.2.3-1.

Table 10.2.3-1: 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
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
a=curr:qos local none
a=curr:qos remote none
a=des:qos mandatory local sendrecv
a=des:qos none remote sendrecv
```

The values of From, To, and P-Asserted-Identity (derived from the P-Preferred-Identity above), as given above, are carried through the INVITE sequence, through the S-CSCF serving the originating subscriber.

Based on local policy or regulatory requirements, the S-CSCF serving the originating subscriber may either allow the identification information to be given to the destination, or may restrict it. In case the originating S-CSCF desires to apply privacy for the P-Asserted-Identity, it introduces a Privacy header value with the "id" tag, as in the example in table 10.2.3-2.

Table 10.2.3-2: INVITE (S-CSCF 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>
Privacy: id
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
Require: precondition
Supported:
Contact:
Content-Type:
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 0 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=video 0 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 97 96 0 15
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
m=audio 3458 RTP/AVP 97 96 0 15
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
```

When the destination P-CSCF forwards the INVITE request to the destination UE, the P-CSCF will remove the P-Asserted-Identity. An example is show in table 10.2.2-2.

10.2.4   Session destination desiring privacy in asserted identity

If the destination user desires the P-Asserted-Identity to be private, the UE indicates this in the value of the Privacy header in the first non-100 response to the initial INVITE. An example of this response from UE to P-CSCF (step#8 of MT#1a, step#10 of MT#1b, step#8 of MT#2), is given in table 10.2.4-1.

Table 10.2.4-1: 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
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" <sip:user2_public1@home2.net>
Privacy: id
From:
To: <tel:+1-212-555-2222>;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=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907165275 0
m=audio 6544 RTP/AVP 97
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
```

P-Preferred-Identity: Provides a hint to identify the answering subscriber. It contains the public user identity, and the name of the answering party.

Privacy: The value "id" is included to indicate that privacy of the asserted identity is requested.

The value of the P-Asserted-Identity header, typically derived from the P-Preferred-Identity header is carried through the 183-Session-Progress sequence, to the originating P-CSCF. When the originating P-CSCF forwards the request to the originating UE, the P-CSCF removes the P-Asserted-Identity and the Privacy headers.

Table 10.2.4-2: 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:
P-Media-Authorization: 0020000100100101706466322e76697369746564322e6e6574000c020139425633303732
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=
```

10.2.5   Session destination without indication of privacy preference

If the destination user did not state a preference for privacy, local policies and regulations may force the network operator to make the session privacy for the asserted identity. The destination UE indicates its lack of preference by not providing a Privacy header. An example of this response from UE to P-CSCF (step#8 of MT#1a, step#10 of MT#1b, step#8 of MT#2), is given in table 10.2.5-1.

Table 10.2.5-1: 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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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
P-Preferred-Identity: "John Smith" <sip:user2_public1@home2.net>
From:
To: <tel:+1-212-555-2222>;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=- 2987933615 2987933615 IN IP6 5555::aaa:bbb:ccc:ddd
s=-
c=IN IP6 5555::eee:fff:aaa:bbb
t=907165275 0
m=audio 6544 RTP/AVP 97
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
```

> **P-Preferred-Identity:** Provides a hint to identify the answering subscriber. It contains the public user identity, and the name of the answering party.

Based on local policy or regulatory requirements, the S-CSCF serving the destination subscriber may either allow the identification information to be given to the initiator, or may restrict it (by following the example in subclause 10.2.4-2).

10.3 Procedures for codec and media flow negotiations

10.3.1 Introduction

This subclause gives signalling flows for the procedures for determining the set of mutually-supported codecs between the endpoints of a multimedia session, determining the initial codecs to be used for the multimedia session, and the procedures for changing between codecs when multiple ones are supported.

10.3.2 Codec change within the existing reservation

After the multimedia session is established, it is possible for either endpoint to change the set of codecs for a media flow. If the change is within the resources already signalled and reserved, then there is no need for extra signalling. Any of the UEs is able to change from one codec to another at any time.

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.
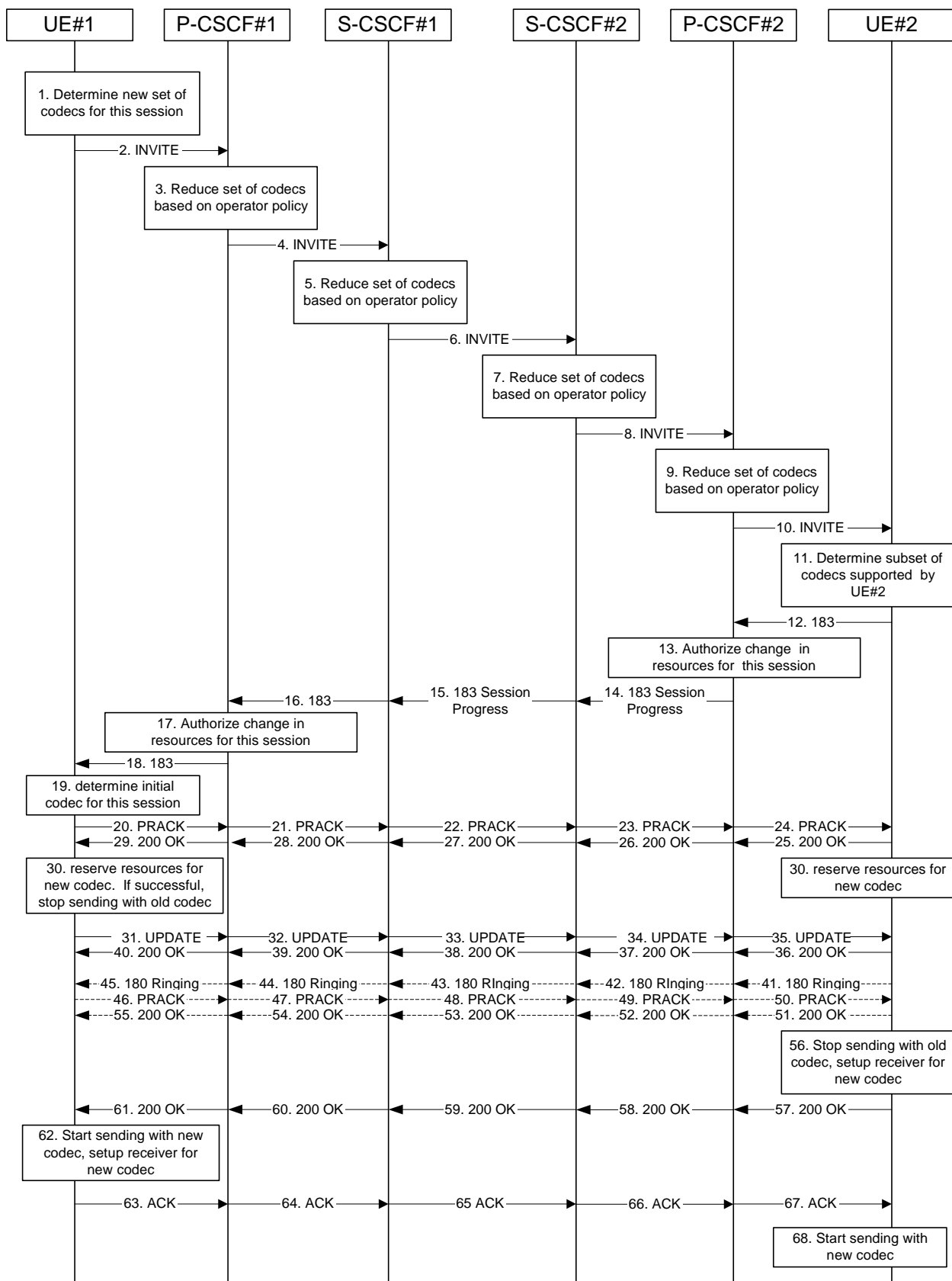
Figure 10.3.3-1: Codec or media flow change - new reservation

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: 0020000100100101706466322e686f6d65322e6e6574000c020133315331343363231
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: 0020000100100101706466312e686f6d65312e6e6574000c02013942563330373200
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=1; pdp-sig=no; gcid=723084392; auth-
token=43876648; 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=
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=1; pdp-sig=no; gcid=309685786; auth-
token=86243681; 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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=1; pdp-sig=no; gcid=309685786; auth-
token=86243681; 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.

10.3.4   Void

10.3.5   Error changing codec or media flows 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 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.

If the destination UE is unable, or unwilling, to change to the new set of codecs, it may return a 488 Not Acceptable Here error response.

If the P-CSCF and/or S-CSCF disallow a particular media flow or codec appearing in the SDP from the initiating UE, and it is the last codec in the last media flow, the CSCF returns a 488 Not Acceptable Here error response.

An example signalling flow for an error changing codec or media flow requiring new resources and/or authorization is given in figure 10.3.5-1. This is the case where the UE rejects the codec change; rejection by a CSCF is a subset of this signalling flow.

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.
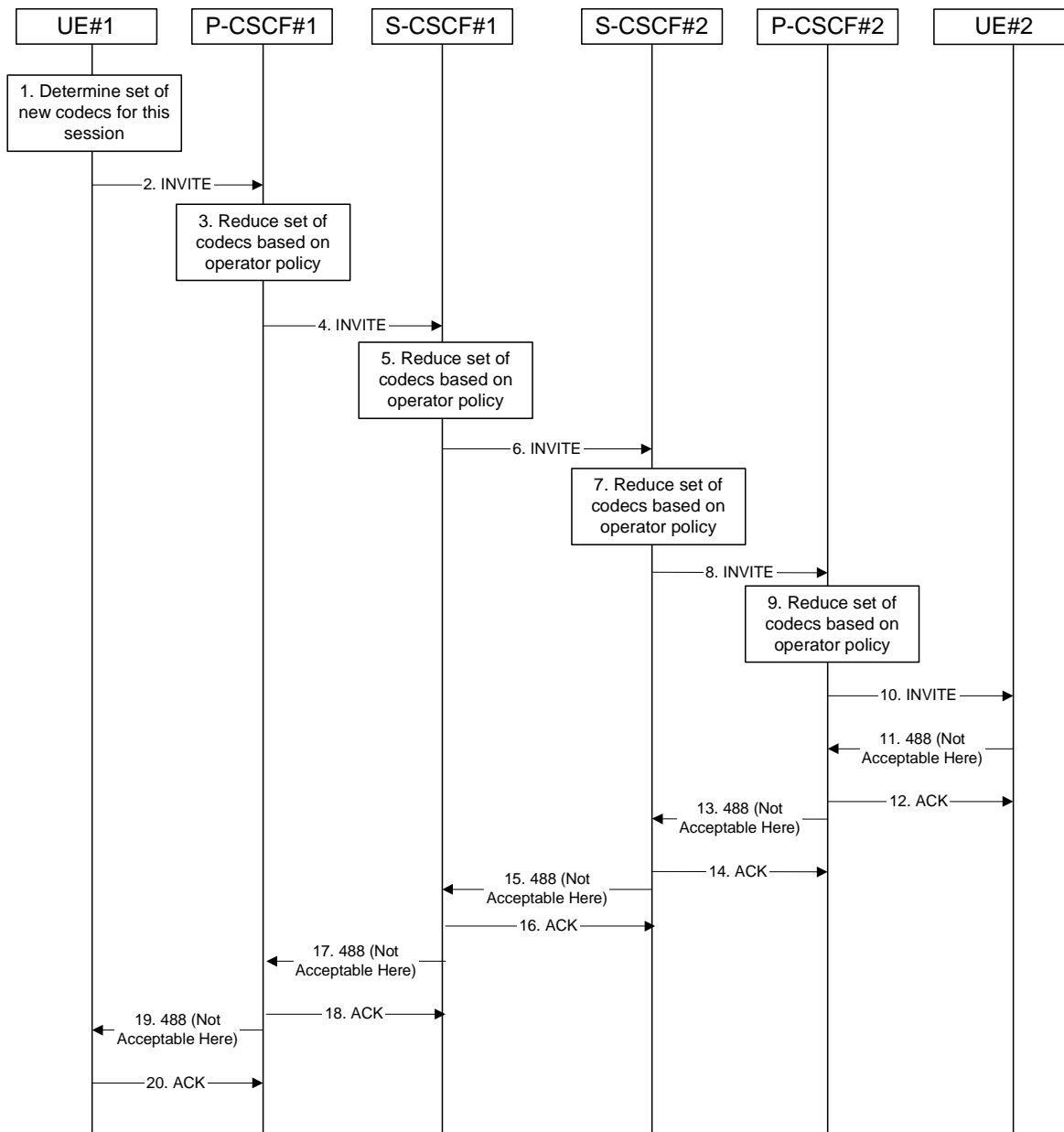
Figure 10.3.5-1: Error changing Codec or media flows needing a new reservation

The detailed procedure is as follows:

1. **Determine new set of codecs for this session**

    UE#1 determines the revised set of codecs 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 10.3.5-2**

UE#1 sends the INVITE request to P-CSCF#1 containing this SDP.

Table 10.3.5-2: 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.

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

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

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 10.3.5-4**

   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 10.3.5-4: 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-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
P-Access-Network-Info:
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=
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 10.3.5-6**

S-CSCF#1 forwards the INVITE request, through the S-CSCF to S-CSCF signalling flow procedures, to S-CSCF#2.

Table 10.3.5-6: 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:pcscf1home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
From:
To:
Call-ID:
Cseq:
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 10.3.5-8**

> S-CSCF#3 forwards the INVITE request to P-CSCF#2.

Table 10.3.5-8: 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
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:
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 10.3.5-10**

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

Table 10.3.5-10: 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: 0020000100100101706466322e686f6d65322e6e6574000c020133315331343363231
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 subset of codecs supported by UE#2**

    UE#2 determines the subset of codecs that it is capable of supporting for this session. It determines the intersection of those it supports 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. For each media flow that is supported, UE#2 inserts a SDP entry with an assigned port and with the codecs in common with those in the SDP from UE#1.

    For this example, assume UE#2 does not supports any of those requested by UE#1.

12. **488 Not Acceptable Here (UE to P-CSCF) – see example in table 10.3.5-12**

    UE#2 responds to the INVITE request (10) with a 488 (Not Acceptable Here) response, sent to P-CSCF#2.

Table 10.3.5-12: 488 Not Acceptable Here (UE to P-CSCF)

```
SIP/2.0 488 Not Acceptable Here
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
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.

13. **ACK (P-CSCF to UE) – see example in table 10.3.5-13**

P-CSCF#2 responds to the 488 (Not Acceptable Here) response by sending an ACK request to UE#2.

Table 10.3.5-13: 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
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

14. **488 Not Acceptable Here (P-CSCF to S-CSCF) – see example in table 10.3.5-14**

P-CSCF#2 sends the 488 (Not Acceptable Here) response to S-CSCF#2.

Table 10.3.5-14: 488 Not Acceptable Here (P-CSCF to S-CSCF)

```
SIP/2.0 488 Not Acceptable Here
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:
```

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

15. **ACK (S-CSCF to P-CSCF) – see example in table 10.3.5-15**

S-CSCF#2 responds to the 488 Not Acceptable Here error by sending an ACK request to P-CSCf#2, along the signalling path established by the INVITE request.

Table 10.3.5-15: 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
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

16. **488 Not Acceptable Here (S-CSCF to S-CSCF) – see example in table 10.3.5-16**

S-CSCF#2 sends the 488 Not Acceptable Here response to S-CSCF#1.

Table 10.3.5-16: 488 Not Acceptable Here (S-CSCF to S-CSCF)

```
SIP/2.0 488 Not Acceptable Here
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:
```

17. ACK (S-CSCF to S-CSCF) – see example in table 10.3.5-17

S-CSCF#1 acknowledges the error indication (16) by sending an ACK request to S-CSCF#2, along the signalling path established by the INVITE request.

Table 10.3.5-17: 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
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

18. 488 Not Acceptable Here (S-CSCF to P-CSCF) – see example in table 10.3.5-18

S-CSCF#1 sends the 488 Not Acceptable Here response to P-CSCF#1.

Table 10.3.5-18: 488 Not Acceptable Here (S-CSCF to P-CSCF)

```
SIP/2.0 488 Not Acceptable Here
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:
```

19. ACK (P-CSCF to S-CSCF) – see example in table 10.3.5-19

P-CSCF#1 acknowledges the error response (18) by sending an ACK request to S-CSCF#1.

Table 10.3.5-19: 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
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

20. 488 Not Acceptable Here (P-CSCF to UE) – see example in table 10.3.5-16

P-CSCF#1 sends the 488 Not Acceptable Here response to UE#1.

Table 10.3.5-16: 488 Not Acceptable Here (P-CSCF to UE)

```
SIP/2.0 488 Not Acceptable Here
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length:
```

21. ACK (UE to P-CSCF) – see example in table 10.3.5-21

UE#1 acknowledges the error response by sending an ACK request to P-CSCF#1.

Table 10.3.5-21: 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
From:
To:
Call-ID:
Cseq:
Content-Length:
```

10.4 Session redirection procedures

10.4.1 Introduction

This subclause gives signalling flows for the procedures for performing session redirection. The decision to redirect a session to a different destination may be made for different reasons by a number of different functional elements, and at different points in the establishment of the session.

Three cases of session redirection prior to bearer establishment are presented, and one case of session redirection after bearer establishment.

These cases enable the typical services of "Session Forward Unconditional", "Session Forward Busy", "Session Forward Variable", "Selective Session Forwarding", and "Session Forward No Answer", though it is important to recognise that the implementation is significantly different from the counterparts in the CS domain.

10.4.2 Session redirection initiated by S-CSCF to IM CN subsystem (MO#2, MT#2 assumed)

One of the entities in a basic session that may initiate a redirection is the S-CSCF of the destination subscriber. The subscriber profile information obtained from the HSS by the 'Cx-pull' during registration may contain complex logic and triggers causing session redirection. S-CSCF#2 sends the SIP INVITE request to the I-CSCF for the new destination (I-CSCF#F in the figure), who forwards it to S-CSCF#F, who forwards it to the new destination.

In cases when the destination subscriber is not currently registered in the IM CN subsystem, the I-CSCF may assign a temporary S-CSCF to perform the service control on behalf of the intended destination. This temporary S-CSCF takes the role of S-CSCF#2 in figure 10.4.2-1.

The service implemented by figure 10.4.2-1 is typically "Session Forward Unconditional", "Session Forward Variable" or "Selective Session Forwarding". S-CSCF#2 may also make use of knowledge of current sessions in progress at the UE, and implement "Session Forwarding Busy" in this way.

There are 9 distinct signalling flows for this session redirection, as follows:

- Single network operator performing origination, forwarding, and termination.

- One network operator performing origination and forwarding, separate network operator performing termination, with a THIG between to maintain configuration independence.

- One network operator performing origination and forwarding, separate network operator performing termination, without a THIG between.

- One network operator performing origination, second network operator performing forwarding and termination, with a THIG between to maintain configuration independence.

- One network operator performing origination, second network operator performing forwarding and termination, without a THIG between.

- One network operator performing origination, second network operator performing forwarding, and third network operator performing termination, without any THIGs between them.

- One network operator performing origination, second network operator performing forwarding, and third network operator performing termination, with a THIG between first two to maintain configuration independence

- One network operator performing origination, second network operator performing forwarding, and third network operator performing termination, with a THIG between second and third to maintain configuration independence.

- One network operator performing origination, second network operator performing forwarding, and third network operator performing termination, with a THIG between all three to maintain configuration independence.

Further, it is possible that a session will be redirected multiple times, so the above list generalizes to include multiple forwarding elements.

All of these Session-Redirection procedures can be combined with MO#1a, MO#1b, or MO#2 for session origination, and with MT#1a, MT#1b, or MT#2 for session termination.

Only the first case is shown here, with a single network operator performing origination, forwarding, and termination. The additional cases can be derived from the procedures shown here and in S-S#1a, and S-S#1b.

This case is shown in the signalling flow in figure 10.4.2-1.
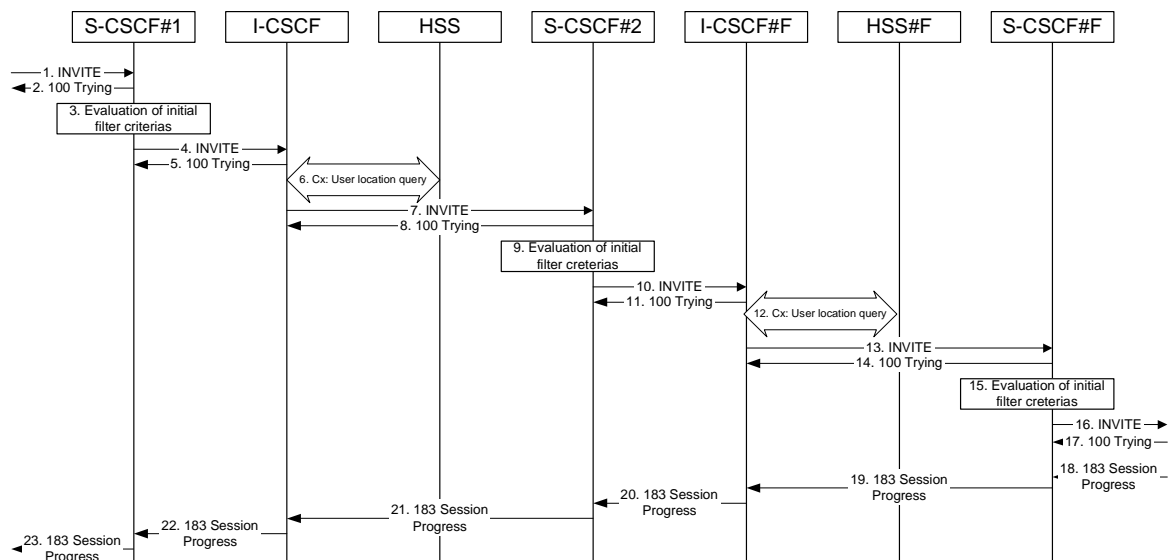
Figure 10.4.2-1: Session redirection initiated by S-CSCF to IM CN subsystem

The IM CN subsystem - Session Redirection Procedure is as follows:

1. **INVITE (MO to S-CSCF) – see example in table 10.4.2-1**

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

Table 10.4.2-1: INVITE (MO to S-CSCF)

```
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
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
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>
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
```

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

2. **100 Trying (S-CSCF to MO) – see example in table 10.4.2-2**

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

Table 10.4.2-2: 100 Trying (S-CSCF 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 servie profile of this subscriber and evaluates the intial filter criterias. For this example, assume no Application Server involvement.

4. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.2-4**

    S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the destination subscriber belongs. Since it is a destination served by the same network operator, S-CSCF#1 forwards the INVITE request directly to I-CSCF in the same network.

Table 10.4.2-4: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user2_public1@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: "John Doe" <tel:+1-212-555-1111>
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=
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.

5. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.2-5**

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

Table 10.4.2-5: 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.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. **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 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 4), which are sent to the HSS.

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.

7. **INVITE (I-CSCF to S-CSCF) – see example in table 10.4.2-7**

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

Table 10.4.2-7: INVITE (I-CSCF to S-CSCF)

```
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
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Route: <sip:scscf2.home1.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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

NOTE 1: 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 10.4.2-8**

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

Table 10.4.2-8: 100 Trying (S-CSCF to I-CSCF)

```
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
```

9. **Evaluation of initial filter criterias**

S-CSCF#2 validates the service profile of this subscriber and evaluates the initial filter criterias. Based on some service-specific criterion, S-CSCF#2 decides to redirect this session attempt to a new IM CN subsystem destination, at the URL sip:user3_public1@home1.net.

10. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.2-10**

S-CSCF#2 performs an analysis of the destination address, and determines the new destination is served by the same network operator. S-CSCF#2 forwards the INVITE request directly to I-CSCF#3 (which may be different than I-CSCF#1 consulted earlier).

Table 10.4.2-10: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user3_public1@home1.net;user=phone 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
Record-Route: <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.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=
```

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.

11. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.2-11**

I-CSCF responds to the INVITE request (10) by sending a 100 Trying provisional response to S-CSCF#1.

Table 10.4.2-11: 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
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
```

12. **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 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 10), which are sent to the HSS.

Table 7.3.2.1-6b provides the parameters sent from the HSS that need to be mapped to SIP INVITE (flow 13) and sent to S-CSCF.

13. **INVITE (I-CSCF to S-CSCF) – see example in table 10.4.2-13**

I-CSCF forwards the INVITE request to the S-CSCF (S-CSCF#3) that will handle the session termination.

Table 10.4.2-13: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user3_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf3_s.home1.net;branch=z9hG4bK87rr82.1, 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: 65
Record-Route: <sip:scscf2.home1.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
Route: <sip:scscf3.home1.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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

NOTE 2: 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.

14. **100 Trying (S-CSCF to I-CSCF) – see example in table 10.4.2-14**

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

Table 10.4.2-14: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf3_s.home1.net;branch=z9hG4bK87rr82.1, 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
```

15. **Evaluation of initial filter criterias**

> S-CSCF#3 validates the service profile of this subscriber and evaluates the initial filter criterias.

16. **INVITE (S-CSCF to MT) – see example in table 10.4.2-16**

> S-CSCF#3 forwards the INVITE request, as determined by the termination procedure. S-CSCF#3 remembers (from the registration procedure) the UE Contact address and the next hop CSCF for this UE.

Table 10.4.2-16: INVITE (S-CSCF to MT)

```
INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf3.home1.net;branch=z9hG4bKyiir82.4, SIP/2.0/UDP
icscf3_s.home1.net;branch=z9hG4bK87rr82.1, 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: 64
Record-Route: <sip:scscf3.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>
Route: <sip:pcscf3.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
P-Called-Party-ID: <sip:user3_public1@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=
```

17. **100 Trying (MT to S-CSCF) – see example in table 10.4.2-17**

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

Table 10.4.2-17: 100 Trying (MT to S-S#2)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf3.home1.net;branch=z9hG4bKyiir82.4, SIP/2.0/UDP
icscff.home1.net;branch=z9hG4bK87rr82.1, 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
```

18. **183 Session Progress (MT to S-CSCF) – see example in table 10.4.2-18**

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

Table 10.4.2-18: 183 Session Progress (MT to S-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf3.home1.net;branch=z9hG4bKyiir82.4, SIP/2.0/UDP
icscf3_s.home1.net;branch=z9hG4bK87rr82.1, 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
Record-Route: <sip:pcscf3.home1.net;lr>, <sip:scscf3.home1.net;lr>, <sip:scscf2.home1.net;lr>,
<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Smith" <tel:+1-212-555-3333>
Privacy: none
P-Charging-Vector:
From:
To: <tel:+1-212-555-2222>;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.

19. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 10.4.2-19**

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

Table 10.4.2-19: 183 Session Progress (S-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
```

```
Via: SIP/2.0/UDP icscf3_s.home1.net;branch=z9hG4bK87rr82.1, 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
Record-Route:
P-Asserted-Identity: "John Smith" <tel:+1-212-555-3333>
Privacy: none
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Supported:
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=
a=
a=
```

20. **183 Session Progress (I-CSCF to S-CSCF) – see example in table 10.4.2-20**

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

Table 10.4.2-20: 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=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
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Supported:
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=
a=
a=
```

21. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 10.4.2-21**

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

Table 10.4.2-21: 183 Session Progress (S-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
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
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Supported:
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=
```

22. **183 Session Progress (I-CSCF to S-CSCF) – see example in table 10.4.2-22**

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

Table 10.4.2-22: 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.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:
From:
To:
Call-ID:
CSeq:
Require:
Supported:
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=
```

23. **183 Session Progress (S-CSCF to MO) – see example in table 10.4.2-23**

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

Table 10.4.2-23: 183 Session Progress (S-CSCF 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:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
CSeq:
Require:
Supported:
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=
```

10.4.3 Session redirection initiated by S-CSCF to CS-domain (S-S#2, MT#2 assumed)

The S-CSCF in the scenario above may determine that the session is to be redirected to a CS-domain endpoint, or to the PSTN. It recognizes this situation by the redirected URL being a tel: URL.

For the simplest configuration (Mobile located in home service area (MO#2), initiating a session to a destination served by same network operator(S-S#2)), the handling of redirection to a tel: URL is shown in figure 10.4.3-1. Other cases, which include roaming, PSTN origination, destinations served by other network operators, and THIGs, are handled in a similar manner.

Figure 10.4.3-1: Session redirection initiated by S-CSCF to CS-Domain

Step-by-step processing is as follows:

1. **INVITE (UE to P-CSCF) – see example in table 10.4.3-1**

   UE sends the INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism.

Table 10.4.3-1: 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.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
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 keyed number from the user.

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.

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.

2. **100 Trying (P-CSCF to UE) – see example in table 10.4.3-2**

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

Table 10.4.3-2: 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 10.4.3-3**

   The P-CSCF adds itself to the Record-Route header and 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 10.4.3-3: INVITE (P-CSCF to S-CSCF)

```
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
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

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

4. **100 Trying (S-CSCF to P-CSCF) – see example in table 10.4.3-4**

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

Table 10.4.3-4: 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
```

5. **Evaluation of initial filter criterias**

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

6. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.3-6**

    S-CSCF forwards the INVITE request, as specified by the S-CSCF to S-CSCF procedures.

Table 10.4.3-6: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user2_public1@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: "John Doe" <tel:+1-212-555-1111>;
```

```
Privacy: none
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=
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.

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.3-7**

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

Table 10.4.3-7: 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
```

8. **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 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 6), which are sent to the HSS.

    Table 7.3.2.1-6b provides the parameters sent from the HSS that need to be mapped to SIP INVITE (flow 9) and sent to S-CSCF.

9. **INVITE (I-CSCF to S-CSCF) – see example in table 10.4.3-9**

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

Table 10.4.3-9: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user2_public1@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>
Route: <sip:scscf2.home1.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=
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.

10. **100 Trying (S-CSCF to I-CSCF) – see example in table 10.4.3-10**

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

Table 10.4.3-10: 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
```

11. **Evaluation of initial filter criterias**

S-CSCF#2 validates the service profile of this subscriber and evaluates the initial filter criterias. Based on some service-specific criterion, S-CSCF#2 decides to redirect this session attempt to a CS-domain endpoint, at the URL tel:+1-212-555-3333.

12. **302 Moved Temporarily (S-CSCF to I-CSCF) – see example in table 10.4.3-12**

S-CSCF#2 sends a 302 Moved Temporarily response to I-CSCF, containing the new destination.

Table 10.4.3-12: 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: <tel:+1-212-555-3333>
Content-Length: 0
```

13. **ACK (I-CSCF to S-CSCF) – see example in table 10.4.3-13**

I-CSCF acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to S-CSCF#2.

Table 10.4.3-13: ACK (I-CSCF to S-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1
Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

14. **302 Moved Temporarily (I-CSCF to S-CSCF) – see example in table 10.4.3-14**

I-CSCF sends a 302 Moved Temporarily response to S-CSCF#1, containing the new destination.

Table 10.4.3-14: 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:
Content-Length: 0
```

15. **ACK (S-CSCF to I-CSCF) – see example in table 10.4.3-15**

S-CSCF#1 acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to I-CSCF.

Table 10.4.3-15: ACK (S-CSCF to I-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
Cseq:
Content-Length:
```

16. **302 Moved Temporarily (S-CSCF to P-CSCF) – see example in table 10.4.3-16**

S-CSCF#1 sends a 302 Moved Temporarily response to P-CSCF, containing the new destination.

Table 10.4.3-16: 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
```

17. **ACK (P-CSCF to S-CSCF) – see example in table 10.4.3-17**

P-CSCF acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to S-CSCF#1.

Table 10.4.3-17: 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:
```

18. **302 Moved Temporarily (P-CSCF to UE) – see example in table 10.4.3-18**

P-CSCF sends a 302 Moved Temporarily response to UE, containing the new destination.

Table 10.4.3-18: 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
```

19. **ACK (UE to P-CSCF) – see example in table 10.4.3-19**

UE acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to P-CSCF.

Table 10.4.3-19: 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:scsf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

20. **UE initiates session in CS domain**

UE initiates a session to the new destination given in the Contact header, using mechanisms of the CS domain.

10.4.4 Session redirection initiated by S-CSCF to general endpoint (S-S#2, MT#2 assumed)

The S-CSCF in the scenario above may determine that the session is to be redirected to an endpoint outside the IMS and outside the CS-domain. Examples of these destinations include web pages, email addresses, etc. It recognizes this situation by the redirected URL being other than a sip: or tel: URL.

For the simplest configuration (Mobile located in home service area (MO#2), initiating a session to a destination served by same network operator(S-S#2)), the handling of redirection to a general URL is shown in figure 10.4.4-1. Other cases, which include roaming, PSTN origination, destinations served by other network operators, and THIGs, are handled in a similar manner.
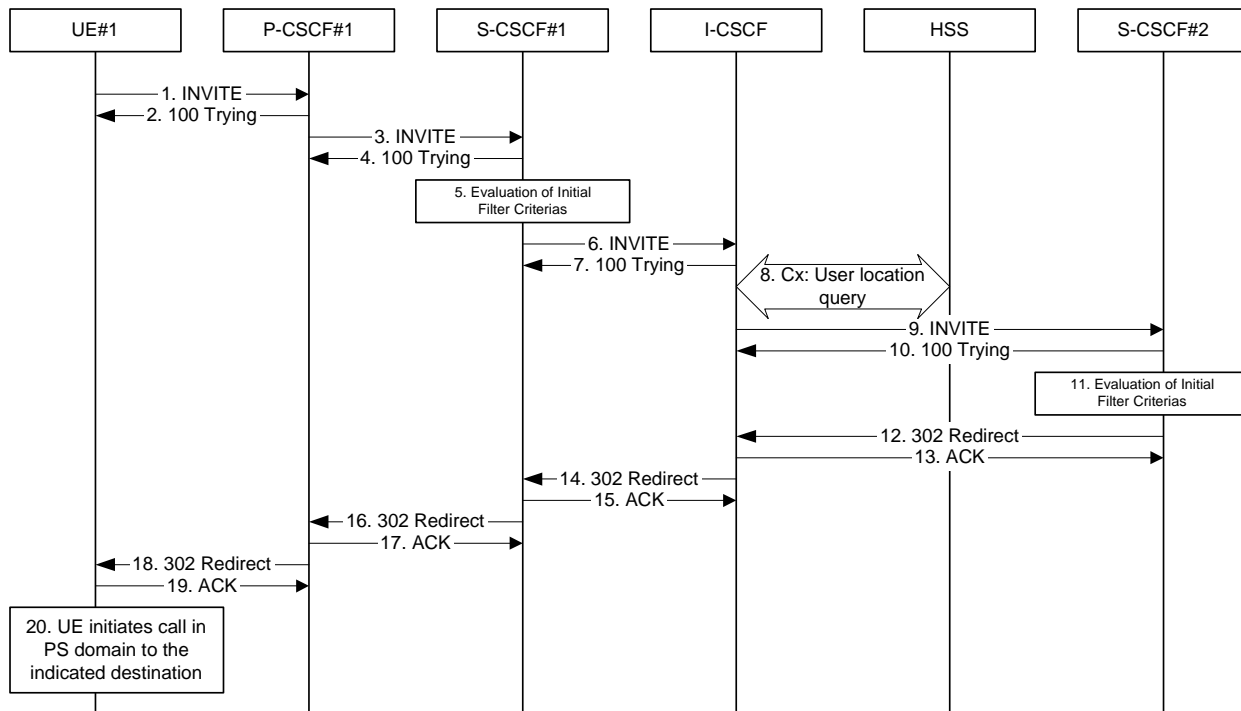
Figure 10.4.4-1: Session redirection initiated by S-CSCF to general endpoint

Step-by-step processing is as follows:

1. **INVITE (UE to P-CSCF) – see example in table 10.4.4-1**

    UE sends the INVITE request, containing an initial SDP, to the P-CSCF determined via the CSCF discovery mechanism.

Table 10.4.4-1: INVITE (UE to P-CSCF)

```
INVITE tel:+1-212-555-2222 SIP/2.0
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd];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
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 keyed number from the user.

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.

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

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.

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.

2. **100 Trying (P-CSCF to UE) – see example in table 10.4.4-2**

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

Table 10.4.4-2: 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 10.4.4-3**

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 10.4.4-3: INVITE (P-CSCF to S-CSCF)

```
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
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Require: preconditions
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.

4. **100 Trying (S-CSCF to P-CSCF) – see example in table 10.4.4-4**

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

Table 10.4.4-4: 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
```

5. **Evaluation of initial filter criterias**

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

6. **INVITE (S-CSCF to I-CSCF) – see example in table 10.4.4-6**

    S-CSCF forwards the INVITE request, as specified by the S-CSCF to S-CSCF procedures.

Table 10.4.4-6: 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.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: "John Doe" <tel:+1-212-555-1111>;
Privacy: none
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=
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.

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 10.4.4-7**

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

Table 10.4.4-7: 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
```

8. **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 7.3.2.1-6a provides the parameters in the SIP INVITE request (flow 6), which are sent to the HSS.

Table 7.3.2.1-6b provides the parameters sent from the HSS that need to be mapped to SIP INVITE (flow 9) and sent to S-CSCF.

9. **INVITE (I-CSCF to S-CSCF) – see example in table 10.4.4-9**

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

Table 10.4.4-9: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user2_public1@home2.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>
Route: <sip:scscf2.home1.net;lr>
Supported:
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=
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.

10. **100 Trying (S-CSCF to I-CSCF) – see example in table 10.4.4-10**

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

Table 10.4.4-10: 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
```

11. **Evaluation of initial filter criterias**

S-CSCF#2 validates the service profile of this subscriber and evaluates the initial filter criterias. Based on some service-specific criterion, S-CSCF#2 decides to redirect this session attempt to a PS-domain endpoint, at the URL mailto:alienblaster@home.net.

12. **302 Moved Temporarily (S-CSCF to I-CSCF) – see example in table 10.4.4-12**

S-CSCF#2 sends a 302 Moved Temporarily response to I-CSCF, containing the new destination.

Table 10.4.4-12: 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: <mailto:alienblaster@home.net>
Content-Length: 0
```

13. **ACK (I-CSCF to S-CSCF) – see example in table 10.4.4-13**

I-CSCF acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to S-CSCF#2.

Table 10.4.4-13: ACK (I-CSCF to S-CSCF)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.net;branch=z9hG4bK09a238.1
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

14. **302 Moved Temporarily (I-CSCF to S-CSCF) – see example in table 10.4.4-14**

I-CSCF sends a 302 Moved Temporarily response to S-CSCF#1, containing the new destination.

Table 10.4.4-14: 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:
Content-Length: 0
```

15. **ACK (S-CSCF to I-CSCF) – see example in table 10.4.4-15**

S-CSCF#1 acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to I-CSCF.

Table 10.4.4-15: ACK (S-CSCF to I-CSCF)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:icscf2_s.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

16. **302 Moved Temporarily (S-CSCF to P-CSCF) – see example in table 10.4.4-16**

    S-CSCF#1 sends a 302 Moved Temporarily response to P-CSCF, containing the new destination.

Table 10.4.4-16: 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
```

17. **ACK (P-CSCF to S-CSCF) – see example in table 10.4.4-17**

    P-CSCF acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to S-CSCF#1.

Table 10.4.4-17: 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:
```

18. **302 Moved Temporarily (P-CSCF to UE) – see example in table 10.4.4-18**

    P-CSCF sends a 302 Moved Temporarily response to UE, containing the new destination.

Table 10.4.4-18: 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
```

19. **ACK (UE to P-CSCF) – see example in table 10.4.4-19**

    UE acknowledges receipt of the 302 Moved Temporarily response by sending an ACK request to P-CSCF.

Table 10.4.4-19: 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.visited1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

20. **UE initiates session in PS domain**

UE initiates a session to the new destination given in the Contact header, using mechanisms of the PS domain.

10.4.5   Void

10.4.6   Void

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.
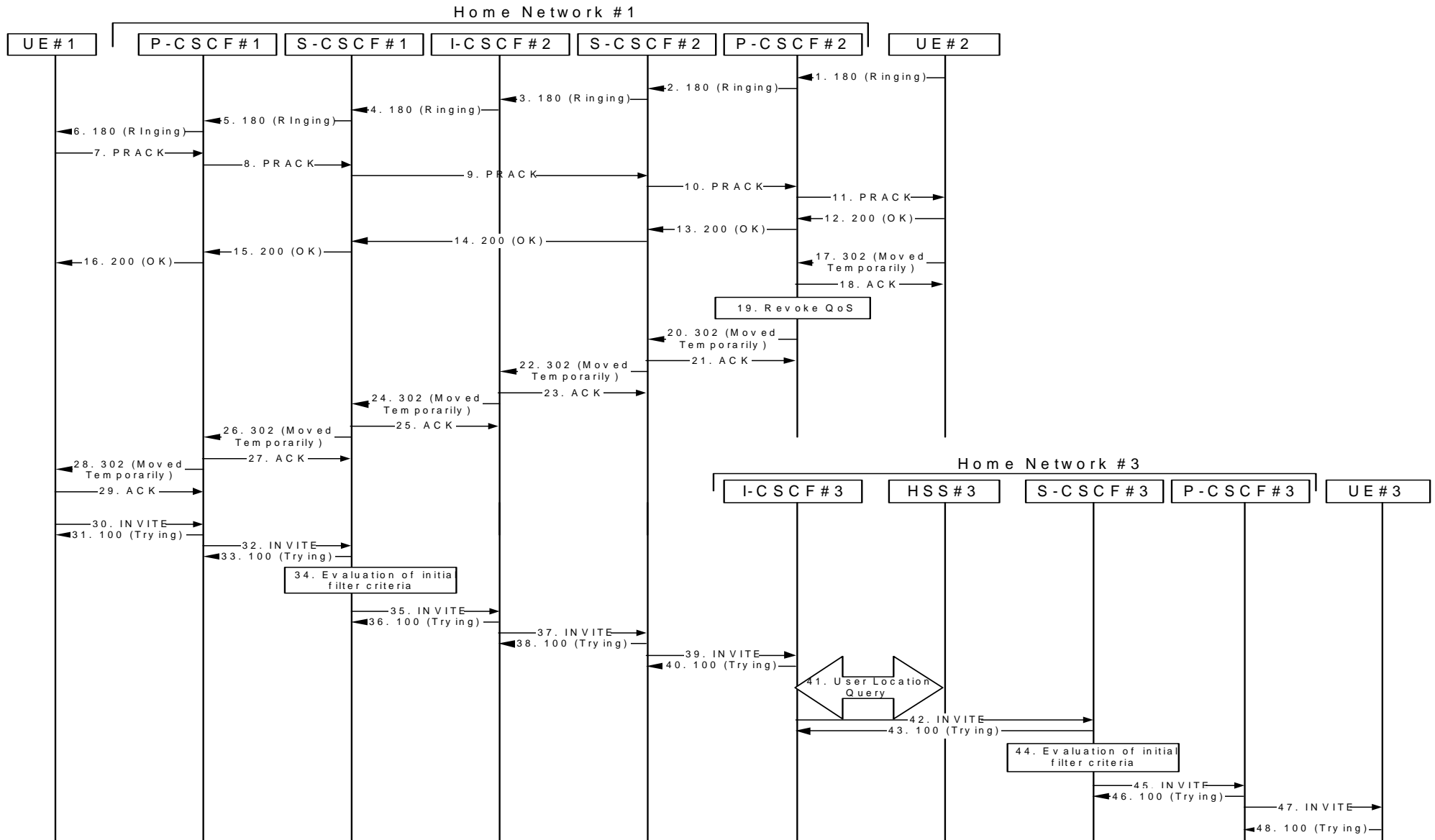
Figure 10.4.7-1: Session redirection after bearer establishment

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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=1
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**

```
SIP/2.0 302 Moved Temporarily
```

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=
```

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.

10.5   Session transfer procedures

10.5.1   Introduction

This subclause gives signalling flows for the procedures for performing session transfers. Subclause 10.5.2 gives the procedures for a transfer that initiates a new session (i.e. to a new destination not previously involved in the session) while the transferor and the transferee do not remain in the same network. Subclause 10.5.3 gives the procedures for a transfer that replaces an existing session (i.e. to a destination that was previously involved in the session) while the transferor and the transferee remain in the same network.

10.5.2   Session Transfer initiating a new session

An IM session already exists between UE#1 and UE#2. UE#2 desires UE#1 to initiate a new session to a new destination, UE#3, and terminate the existing session. The procedures for this transfer are shown in figure 10.5.2-1.
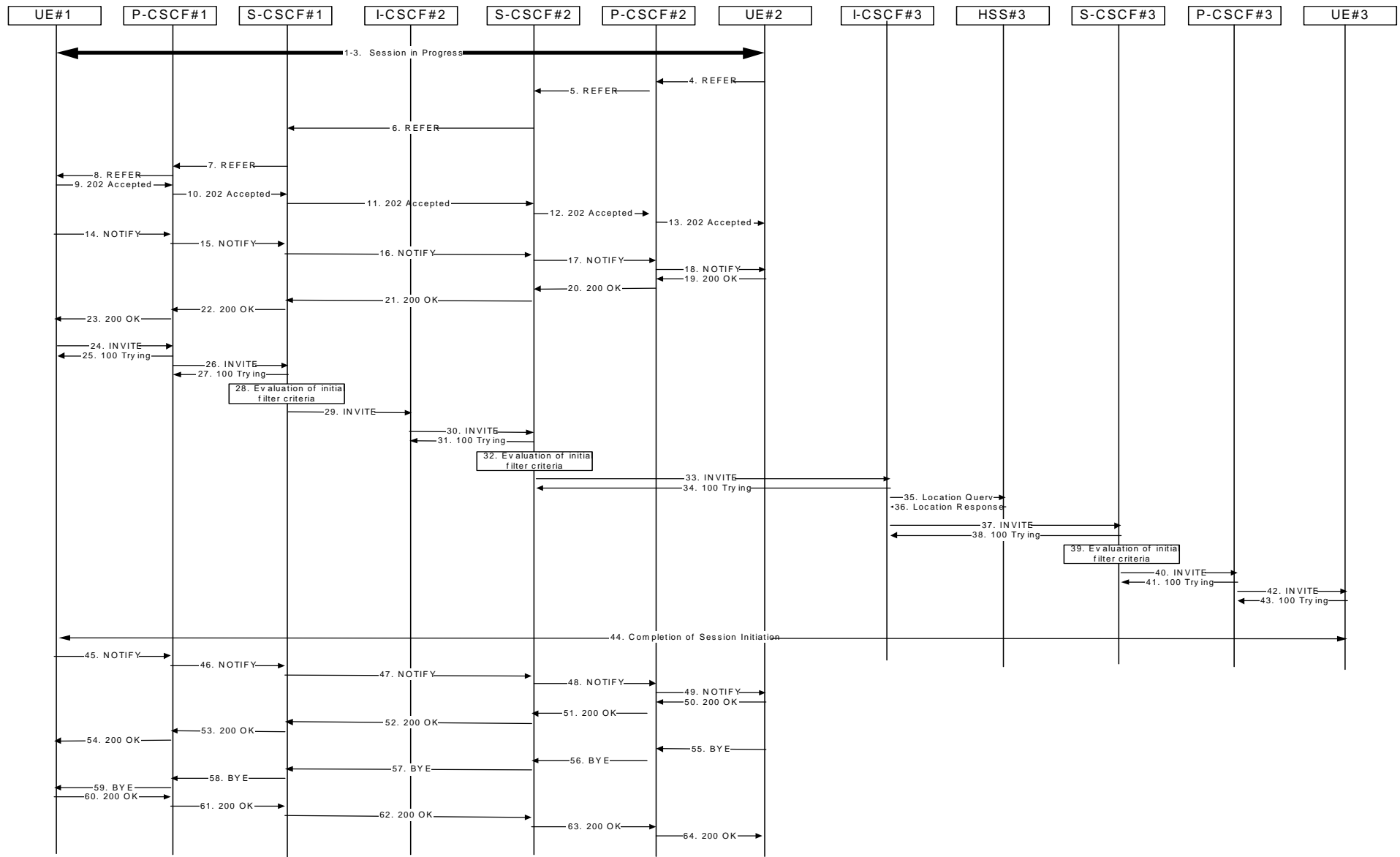
Figure 10.5.2-1: Session Transfer initiating a new session

1-3. **Session in Progress**

UE#1 initiates a multimedia session with UE#2. As a result, the state information stored at P-CSCF#2 is shown in table 10.5.2-1.

Table 10.5.2-1: State Information

```
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>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Contact(dest): <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Contact(orig): <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
```

4. **REFER (UE to P-CSCF) – see example in table 10.5.2-4**

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

Table 10.5.2-4: REFER (UE to P-CSCF)

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 70
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>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
From: <tel:+1-212-555-2222>;tag=314159
To: <sip:user1_public1@home1.net>;tag=171828
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 REFER
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c= 22334455; spi-s=11223344; port-c=6199;
port-s=5088
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Refer-To: <tel:+1-212-555-3333>
Content-Length: 0
```

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

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

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

Cseq: Next higher sequential value.

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.

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

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

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

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 69
Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Smith" <tel:+1-212-555-2222>
P-Access-Network-Info:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To:
Content-Length:
```

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

Contact: Contains a SIP URI with the IP address or FQDN of the UE.

6. **REFER (S-CSCF to S-CSCF) – see example in table 10.5.2-6**

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

Table 10.5.2-6: REFER (S-CSCF to S-CSCF)

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To: <sip:token(tel:+1-212-555-3333)@scscf2.home2.net;lr;tokenized-by=scscf2.home2.net>
Content-Length:
```

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

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

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

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 67
Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To:
Content-Length:
```

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

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

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

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net:7531;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 66
P-Asserted-Identity:
Privacy:
From:
To:
Call-ID:
Cseq:
Contact:
Refer-To:
Content-Length:
```

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

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

Table 10.5.2-9: 202 (Accepted) (UE to P-CSCF)

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf1.home1.net:7531;comp=sigcomp;branch=z9hG4bK876t12.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Content-Length: 0
```

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

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

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

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

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

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

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

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

```
REFER sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
```

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

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

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

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

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

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

13. **202-Accepted (P-CSCF to UE) – see example in table 10.5.2-13**

> P-CSCF#2 forwards the 202 (Accepted) final response to UE#2.

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

```
SIP/2.0 202 Accepted
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

14. **NOTIFY (UE to P-CSCF) – see example in table 10.5.2-14**

> UE#1 sends an immediate NOTIFY request to its proxy, P-CSCF#1.

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

```
NOTIFY 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;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
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 NOTIFY
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:8805;comp=sigcomp>
Subscription-State: active;expires=240
Event: refer
Content-Type: message/sipfrag
Content-Length: (…)

SIP/2.0 100 Trying
```

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

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

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

Cseq: Next higher sequential value.

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

15. **NOTIFY (P-CSCF to S-CSCF) – see example in table 10.5.2-15**

   P-CSCF#1 forwards the NOTIFY 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 10.5.2-15: NOTIFY (P-CSCF to S-CSCF)

```
NOTIFY 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>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
Contact:
Subscription-State:
Event:
Content-Type:
Content-Length:

SIP/2.0 100 Trying
```

16. **NOTIFY (S-CSCF to S-CSCF) – see example in table 10.5.2-16**

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

Table 10.5.2-16: NOTIFY (S-CSCF to S-CSCF)

```
NOTIFY 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:
Contact:
Subscription-State:
Event:
Content-Type:
Content-Length:

SIP/2.0 100 Trying
```

17. **NOTIFY (S-CSCF to P-CSCF) – see example in table 10.5.2-17**

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

Table 10.5.2-17: NOTIFY (S-CSCF to P-CSCF)

```
NOTIFY 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:
Event:
Contact:
Subscription-State:
Content-Type:
Content-Length:

SIP/2.0 100 Trying
```

18. **NOTIFY (P-CSCF to UE) – see example in table 10.5.2-18**

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

Table 10.5.2-18: NOTIFY (P-CSCF to UE)

```
NOTIFY sip:[5555::eee:fff:aaa:bbb]:5088;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:
Event:
Contact:
Subscription-State:
Content-Type:
Content-Length:

SIP/2.0 100 Trying
```

19. **200 (OK) (UE to P-CSCF) – see example in table 10.5.2-19**

UE#2 acknowledges receipt of the NOTIFY request (18) with a 200 (OK) final response, sent to P-CSCF#2.

Table 10.5.2-19: 200 (OK) (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net;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:
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length: 0
```

20. **200 (OK) (P-CSCF to S-CSCF) – see example in table 10.5.2-20**

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

Table 10.5.2-20: 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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

21. **200 (OK) (S-CSCF to S-CSCF) – see example in table 10.5.2-21**

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

Table 10.5.2-21: 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:
```

22. **200 (OK) (S-CSCF to P-CSCF) – see example in table 10.5.2-22**

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

Table 10.5.2-22: 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:
```

23. **200 (OK) (P-CSCF to UE) – see example in table 10.5.2-23**

    P-CSCF#1 forwards the 200 (OK) final response to UE#1.

Table 10.5.2-23: 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:
Contact:
Content-Length:
```

24. **INVITE (UE to P-CSCF) – see example in table 10.5.2-24**

    UE#1 initiates an INVITE request based on the Refer-To header URL in the REFER request. The INVITE is sent from the UE to P-CSCF#1.

Table 10.5.2-24: INVITE (UE to P-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home2.net;lr;tokenized-by=scscf2.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.home1.net:7531;comp=sigcomp;lr>, <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
```

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

25. **100 (Trying) (P-CSCF to UE) – see example in table 10.5.2-25**

P-CSCF#1 responds to the INVITE request (24) with a 100 (Trying) provisional response.

Table 10.5.2-25: 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
```

26. **INVITE (P-CSCF to S-CSCF) – see example in table 10.5.2-26**

The P-CSCF adds itself to the Record-Route header and 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.

Table 10.5.2-26: INVITE (P-CSCF to S-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home2.net;lr;tokenized-by=scscf2.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
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=
```

27. **100 (Trying) (S-CSCF to P-CSCF) – see example in table 10.5.2-27**

S-CSCF#1 responds to the INVITE request (26) with a 100 (Trying) provisional response.

Table 10.5.2-27: 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
```

28. **Evaluation of initial filter criterias**

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

29. **INVITE (S-CSCF to I-CSCF) – see example in table 10.5.2-29**

S-CSCF#1 performs an analysis of the destination address, which is a private URL generated by S-CSCF#2. S-CSCF#1 determines the network operator to whom the destination subscriber belongs. Since (for this example) the forwarding network operator does not desire to keep their internal configuration hidden, S-CSCF#1 forwards the INVITE request directly to I-CSCF#2.

Table 10.5.2-29: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home2.net;lr;tokenized-by=scscf2.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
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.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=
```

30. **INVITE (I-CSCF to S-CSCF) – see example in table 10.5.2-30**

I-CSCF#2 performs an analysis of the destination address, which is a private URL generated by S-CSCF#2. I-CSCF#2 forwards the INVITE request directly to S-CSCF#2.

Table 10.5.2-30: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:token(tel:+1-212-555-3333)@scscf2.home2.net;lr;tokenized-by=scscf2.home2.net SIP/2.0
Via: SIP/2.0/UDP sip:icscf2_s.home2.net;branch=z9hG4bK221s21.2, 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:
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=
```

NOTE 1:   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.

31. **100 (Trying) (S-CSCF to I-CSCF) – see example in table 10.5.2-31**

I-CSCF#2 responds to the INVITE request (29) by sending a 100 (Trying) provisional response to S-CSCF#1.

Table 10.5.2-31: 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.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
```

32. **Evaluation of initial filter criterias**

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

33. **INVITE (S-CSCF to I-CSCF) – see example in table 10.5.2-33**

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

S-CSCF#2 performs an analysis of the destination address, and determines the network operator to whom the destination subscriber belongs. Since (for this example) the forwarding network operator does not desire to keep their internal configuration hidden, S-CSCF#2 forwards the INVITE request directly to I-CSCF#3.

S-CSCF#2 translates the destination TEL URL (+1-212-555-3333) into a SIP URI (sip:user3_public1@home3.net).

Table 10.5.2-33: INVITE (S-CSCF to I-CSCF)

```
INVITE sip:user3_public1@home3.net 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
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy: none
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=
```

34. **100 (Trying) (I-CSCF to S-CSCF) – see example in table 10.5.2-34**

I-CSCF#3 responds to the INVITE request (33) by sending a 100 (Trying) provisional response to S-CSCF#2.

Table 10.5.2-34: 100 (Trying) (I-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
```

35. **Location Query**

I-CSCF (at the border of the terminating subscriber's network) queries the HSS for current location information. It will send "Cx-location-query" to the HSS to obtain the location information for the destination.

36. **Location Response**

HSS responds with the address of the current S-CSCF for the terminating subscriber.

37. **INVITE (I-CSCF to S-CSCF) – see example in table 10.5.2-37**

I-CSCF#3 forwards the INVITE request to the S-CSCF (S-CSCF#3) that will handle the session termination.

Table 10.5.2-37: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user3_public1@home3.net SIP/2.0
Via: SIP/2.0/UDP icscf3_s.home3.net;branch=z9hG4bK83th12.7, 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
Route: <sip:scscf3.home3.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.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=
```

NOTE 2: 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.

38. **100 (Trying) (S-CSCF to I-CSCF) – see example in table 10.5.2-38**

S-CSCF#3 responds to the INVITE request (37) with a 100 (Trying) provisional response.

Table 10.5.2-38: 100 (Trying) (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf3_s.home3.net;branch=z9hG4bK83th12.7, 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
```

39. **Evaluation of initial filter criterias**

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

40. **INVITE (S-CSCF to P-CSCF) – see example in table 10.5.2-40**

S-CSCF#3 remembers (from the registration procedure) the next hop CSCF for this UE. It forwards the INVITE request to P-CSCF#3.

Table 10.5.2-40: INVITE (S-CSCF to P-CSCF)

```
INVITE sip:[5555::aaa:bbb:ccc:fff]:9911;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf3.home3.nett;branch=z9hG4bKe3yh1k.v, SIP/2.0/UDP
icscf3_s.home3.net;branch=z9hG4bK83th12.7, 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: 64
Route: <sip:pcscf3.home3.net;lr>
Record-Route: <sip:scscf3.home3.net;lr>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
P-Called-Party-ID: <sip:user3_public1@home3.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=
```

41. **100 (Trying) (P-CSCF to S-CSCF) – see example in table 10.5.2-41**

P-CSCF#3 responds to the INVITE request (40) by sending a 100 (Trying) provisional response to S-CSCF#3.

Table 10.5.2-41: 100 (Trying) (P-CSCF to S-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf3.home3.net;branch=z9hG4bKe3yh1k.v, SIP/2.0/UDP
icscf3_s.home3.net;branch=z9hG4bK83th12.7, SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1,
SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
icscf2_s.home2.net;branch=z9hG4bK871y12.1, 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
```

42. **INVITE (P-CSCF to UE) – see example in table 10.5.2-42**

P-CSCF forwards the INVITE request to the UE.

Table 10.5.2-42: INVITE (P-CSCF to UE)

```
INVITE sip:[5555::aaa:bbb:ccc:fff]:9911;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf3.home3.net:1199;comp=sigcomp;branch=z9hG4bK523r01.2, SIP/2.0/UDP
scscf3.home3.nett;branch=z9hG4bKe3yh1k.v, SIP/2.0/UDP icscf3_s.home3.net;branch=z9hG4bK83th12.7,
SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP icscf2_s.home2.net;branch=z9hG4bK871y12.1,
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: 63
Record-Route: <sip:pcscf3.home3.net:1199;lr;comp=sigcomp>, <sip:scscf3.home3.net;lr>,
<sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Called-Party-ID:
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=
```

43. **100 (Trying) (UE to P-CSCF) – see example in table 10.5.2-43**

UE#3 may optionally send a 100 (Trying) provisional response to P-CSCF.

Table 10.5.2-43: 100 (Trying) (UE to P-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP pcscf3.home3.net:1199;comp=sigcomp;branch=z9hG4bK523r01.2
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

44. **Completion of Session Initiation**

UE#1 and UE#3 complete the session initiation, as shown in the MO, S-S, and MT procedures.

45. **NOTIFY (UE to P-CSCF) – see example in table 10.5.2-45**

When the session with UE#3 has been successfully established, UE#1 sends a NOTIFY request to its proxy, P-CSCF#1.

Table 10.5.2-45: NOTIFY (UE to P-CSCF)

```
NOTIFY 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
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 NOTIFY
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>
Subscription-State: active;expires=210
Event: refer
Content-Type: message/sipfrag
Content-Length: (…)

SIP/2.0 200 OK
```

Request-URI:	Contains the value of the Contact header from the 200 (OK) response to the initial INVITE.
Via:	Contains the IP address or FQDN of the originating UE.
From:/To:/Call-ID:	Contain the values previously used to establish the session, including the tag value from the response.
Cseq:	Next higher sequential value.
Security-Verify:	Contains the security agreement as represented by the received Security-Server header.

46. **NOTIFY (P-CSCF to S-CSCF) – see example in table 10.5.2-46**

P-CSCF#1 forwards the NOTIFY 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 10.5.2-46: NOTIFY (P-CSCF to S-CSCF)

```
NOTIFY 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>
P-Access-Network-Info:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Contact:
Subscription-State:
Event:
Content-Type:
Content-Length:

SIP/2.0 200 OK
```

47. **NOTIFY (S-CSCF to S-CSCF) – see example in table 10.5.2-47**

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

Table 10.5.2-47: NOTIFY (S-CSCF to S-CSCF)

```
NOTIFY 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:
From:
To:
Call-ID:
Cseq:
Contact:
```

```
Subscription-State:
Event:
Content-Type:
Content-Length:

SIP/2.0 200 OK
```

48. **NOTIFY (S-CSCF to P-CSCF) – see example in table 10.5.2-48**

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

Table 10.5.2-48: NOTIFY (S-CSCF to P-CSCF)

```
NOTIFY 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:
From:
To:
Call-ID:
Cseq:
Event:
Contact:
Subscription-State:
Content-Type:
Content-Length:

SIP/2.0 200 OK
```

49. **NOTIFY (P-CSCF to UE) – see example in table 10.5.2-49**

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

Table 10.5.2-49: NOTIFY (P-CSCF to UE)

```
NOTIFY 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:
Event:
Contact:
Subscription-State:
Content-Type:
Content-Length:

SIP/2.0 200 OK
```

50. **200 (OK) (UE to P-CSCF) – see example in table 10.5.2-50**

    UE#2 acknowledges receipt of the NOTIFY request (49) with a 200 (OK) final response, sent to P-CSCF#2.

Table 10.5.2-50: 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:
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length: 0
```

51. **200 (OK) (P-CSCF to S-CSCF) – see example in table 10.5.2-51**

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

Table 10.5.2-51: 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:
Contact:
Content-Length:
```

52. **200 (OK) (S-CSCF to S-CSCF) – see example in table 10.5.2-52**

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

Table 10.5.2-52: 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:
```

53. **200 (OK) (S-CSCF to P-CSCF) – see example in table 10.5.2-53**

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

Table 10.5.2-53: 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:
```

54. **200 (OK) (P-CSCF to UE) – see example in table 10.5.2-54**

P-CSCF#1 forwards the 200 (OK) final response to UE#1.

Table 10.5.2-54: 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:
```

55. **SIP BYE (UE to P-CSCF) – see example in table 10.5.2-55**

Upon receiving the notification of successful refer operation (49), UE#2 terminates the session with UE#1.

Table 10.5.2-55: SIP BYE (UE to P-CSCF)

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 70
Route: <sip:pcscf2.home2.net:5088;lr;comp=sigcomp,;lr>, <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: <tel:+1-212-555-2222>;tag=314159
To: <sip:user1_public1@home1.net>;tag=171828
Call-ID: cb03a0s09a2sdfglkj490333
Require: sec-agree
Proxy-Require: sec-agree
Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi-c= 22334455; spi-s=11223344; port-c=6199;
port-s=5088
Cseq: 131 BYE
Content-Length: 0
```

Via:	Contains the IP address or FQDN of the originating UE.
From:/To:/Call-ID:	Contain the values previously used to establish the session, including the tag value from the response. Since this request is being initiated by the destination, the From and To are reversed.
Cseq:	Next higher sequential value.
Security-Verify:	Contains the security agreement as represented by the received Security-Server header.

56. **SIP BYE (P-CSCF to S-CSCF) – see example in table 10.5.2-56**

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

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 10.5.2-56: SIP BYE (P-CSCF to S-CSCF)

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 69
Route: <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Access-Network-Info:
From:
To:
Call-ID:
Cseq:
Content-Length:
```

57. **SIP BYE (S-CSCF to S-CSCF) – see example in table 10.5.2-57**

S-CSCF#2 forwards the SIP BYE request to S-CSCF#1.

Table 10.5.2-57: SIP BYE (S-CSCF to S-CSCF)

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 68
Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
```

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
```

```
Cseq:
Content-Length:
```

58. **SIP BYE (S-CSCF to P-CSCF) – see example in table 10.5.2-58**

    S-CSCF#1 forwards the SIP BYE request to P-CSCF#1.

Table 10.5.2-58: SIP BYE (S-CSCF to P-CSCF)

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 67
Route: <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

59. **SIP BYE (P-CSCF to UE) – see example in table 10.5.2-59**

    P-CSCF#2 forwards the SIP BYE request to UE#2.

Table 10.5.2-59: SIP BYE (P-CSCF to UE)

```
BYE sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP pcscf1.home1.net:7531;comp=sigcomp;branch=z9hG4bK431h23.1, SIP/2.0/UDP
scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1,
SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
Max-Forwards: 66
From:
To:
Call-ID:
Cseq:
Content-Length:
```

60. **200 (OK) (UE to P-CSCF) – see example in table 10.5.2-60**

    UE#2 acknowledges receipt of the SIP BYE request (59) with a 200 (OK) final response, sent to P-CSCF#1.

Table 10.5.2-60: 200 (OK) (UE to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf1.home1.net:7531;comp=sigcomp;branch=z9hG4bK431h23.1, SIP/2.0/UDP
scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1,
SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp;branch=z9hG4bK834y72.2
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

61. **200 (OK) (P-CSCF to S-CSCF) – see example in table 10.5.2-61**

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

Table 10.5.2-61: 200 (OK) (P-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1, SIP/2.0/UDP
scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1,
SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
P-Access-Network-Info:
From:
```

```
To:
Call-ID:
CSeq:
Content-Length:
```

62. **200 (OK) (S-CSCF to S-CSCF) – see example in table 10.5.2-62**

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

Table 10.5.2-62: 200 (OK) (S-CSCF to S-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Content-Length:
```

63. **200 (OK) (S-CSCF to P-CSCF) – see example in table 10.5.2-63**

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

Table 10.5.2-63: 200 (OK) (S-CSCF to P-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP pcscf2.home2.net;branch=z9hG4bK876t12.1, SIP/2.0/UDP
[5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Content-Length:
```

64. **200 (OK) (P-CSCF to UE) – see example in table 10.5.2-64**

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

Table 10.5.2-64: 200 (OK) (P-CSCF to UE)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP [5555::eee:fff:aaa:bbb]:1357;comp=sigcomp;branch=z9hG4bK834y72.2
From:
To:
Call-ID:
CSeq:
Content-Length:
```

10.5.3   Session Transfer replacing an existing session

Void.

10.6 IMS Message Exchange, UEs in different networks
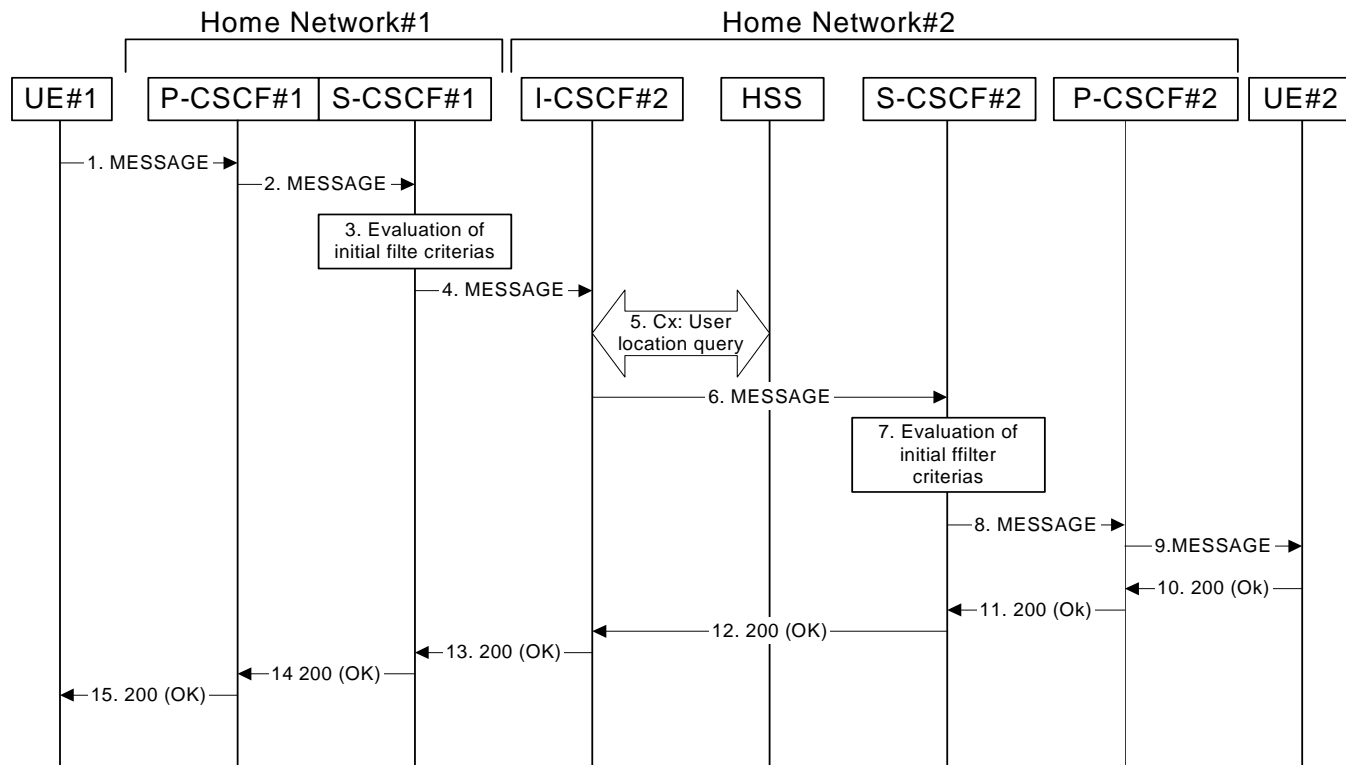
Figure 10.6-1 Message exchange, UEs in different networks

Figure 10.6-1 shows two IMS UEs exchanging a Message. The details of the flows are as follows:

1. **MESSAGE request (UE to P-CSCF#1) – see example in table 10.6-1**

    UE#1 sends the MESSAGE request to the P-CSCF.

Table 10.6-1 MESSAGE request (UE to P-CSCF#1)

```
MESSAGE 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
P-Preferred-Identity: <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
Route: <sip:pcscf1.home1.net:7531;lr;comp=sigcomp>, <sip:scscf1.home1.net;lr>
From: <sip:user1_public1@home1.net>;tag=31415
To: <sip:user2_public1@home2.net>
Call-ID: b89rjhnedlrfjflslj40a222
CSeq: 129 MESSAGE
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: text/plain
Content-Length: (…)

     The address is: 650 Route des Lucioles - Sophia Antipolis. From the airport take the A8
towards Cannes.
```

Request URI: Public user identity of the subscriber subscribes that the MESSAGE request is being sent to. In this case the Public User Identity of the user in SIP URI format.

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

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.

From: This field is populated with the SIP URI containing the logical representation (FQDN) for the entity sending the MESSAGE request.

To: Same as the Request-URI.

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

2. **MESSAGE request (P-CSCF#1 to S-CSCF#1) – see example in table 10.6-2**

The MESSAGE 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 10.6-2 MESSAGE request (P-CSCF#1 to S-CSCF#1)

```
MESSAGE sip:user2_public1@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-Asserted-Identity: <sip:user1_public1@home1.net>
P-Access-Network-Info:
Privacy:
Route: <sip:scscf1.home1.net;lr>
From:
To:
CSeq:
Content-Type:
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.

3. **Evaluation of initial filter criterias**

S-CSCF validates the service profile of this subscriber and evaluates the initial filter criteria. In this example there are no Service Points of Interest in this Request.

4. **MESSAGE request (S-CSCF#1 to I-CSCF#2) – see example in table 10.6-4**

The S-CSCF forwards the MESSAGE request to an I-CSCF in the destination network.

Table 10.6-4 MESSAGE request (S-CSCF#1 to I-CSCF#2)

```
MESSAGE sip:user2_public1@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-Asserted-Identity: <sip:user1_public1@home1.net>, <tel:+1-212-555-1111>
Privacy:
From:
To:
CSeq:
Content-Type:
Content-Length:

(…)
```

P-Asserted-Identity: S-CSCF inserts the TEL URI of the user in the P-Asserted-Identity header field.

5. **CX-User-Location Querry**

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

6. **MESSAGE request (I-CSCF#2 to SCSCF#2) – see example in table 10.6-6**

The I-CSCF forwards the MESSAGE request to the S-CSCF that serves the subscriber that the message is destined for.

Table 10.6-6 MESSAGE request (I-CSCF#2 to S-CSCF#2)

```
MESSAGE 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
P-Asserted-Identity:
Privacy:
Route: <sip:scscf2.home2.net;lr>
From:
To:
CSeq:
Content-Type:
Content-Length:

(…)
```

7. **Evaluation of initial filter criterias**

S-CSCF validates the service profile of this subscriber and evaluates the initial filter criterias. In this example there are no Service Points of Interest in this Request.

8. **MESSAGE request (S-CSCF#2 to P-CSCF#2) – see example in table 10.6-8**

The S-CSCF rewrites the Request-URI to the registered contact of the destination UE and forwards the MESSAGE request to the P-CSCF based on the Path header obtained at registration.

Table 10.6-8 MESSAGE request (S-CSCF#2 to P-CSCF#2)

```
MESSAGE 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
P-Asserted-Identity:
Privacy:
Route: <sip:pcscf2.home2.net;lr>
From:
To:
CSeq:
P-Called-Party-ID: <sip:user2_public1@home2.net>
Content-Type:
Content-Length:

(…)
```

P-Called-Party-ID: S-CSCF inserts the contents of the original Request URI in the P-Called-Party-ID header field.

9. **MESSAGE request (P-CSCF#2 to UE#2) – see example in table 10.6-9**

The S-CSCF rewrites the Request-URI to the registered contact of the destination UE and forwards the MESSAGE request to the P-CSCF based on the Path header obtained at registration.

Table 10.6-9 MESSAGE request (P-CSCF#2 to UE#2)

```
MESSAGE 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
P-Asserted-Identity:
Privacy:
From:
To:
CSeq:
P-Called-Party-ID:
Content-Type:
Content-Length:

(…)
```

10. **200 (OK) response (PS to S-CSCF) - see example in table 10.6-10**

> UE#2 sends the response to P-CSCF#2.

Table 10.6-10: 200 (OK) response (UE#2 to P-CSCF#2)

```
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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To: <sip:user1_public1@home1.net>;tag=151170
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.

11. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 10.6-11**

> P-CSCF#2 forwards the response to S-CSCF#2.

Table 10.6-11: 200 (OK) response (P-CSCF#2 to S-CSCF#2)

```
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.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:
```

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

12. **200 (OK) response (S-CSCF#2 to I-CSCF#2) - see example in table 10.6-12**

> S-CSCF#2 forwards the response to I-CSCF#2.

Table 10.6-12: 200 (OK) response (S-CSCF#2 to I-CSCF#2)

```
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
From:
To:
```

```
Call-ID:
CSeq:
Content-Length:
```

13. **200 (OK) response (I-CSCF#2 to S-CSCF#1) - see example in table 10.6-13**

   I-CSCF#2 forwards the response to S-CSCF#1.

Table 10.6-13: 200 (OK) response (I-CSCF#2 to S-CSCF#1)

```
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:
```

14. **200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 10.6-14**

   S-CSCF#1 forwards the response to P-CSCF#1.

Table 10.6-14: 200 (OK) response (S-CSCF#1 to P-CSCF#1)

```
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. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 10.6-15**

   P-CSCF#1 forwards the response to UE#1.

Table 10.6-15: 200 (OK) response (P-CSCF#1 to UE#1)

```
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:
```

11   Void

This clause is intentionally left void.

12   Void

This clause is intentionally left void.

13   Void

This clause is intentionally left void.

14 Void

This clause is intentionally left void.

15 Void

This clause is intentionally left void.

16 Signalling flows for REGISTER (hiding)

16.1 Introduction

See subclause 6.1.

16.2 Registration signalling: user not registered

Figure 16.2-1 shows the registration signalling flow for the scenario when the user is not registered. For the purpose of this 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 has network configuration hiding active.
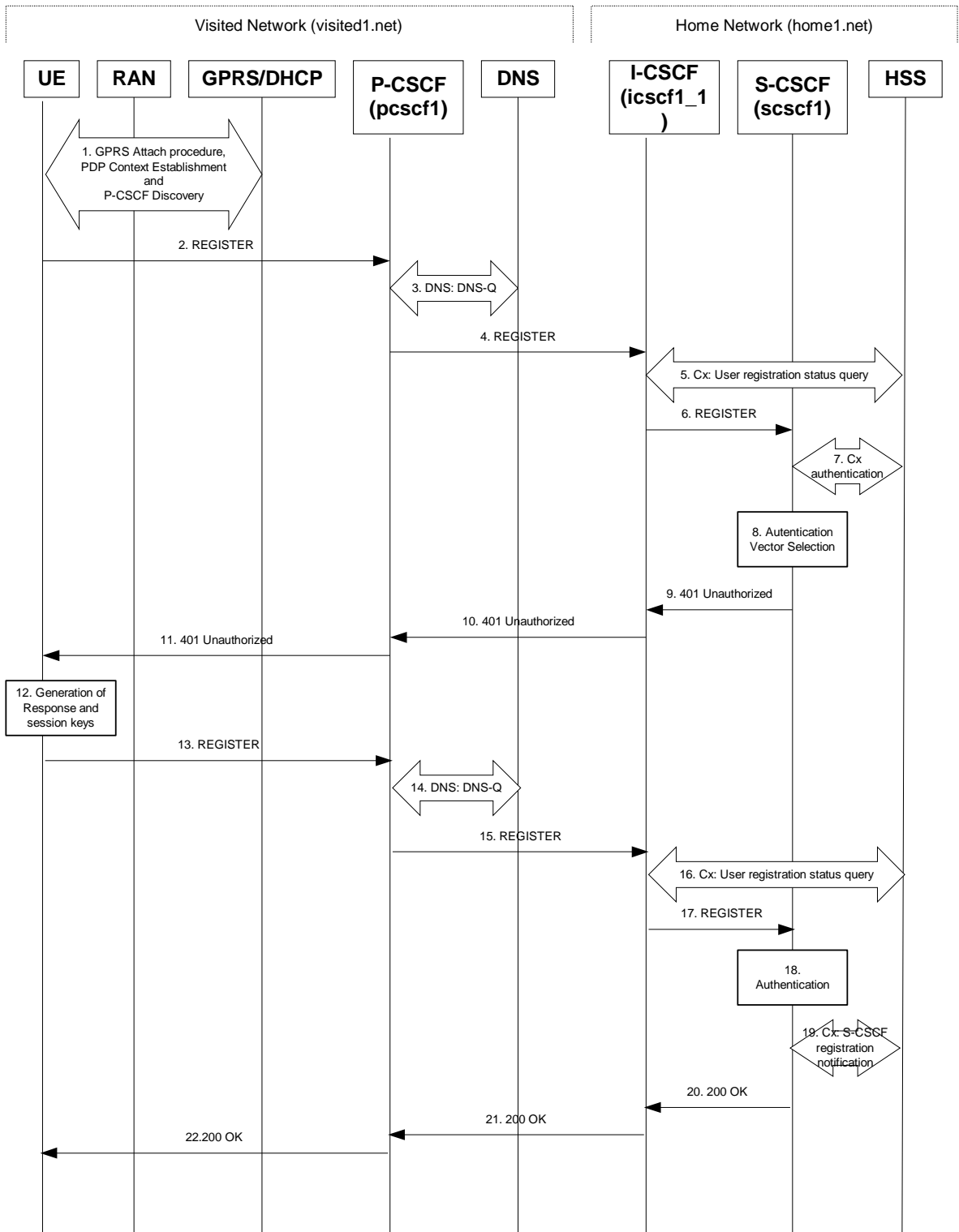
Figure 16.2-1: Registration when UE roaming

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 16.2-2**

> 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 16.2-2 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 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 the username 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 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 are not indicated, the P-CSCF performs an NAPTR query for the domain specified in the Request-URI.

Table 16.2-3a 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 16.2-3b 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 16.2-3c 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 16.2-3d DNS: 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.com
                                       0 IN SRV 1  0 5060 icscf7_p.home1.com

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 16.2-4**

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.

The P-CSCF needs to be in the path for all terminating requests for this user. To ensure this, the P-CSCF adds itself to the path for future requests.

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.

Table 16.2-4 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.

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 need to been sent to HSS.

6. **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.2-6**

   I-CSCF adds a proper I-CSCF URI to the Path header.

   This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected. The Request-URI is changed to the address of the S-CSCF.

Table 16.2-6 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: <sip:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Require:
P-Visited-Network-ID:
P-Charging-Vector:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported: path
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 these URIs for routing mobile terminated requests.

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

7. **Cx: S-CSCF 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.

For detailed message flows see 3GPP TS 29.228.

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

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 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 16.2-9**

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

Table 16.2-9: 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:
To: <sip:user1_public1@home1.net>;tag=5ef4
Call-ID:
WWW-Authenticate: Digest realm="registrar.home1.net", nonce=base64(RAND + AUTN + server specific
data), algorithm=AKAv1-MD5, ik="00112233445566778899aabbccddeeff",
ck="ffeeddccbbaa11223344556677889900"
CSeq:
```

```
Content-Length:
```

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: 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 16.2-10**

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

Table 16.2-10: 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 16.2-11**

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

Table 16.2-11: 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.

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

Upon receiving the Unauthorized 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 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 16.2-13**

Table 16.2-13 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>; tag=5ef4
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"
Require: sec-agree
Proxy-Require: sec-agree
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
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.

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 are not indicated, the P-CSCF performs an NAPTR query for the domain specified in the Request-URI.

Table 16.2-14a 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 16.2-14b 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 a DNS SRV lookup according to RFC 2782 [4].

Table 16.2-14c 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 16.2-14d 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 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.

15. **REGISTER request (P-CSCF to I-CSCF) – see example in table 16.2-15**

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.

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

Table 16.2-15 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 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 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 6.2-16a provides the parameters in the REGISTER request (flow 15) which need to been sent to HSS.

17. **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.2-17**

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

Table 16.2-17 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: <sip:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
```

```
Require:
P-Visited-Network-ID:
P-Charging-Vector:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Content-Length:
```

Path: The I-CSCF adds an I-CSCF(THIG) to the list of URIs in the Path header. The S-CSCF stores the contents of the Path headers and uses these addresses for routing mobile terminated requests.

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 parameters 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. The HSS stores the S-CSCF name for that subscriber. For a positive response, the HSS will 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 SIP REGISTER request (flow 17) which need to been sent to HSS.

20. **200 OK response (S-CSCF to I-CSCF) – see example in table 16.2-20**

The S-CSCF sends a 200 (OK) response to the I-CSCF indicating that Registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 16.2-20 200 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:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Service-Route: <sip:icscf1_p.home1.net;lr>, <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 16.2-21**

The I-CSCF translates the S-CSCF name in the Service-Route header. The I-CSCF forwards the 200 (OK) response from the S-CSCF to the P-CSCF indicating that the registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 16.2-21 200 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: <sip:icscf1_p.home1.net;lr>,
<sip:token(orig@scscf1.home1.net;lr)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
Contact:
CSeq:
Date:
P-Associated-URI:
Content-Length:
```

22. **200 OK response (P-CSCF to UE) – see example in table 16.2-22**

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 the registration was successful.

Table 16.2-22 200 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:
```

16.3 Registration signalling: reregistration – user currently registered

For the purpose of the reregistration signalling flow shown in figure 16.3-1, 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 has network configuration hiding active.

This signalling flow assumes:

1. That the same PDP Context allocated during the initial registration scenario is still used for reregistration. For the case when the UE does not still have an active PDP context then PDP context procedures from subclause 16.2 is completed first.

2. The S-CSCF selection procedure invoked by the I-CSCF is not needed.
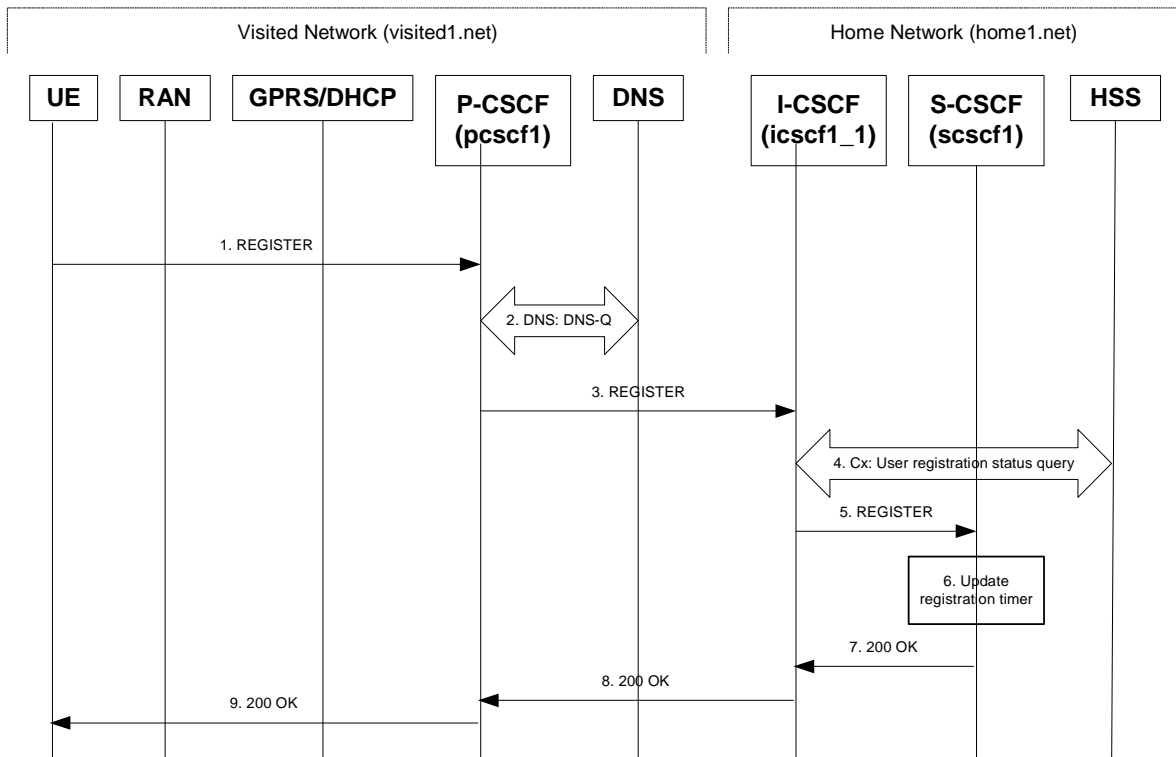
Figure 16.3-1: Reregistration when UE roaming

1. **REGISTER request (UE to P-CSCF) – see example in table 16.3-1**

> The registration expires in the UE. The UE reregisters by sending a new REGISTER request. This request is sent to the same P-CSCF with which the UE initially registered.

Table 16.3-1 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>; tag=5ef4
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: 3 REGISTER
Supported: path
Content-Length: 0
```

The header field usage is the same as for the initial registration scenario:

> **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 public user identity being registered. This is the identity by which other parties know this subscriber.

Contact: This indicates the point-of-presence for the subscriber – the IP address of the UE. This is the temporary identifier 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 P-CSCF.

Authorization: It carries authentication information. The private user identity (user1_private@home1.net) is carried in the username field of the Digest AKA protocol. As this is a re-registration process, the cached information (realm, nonce, algorithm, uri, response) is also sent.

NOTE 1: The actual nonce value in the WWW-Authenticate header field is encoded in base64, and it may look like: nonce="A34Cm+Fva37UYWpGNB34JP"

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 ("home1.net") into an address or entry point into the home operator's network (the I-CSCF). This information is stored in the USIM.

Security-Client: Lists the supported algorithm(s) by the UE. The values spi-c, spi-s, port-c and port-s are new parameter values and will not be used for security association setup in case the request is answered with 200 (OK).

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

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 detect that it already has a registration record for this UE and will reset it's SIP registration timer for this UE to the Expires time in this request.

2. **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 DNS provides the P-CSCF with an address of the I-CSCF in the home network. The P-CSCF must not use the I-CSCF address cached as a result of the previous registration.

3. **REGISTER request (P-CSCF to I-CSCF) – see example in table 16.3-3**

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 16.3-3 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
P-Access-Network-Info:
Max-Forwards: 69
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: path
Content-Length:
```

Path: This is the P-CSCF URI 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.

4. **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. Because the user has registered, the HSS returns the I-CSCF with the S-CSCF address for the subscriber

For detailed message flows see 3GPP TS 29.228.

For the parameters in the REGISTER request (flow 3), which are sent to the HSS, see table 6.2-5a.

Table 6.3-4a provides the parameters in the SIP REGISTER request (flow 5), which are obtained from the information sent back from the HSS.

5. **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.3-5**

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected. The Request-URI is changed to the address of the S-CSCF.

I-CSCF adds a proper I-CSCF name to the Path header.

Table 16.3-5 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
P-Access-Network-Info:
Max-Forwards: 68
Path: <sip:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Require:
P-Visited-Network-ID:
P-Charging-Vector:
From:
To:
Contact:
Authorization:
Call-ID:
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 these URIs for routing mobile terminated requests.

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

Upon receiving this request the S-CSCF will detect that it already has a registration record for this UE and will reset it's SIP registration timer for this UE to the Expires time in this request.

6. **Update registration timer**

As the REGISTER request arrived integrity protected, the S-CSCF does not need to challenge the user, but just update the registration timer to the value requested by the user (if the policy of the network allows it).

NOTE: The S-CSCF is allowed to challenge the user. If S-CSCF decides to challenge the user, the call flow will be similar to the one presented in section 16.2.

7. **200 OK response (S-CSCF to I-CSCF) – see example in Table 16.3-7**

The S-CSCF sends a 200 (OK) response to the I-CSCF indicating that Registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 16.3-7 200 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:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Service-Route: <sip:icscf1_p.home1.net;lr>, <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 value that includes a URI of an I-CSCF (THIG) and its own URI including a character string in the user part to differentiate mobile originating requests from mobile terminating requests.

8. **200 OK response (I-CSCF to P-CSCF) – see example in Table 16.3-8**

The I-CSCF translates the S-CSCF name in the Service-Route header. The I-CSCF forwards the 200 (OK) response from the S-CSCF to the P-CSCF indicating that Registration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 16.3-8 200 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: <sip:icscf1_p.home1.net;lr>, <sip:token(scscf1.home1.net;lr)@home1.net;tokenized-
by=home1.net>
From:
To:
Call-ID:
Contact:
CSeq:
Date:
P-Associated-URI:
Content-Length:
```

9. **200 OK response (P-CSCF to UE) – see example in Table 16.3-9**

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 the registration was successful.

Table 16.3-9 200 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:
```

16.4 Registration signalling: mobile initiated deregistration

Figure 16.4-1 shows a signalling flow for mobile initiated deregistration. For the purposes of this deregistration signalling flow, the subscriber is considered to be roaming. In this signalling flow, the home network has configuration hiding active.

This signalling flow assumes:

1. That the same PDP Context allocated during the initial registration scenario is still used for deregistration. For the case when the UE does not still have an active PDP context then PDP context procedures from subclause 16.2 must first be completed.

2. The procedure employed for P-CSCF discovery is not needed.

3. The S-CSCF selection procedure invoked by the I-CSCF is not needed.
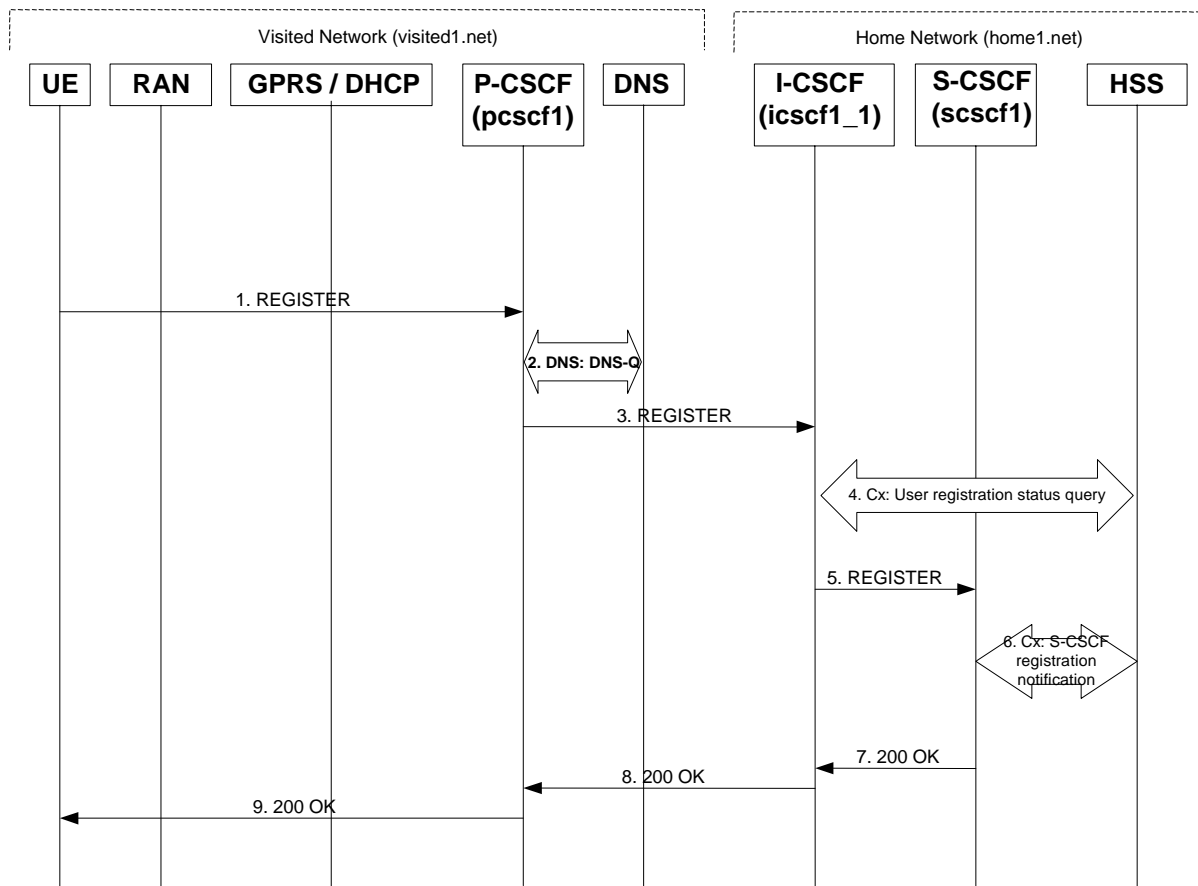
Figure 16.4-1: Registration signalling: mobile initiated deregistration

1. **REGISTER request (UE to P-CSCF) – see example in table 16.4-1**

    The UE intends to de-register itself. It does so by sending a new REGISTER request. This request looks similar as in reregister case, but the Expires header contains zero. This request is sent to the same P-CSCF with which the UE initially registered.

Table 16.4-1 REGISTER (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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Max-Forwards: 70
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=0
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"
CSeq: 7 REGISTER
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
Supported: path
Content-Length: 0
```

The header field usage is the same as for the initial registration scenario:

> **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 public user identity. This is the identity by which other parties know this subscriber.

> **Contact:** This indicates the point-of-presence for the subscriber – the IP address of the UE. This is the temporary identifier for the subscriber that is being de-registered. The 0 value of the expires parameter indicates the registration is being cancelled.

> **Authorization:** It carries authentication information. The private user identity is carried in the usernamed field of the Digest AKA protocol. The deregistration process also includes the cached information (realm, nonce, algorithm, uri, response).

> **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 ("home1.net") into an address or entry point into the home operator's network (the I-CSCF). This information is stored in the USIM.

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

> **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 reset the SIP registration timer for this UE to 0.

2. **DNS: DNS-Q**

> Based on the user's URI, the P-CSCF determines that UE is registering from a visiting domain and performs a DNS query 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 DNS provides the P-CSCF with an address of the I-CSCF in the home network. The P-CSCF must not use the I-CSCF address cached as a result of the previous registration.

3. **REGISTER request (P-CSCF to I-CSCF) – see example in table 16.4-3**

> 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-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 16.4-3 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
P-Access-Network-Info:
Max-Forwards: 69
Path: <sip:term@pcscf1.visited1.net;lr>
Require: path
P-Visited-Network-ID: "Visited Network Number 1"
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 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.

4. **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. Because the user has registered, the HSS returns the I-CSCF with the S-CSCF address for the subscriber

For detailed message flows see 3GPP TS 29.228.

For the parameters in the SIP REGISTER request (flow 3) which are sent to the HSS, see table 6.2-5a.

Table 6.3-4a provides the parameters in the SIP REGISTER request (flow 5) which are obtained from the information sent back from the HSS.

5. **REGISTER (I-CSCF to S-CSCF) – see example in table 16.4-5**

I-CSCF adds a proper I-CSCF name to the Path header.

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected. The Request-URI is changed to the address of the S-CSCF.

Table 16.4-5 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
P-Access-Network-Info:
Max-Forwards: 68
Path: <sip:icscf1_p.home1.net;lr> <sip:term@pcscf1.visited1.net;lr>
Require:
P-Visited-Network-ID:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Expires:
Content-Length:
```

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

Upon receiving this request the S-CSCF will reset the SIP registration timer for this UE to 0.

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

The S-CSCF informs the HSS that the user is no longer registered and 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.

For the parameters in the SIP REGISTER request (flow 5), which are sent to the HSS, see table 6.2-7a.

7. **200 OK (S-CSCF to I-CSCF) – see example in table 16.4-7**

The S-CSCF sends a 200 (OK) response to the I-CSCF indicating that deregistration was successful. This request will traverse the path that the REGISTER request took as described in the Via list. The S-CSCF clears its information for that subscriber.

Table 16.4-7 200 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:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Service-Route: <sip:icscf1_p.home1.net;lr>, <sip:orig@scscf1.home1.net;lr>
From:
To: <sip:user1_public1@home1.net>
Call-ID: apb03a0s09dkjdfglkj49111
Contact: <sip:[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp>;expires=0
CSeq: 3 REGISTER
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: 0
```

8. **200 OK (I-CSCF to P-CSCF) – see example in table 16.4-8**

The I-CSCF forwards the 200 (OK) response from the S-CSCF to the P-CSCF indicating that deregistration was successful. This response will traverse the path that the REGISTER request took as described in the Via list.

Table 16.4-8 200 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: <sip:icscf1_p.home1.net;lr>, <sip:token(scscf1.home1.net;lr)@home1.net;tokenized-
by=home1.net>
From:
To:
Call-ID:
Contact:
CSeq:
Date:
P-Associated-URI:
Content-Length:
```

9. **200 OK (P-CSCF to UE) – see example in table 16.4-9**

The P-CSCF forwards the 200 (OK) response from the I-CSCF to the UE indicating that deregistration was successful. The P-CSCF clears its information for that subscriber after sending the acknowledgement to the UE.

Table 16.4-9 200 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:
```

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.
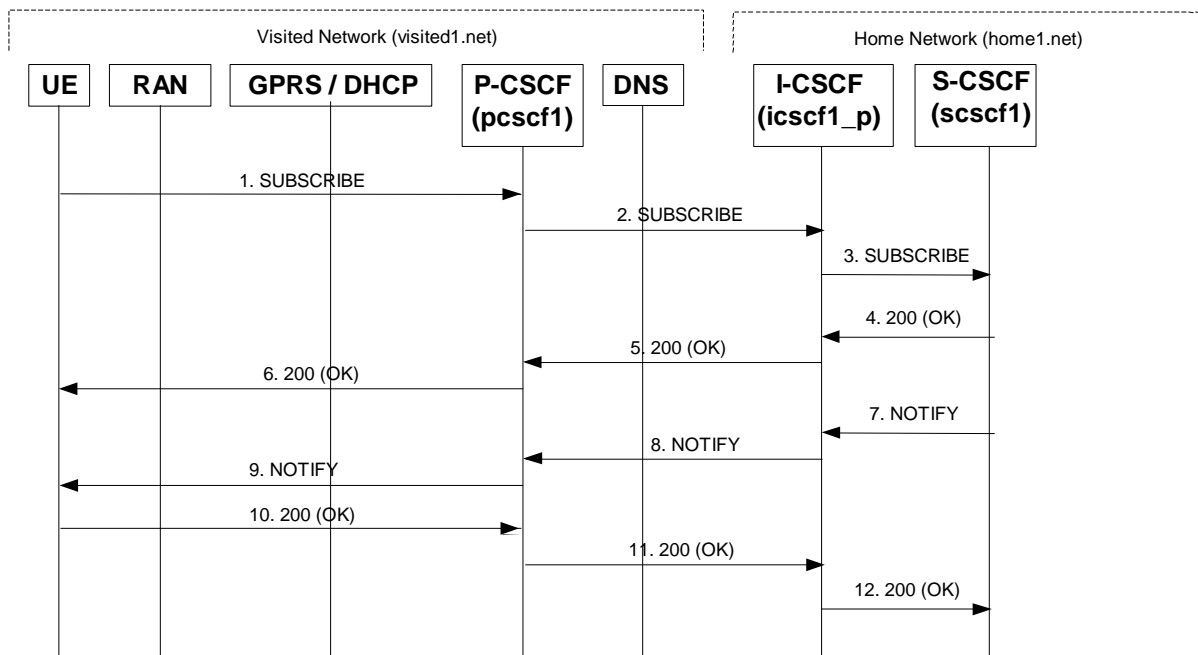
**Figure 16.5-1: UE subscription for the registration state event package
(with I-CSCF providing configuration independence)**

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">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
        <contact id="77" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="tel:+358504821437" id="a9" state="active">
        <contact id="78" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </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.

```
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:
```

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.
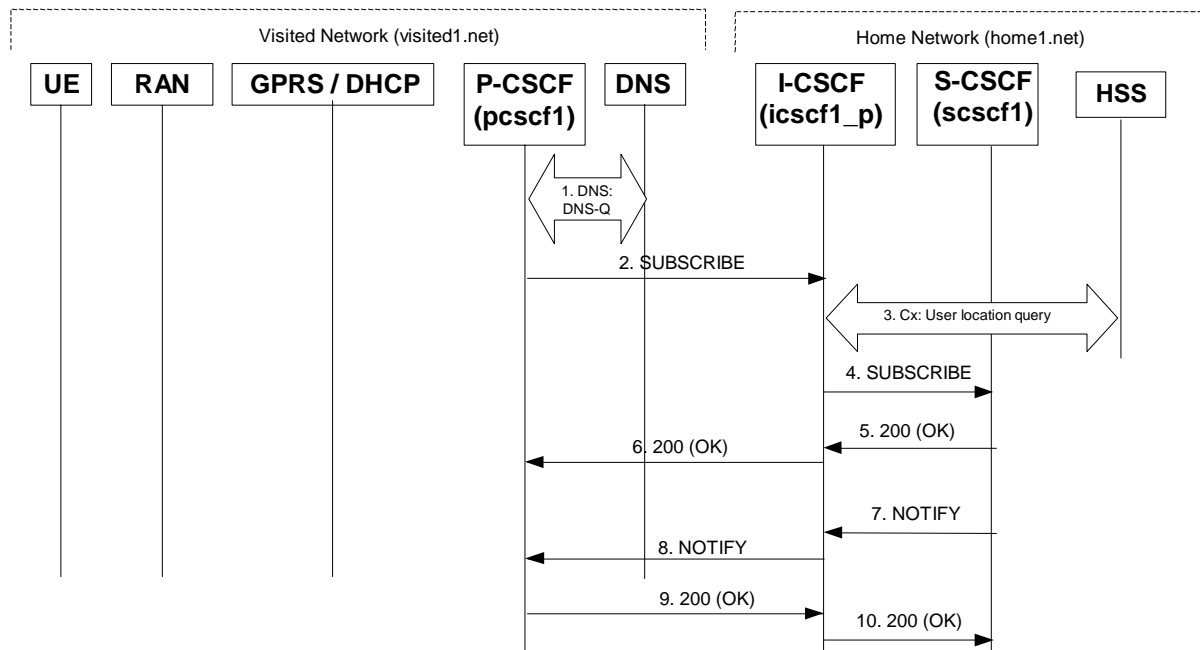
**Figure 16.6-1: P-CSCF subscription for the registration state event package
(with I-CSCF providing configuration independence)**

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">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="sip:user1_public2@home1.net" id="a8" state="active">
        <contact id="77" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </contact>
    </registration>
    <registration aor="tel:+358504821437" id="a9" state="active">
        <contact id="78" state="active" event="created">sip:[5555::aaa:bbb:ccc:ddd]
        </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:
```

16.7 Notifying of the network initiated deregistration event (not provided)

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.
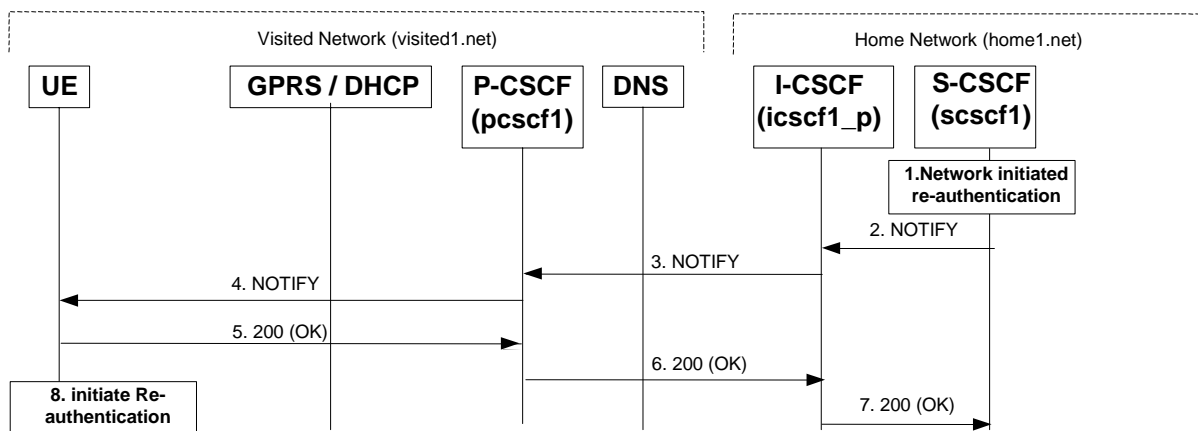
**Figure 16.8-1: S-CSCF informs UE that network initiated re-authentication is needed
(with I-CSCF providing configuration independence)**

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">sip:[5555::aaa:bbb:ccc:ddd]
     </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.

ETSI

8. **Re-authentication (UE)**

    The UE now initiates the re-authentication procedures.

16.9 Registration error conditions

16.9.1 Reregistration – failure of reregistration

This signalling flow (see figure 16.9.1-1) is a continuation of the signalling flow in subclause 16.3 after reception of signalling flow 4. This signalling flow shows the recovery after a failure of the S-CSCF that had been assigned to the subscriber in a previous registration.
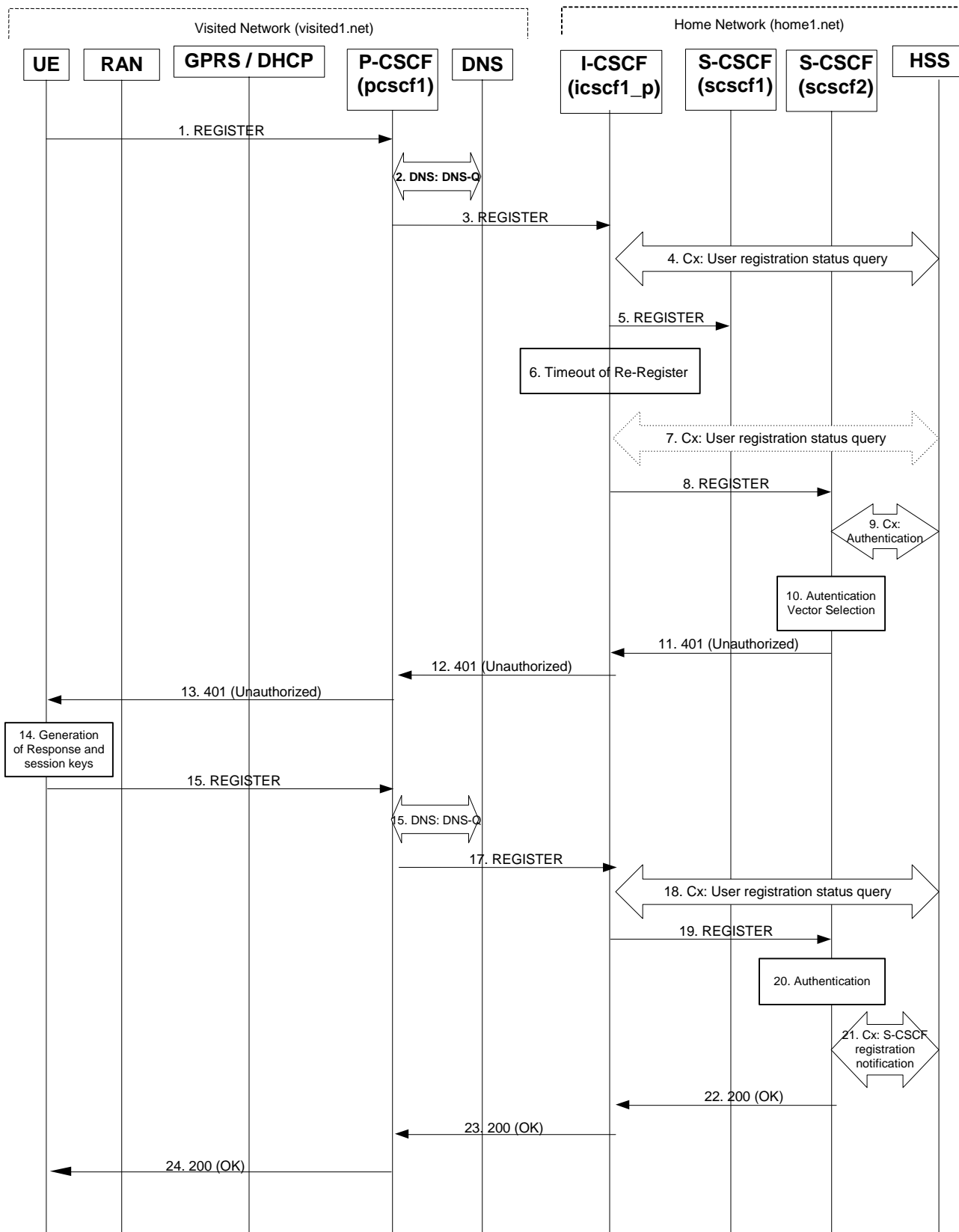
Figure 16.9.1-1: Failure of previous S-CSCF during reregistration

Steps 1 through 4 are the same as the signalling flow in subclause 16.3.

5 **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.9.1-5**

This signalling flow forwards the REGISTER request from the I-CSCF to the S-CSCF selected. The Request-URI is changed to the address of the S-CSCF.

I-CSCF adds a proper I-CSCF name to the Path header.

Table 16.9.1-5 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
P-Access-Network-Info:
Max-Forwards: 68
Path: <sip:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Require: path
P-Visited-Network-ID: "Visited Network Number 1"
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:registar.home1.net",
response="0a1b04c89e54f09ab45e84d30e29f83a", integrity-protected="yes"
CSeq: 10 REGISTER
Supported: path
Content-Length: 0
```

6 **Timeout of reregister**

The I-CSCF times out, waiting for the response from the S-CSCF.

7 **Cx: User registration status query (Optional)**

The I-CSCF informs the HSS that the S-CSCF for the subscriber is unreachable and requests information related to the required S-CSCF capabilities from the HSS, The HSS sends the capability information required for S-CSCF selection. The I-CSCF uses this information to select a suitable S-CSCF.

This step is optional. Depending on implementation, sufficient information may be available to the I-CSCF from Step 4, to allow the I-CSCF select an alternate S-CSCF. Alternative mechanisms (for example a CSCF management plane) would be used to enable the HSS learn of S-CSCF failure. In addition, the HSS will learn about the assignment of a new S-CSCF in Step 9.

8 **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.9.1-8**

This signalling flow forwards the REGISTER request from the I-CSCF to the newly selected S-CSCF. The Request-URI is changed to the address of the new S-CSCF.

Table 16.9.1-8 REGISTER request (I-CSCF to S-CSCF)

```
REGISTER sip:scscf2.home1.net SIP/2.0
Via:
P-Access-Network-Info:
Max-Forwards: 68
Path:
Require:
P-Visited-Network-ID:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Content-Length:
```

The next ten steps (9 to 18) are the same as in the normal reregistration case (steps 6 to 12 in subclause 16.3).

19. **REGISTER request (I-CSCF to S-CSCF) – see example in table 16.9.1-19**

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

Table 16.9.1-19 REGISTER request (I-CSCF to S-CSCF)

```
REGISTER sip:scscf2.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: <sip:icscf1_p.home1.net;lr>, <sip:term@pcscf1.visited1.net;lr>
Require:
P-Visited-Network-ID:
From:
To:
Contact:
Call-ID:
Authorization:
CSeq:
Supported:
Content-Length:
```

Path: The S-CSCF stores the contents of the Path header and uses these URIs for routeing mobile terminated sessions.

The remaining steps (20-25) are the same as in the normal reregistration case (steps 17-22 in subclause 16.3)

17 Signalling flows for session initiation (hiding)

17.1 Introduction

See subclause 7.1.

17.2 Origination Procedures

17.2.1 Introduction

See subclause 7.2.1.

17.2.2 MO#1b

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.
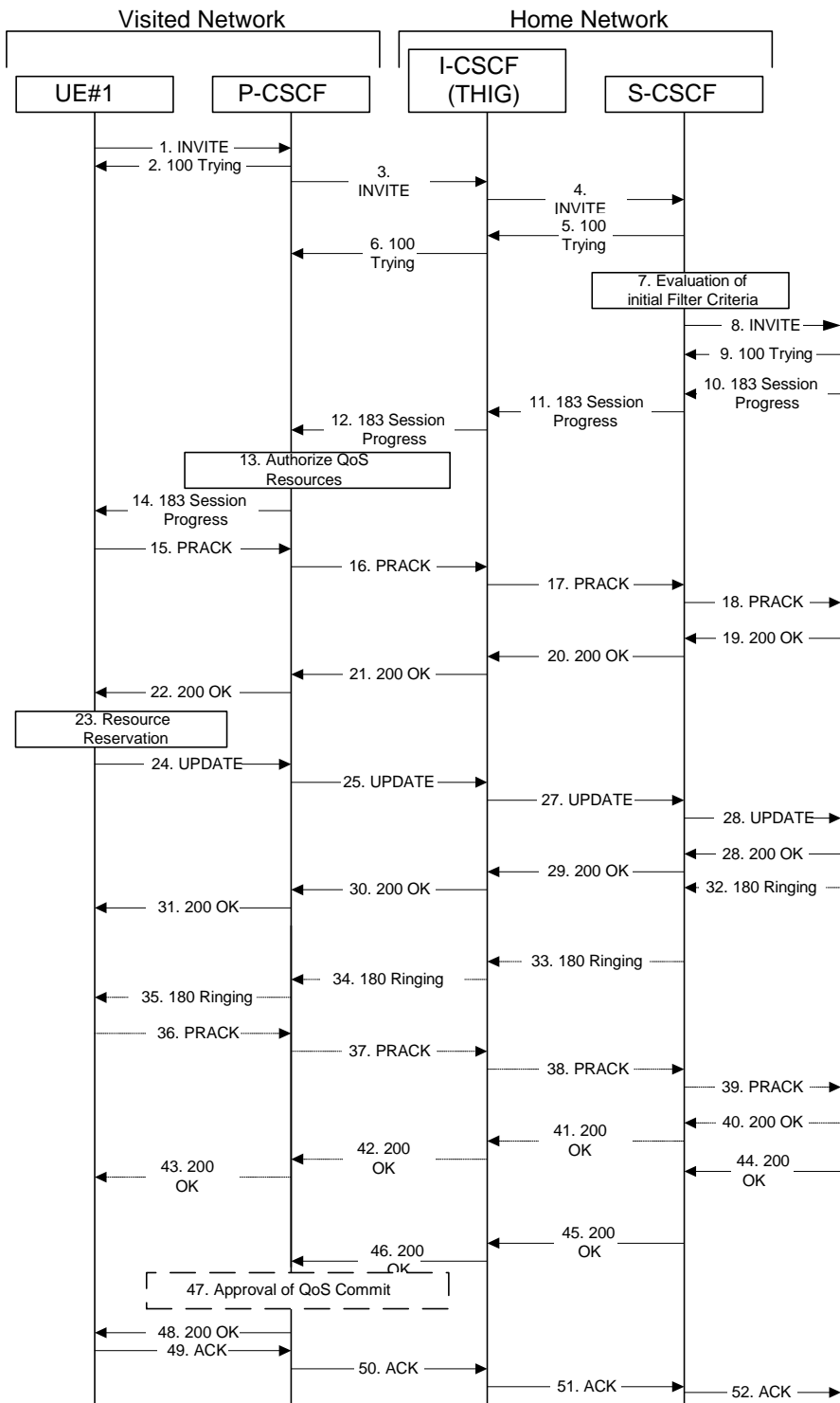
Figure 17.2.2.1-1: MO#1b

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=
```

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
```

ETSI

```
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=
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: 0020000100100101706466312e76697369746564322e6e6574000c02013942563330373200
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=
```

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=
```

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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=1
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=
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:
```

17.2.2.2   Failure in termination procedure

The roaming subscriber that initiated a session with procedure MO#1b had the attempt fail due to an error detected in the Termination procedure or in the S-CSCF-to-S-CSCF procedure. This could be due to, for example, destination busy (error code 486), destination service denied (error code 403), destination currently out of coverage (error code 480), or some other error.

Depending on the exact error that causes the session initiation failure, and when the error situation was detected, UE#1 could be at many different stages in the session establishment procedure. This is shown in figure 17.2.2.2-1, as optional messages 7-43 that may appear in this error procedure.
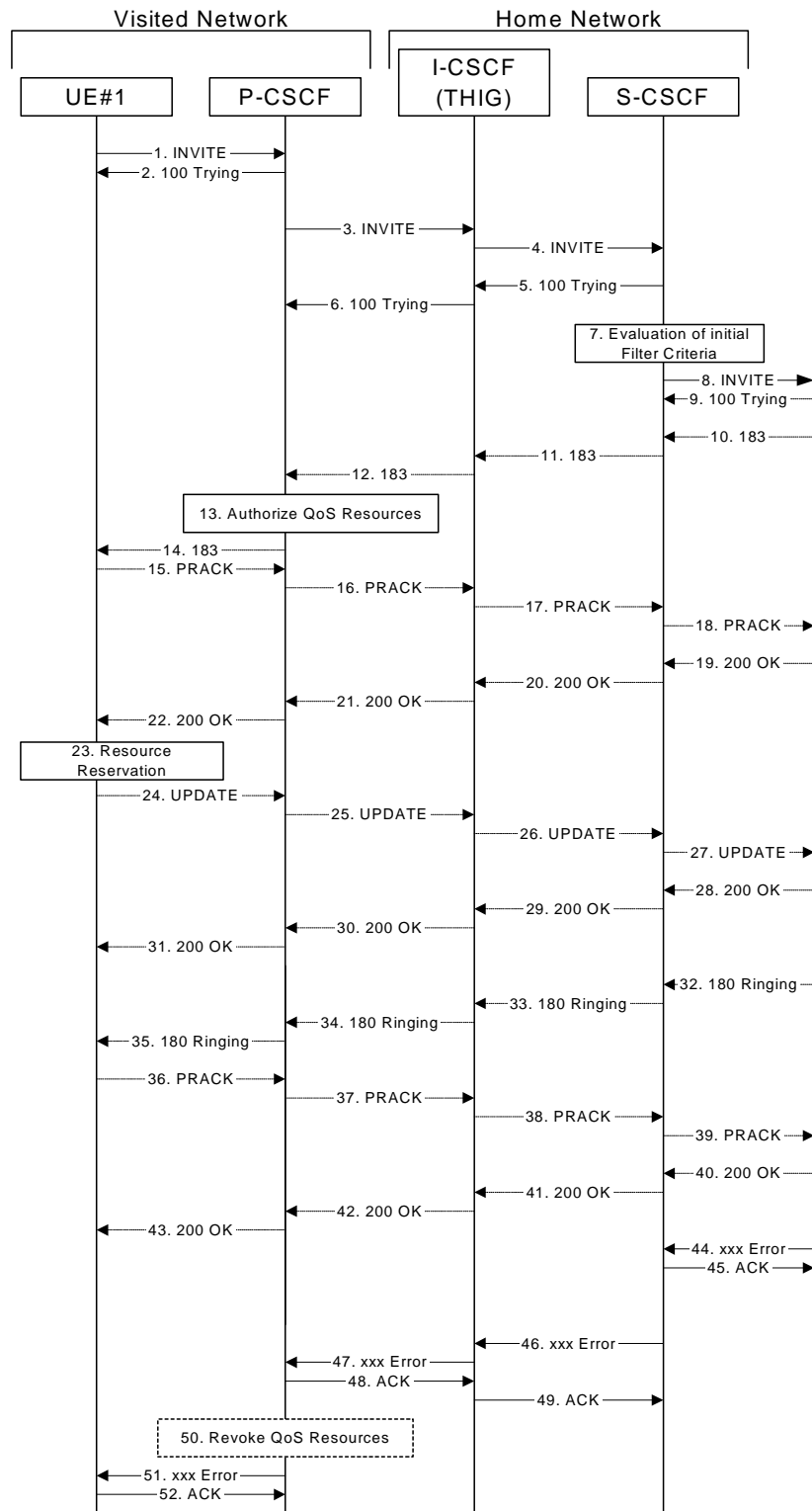
Figure 17.2.2.2-1: Failure in termination procedure

1-8. **INVITE (UE to P-CSCF) et seq**

UE#1 initiated a session, as described in subclause 117.2.2.1.

9-43. **100 Trying (S-S to MO#1b) et seq**

Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 117.2.2.1.

44. **xxx Error (S-S to MO#1b) – see example in table 17.2.2.2-44 (related to 17.2.2.2-8)**

The termination procedure detected some error situation, and returned a SIP error response.

NOTE 1: The error response may be, for example, "486 (Busy Here)", "403 (Service Denied)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 17.2.2.2-44: 486 Busy Here (S-S to MO#1b)

```
SIP/2.0 486 Busy Here
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: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Retry-After: 3600
Content-Length: 0
```

45. **ACK (MO#1a to S-S) – see example in table 17.2.2.2-45**

Upon receive the 486 response from the S-S procedure, S-CSCF sends ACK.

Table 17.2.2.2-45: ACK (MO#1a to S-S)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

46. **xxx Error (S-CSCF to P-CSCF) – see example in table 17.2.2.2-46 (related to 17.2.2.2-44)**

The S-CSCF returned a SIP error response to I-CSCF.

NOTE 2: The error response may be, for example, "486 (Busy Here)", "403 (Service Denied)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 17.2.2.2-46: 486 Busy Here (S-CSCF to I-CSCF)

```
SIP/2.0 486 Busy Here
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:
Retry-After:3600
Content-Length: 0
```

47. **xxx Error (I-CSCF to P-CSCF) – see example in table 17.2.2.2-47**

The I-CSCF returned a SIP error response to P-CSCF.

NOTE 3: The error response may be, for example, "486 (Busy Here)", "403 (Service Denied)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 17.2.2.2-47: 486 Busy Here (S-CSCF to I-CSCF)

```
SIP/2.0 486 Busy Here
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:
Retry-After:3600
Content-Length: 0
```

48. **ACK (P-CSCF to I-CSCF) – see example in table 17.2.2.2-48**

      Upon receive the 486 response from the I-CSCF, P-CSCF sends ACK.

Table 17.2.2.2-48: ACK (P-CSCF to I-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>)@home1.net;tokenized-
by=home1.net>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

49. **ACK (I-CSCF to S-CSCF) – see example in table 17.2.2.2-49**

      Upon receive the 486 response from the P-CSCF, I-CSCF sends ACK.

Table 17.2.2.2-49: ACK (I-CSCF to S-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

50. **Revoke QoS authorization**

      P-CSCF removes the QoS authorization, if any, for this session.

51. **xxx Error (P-CSCF to UE) – see example in table 17.2.2.2-51 (related to 17.2.2.2-47)**

      The P-CSCF returned a SIP error response to UE.

  NOTE 4: The error response may be, for example, "486 (Busy Here)", "403 (Service Denied)", "480 (Temporarily Unavailable)", or others. For this example, "486 (Busy Here)" is shown.

Table 17.2.2.2-51: 486 Busy Here (P-CSCF to UE)

```
SIP/2.0 486 Busy Here
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Retry-After:3600
Content-Length: 0
```

52. **ACK (UE to P-CSCF) – see example in table 17.2.2.2-52**

      Upon receive the 486 response from the P-CSCF, UE sends ACK.

Table 17.2.2.2-52: ACK (UE to P-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
```

```
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
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>
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

17.2.2.3   Session abandoned, or resource failure

The roaming subscriber that initiated a session with procedure MO#1b either abandoned the attempt, or was unable to obtain the resources necessary for the session. The signalling flow for this error handling is shown in figure 17.2.2.3-1.

If the session is aborted due to failure to obtain resources, it will occur at step #23 in the signalling flow; steps 24-43 (marked as optional) will not be present. If the session is abandoned due to user command, it can happen at any point between steps 10-43.
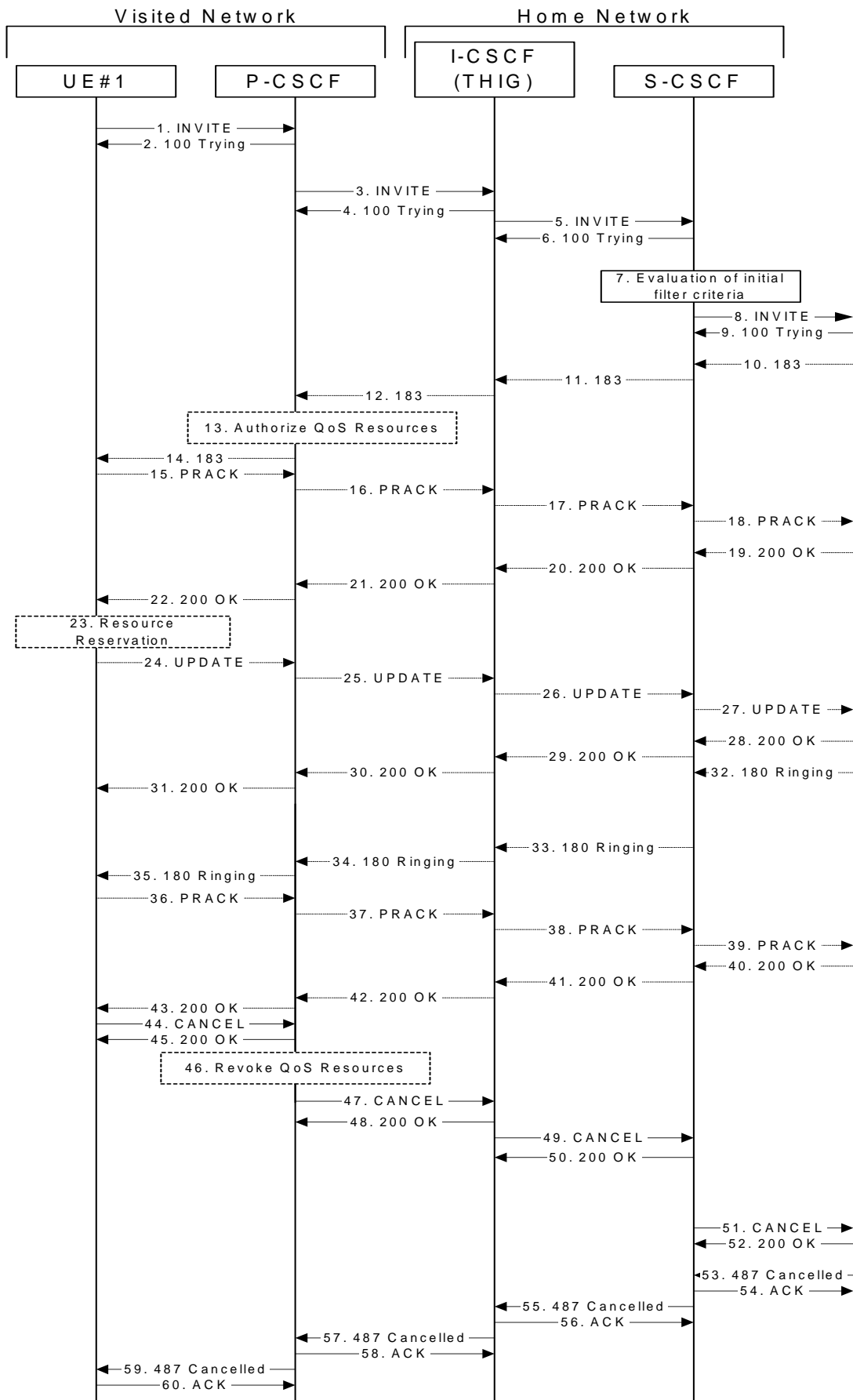
Figure 17.2.2.3-1: Session abandoned or resource failure

1-9. **INVITE (UE to P-CSCF) et seq**

> UE#1 initiated a session, as described in subclause 17.2.2.1.

10-43. **183 SDP (S-S to MO#1b) et seq**

> Session initiation possibly continued, prior to detection of a failure condition, as described in subclause 17.2.2.1.

44. **CANCEL (UE to P-CSCF) – see example in table 17.2.2.3-44**

> The UE cancelled the original INVITE request.

Table 17.2.2.3-44: CANCEL (UE to P-CSCF)

```
CANCEL sip:user2_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:icscf1_p.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 CANCEL
Content-Length: 0
```

45. **200 OK (P-CSCF to UE) – see example in table 17.2.2.3-45**

> Upon receive the CANCEL request from the UE, P-CSCF sends 200 OK.

Table 17.2.2.3-45: 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: 0
```

46. **Revoke QoS authorization**

> P-CSCF removes the QoS authorization, if any, for this session.

47. **CANCEL (P-CSCF to I-CSCF) – see example in table 17.2.2.3-47 (related to table 17.2.2.3-44)**

> The P-CSCF forwards the CANCEL request to I-CSCF.

Table 17.2.2.3-47: CANCEL (P-CSCF to I-CSCF)

```
CANCEL sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
   Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>)@home1.net;tokenized-
by=home1.net>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

48. **200 OK (I-CSCF to P-CSCF) – see example in table 17.2.2.3-48**

> Upon receiving the 200-OK response from the P-CSCF, I-CSCF sends 200 OK.

Table 17.2.2.3-48: 200 OK (I-CSCF to P-CSCF)

```
SIP/2.0 200 OK
```

```
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

49. **CANCEL (I-CSCF to S-CSCF) – see example in table 17.2.2.3-49**

The I-CSCF forwards the CANCEL request to S-CSCF.

Table 17.2.2.3-49: CANCEL (I-CSCF to S-CSCF)

```
CANCEL sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1
   Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

50. **200 OK (S-CSCF to I-CSCF) – see example in table 17.2.2.3-50**

Upon receiving the CANCEL request from the P-CSCF, S-CSCF sends 200 OK.

Table 17.2.2.3-50: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

51. **CANCEL (S-CSCF to S-S) – see example in table 17.2.2.3-51 (related to table 17.2.2.3-49)**

The S-CSCF forwards the CANCEL request to the appropriate S-CSCF-to-S-CSCF procedure.

Table 17.2.2.3-51: CANCEL (S-CSCF to S-S)

```
CANCEL sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
   Max-Forwards: 70
Route: <sip:scscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

52. **200 OK (S-S to S-CSCF) – see example in table 17.2.2.3-52**

Upon receive the CANCEL request from the S-CSCF, the next hop (whatever it is) sends 200 OK.

Table 17.2.2.3-52: 200 OK (S-S 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
```

53. **487 Request Terminated (S-S to MO#1b) – see example in table 17.2.2.3-53 (related to table 17.2.2.3-8)**

The termination procedure cancelled the request, and returned a SIP error response to the original INVITE request.

Table 17.2.2.3-53: 487 Request Terminated (S-S to MO#1b)

```
SIP/2.0 487 Request Terminated
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: 127 INVITE
Content-Length: 0
```

54. **ACK (MO#1b to S-S) – see example in table 17.2.2.3-54**

Upon receive the 487 response from the S-S procedure, S-CSCF sends ACK.

Table 17.2.2.3-54: ACK (MO#1b to S-S)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

55. **487 Request Terminated (S-CSCF to I-CSCF) – see example in table 17.2.2.3-55 (related to table 17.2.2.3-53)**

The S-CSCF returned the SIP error response to I-CSCF.

Table 17.2.2.3-55: 487 Request Terminated (S-CSCF to I-CSCF)

```
SIP/2.0 487 Request Terminated
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
```

56. **ACK (I-CSCF to S-CSCF) – see example in table 17.2.2.3-56**

Upon receive the ACK from the P-CSCF, I-CSCF sends ACK.

Table 17.2.2.3-56: ACK (I-CSCF to S-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP icscf1_p.home1.net;branch=z9hG4bK351g45.1
Max-Forwards: 70
Route: <sip:scscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

57. **487 Request Terminated (I-CSCF to P-CSCF) – see example in table 17.2.2.3-57**

The I-CSCF returned the SIP error response to P-CSCF.

Table 17.2.2.3-57: 487 Request Terminated (I-CSCF to P-CSCF)

```
SIP/2.0 487 Request Terminated
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
```

58. **ACK (P-CSCF to I-CSCF) – see example in table 17.2.2.3-58**

> Upon receive the 487 response from the S-CSCF, P-CSCF sends ACK.

Table 17.2.2.3-58: ACK (P-CSCF to I-CSCF)

```
ACK sip:user2_public1@home1.net SIP/2.0
Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1,
Max-Forwards: 70
Route: <sip:icscf1_p.home1.net;lr>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

59. **487 Request Terminated (P-CSCF to UE) – see example in table 17.2.2.3-59 (related to table 17.2.2.3-56)**

> The P-CSCF returned a SIP error response to UE.

Table 17.2.2.3-59: 487 Request Terminated (P-CSCF to UE)

```
SIP/2.0 487 Request Terminated
Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

60. **ACK (UE to P-CSCF) – see example in table 17.2.2.3-60**

> Upon receive the 487 response from the P-CSCF, UE sends ACK.

Table 17.2.2.3-60: ACK (UE to P-CSCF)

```
ACK sip:user2_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:icscf1_p.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
CSeq: 127 ACK
Content-Length: 0
```

17.3 S-CSCF (MGCF) to S-CSCF (MGCF) procedures

17.3.1 Introduction

See subclause 7.3.1.

17.3.2 S-S#1b

17.3.2.1 (S-S#1b) Different network operators performing origination and termination, with configuration hiding by both network operators (MO#2, MT#2 assumed)

Figure 17.3.2.1-1 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 desires to keep their configuration hidden, so forwards the request through an I-CSCF (I-CSCF#1) to a well-known entry point in the destination operator's network, I-CSCF#2. I-CSCF#2 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 also desires to keep their configuration hidden, so I-CSCF#2 inserts itself into the signalling path for future exchanges.

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#1b is therefore a visited network.

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

> **MO#2**   Mobile origination, located in home service area. The "Originating Network" of S-S#1b 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#1b is a visited network.

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

> **MT#2**   Mobile termination, located in home service area. The "Terminating Network" of S-S#1b is the home network.
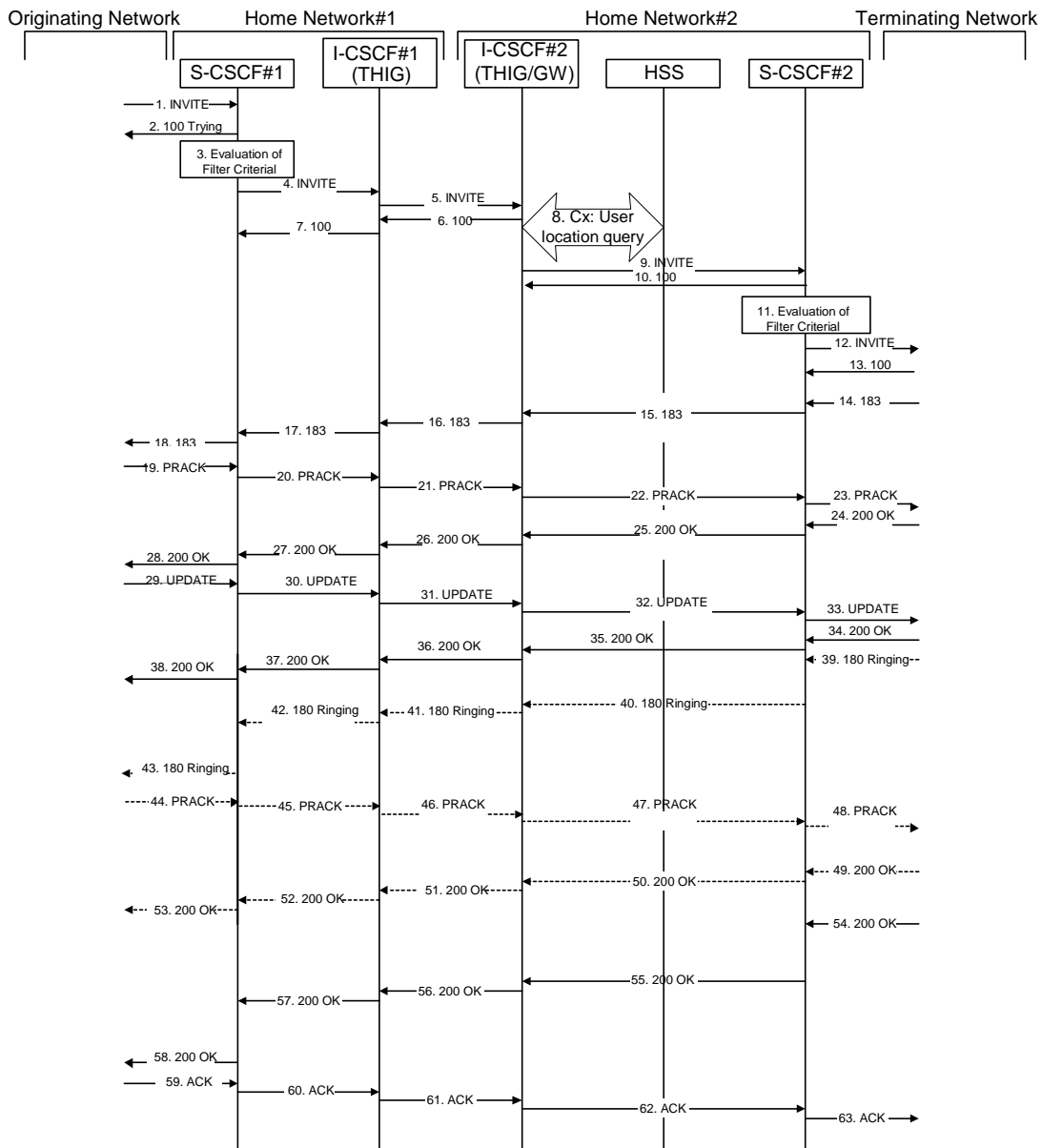
Figure 17.3.2.1-1: S-S#1b

Procedure S-S#1b is as follows:

1. **INVITE (MO to S-S#1b) – see example in table 17.3.2.1-1**

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

Table 17.3.2.1-1: INVITE (MO to S-S#1b)

```
INVITE sip:user2_public1@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
Record-Route: <sip:pcscf1.home1.net;lr>
Route: <sip:scscf1.home1.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: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
```

```
Cseq: 127 INVITE
Require: precondition
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
```

2. **100 Trying (S-S#1b to MO) – see example in table 17.3.2.1-2**

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

Table 17.3.2.1-2: 100 Trying (S-S#1b 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 I-CSCF) – see example in table 17.3.2.1-4**

> 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 desires to keep their internal configuration hidden, S-CSCF#1 forwards the INVITE request to I-CSCF#1 adding I-CSCF#1 to the top of the Route Header.

Table 17.3.2.1-4: 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.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>
Route: <sip:icscf1_s.home1.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:
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 adds the identifier of its own network to the originating Inter Operator Identifier (IOI) parameter of this header.

Route: Updated to cause I-CSCF to forward the request to an I-CSCF in the terminating operator"s network. The topmost Route header is set to the I-CSCF (THIG) for configuration hiding.

5. **INVITE (I-CSCF to I-CSCF) – see example in table 17.3.2.1-5**

I-CSCF#1 finds the entry point in home2.net and forwards the INVITE request to I-CSCF#2.

As the I-CSCF#1 does not know whether the I-CSCF#2 at home2.net is a loose router or not, it does not introduce a Route header.

Table 17.3.2.1-5: INVITE (I-CSCF to I-CSCF)

```
INVITE sip:user2_public1@home2.net 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
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: 67
Record-Route: <sip:icscf1_s.home1.net;lr>, <sip:Token(<sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Asserted-Identity:
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=
```

Via:/Record-Route: I-CSCF#1 Encrypts all the entries that belong to its own network to maintain configuration independence of the home#1 operator.

6. **100 Trying (I-CSCF to I-CSCF) – see example in table 17.3.2.1-6**

I-CSCF#2 responds to the INVITE request (5) with a 100 Trying provisional response.

Table 17.3.2.1-6: 100 Trying (I-CSCF to I-CSCF)

```
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
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
```

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 17.3.2.1-7**

I-CSCF#1 decrypts the Via header entries that are tokenised and belong to its own network, and forwards the 100 Trying provisional response to S-CSCF#1.

Table 17.3.2.1-7: 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:
```

8. **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 7.3.2-6a provides the parameters in the SIP INVITE request (flow 5) which are sent to the HSS.

Table 7.3.2-6b provides the parameters sent from the HSS that need to be mapped to the SIP INVITE request (flow 9) and sent to the S-CSCF.

9. **INVITE (I-CSCF to S-CSCF) – see example in table 17.3.2.1-9**

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

Table 17.3.2.1-9: 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
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
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
Record-Route: <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
Route: <sip:scscf2.home2.net;lr>
P-Asserted-Identity:
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=
```

10. **100 Trying (S-CSCF to I-CSCF) – see example in table 17.3.2.1-10**

S-CSCF#2 responds to the INVITE request (9) with a 100 Trying provisional response.

Table 17.3.2.1-10: 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
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
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
```

11. **Evaluation of initial filter criterias**

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

12. **INVITE (S-S#1b to MT) – see example in table 17.3.2.1-12**

  S-CSCF#2 forwards the INVITE request, as determined by the termination procedure.

Table 17.3.2.1-12: INVITE (S-S#1b to MT)

```
INVITE sip:user2_public1@home2.net 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
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
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:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
Route: <sip:pcscf2.home2.net;lr>
P-Asserted-Identity:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
Privacy:
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=
```

13. **100 Trying (MT to S-S#1b) – see example in table 17.3.2.1-13**

  S-CSCF#2 receives a 100 Trying provisional response to the INVITE request (12), as specified by the termination procedures.

Table 17.3.2.1-13: 100 Trying (MT to S-S#1b)

```
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
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
```

14. **183 Session Progress (MT to S-S#1b) – see example in table 17.3.2.1-14**

The media stream capabilities of the destination are returned along the signalling path, in a 183 Session Progress provisional response to the INVITE request (12), as per the termination procedure.

Table 17.3.2.1-14: 183 Session Progress (MT to S-S#1b)

```
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
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.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:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
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:
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
```

15. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 17.3.2.1-15**

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

Table 17.3.2.1-15: 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
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
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:
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:
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=
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.

16. **183 Session Progress (I-CSCF to I-CSCF) – see example in table 17.3.2.1-16**

> I-CSCF#2 forwards the 183 Session Progress provisional response to I-CSCF#1.

Table 17.3.2.1-16: 183 Session Progress (I-CSCF to I-CSCF)

```
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
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:Token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Asserted-Identity:
P-Charging-Vector:
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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

Record-Route: The I-CSCF#2 encrypts all the entries belonging to its own network (home#2).

17. **183 Session Progress (I-CSCF to S-CSCF) – see example in table 17.3.2.1-17**

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

Table 17.3.2.1-17: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Asserted-Identity:
P-Charging-Vector:
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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

```
a=
```

Via/Record-Route: I-CSCF#1 decrypts all the entries that are tokenised and belong to its own network.

18. **183 Session Progress (S-S#1b to MO) – see example in table 17.3.2.1-18**

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

Table 17.3.2.1-18: 183 Session Progress (S-S#1b 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:
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=
a=
a=
```

19. **PRACK (MO to S-S#1b) – see example in table 17.3.2.1-19**

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 17.3.2.1-19: PRACK (MO to S-S#1b)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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
```

20. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-20**

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

Table 17.3.2.1-20: PRACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
<sip:Token(<sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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=
```

21. **PRACK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-21**

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

Table 17.3.2.1-21: PRACK (I-CSCF to I-CSCF)

```
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
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: 67
Route: <sip:icscf2_s.home2.net;lr>, <sip:Token(<sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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: I-CSCF#1 encrypts all the entries that belong to its own network to maintain configuration independence of the home#1 operator.

22. **PRACK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-22**

I-CSCF#2 decrypts all the tokenized route entries belonging to its own network to recover the routing information, and forwards the PRACK request to S-CSCF#2.

Table 17.3.2.1-22: PRACK (I-CSCF to S-CSCF)

```
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
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:scscf2.home2.net;lr>, <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=
```

23. **PRACK (S-S#1b to MT) – see example in table 17.3.2.1-23**

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

Table 17.3.2.1-23: PRACK (S-S#1b 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
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
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.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=
```

24. **200 OK (MT to S-S#1b) – see example in table 17.3.2.1-24**

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

Table 17.3.2.1-24: 200 OK (MT to S-S#1b)

```
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
```

```
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
```

25. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-25**

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

Table 17.3.2.1-25: 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
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
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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
```

```
a=
a=
```

26. **200 OK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-26**

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

Table 17.3.2.1-26: 200 OK (I-CSCF to I-CSCF)

```
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
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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

27. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-27**

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

Table 17.3.2.1-27: 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.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=
```

Via: I-CSCF#1 decrypts all the tokenised entries belonging to its own network.

28. **200 OK (S-S#1b to MO) – see example in table 17.3.2.1-28**

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

Table 17.3.2.1-28: 200 OK (S-S#1b 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=
b=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

29. **UPDATE (MO to S-S#1b) – see example in table 17.3.2.1-29**

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

Table 17.3.2.1-29: UPDATE (MO to S-S#1b)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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
```

30. **UPDATE (S-CSCF to I-CSCF) – see example in table 17.3.2.1-30**

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

Table 17.3.2.1-30: UPDATE (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
<sip:Token(<sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=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=
```

31. **UPDATE (I-CSCF to I-CSCF) – see example in table 17.3.2.1-31**

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

Table 17.3.2.1-31: UPDATE (I-CSCF to I-CSCF)

```
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
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: 67
Route: <sip:icscf2_s.home2.net;lr>, <sip:Token(<sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=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=
```

Via::   I-CSCF#1 encrypts all the entries belonging to its own network to maintain configuration independence of the home#1 operator.

32. **UPDATE (I-CSCF to S-CSCF) – see example in table 17.3.2.1-32**

I-CSCF#2 decrypts all the tokenised Route entries belonging to its own network and forwards the UPDATE request to S-CSCF#2.

Table 17.3.2.1-32: UPDATE (I-CSCF to S-CSCF)

```
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
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:scscf2.home2.net;lr>, <sip:pcscf2.home2.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=
```

33. **UPDATE (S-S#1b to MT) – see example in table 17.3.2.1-33**

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

Table 17.3.2.1-33: UPDATE (S-S#1b 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
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
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.home2.net;lr>
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=
a=
a=
```

34. **200 OK (MT to S-S#1b) – see example in table 17.3.2.1-34**

      The terminating endpoint responds to the UPDATE request (33) with a 200 OK response.

Table 17.3.2.1-34: 200 OK (MT to S-S#1b)

```
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
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
```

35. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-35**

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

Table 17.3.2.1-35: 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
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
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=
```

36. **200 OK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-36**

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

Table 17.3.2.1-36: 200 OK (I-CSCF to I-CSCF)

```
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
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=
```

37. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-37**

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

Table 17.3.2.1-37: 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.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=
```

Via: I-CSCF#1 decrypts all the tokenisedentries belonging to its own network.

38. **200 OK (S-S#1b to MO) – see example in table 17.3.2.1-38**

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

Table 17.3.2.1-38: 200 OK (S-S#1b 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=
b=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

39. **180 Ringing (MT to S-S#1b) – see example in table 17.3.2.1-39**

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 17.3.2.1-39: 180 Ringing (MT to S-S#1b)

```
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
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.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:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
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: 9022
Content-Length: 0
```

40. **180 Ringing (S-CSCF to I-CSCF) – see example in table 17.3.2.1-40**

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

Table 17.3.2.1-40: 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
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
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:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

41. **180 Ringing (I-CSCF to I-CSCF) – see example in table 17.3.2.1-41**

    I-CSCF#2 forwards the 180 Ringing response to I-CSCF#1.

Table 17.3.2.1-41: 180 Ringing (I-CSCF to I-CSCF)

```
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
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:Token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Record-Route: I-CSCF#2 encrypts allthe entries belonging to its own network.

42. **180 Ringing (I-CSCF to S-CSCF) – see example in table 17.3.2.1-42**

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

Table 17.3.2.1-42: 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: <sip:Token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

Record-Route: I-CSCF#1 decrypts all the entries belonging to its own network.

Via: I-CSCF#1 decrypts all the tokenised entries belonging to its own network.

43. **180 Ringing (S-S#1b to MO) – see example in table 17.3.2.1-43**

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

Table 17.3.2.1-43: 180 Ringing (S-S#1b 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:
RSeq:
Content-Length:
```

44. **PRACK (MO to S-S#1b) – see example in table 17.3.2.1-44**

The originator acknowledges the 180 Ringing provisional response (43) with a PRACK request.

Table 17.3.2.1-44: PRACK (MO to S-S#1b)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
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:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

45. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-45**

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

Table 17.3.2.1-45: PRACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
<sip:Token(<sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

46. **PRACK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-46**

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

Table 17.3.2.1-46: PRACK (I-CSCF to I-CSCF)

```
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
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: 67
Route: <sip:icscf2_s.home2.net;lr>, <sip:Token(<sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

> **Via:**   I-CSCF#1 encrypts all the entries belonging to its own network maintain
>   configuration independence of the home#1 operator.

47. **PRACK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-47**

   I-CSCF#2 determines the routing information, and forwards the PRACK request to S-CSCF#2.

Table 17.3.2.1-47: PRACK (I-CSCF to S-CSCF)

```
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
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:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

48. **PRACK (S-S#1b to MT) – see example in table 17.3.2.1-48**

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

Table 17.3.2.1-48: PRACK (S-S#1b 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
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
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.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

49. **200 OK (MT to S-S#1b) – see example in table 17.3.2.1-49**

   The terminating endpoint responds to the PRACK request (48) with a 200 OK response.

Table 17.3.2.1-49: 200 OK (MT to S-S#1b)

```
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
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
```

50. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-50**

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

Table 17.3.2.1-50: 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
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
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:
```

51. **200 OK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-51**

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

Table 17.3.2.1-51: 200 OK (I-CSCF to I-CSCF)

```
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
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:
```

52. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-52**

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

Table 17.3.2.1-52: 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.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:
```

Via:　　　　　I-CSCF#1 decrypts all tokenised entries that belong to its network..

53. **200 OK (S-S#1b to MO) – see example in table 17.3.2.1-53**

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

Table 17.3.2.1-53: 200 OK (S-S#1b 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:
```

54. **200 OK (MT to S-S#1b) – see example in table 17.3.2.1-54**

> The final response to the INVITE (12), 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 17.3.2.1-54: 200 OK (MT to S-S#1b)

```
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
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.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:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
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>
Content-Length: 0
```

55. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-55**

> The 200 OK response is forwarded to the I-CSCF#2.

Table 17.3.2.1-55: 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
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
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:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

56. **200 OK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-56**

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

Table 17.3.2.1-56: 200 OK (I-CSCF to I-CSCF)

```
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
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:Token(<sip:pcscf2.home2.net>, <sip:scscf2.home2.net>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net>, <sip:icscf1_s.home1.net>,
<sip:Token(<sip:scscf1.home1.net>, <sip:pcscf1.home1.net>)@home1.net;tokenized-by=home1.net>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: I-CSCF#2 encrypts all the entries that belong to its network.

57. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-57**

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

Table 17.3.2.1-57: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:Token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: I-CSCF#1 decrypts all the tokenised entries belonging to its own network.

Via: I-CSCF#1 decrypts all the tokenised entries that belong to its own network.

58. **200 OK (S-S#1b to MO) – see example in table 17.3.2.1-58**

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

Table 17.3.2.1-58: 200 OK (S-S#1b 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:
Content-Length:
```

59. **ACK (MO to S-S#1b) – see example in table 17.3.2.1-59**

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

Table 17.3.2.1-59: ACK (MO to S-S#1b)

```
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:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
<sip:Token(<sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.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
```

60. **ACK (S-CSCF to I-CSCF) – see example in table 17.3.2.1-60**

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

Table 17.3.2.1-60: ACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:icscf2_s.home2.net;lr>,
<sip:Token(<sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

61. **ACK (I-CSCF to I-CSCF) – see example in table 17.3.2.1-61**

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

Table 17.3.2.1-61: ACK (I-CSCF to I-CSCF)

```
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
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: 67
Route: <sip:icscf2_s.home2.net;lr>, <sip:Token(<sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

Via::   I-CSCF#1 encrypts all the entries that belong to its own network to maintain configuration independence of the home#1 operator.

62. **ACK (I-CSCF to S-CSCF) – see example in table 17.3.2.1-62**

   I-CSCF#2 decrypts all the tokenised Route entries that belong to its own network and forwards the ACK request to S-CSCF#2.

Table 17.3.2.1-62: ACK (I-CSCF to S-CSCF)

```
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
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:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

63. **ACK (S-S#1b to MT) – see example in table 17.3.2.1-63**

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

Table 17.3.2.1-63: ACK (S-S#1b 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
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
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.home2.net;lr>
From:
To:
Call-ID:
Cseq:
```

`Content-Length:`

17.3.2.2 Termination failure (not provided)

An example of this flow is not shown in the present document.

17.3.2.3 Origination failure (not provided)

An example of this flow is not shown in the present document.

17.3.3 S-S#1c

17.3.3.1 (S-S#1c) Different network operators performing origination and termination, with configuration hiding by originating network operator (MO#2, MT#2 assumed)

Figure 17.3.3.1-1 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 desires to keep their configuration hidden, so forwards the request through an I-CSCF (I-CSCF#1) to a well-known entry point in the destination operator's network, I-CSCF#2. I-CSCF#2 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 I-CSCF#2 does not insert itself into the signalling path for future exchanges.

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#1c is therefore a visited network.
MO#1b	Mobile origination, roaming, with a THIG in home network. The "Originating Network" of S-S#1c is therefore a visited network.
MO#2	Mobile origination, located in home service area. The "Originating Network" of S-S#1c 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#1c is a visited network.
MT#1b	Mobile termination, roaming, with a THIG in home network. The "Terminating Network" of S-S#1c is a visited network.
MT#2	Mobile termination, located in home service area. The "Terminating Network" of S-S#1c is the home network.
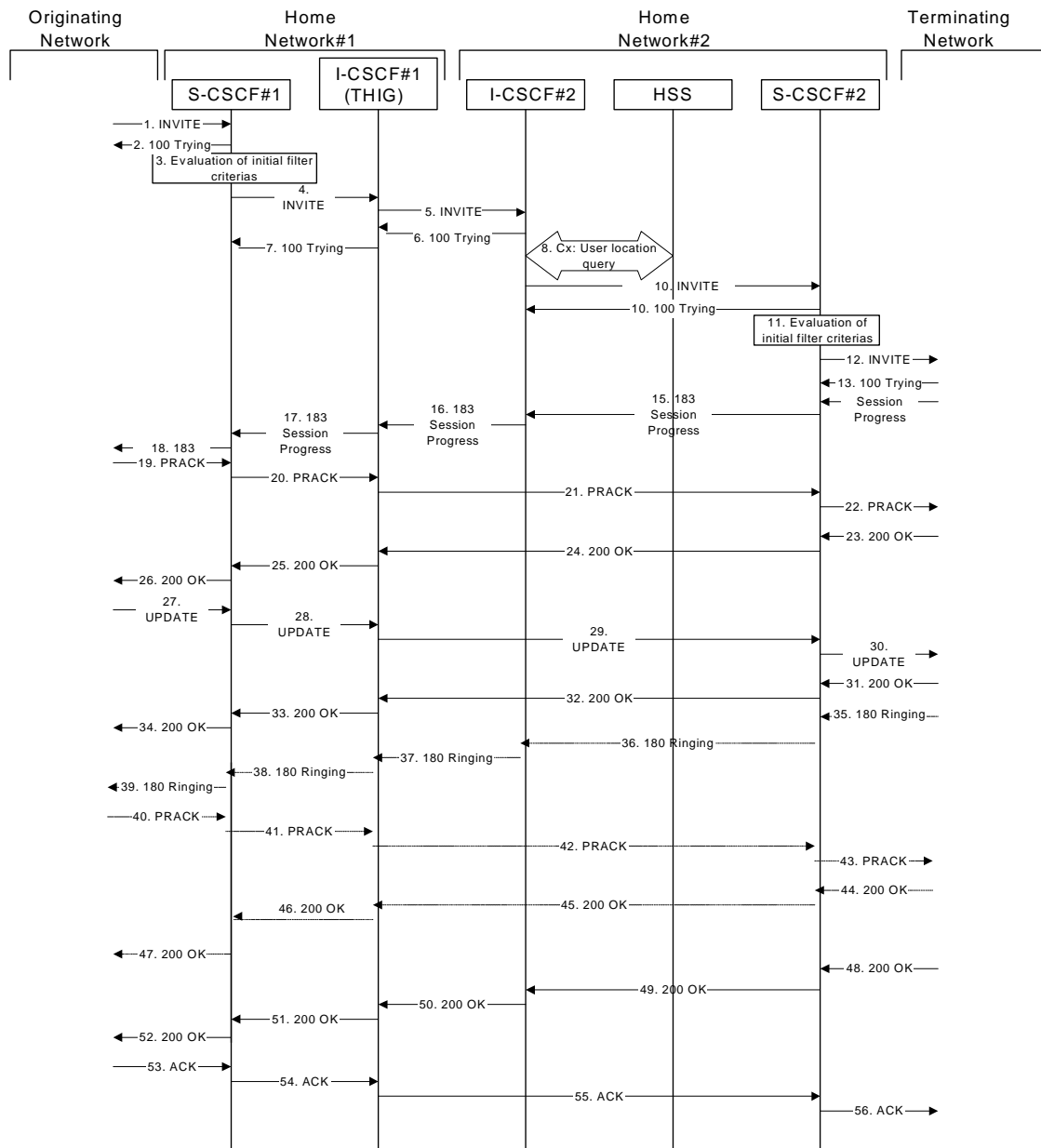
Figure 17.3.3.1-1: S-S#1c

Procedure S-S#1c is as follows:

1. **INVITE (MO to S-S#1c) – see example in table 17.3.3.1-1**

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

Table 17.3.3.1-1: INVITE (MO to S-S#1c)

```
INVITE sip:user2_public1@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>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <sip:user1_public1@home1.net>
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
```

```
Cseq: 127 INVITE
Require: precondition
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
```

2. **100 Trying (S-S#1c to MO) – see example in table 17.3.3.1-2**

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

Table 17.3.3.1-2: 100 Trying (S-S#1c 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 Filter Criteria**

   S-CSCF#1 validates the service profile of this subscriber, and evaluates the initial filter criterias.

4. **INVITE (S-CSCF to I-CSCF) – see example in table 17.3.3.1-4**

   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 desires to keep their internal configuration hidden, S-CSCF#1 forwards the INVITE request to I-CSCF#1.

Table 17.3.3.1-4: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 68
Route: <sip:icscf1_s.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:
To:
Call-ID:
Cseq:
Required:
```

```
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=
```

Route: Topmost Route header set to the I-CSCF that will perform the translation needed to maintain configuration independence.

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. **INVITE (I-CSCF to I-CSCF) – see example in table 17.3.3.1-5**

I-CSCF#1 finds the entry point in home2.net and forwards the INVITE request to I-CSCF#2.

Table 17.3.3.1-5: INVITE (I-CSCF to I-CSCF)

```
INVITE sip:user2_public1@home2.net 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, 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: 67
Record-Route:    <sip:Token(<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:
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:/Record-Route: Translated to maintain configuration independence of the home#1 operator.

6. **100 Trying (I-CSCF to I-CSCF) – see example in table 17.3.3.1-6**

   I-CSCF#2 responds to the INVITE request (5) with a 100 Trying provisional response.

Table 17.3.3.1-6: 100 Trying (I-CSCF to I-CSCF)

```
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, 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
```

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 17.3.3.1-7**

   I-CSCF#1 determines the Via header, and forwards the 100 Trying provisional response to S-CSCF#1.

Table 17.3.3.1-7: 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:
```

8. **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.

   Table 7.3.2-6a provides the parameters in the SIP INVITE request (flow 5), which are sent to the HSS.

   Table 7.3.2-6b provides the parameters sent from the HSS that are mapped to the SIP INVITE request (flow 9) and sent to the S-CSCF.

9. **INVITE (I-CSCF to S-CSCF) – see example in table 17.3.3.1-9**

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

Table 17.3.3.1-9: INVITE (I-CSCF to S-CSCF)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_s.home1.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,
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:scscf2.home2.net;lr>
```

```
Record-Route:
P-Asserted-Identity:
Privacy:
P-Charging-Vector:
From:
To:
Call-ID:
Cseq:
Required:
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=
```

10. **100 Trying (S-CSCF to I-CSCF) – see example in table 17.3.3.1-10**

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

Table 17.3.3.1-10: 100 Trying (S-CSCF to I-CSCF)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP icscf2_s.home1.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,
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
```

11. **Evaluation of initial filter criteria**

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

12. **INVITE (S-S#1c to MT) – see example in table 17.3.3.1-12**

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 17.3.3.1-12: INVITE (S-S#1c 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.home1.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, 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.home2.net;lr>
Record-Route: <sip:scscf2.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>)@home1.net;tokenized-by=home1.net>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From:
To:
Call-ID:
Cseq:
Required:
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=
```

13. **100 Trying (MT to S-S#1c) – see example in table 17.3.3.1-13**

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

Table 17.3.3.1-13: 100 Trying (MT to S-S#1c)

```
SIP/2.0 100 Trying
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf2_s.home1.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, 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
```

14. **183 Session Progress (MT to S-S#1c) – see example in table 17.3.3.1-14 (related to 17.3.3.1-12)**

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

Table 17.3.3.1-14: 183 Session Progress (MT to S-S#1c)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf2_s.home1.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, 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.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<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
P-Asserted-Identity: "John Smith" <sip:user2_public1@home1.net>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
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
```

15. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 17.3.3.1-15**

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

Table 17.3.3.1-15: 183 Session Progress (S-CSCF to I-CSCF)

```
SIP/2.0 183 Session Progress
Via: SIP/2.0/UDP icscf2_s.home1.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,
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:
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:
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=
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.

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

16. **183 Session Progress (I-CSCF to I-CSCF) – see example in table 17.3.3.1-16**

I-CSCF#2 forwards the 183 Session Progress provisional response to I-CSCF#1.

Table 17.3.3.1-16: 183 Session Progress (I-CSCF to I-CSCF)

```
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, 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:
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=
```

17. **183 Session Progress (I-CSCF to S-CSCF) – see example in table 17.3.3.1-17**

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

Table 17.3.3.1-17: 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.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:icscf1_s.home1.net;lr>,
<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.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: I-CSCF#1 determines the entry to the right of its own entry.

Via: determined by I-CSCF#1.

18. **183 Session Progress (S-S#1c to MO) – see example in table 17.3.3.1-18**

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

Table 17.3.3.1-18: 183 Session Progress (S-S#1c 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:
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=
a=
```

19. **PRACK (MO to S-S#1c) – see example in table 17.3.3.1-19**

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 17.3.3.1-19: PRACK (MO to S-S#1c)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Require: precondition
Cseq: 128 PRACK
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
```

20. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-20**

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

Table 17.3.3.1-20: PRACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>, <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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

21. **PRACK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-21**

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

Table 17.3.3.1-21: 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_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
Max-Forwards: 67
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Type:
Content-Length:

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

PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0

```
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
```

22. **PRACK (S-S#1c to MT) – see example in table 17.3.3.1-22**

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

Table 17.3.3.1-22: PRACK (S-S#1c 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
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
Max-Forwards: 66
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=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

23. **200 OK (MT to S-S#1c) – see example in table 17.3.3.1-23**

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

Table 17.3.3.1-23: 200 OK (MT to S-S#1c)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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: 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
```

24. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-24**

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

Table 17.3.3.1-24: 200 OK (S-CSCF to I-CSCF)

```
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, 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=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

25. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-25**

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

Table 17.3.3.1-25: 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.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=
```

Via: Determined by I-CSCF#1.

26. **200 OK (S-S#1c to MO) – see example in table 17.3.3.1-26**

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

Table 17.3.3.1-26: 200 OK (S-S#1c 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=
b=
a=
a=
a=
a=
a=
a=
a=
m=
b=
a=
```

```
a=
a=
a=
a=
a=
a=
a=
```

27. **UPDATE (MO to S-S#1c) – see example in table 17.3.3.1-27**

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

Table 17.3.3.1-27: UPDATE (MO to S-S#1c)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.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
```

28. **UPDATE (S-CSCF to I-CSCF) – see example in table 17.3.3.1-28**

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

Table 17.3.3.1-28: UPDATE (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.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=
```

29. **UPDATE (I-CSCF to S-CSCF) – see example in table 17.3.3.1-29**

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

Table 17.3.3.1-29: 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_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
Max-Forwards: 67
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.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=
```

30. **UPDATE (S-S#1c to MT) – see example in table 17.3.3.1-30**

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

Table 17.3.3.1-30: UPDATE (S-S#1c 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
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
```

```
Max-Forwards: 66
Route: <sip:pcscf2.home2.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=
```

31. **200 OK (MT to S-S#1c) – see example in table 17.3.3.1-31**

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

Table 17.3.3.1-31: 200 OK (MT to S-S#1c)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Type: application/sdp
Content-Length: (...)

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

32. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-32**

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

Table 17.3.3.1-32: 200 OK (S-CSCF to I-CSCF)

```
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, 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=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
```

33. 200 OK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-33

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

Table 17.3.3.1-33: 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.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=
```

Via: Determined by I-CSCF#1.

34. **200 OK (S-S#1c to MO) – see example in table 17.3.3.1-34**

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

Table 17.3.3.1-34: 200 OK (S-S#1c 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=
b=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
```

35. **180 Ringing (MT to S-S#1c) – see example in table 17.3.3.1-35 (related to table 17.3.3.1-12)**

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 17.3.3.1-35: 180 Ringing (MT to S-S#1c)

```
SIP/2.0 180 Ringing
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf2_s.home1.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, 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.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<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:
Call-ID:
CSeq:
Require: 100rel
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
RSeq: 9022
Content-Length: 0
```

36. **180 Ringing (S-CSCF to I-CSCF) – see example in table 17.3.3.1-36**

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

Table 17.3.3.1-36: 180 Ringing (S-CSCF to I-CSCF)

```
SIP/2.0 180 Ringing
```

```
Via: SIP/2.0/UDP icscf2_s.home1.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,
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:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

37. **180 Ringing (I-CSCF to I-CSCF) – see example in table 17.3.3.1-37**

 I-CSCF#2 forwards the 180 Ringing response to I-CSCF#1.

Table 17.3.3.1-37: 180 Ringing (I-CSCF to I-CSCF)

```
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, 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:
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

38. **180 Ringing (I-CSCF to S-CSCF) – see example in table 17.3.3.1-38**

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

Table 17.3.3.1-38: 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: <sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

 Record-Route: Formed by I-CSCF#1 determining the entry to the right of its own entry.

 Via: Determined by I-CSCF#1.

39. **180 Ringing (S-S#1c to MO) – see example in table 17.3.3.1-39**

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

Table 17.3.3.1-39: 180 Ringing (S-S#1c 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:
RSeq:
Content-Length:
```

40. **PRACK (MO to S-S#1c) – see example in table 17.3.3.1-40**

The originator acknowledges the 180 Ringing provisional response (39) with a PRACK request.

Table 17.3.3.1-40: PRACK (MO to S-S#1c)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

41. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-41**

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

Table 17.3.3.1-41: PRACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

42. **PRACK (I-CSCF to I-CSCF) – see example in table 17.3.3.1-42**

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

Table 17.3.3.1-42: 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_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
Max-Forwards: 67
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Require:
RAck:
Content-Length:
```

43. **PRACK (S-S#1c to MT) – see example in table 17.3.3.1-43**

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

Table 17.3.3.1-43: PRACK (S-S#1c 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
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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
Max-Forwards: 66
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

44. **200 OK (MT to S-S#1c) – see example in table 17.3.3.1-44**

> The terminating endpoint responds to the PRACK request (43) with a 200 OK response.

Table 17.3.3.1-44: 200 OK (MT to S-S#1c)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP scscf2.home2.net;branch=z9hG4bK764z87.1, SIP/2.0/UDP
icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP Token(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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

45. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-45**

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

Table 17.3.3.1-45: 200 OK (S-CSCF to I-CSCF)

```
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, 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:
```

46. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-46**

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

Table 17.3.3.1-46: 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.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:
```

Via: Determined by I-CSCF#1.

47. **200 OK (S-S#1c to MO) – see example in table 17.3.3.1-47**

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

Table 17.3.3.1-47: 200 OK (S-S#1c 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:
```

48. **200 OK (MT to S-S#1c) – see example in table 17.3.3.1-48 (related to 17.3.3.1-13)**

The final response to the INVITE (13), 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 17.3.3.1-48: 200 OK (MT to S-S#1c)

```
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
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.home2.net;lr>, <sip:scscf2.home2.net;lr>, <sip:icscf1_s.home1.net;lr>,
<sip:Token(<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:
Call-ID:
CSeq: 127 INVITE
Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>
Content-Length: (...)
```

49. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-49**

The 200 OK response is forwarded to the I-CSCF#2.

Table 17.3.3.1-49: 200 OK (S-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf2_s.home1.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
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:
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

50. **200 OK (I-CSCF to I-CSCF) – see example in table 17.3.3.1-50**

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

Table 17.3.3.1-50: 200 OK (I-CSCF to I-CSCF)

```
SIP/2.0 200 OK
Via: SIP/2.0/UDP icscf1_s.home1.net;branch=z9hG4bK312a32.1, SIP/2.0/UDP
Token(sip: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:
From:
```

```
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

51. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-51**

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

Table 17.3.3.1-51: 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.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:icscf1_s.home1.net;lr>,
<sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

Record-Route: Formed by I-CSCF#1 determining the entry to the right of its own entry.

Via: Determined by I-CSCF#1.

52. **200 OK (S-S#1c to MO) – see example in table 17.3.3.1-52**

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

Table 17.3.3.1-52: 200 OK (S-S#1c 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:
Content-Length:
```

53. **ACK (MO to S-S#1c) – see example in table 17.3.3.1-53**

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

Table 17.3.3.1-53: ACK (MO to S-S#1c)

```
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:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>,
<sip:pcscf2.home2.net;lr>
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
```

54. **ACK (S-CSCF to I-CSCF) – see example in table 17.3.3.1-54**

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

Table 17.3.3.1-54: ACK (S-CSCF to I-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:icscf1_s.home1.net;lr>, <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

55. **ACK (I-CSCF to S-CSCF) – see example in table 17.3.3.1-55**

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

Table 17.3.3.1-55: 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_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
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: 67
Route: <sip:scscf2.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

56. **ACK (S-S#1c to MT) – see example in table 17.3.3.1-56**

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

Table 17.3.3.1-56: ACK (S-S#1c 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
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
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.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

17.3.3.2   Termination failure (not provided)

An example of this flow is not shown in the present document.

17.3.3.3   Origination failure (not provided)

An example of this flow is not shown in the present document.

17.3.4   S-S#1d

17.3.4.1   (S-S#1d) Different network operators performing origination and termination, with configuration hiding by terminating network operator (MO#2, MT#2 assumed)

Figure 17.3.4.1-1 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. S-CSCF#1 forwards the request to a well-known entry point in the destination operator's network, I-CSCF#2. I-CSCF#2 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 desires to keep their configuration hidden, so I-CSCF#2 inserts itself into the signalling path for future exchanges.

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#1d is therefore a visited network.

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

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

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

MT#2   Mobile termination, located in home service area. The "Terminating Network" of S-S#1d is the home network.
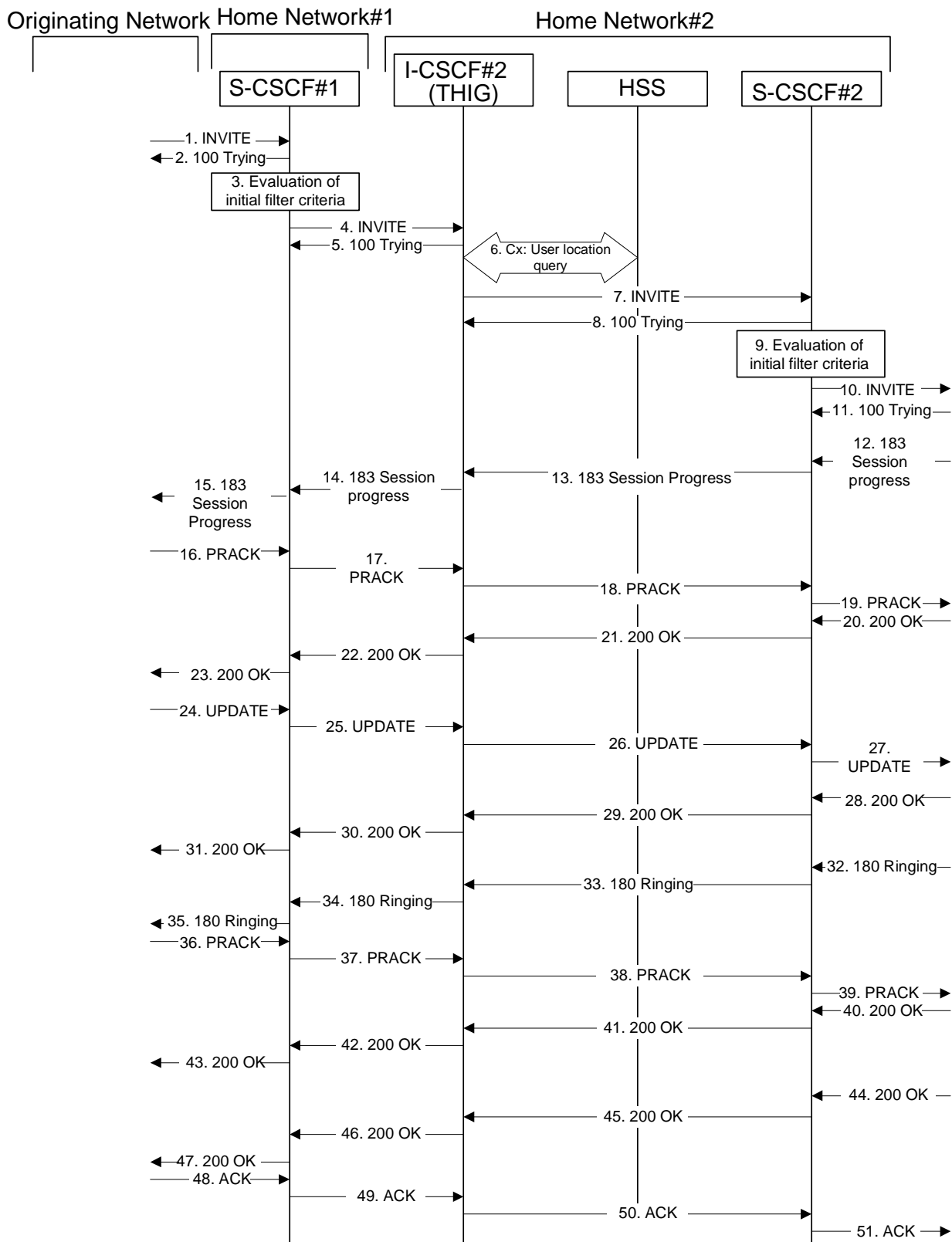
Figure 17.3.4.1-1: S-S#1d

Procedure S-S#1d is as follows:

1. **INVITE (MO to S-S#1d) – see example in table 17.3.4.1-1**

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

Table 17.3.4.1-1: INVITE (MO to S-S#1d)

```
INVITE sip:user2_public1@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>
Record-Route: <sip:pcscf1.home1.net;lr>
P-Asserted-Identity: "John Doe" <tel:+1-212-555-1111>
Privacy: none
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
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
```

2. **100 Trying (S-S#1d to MO) – see example in table 17.3.4.1-2**

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

Table 17.3.4.1-2: 100 Trying (S-S#1d 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 I-CSCF) – see example in table 17.3.4.1-4**

    S-CSCF#1 performs an analysis of the destination address, and determines the network operator to whom the
    destination subscriber belongs. S-CSCF#1 forwards the INVITE request to I-CSCF#2, the well-known entry
    point of the destination network.

Table 17.3.4.1-4: 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.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: "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=
m=
b=
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 originating Inter Operator Identifier (IOI) parameter of this header.

5. **100 Trying (I-CSCF to I-CSCF) – see example in table 17.3.4.1-5**

> I-CSCF#2 responds to the INVITE request (4) with a 100 (Trying) provisional response.

Table 17.3.4.1-5: 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.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. **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.

Table 7.3.2.1-6a provides the parameters in the SIP INVITE message (flow 4) which need to be sent to HSS.

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.

7. **INVITE (I-CSCF to S-CSCF) – see example in table 17.3.4.1-7**

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

Table 17.3.4.1-7: 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.home1.net;branch=z9hG4bK431h23.1,
SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Max-Forwards: 67
Route: <sip:scscf1.home2.net;lr>
Record-Route: <sip:icscf2_s.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.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=
a=
```

8. **100 Trying (S-CSCF to I-CSCF) – see example in table 17.3.4.1-8**

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

Table 17.3.4.1-8: 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.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
```

9. **Evaluation of initial filter criterias**

S-CSCF#2 validates the service profile of this subscriber and evaluates the initial filter criterias. For this example, assume no Application Server involvement

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

10. **INVITE (S-S#1d to MT) – see example in table 17.3.4.1-10**

S-CSCF#2 forwards the INVITE request, as determined by the termination procedure.

Table 17.3.4.1-10: INVITE (S-S#1d 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.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:icscf2_s.home2.net;lr>, <sip:scscf1.home1.net;lr>,
<sip:pcscf1.home1.net;lr>
P-Asserted-Identity:
Privacy:
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
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=
```

11. **100 Trying (MT to S-S#1d) – see example in table 17.3.4.1-11**

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

Table 17.3.4.1-11: 100 Trying (MT to S-S#1d)

```
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
```

12. **183 Session Progress (MT to S-S#1d) – see example in table 17.3.4.1-12**

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 17.3.4.1-12: 183 Session Progress (MT to S-S#1d)

```
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:icscf2_s.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>
Privacy: none
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"
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
```

13. **183 Session Progress (S-CSCF to I-CSCF) – see example in table 17.3.4.1-13**

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

Table 17.3.4.1-13: 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.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
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-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 17.3.4.1-14**

I-CSCF#2 forwards the 183 (Session Progress) provisional response to S-CSCF#1.

Table 17.3.4.1-14: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:scscf1.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=
```

Record-Route: The I-CSCF#2 tokenizes the entries of its own network

15. **183 Session Progress (S-S#1d to MO) – see example in table 17.3.4.1-15**

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

Table 17.3.4.1-15: 183 Session Progress (S-S#1d 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:
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=
a=
```

16. **PRACK (MO to S-S#1d) – see example in table 17.3.4.1-16**

    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 17.3.4.1-16: PRACK (MO to S-S#1d)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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
```

17. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.4.1-17**

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

Table 17.3.4.1-17: PRACK (S-CSCF to I-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:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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=
```

18. **PRACK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-18**

I-CSCF#2 determines the routing information, and forwards the PRACK request to S-CSCF#2.

Table 17.3.4.1-18: PRACK (I-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP 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.home2.net;lr>, <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=
```

19. **PRACK (S-S#1d to MT) – see example in table 17.3.4.1-19**

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

Table 17.3.4.1-19: PRACK (S-S#1d 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
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>
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=
```

20. **200 OK (MT to S-S#1d) – see example in table 17.3.4.1-20**

   The terminating endpoint responds to the PRACK request (19) with a 200 (OK) response.

Table 17.3.4.1-20: 200 OK (MT to S-S#1d)

```
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.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 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 17.3.4.1-21**

   S-CSCF#2 forwards the 200 (OK) response to I-CSCF#2.

Table 17.3.4.1-21: 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.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=
```

22. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-22**

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

Table 17.3.4.1-22: 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.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. **200 OK (S-S#1d to MO) – see example in table 17.3.4.1-23**

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

Table 17.3.4.1-23: 200 OK (S-S#1d 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=
b=
a=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
a=
a=
a=
a=
a=
a=
```

24. **UPDATE (MO to S-S#1d) – see example in table 17.3.4.1-24**

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

Table 17.3.4.1-24: UPDATE (MO to S-S#1d)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
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 17.3.4.1-25**

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

Table 17.3.4.1-25: UPDATE (S-CSCF to I-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP 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:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=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=
```

26. **UPDATE (I-CSCF to S-CSCF) – see example in table 17.3.4.1-26**

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

Table 17.3.4.1-26: UPDATE (I-CSCF to S-CSCF)

```
UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP 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.home2.net;lr>, <sip:pcscf2.home2.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=
```

27. **UPDATE (S-S#1d to MT) – see example in table 17.3.4.1-27**

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

Table 17.3.4.1-27: UPDATE (S-S#1d 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
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>
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 (MT to S-S#1d) – see example in table 17.3.4.1-28**

> The terminating endpoint responds to the UPDATE request (27) with a 200 (OK) response.

Table 17.3.4.1-28: 200 OK (MT to S-S#1d)

```
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.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: (…)

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 17.3.4.1-29**

S-CSCF#2 forwards the 200 (OK) response to I-CSCF#2.

Table 17.3.4.1-29: 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.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=
```

30. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-30**

> I-CSCF#2 forwards the 200 (OK) response to S-CSCF#1.

Table 17.3.4.1-30: 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.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=
```

31. **200 OK (S-S#1d to MO) – see example in table 17.3.4.1-31**

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

Table 17.3.4.1-31: 200 OK (S-S#1d 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=
b=
a=
a=
a=
a=
a=
a=
m=
b=
a=
a=
```

```
SIP/2.0 200 OK
```

```
a=
a=
a=
a=
a=
```

32. **180 Ringing (MT to S-S#1d) – see example in table 17.3.4.1-32**

> 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 17.3.4.1-32: 180 Ringing (MT to S-S#1d)

```
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:icscf2_s.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>
RSeq: 9022
Content-Length: 0
```

33. **180 Ringing (S-CSCF to I-CSCF) – see example in table 17.3.4.1-33**

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

Table 17.3.4.1-33: 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.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:
```

34. **180 Ringing (I-CSCF to S-CSCF) – see example in table 17.3.4.1-34**

> I-CSCF#2 forwards the 180 (Ringing) response to S-CSCF#1.

Table 17.3.4.1-34: 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: <sip:token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Require:
Contact:
RSeq:
Content-Length:
```

35. **180 Ringing (S-S#1d to MO) – see example in table 17.3.4.1-35**

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

Table 17.3.4.1-35: 180 Ringing (S-S#1d 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:
RSeq:
Content-Length:
```

36. **PRACK (MO to S-S#1d) – see example in table 17.3.4.1-36**

The originator acknowledges the 180 (Ringing) provisional response (35) with a PRACK request.

Table 17.3.4.1-36: PRACK (MO to S-S#1d)

```
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: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
Route: <sip:scscf1.home1.net;lr>, <sip:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 130 PRACK
RAck: 9022 127 INVITE
Content-Length: 0
```

37. **PRACK (S-CSCF to I-CSCF) – see example in table 17.3.4.1-37**

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

Table 17.3.4.1-37: PRACK (S-CSCF to I-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP 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:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

38. **PRACK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-38**

I-CSCF#2 determines the routing information, and forwards the PRACK request to S-CSCF#2.

Table 17.3.4.1-38: PRACK (I-CSCF to S-CSCF)

```
PRACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp  SIP/2.0
Via: SIP/2.0/UDP 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.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

39. PRACK (S-S#1d to MT) – see example in table 17.3.4.1-39

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

Table 17.3.4.1-39: PRACK (S-S#1d 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
icscf2_s.home2.net;branch=z9hG4bK871y12.1, SIP/2.0/UDP scscf.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
Max-Forwards: 66
Route: <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
RAck:
Content-Length:
```

40. 200 OK (MT to S-S#1d) – see example in table 17.3.4.1-40

The terminating endpoint responds to the PRACK request (39) with a 200 (OK) response.

Table 17.3.4.1-40: 200 OK (MT to S-S#1d)

```
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.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
```

41. 200 OK (S-CSCF to I-CSCF) – see example in table 17.3.4.1-41

S-CSCF#2 forwards the 200 (OK) response to I-CSCF#2.

Table 17.3.4.1-41: 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.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:
```

42. 200 OK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-42

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

Table 17.3.4.1-42: 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.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:
```

43. **200 OK (S-S#1d to MO) – see example in table 17.3.4.1-43**

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

Table 17.3.4.1-43: 200 OK (S-S#1d 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:
```

44. **200 OK (MT to S-S#1d) – see example in table 17.3.4.1-44**

   The final response to the INVITE (10), 200 (OK) response, 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 17.3.4.1-44: 200 OK (MT to S-S#1d)

```
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.home2.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:icscf2_s.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>
Content-Length: 0
```

45. **200 OK (S-CSCF to I-CSCF) – see example in table 17.3.4.1-45**

   The 200 (OK) response is forwarded to the I-CSCF#2.

Table 17.3.4.1-45: 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.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:
```

46. **200 OK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-46**

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

Table 17.3.4.1-46: 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.home1.net;branch=z9hG4bK431h23.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7
Record-Route: <sip:token(<sip:pcscf2.home2.net;lr>, <sip:scscf2.home2.net;lr>)@home2.net;tokenized-
by=home2.net>, <sip:icscf2_s.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>
From:
To:
Call-ID:
CSeq:
Contact:
Content-Length:
```

47. **200 OK (S-S#1d to MO) – see example in table 17.3.4.1-47**

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

Table 17.3.4.1-47: 200 OK (S-S#1d 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:
Content-Length:
```

48. **ACK (MO to S-S#1d) – see example in table 17.3.4.1-48**

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

Table 17.3.4.1-48: ACK (MO to S-S#1d)

```
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:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.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
```

49. **ACK (S-CSCF to I-CSCF) – see example in table 17.3.4.1-49**

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

Table 17.3.4.1-49: ACK (S-CSCF to I-CSCF)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP 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:icscf2_s.home2.net;lr>, <sip:token(<sip:pcscf2.home2.net;lr>,
<sip:scscf2.home2.net;lr>)@home2.net;tokenized-by=home2.net>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

50. **ACK (I-CSCF to S-CSCF) – see example in table 17.3.4.1-50**

> I-CSCF#2 forwards the ACK request to S-CSCF#2.

Table 17.3.4.1-50: ACK (I-CSCF to S-CSCF)

```
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
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.home2.net;lr>, <sip:pcscf2.home2.net;lr>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

51. **ACK (S-S#1d to MT) – see example in table 17.3.4.1-51**

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

Table 17.3.4.1-51: ACK (S-S#1d 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
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>
From:
To:
Call-ID:
Cseq:
Content-Length:
```

17.3.4.2 Termination failure (not provided)

An example of this flow is not shown in the present document.

17.3.4.3 Origination failure (not provided)

An example of this flow is not shown in the present document.

17.3.5 Not applicable

Void.

17.3.6 S-S#3

17.3.6.1 (S-S#3) PSTN Termination performed by home network of originator (not provided)

An example of this flow is not shown in the present document.

17.3.7 S-S#4

17.3.7.1 (S-S#4) PSTN Termination performed by different operator than origination (not provided)

An example of this flow is not shown in the present document.

17.4 Termination procedures

17.4.1 Introduction

See subclause 7.4.1.

17.4.2 MT#1b

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.
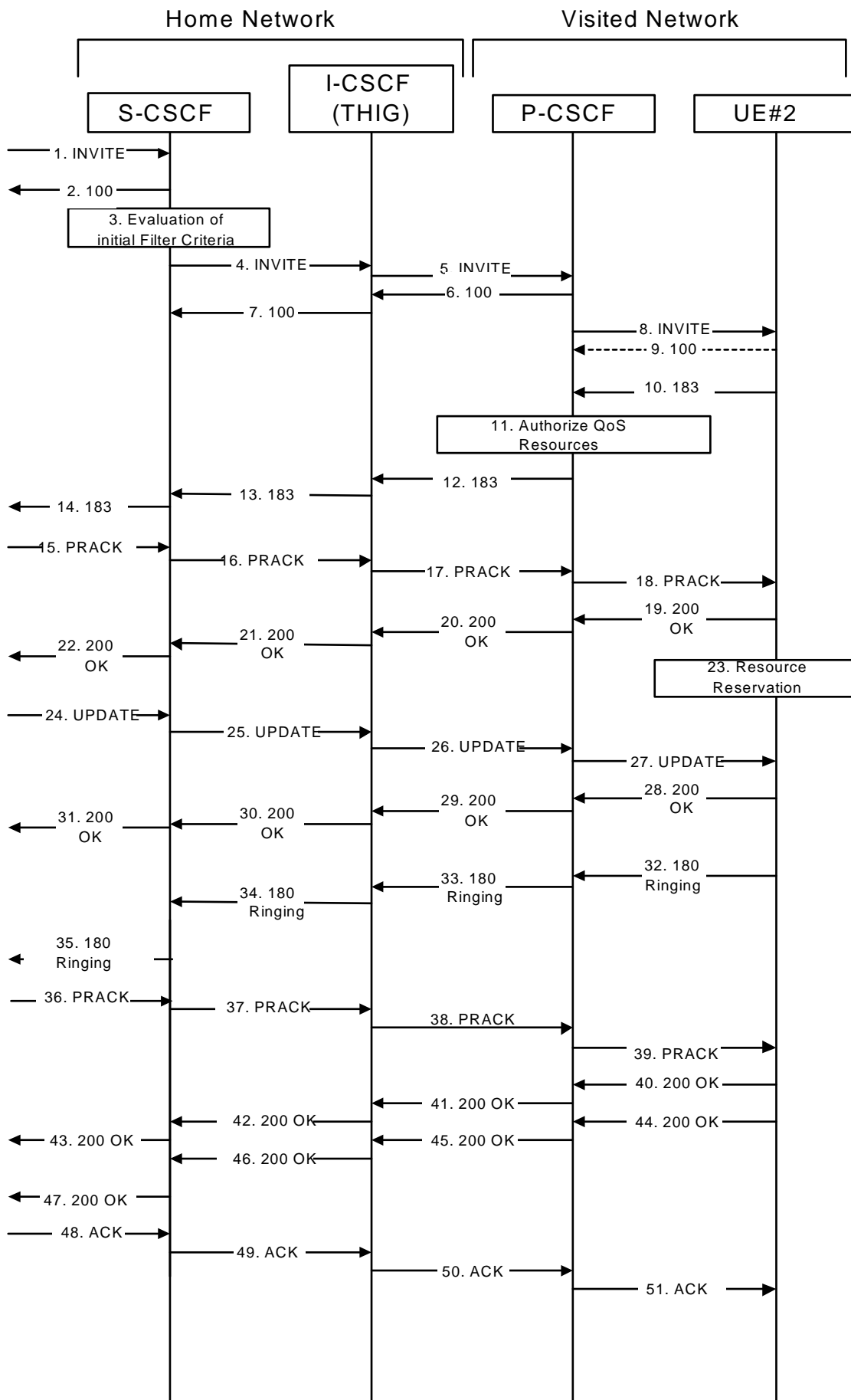
Figure 17.4.2.1-1: MT#1b

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=
```

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=
```

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: 0020000100100101706466322e76697369746564322e6e6574000c020133315331343363231
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>
```

ETSI

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=
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=
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=
```

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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=3
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:
```

17.4.2.2 UE-detected failure/resource failure (not provided)

An example of this flow is not shown in the present document.

17.4.2.3 Origination failure (not provided)

An example of this flow is not shown in the present document.

17.4.3 Not applicable

Void.

17.4.4 Not required

Void.

17.4.5 MT#1d

17.4.5.1 (MT#1d) Mobile termination, roaming, with I-CSCF in home network providing configuration independence, terminating UE is busy, and not able or not willing to answer the call (MO#2, S-S#2 assumed)

Figure 17.4.5.1-1 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 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.
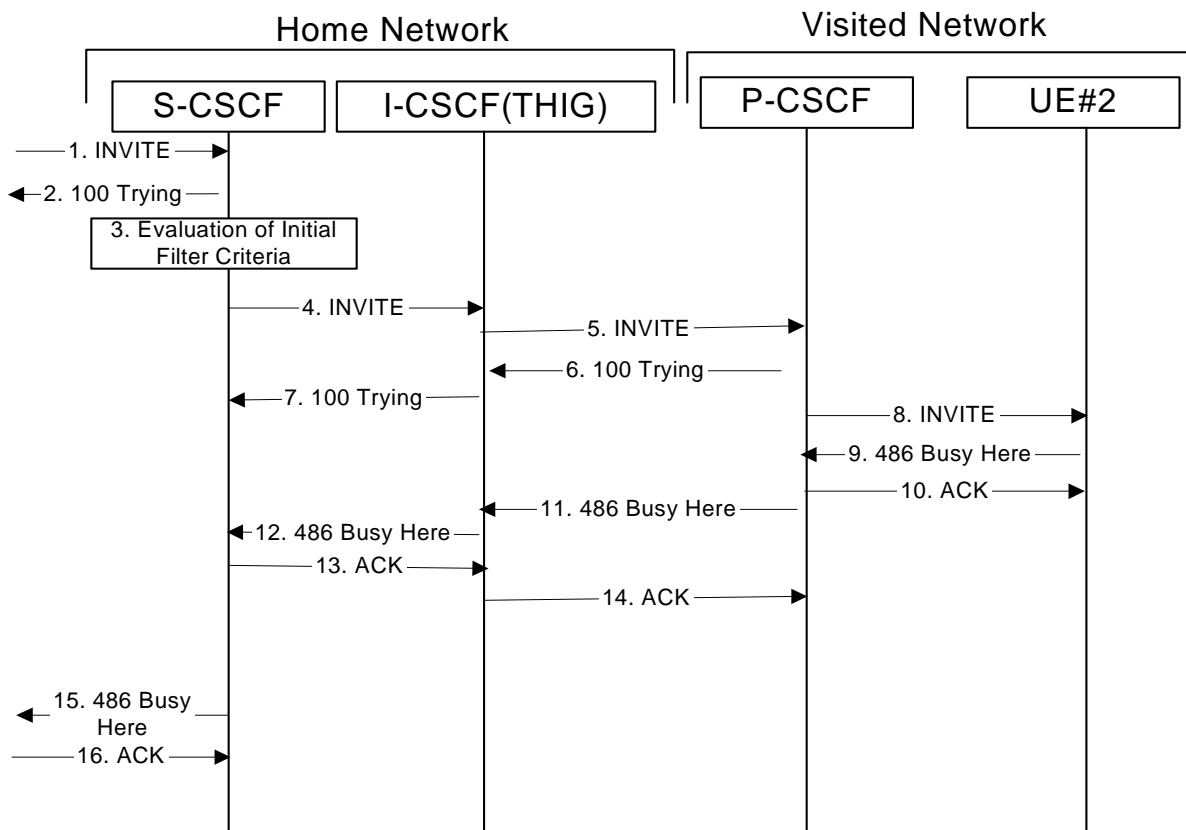

Figure 17.4.5.1-1: MT#1d

Procedure MT#1d is as follows:

1. **INVITE (S-S to MT#1d) – see example in table 17.4.5.1-1**

    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 17.4.5.1-1: INVITE (S-S to MT#1d)

```
INVITE sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP icscf2_p.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.home2.net;lr>
Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.home1.net;lr>
P-Asserted_Ientity: "John Doe" <sip:user1_public1@home1.net>
P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"; orig-ioi=home1.net
Privacy: none
From: <sip:user1_public1@home1.net>;tag=171828
To: <sip:user2_public1@home2.net>
Call-ID: cb03a0s09a2sdfglkj490333
Cseq: 127 INVITE
Require: precondition
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
```

2. **100 Trying (MT#1d to S-S) – see example in table 17.4.5.1-2**

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

Table 17.4.5.1-2: 100 Trying (MT#1d 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 criterias**

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

4. **INVITE (S-CSCF to I-CSCF) – see example in table 17.4.5.1-4**

    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 17.4.5.1-4: 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:
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]
Privacy:
From:
To:
Call-ID:
Cseq:
Require:
Supported:
Contact:
P-Called-Party-ID: <sip:user1_public1@home2.net>
Content-Type:
Content-Length: (…)

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

Route: Built from the Contact address 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-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 17.4.5.1-5**

I-CSCF translates the Via headers in the request, and forwards the INVITE request to P-CSCF.

Table 17.4.5.1-5: 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(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: 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>
P-Asserted-Identity:
P-Charging-Vector:
Privacy:
From:
To:
Call-ID:
Cseq:
Contact:
Require:
Supported:
```

```
P-Called-Party-ID:
Content-Type:
Content-Length:

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

6. **100 Trying (P-CSCF to I-CSCF) – see example in table 17.4.5.1-6**

   P-CSCF responds to the INVITE request (5) with a 100 Trying provisional response.

Table 17.4.5.1-6: 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(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: 0
```

7. **100 Trying (I-CSCF to S-CSCF) – see example in table 17.4.5.1-7**

   I-CSCF determines the Via header, and forwards the 100 Trying provisional response to S-CSCF.

Table 17.4.5.1-7: 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 17.4.5.1-8**

   P-CSCF forwards the INVITE request to the UE.

Table 17.4.5.1-8: 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(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: 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>
P-Asserted_Identity:
Privacy:
P-Media-Authorization: 0020000100100101706466322e76697369746564322e6e6574000c020133315331343363231
From:
To:
Call-ID:
Cseq:
Contact:
Require:
Supported:
P-Called-Party-ID:
Content-Type:
Content-Length:

v=
o=
s=
c=
t=
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 "pdf2.visited2.net" with credentials "31S14621".

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

9. **486 Busy Here (UE to P-CSCF) – see example in table 17.4.5.1-9**

UE is contacted successfully but it is currently not willing or able to take additional sessions. The response MAY indicate a better time to call in the Retry-After header.

Table 17.4.5.1-9: 486 Busy Here (UE to P-CSCF)

```
SIP/2.0 486 Busy Here
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(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
P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11
From:
To: <sip:user2_public1@home2.net>;tag=314159
Call-ID:
CSeq:
Retry-After: 3600
Content-Length: 0
```

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

Retry-After: Indicates how long the caller can try again.

10. **ACK (P-CSCF to UE) – see example in table 17.4.5.1-10**

Upon receive the 486 response from the UE, P-CSCF sends ACK back to the UE.

Table 17.4.5.1-10: ACK (P-CSCF to UE)

```
ACK sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcompsip SIP/2.0
Via: SIP/2.0/UDP pcscf2.visited2.net:5088;comp=sigcomp;branch=z9hG4bK361k21.1
Max-Forwards: 70
```

```
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

11. **486 Busy Here (P-CSCF to I-CSCF) – see example in table 17.4.5.1-11 (related to table 17.4.5.1-9)**

P-CSCF forwards the 486 response to the I-CSCF.

Table 17.4.5.1-11: 486 Busy Here (P-CSCF to I-CSCF)

```
SIP/2.0 486 Busy Here
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1, SIP/2.0/UDP
    Token(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
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Retry-After:
Content-Length:
```

12. **486 Busy Here (I-CSCF to S-CSCF) – see example in table 17.4.5.1-12**

I-CSCF forwards the 486 response to the S-CSCF.

Table 17.4.5.1-12: 486 Busy Here (I-CSCF to S-CSCF)

```
SIP/2.0 486 Busy Here
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
P-Access-Network-Info:
From:
To:
Call-ID:
CSeq:
Retry-After:
Content-Length:
```

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

13. **ACK (S-CSCF to I-CSCF) – see example in table 17.4.5.1-13**

S-CSCF copies the Requet-URI and Route headers from the original INVITE request to ACK and send it to the P-CSCF via I-CSCF.

Table 17.4.5.1-13: ACK (S-CSCF to I-CSCF)

```
ACK: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcompsip SIP/2.0
Via: SIP/2.0/UDP scscf2.home1.net;branch=z9hG4bK764z87.1
Max-Forwards: 70
Route: <sip:icscf2_p.home1.net;lr>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length:
```

14. **ACK (I-CSCF to P-CSCF) – see example in table 17.4.5.1-14**

I-CSCF forwards the ACK to the P-CSCF, P-CSCF checks the ACK and makes sure this is for a 4xx response, so P-CSCF will not forward it further down.

Table 17.4.5.1-14: ACK (I-CSCF to P-CSCF)

```
ACK: sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcompsip SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home1.net;branch=z9hG4bKa9012.1@ SIP/2.0/UDP
    Token(scscf2.home1.net;branch=z9hG4bK764z87.1
Max-Forwards: 69
Route: <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length:
```

15. **486 Busy Here (MT#1d to S-S) – see example in table 17.4.5.1-15 (related to table 17.4.5.1-12)**

> S-CSCF forwards the 486 response to the originator, per the S-CSCF to S-CSCF procedure.

Table 17.4.5.1-15: 486 Busy Here (MT#1d to S-S)

```
SIP/2.0 486 Busy Here
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:
Retry-After:3600
Content-Length: 0
```

16. **ACK (S-S to MT#1d) – see example in table 17.4.5.1-16**

> S-CSCF sends the ACK to the S-CSCF.

Table 17.4.5.1-16: ACK (S-S to MT#1d)

```
ACK sip:user2_public1@home2.net SIP/2.0
Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332b23.1
Max-Forwards: 70
Route: <sip:scscf2.home1.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length: 0
```

17.5 Sample multimedia signalling flows: addition of further media streams

17.5.1 Introduction

See subclause 7.5.1.

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.
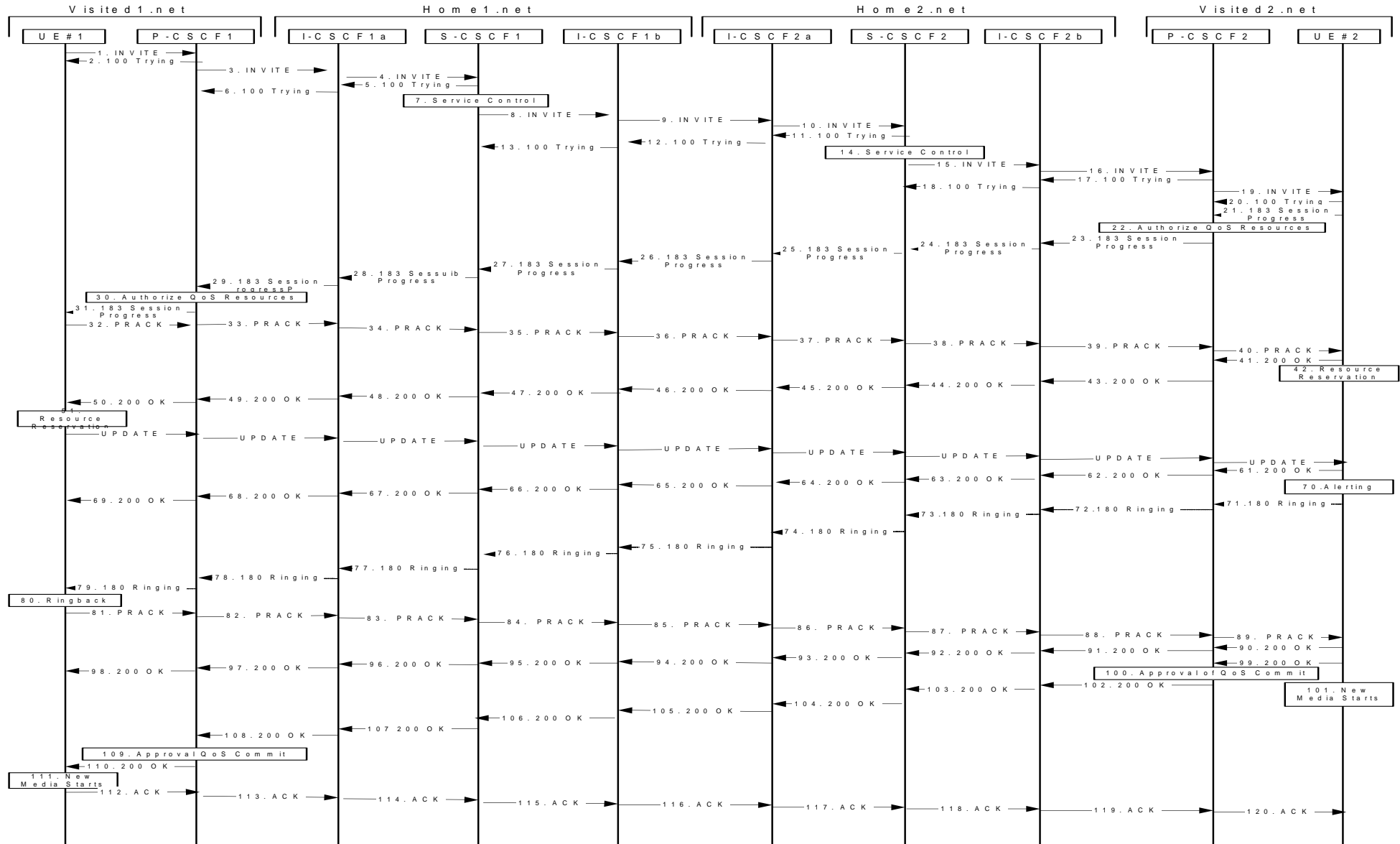
Figure 17.5.2-1: Sample multimedia signalling flow - additional of further media with I-CSCF (THIG)

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: 0020000100100101706466322e76697369746564322e6e6574000c020133315331343363233
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
```

ETSI

```
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=
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=
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: 00200001001001017064663312e76697369746564312e6e6574000c02013942563330373400
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=
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];
pdp-sig=no; gcid=723084371; auth-token=43876559; flow-id=1
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=
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=1
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];
pdp-sig=no; gcid=309685742; auth-token=86243614; flow-id=1
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:
```

17.6   Error handling: Session Initiation (not provided)

An example of this flow is not shown in the present document.

18   Signalling flows for session release (hiding)

18.1   Introduction

See subclause 8.1.

18.2   Mobile terminal initiated session release

Figure 18.2-1 shows a mobile terminal initiated IM CN subsystem application (SIP) session release. It is assumed that the session is active and that the bearer was established directly between the two visited networks (the visited networks could be the home network in either or both cases).

NOTE 1:   For the pupuses of the description of the I-CSCF in figure 18.2-1 and in the associated text, it is assumed that the party that established the session initiated the clearing. For clearing in the reverse direction, there is a slight change in the optionality of the I-CSCFs between the S-CSCFs. This is as described for session establishment.
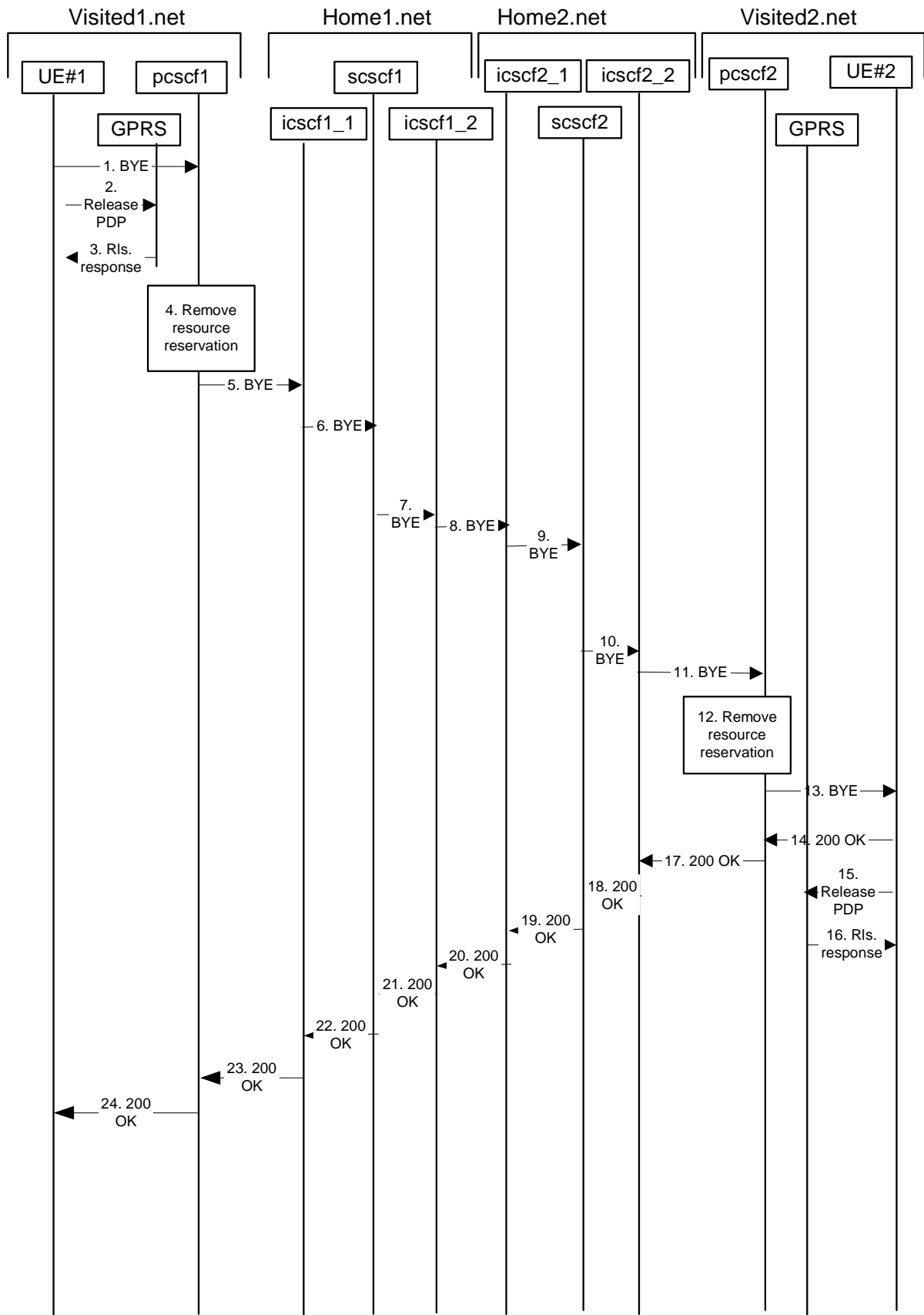
Figure 18.2-1: Mobile initiated session release

1. **SIP BYE (UE to P-CSCF) - see example in table 18.2-1**

    One mobile party hangs up, which generates a SIP BYE request from the UE to the P-CSCF.

Table 18.2-1: SIP BYE (UE to P-CSCF)

```
BYE 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_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: 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
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: 153 BYE
Content-Length: 0
```

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

Via: takes the value of either the IP address or the 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: the example contents of the From header, the To header and Call-ID header are used to identify the session being cleared, and therefore are identical to those of the previously received response for that session, so that they include any tag parameters.

CSeq: the content of the Cseq header must have a higher sequence number than the previous transaction. Here it is assumed that a Cseq value no greater than 152 has been previously used.

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

2. **Release PDP**

    Steps 2 and 3 may take place before or after Step 1 and in parallel with Step 4. The UE initiates the release of the bearer PDP context. The GPRS subsystem releases the PDP context. The IP network resources that had were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

3. **Rls. Response**

    The GPRS subsystem responds to the UE.

4. **Remove resource reservation**

    The P-CSCF removes the authorization for resources that had previously been issued for this endpoint for this session. This step will also result in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the session have been deleted.

5. **SIP BYE (P-CSCF to I-CSCF) - see example in table 18.2-5**

    The P-CSCF sends a SIP BYE request to the I-CSCF (THIG) hiding the S-CSCF of the releasing party.

    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 18.2-5: SIP BYE (P-CSCF to I-CSCF)

```
BYE 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_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:
Content-Length:
```

6. **SIP BYE (I-CSCF to S-CSCF) - see example in table 18.2-6**

  The I-CSCF (THIG) sends a SIP BYE request to the S-CSCF of the releasing party.

Table 18.2-6: SIP BYE (I-CSCF to S-CSCF)

```
BYE 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: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:
Content-Length:
```

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

7. **SIP BYE (S-CSCF to I-CSCF) - see example in table 18.2-7**

  The SIP BYE request is sent from the S-CSCF to the I-CSCF (THIG).

Table 18.2-7: SIP BYE (S-CSCF to I-CSCF)

```
BYE 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=home1.net>, <sip:pcscf2.visited2.net;lr>
From:
To:
Call-ID:
CSeq:
Content-Length:
```

8. **SIP BYE (I-CSCF to I-CSCF) - see example in table 18.2-8**

  The SIP BYE request is sent from the I-CSCF (THIG) to the I-CSCF of the network of the other party.

Table 18.2-8: SIP BYE (I-CSCF to I-CSCF)

```
BYE 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: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:
```

9. **SIP BYE (I-CSCF to S-CSCF) - see example in table 18.2-9**

> The SIP BYE request is forwarded from the I-CSCF that was used to determine the location of S-CSCF of the other party.

Table 18.2-9: SIP BYE (I-CSCF to S-CSCF)

```
BYE 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,
SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP
[5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7)@home1.net;tokenized-by=home1.net
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:
```

10. **SIP BYE (S-CSCF to I-CSCF) - see example in table 18.2-10**

> The SIP BYE request is forwarded to a I-CSCF (THIG).

Table 18.2-10: SIP BYE (S-CSCF to I-CSCF)

```
BYE 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:
```

11. **SIP BYE (I-CSCF to P-CSCF) - see example in table 18.2-11**

> The I-CSCF (THIG) forwards the SIP BYE request to the P-CSCF.

Table 18.2-11: SIP BYE (I-CSCF to P-CSCF)

```
BYE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp SIP/2.0
Via: SIP/2.0/UDP icscf2_p.home2.net, SIP/2.0/UDP Token(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:
```

12. **Remove resource reservation**

The P-CSCF removes the authorisation for resources that had previously been issued for this endpoint for this session. This step also results in a release indication to the GPRS subsystem to confirm that the IP bearers associated with the UE#2 session have been deleted.

13. **SIP BYE (P-CSCF to UE) - see example in table 18.2-13**

The P-CSCF forwards the SIP BYE request on to the UE.

Table 18.2-13: SIP BYE (P-CSCF to UE)

```
BYE 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, SIP/2.0/UDP Token(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:
```

14. **200 OK (UE to P-CSCF) - see example in table 18.2-14**

The mobile responds with a 200 (OK) response, which is sent back to the P-CSCF.

Table 18.2-14: 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.home2.net, SIP/2.0/UDP Token(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-Length:
```

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

15. **Release PDP**

Steps 15 and 16 may be done in parallel with step 14. The Mobile initiates the release of the bearer PDP context.

16. **Rls response**

The GPRS subsystem releases the PDP context. The IP network resources that had were reserved for the message receive path to the mobile for this session are now released. This is initiated from the GGSN. If RSVP was used to allocated resources, then the appropriate release messages for that protocol would invoked here.

17. **200 OK (P-CSCF to I-CSCF) - see example in table 18.2-17**

The P-CSCF sends a 200 OK response to the I-CSCF (THIG).

Table 18.2-17: 200 OK (P-CSCF to I-CSCF)

```
SIP/2.0 200 OK
```

```
Via: SIP/2.0/UDP icscf2_p.home2.net, SIP/2.0/UDP Token(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:
```

18. **200 OK (I-CSCF to S-CSCF) - see example in table 18.2-18**

> The I-CSCF (THIG) sends a 200 OK response to the S-CSCF.

Table 18.2-18: 200 OK (I-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 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:
```

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

19. **200 OK (S-CSCF to I-CSCF) - see example in table 18.2-19**

> The S-CSCF of the other party forwards the 200 OK response to its selecting I-CSCF.

Table 18.2-19: 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
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:
```

20. **200 OK (I-CSCF to I-CSCF) - see example in table 18.2-20**

> The selecting I-CSCF forwards the 200 OK response to the I-CSCF (THIG).

Table 18.2-20: 200 OK (I-CSCF to I-CSCF)

```
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:
```

21. **200 OK (I-CSCF to S-CSCF) - see example in table 18.2-21**

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

Table 18.2-21: 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
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:
```

22. **200 OK (S-CSCF to I-CSCF) - see example in table 18.2-22**

The S-CSCF of the releasing party forwards the 200 OK response to the I-CSCF (THIG).

Table 18.2-22: 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:
```

23. **200 OK (I-CSCF to P-CSCF) - see example in table 18.2-23**

The I-CSCF (THIG) forwards the 200 OK response to the P-CSCF of the releasing party.

Table 18.2-23: 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:
```

24. **SIP OK (P-CSCF to UE) - see example in table 18.2-24**

The P-CSCF of the releasing party forwards the 200 OK response to the UE.

Table 18.2-24: SIP 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:
```

18.3 PSTN initiated session release (not provided)

An example of this flow is not shown in the present document.

18.4 Error handling: session release (not provided)

An example of this flow is not shown in the present document.

19 Network initiated procedures (hiding) (not provided)

An example of this flow is not shown in the present document.

20 Procedures to enable enhanced multimedia services (hiding) (not provided)

An example of this procedure is not shown in the present document.

Annex A (informative):
Change history

Date	TSG #	TSG Doc.	CR#	Rev	Subject/Comment	Old	New	WG doc#
02/03/02					Editorial clean-up by ETSI/MCC.	2.0.1	2.0.2	
2002-03	TSG CN#15	NP-020048			3GPP TS 24.228 draft was approved, and the TS is under formal change control in Rel-5	2.0.2	5.0.0	
2002-06	NP-16	NP-020227	002	1	Update of the authorization flows	5.0.0	5.1.0	N1-020904
2002-06	NP-16	NP-020316	004	5	MO, S-S, MT #1a reference flow update	5.0.0	5.1.0	
2002-06	NP-16	NP-020227	005		Addition of Max-Forwards Header to Registration Flows	5.0.0	5.1.0	N1-020813
2002-06	NP-16	NP-020227	010	1	Integrity protection signal from P-CSCF to S-CSCF	5.0.0	5.1.0	N1-020916
2002-06	NP-16	NP-020227	017	2	DNS-NAPTR Query	5.0.0	5.1.0	N1-021090
2002-06	NP-16	NP-020227	018	3	General update of sections 10.1, 10.2 and 10.3	5.0.0	5.1.0	N1-021416
2002-06	NP-16	NP-020227	019	5	MO, S-S, MT #2 reference flows update	5.0.0	5.1.0	N1-021505
2002-06	NP-16	NP-020227	020	2	Session Redirection Flow Update	5.0.0	5.1.0	N1-021413
2002-06	NP-16	NP-020227	021	2	Session Transfer Flow Update	5.0.0	5.1.0	N1-021414
2002-06	NP-16	NP-020227	022	1	Addition of DHCPv6 references to 24.228	5.0.0	5.1.0	N1-021087
2002-06	NP-16	NP-020228	023		S-S#3 update	5.0.0	5.1.0	N1-021040
2002-06	NP-16	NP-020228	024	1	S-S#4 update	5.0.0	5.1.0	N1-021229
2002-06	NP-16	NP-020228	025	3	CS-O, CS-T Reference flow update	5.0.0	5.1.0	N1-021239
2002-06	NP-16	NP-020228	027		Update of Mobile terminal initiated session release flows (non-hiding)	5.0.0	5.1.0	N1-021151
2002-06	NP-16	NP-020228	028	2	Downloading the implicitely registered public user identities from the S-CSCF to P-CSCF	5.0.0	5.1.0	N1-021473
2002-06	NP-16	NP-020228	029	1	Update of Mobile terminal initiated session release flows (hiding)	5.0.0	5.1.0	N1-021464
2002-06	NP-16	NP-020228	030	1	Correction of the subscription to the registration event package	5.0.0	5.1.0	N1-021435
2002-06	NP-16	NP-020228	031	1	Addition of further Media Streams Flow Update	5.0.0	5.1.0	N1-021415
2002-06	NP-16	NP-020228	034	2	MO#1a failures update	5.0.0	5.1.0	N1-021500
2002-06	NP-16	NP-020228	035	2	MT#1a failures update	5.0.0	5.1.0	N1-021501
2002-06	NP-16	NP-020229	036	2	S-S#1a failures update	5.0.0	5.1.0	N1-021502
2002-06	NP-16	NP-020229	037	2	MT#1c + MT#2a update	5.0.0	5.1.0	N1-021503
2002-06	NP-16	NP-020229	038	2	MT#1e update	5.0.0	5.1.0	N1-021504
2002-06	NP-16	NP-020229	040	1	Branch parameter corrections	5.0.0	5.1.0	N1-021451
2002-06	NP-16	NP-020229	041		Changing COMET to UPDATE in chapter 5	5.0.0	5.1.0	N1-021232
2002-06	NP-16	NP-020229	042		Update of chapter 7.4.8	5.0.0	5.1.0	N1-021233
2002-06	NP-16	NP-020317	043	1	Content of From/To headers	5.0.0	5.1.0	
2002-06	NP-16	NP-020229	044	1	S-S#1b reference flows update	5.0.0	5.1.0	N1-021381
2002-06	NP-16	NP-020288	046	2	Adding security parameters to the call flows	5.0.0	5.1.0	
2002-06	NP-16	NP-020229	049	1	S-CSCF allocation	5.0.0	5.1.0	N1-021442
2002-06	NP-16	NP-020229	050	1	Correction to Warn codes	5.0.0	5.1.0	N1-021462
2002-06	NP-16	NP-020229	053		Removal of Referred-By header from specification	5.0.0	5.1.0	N1-021353
2002-06	NP-16	NP-020297	061	1	MO#1b and MT#1b update	5.0.0	5.1.0	
2002-06	NP-16	NP-020309	062	2	SS#1c update	5.0.0	5.1.0	
2002-09	NP-17	NP-020374	063	1	Correction to the dns procedures	5.1.0	5.2.0	N1-021778
2002-09	NP-17	NP-020374	064	1	Add P-header examples to call flow MO#1a	5.1.0	5.2.0	N1-021798
2002-09	NP-17	NP-020374	066	1	Add P-header examples to call flow MT#1a	5.1.0	5.2.0	N1-021800
2002-09	NP-17	NP-020336	067	1	Remaining REGISTER and SUBSCRIBE flow updates	5.1.0	5.2.0	
2002-09	NP-17	NP-020374	068		Addition of P-Visited-Network-ID to 24.228	5.1.0	5.2.0	N1-021664
2002-09	NP-17	NP-020374	069	1	Corrections to 24.228 flows	5.1.0	5.2.0	N1-021760

2002-09	NP-17	NP-020374	070		CallID of REGISTER requests	5.1.0	5.2.0	N1-021712
2002-12	NP-18	NP-020555	047	2	Relationship of Application Servers to flows in 24.228	5.2.0	5.3.0	N1-021915
2002-12	NP-18	NP-020555	048	3	Addition of tokenization to key	5.2.0	5.3.0	N1-022145
2002-12	NP-18	NP-020555	054	3	Removal of editor's notes - clause 1 through 4 and other minor changes	5.2.0	5.3.0	N1-022146
2002-12	NP-18	NP-020555	071	1	Add P-headers to MO#1b flow	5.2.0	5.3.0	N1-022096
2002-12	NP-18	NP-020555	072	4	Add charging P-header examples to call flows	5.2.0	5.3.0	N1-022441
2002-12	NP-18	NP-020555	073	4	Corrections to the Path and Service-Route headers	5.2.0	5.3.0	N1-022390
2002-12	NP-18	NP-020555	074		General clean-up of section 17.3	5.2.0	5.3.0	N1-021952
2002-12	NP-18	NP-020555	075	1	Correction to 24.228 flows - sections 10.4 and 10.5	5.2.0	5.3.0	N1-022118
2002-12	NP-18	NP-020555	076	1	Correction to 24.228 flows- section 17.5	5.2.0	5.3.0	N1-022119
2002-12	NP-18	NP-020556	078		General update of section 5.3	5.2.0	5.3.0	N1-021986
2002-12	NP-18	NP-020556	080		Correction on P-Asserted-Id, P-Preferred-Id, Remote-Party-ID(chapter 7)	5.2.0	5.3.0	N1-022015
2002-12	NP-18	NP-020556	083	1	Clause 17.6 Error handling	5.2.0	5.3.0	N1-022291
2002-12	NP-18	NP-020556	088	1	Addition of missing "<>" for URIs in chapter 7 and 8	5.2.0	5.3.0	N1-022480
2002-12	NP-18	NP-020556	089	1	Call transfer update	5.2.0	5.3.0	N1-022448
2002-12	NP-18	NP-020556	090	1	Changing tel URL to SIP URI in P-Associated-URI header field	5.2.0	5.3.0	N1-022437
2002-12	NP-18	NP-020556	091	1	Addition of Message flows to 24.228	5.2.0	5.3.0	N1-022457
2002-12	NP-18	NP-020556	092	1	SA related procedures	5.2.0	5.3.0	N1-022460
2002-12	NP-18	NP-020557	093		PCF to PDF	5.2.0	5.3.0	N1-022386
2003-03	NP-19	NP-030047	097	2	Correction of the Registration state event	5.3.0	5.4.0	N1-030269
2003-03	NP-19	NP-030047	098	1	General update to clauses 7 and 8	5.3.0	5.4.0	N1-030247
2003-03	NP-19	NP-030047	099	1	General update to clauses 17 and 18	5.3.0	5.4.0	N1-030248
2003-03	NP-19	NP-030047	100	1	General update to clause 10	5.3.0	5.4.0	N1-030249
2003-03	NP-19	NP-030048	102	2	General update to clauses 6 and 16	5.3.0	5.4.0	N1-030283
2003-06	NP-20	NP-030274	103		Minor 24.228 cleanup	5.4.0	5.5.0	N1-030408
2003-06	NP-20	NP-030274	104	2	General update (SDP) to clauses 7 and 8	5.4.0	5.5.0	N1-030704
2003-06	NP-20	NP-030274	105		Globally unique value of the ICID	5.4.0	5.5.0	N1-030416
2003-06	NP-20	NP-030274	106	1	Alignment of flows with RFC 3329 (sec-agree)	5.4.0	5.5.0	N1-030512
2003-06	NP-20	NP-030274	107		Minor corrections in 10.4.2 and 10.5.2	5.4.0	5.5.0	N1-030458
2003-06	NP-20	NP-030274	108		Minor corrections in 5.3.6	5.4.0	5.5.0	N1-030459
2003-06	NP-20	NP-030274	109	1	SUBSCRIBE information stored at the P-CSCF and S-CSCF	5.4.0	5.5.0	N1-030522
2003-06	NP-20	NP-030274	110		Removal of the Event header field from the response to the SUBSCRIBE request	5.4.0	5.5.0	N1-030797

2003-06	NP-20	NP-030274	111	1	Expires header alignment with 24.229	5.4.0	5.5.0	N1-030847
2003-09	NP-21	NP-030411	113		Removal of address binding by P-CSCF in registration flows	5.5.0	5.6.0	N1-031011
2003-09	NP-21	NP-030411	114	1	Corrections on MGCF handling CS originating or terminating sessions	5.5.0	5.6.0	N1-031237
2003-09	NP-21	NP-030411	115	1	Update Handling of SA chap_6_7_8	5.5.0	5.6.0	N1-031262
2003-09	NP-21	NP-030411	116	1	Update Handling of SA chap_ 10	5.5.0	5.6.0	N1-031263
2003-09	NP-21	NP-030411	117	1	Update Handling of SA chap_16_17_18	5.5.0	5.6.0	N1-031264
2003-12	NP-22	NP-030475	119		Correction to description or RES/XRES usage	5.6.0	5.7.0	N1-031446
2003-12	NP-22	NP-030475	120	1	'Roaming' word and CS-O sessions	5.6.0	5.7.0	N1-031638
2003-12	NP-22	NP-030475	121	1	Corrections regarding SDP handling	5.6.0	5.7.0	N1-031639
2003-12	NP-22	NP-030475	122		Correction of reregistration flow	5.6.0	5.7.0	N1-031487
2003-12	NP-22	NP-030475	123	1	Correction of flow in 6.9.3	5.6.0	5.7.0	N1-031620
2003-12	NP-22	NP-030475	124	1	Corrections to the P-Access-Network-Info header (Part 1)	5.6.0	5.7.0	N1-031708
2003-12	NP-22	NP-030475	125	1	Corrections to the P-Access-Network-Info header (Part 2)	5.6.0	5.7.0	N1-031709
2004-03	NP-23	NP-040026	128		Editorial modification in notation conventions	5.7.0	5.8.0	N1-040335

History

Document history			
V5.1.0	June 2002	Publication	
V5.2.0	September 2002	Publication	
V5.3.0	December 2002	Publication	
V5.4.0	March 2003	Publication	
V5.5.0	June 2003	Publication	
V5.6.0	September 2003	Publication	
V5.7.0	December 2003	Publication	
V5.8.0	March 2004	Publication	