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Technical Report

3rd Generation Partnership Project;

Technical Specification Group Core Network and Terminals;

Signalling flows for the session setup in the   
IP Multimedia core network Subsystem (IMS)   
based on Session Initiation Protocol (SIP)

and Session Description Protocol (SDP);

Stage 3

(Release 16)

* *

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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

# 1 Scope

The present document gives examples of the session setup in the IM CN subsystem based on SIP and SDP.

These signalling flows provide detailed signalling flows, which expand on the overview information flows provided in 3GPP TS 23.228 [2]. The flows focus on a basic session setup, i.e. no flows will be provided for topology hiding, for sessions with IBCF involved or for sessions having certain features.

# 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 TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3".

[2] 3GPP TS 24.228 Release 5: "Signalling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) - Stage 3".

[3] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[4] IETF RFC 3261: "SIP: Session Initiation Protocol".

[5] IETF RFC 3312: "Integration of Resource Management and Session Initiation Protocol (SIP)".

[6] IETF RFC 3262: "Reliability of Provisional Responses in Session Initiation Protocol (SIP)".

[7] IETF RFC 3311: "The Session Initiation Protocol (SIP) UPDATE Method".

[8] IETF RFC 3264: "An Offer/Answer Model with Session Description Protocol (SDP)".

[9] RFC 4032 (March 2005): "Update to the Session Initiation Protocol (SIP) Preconditions Framework".

[10] draft-ietf-mmusic-sdp-capability-negotiation-08 (December 2007): "SDP Capability Negotiation".

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

## 3.2 Symbols

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

## 3.3 Abbreviations

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

AMR Adaptive Multi-Rate

AS Application Server

CN Core Network

CSCF Call Session Control Function

DSL Digital Subscriber Line

FQDN Fully Qualified Domain Name

HSS Home Subscriber Server

HTTP Hyper Text Transfer Protocol

I-CSCF Interrogating CSCF

IM IP Multimedia

IMS IP Multimedia CN subsystem

IP Internet Protocol

IP-CAN IP-Connectivity Access Network

MGCF Media Gateway Control Function

MRFC Multimedia Resource Function Controller

MRFP Multimedia Resource Function Processor

NGN Next Generation Network

PCRF Policy and Charging Rules Function

P-CSCF Proxy CSCF

PSI Public Service Identity

S-CSCF Serving CSCF

SDP Session Description Protocol

SIP Session Initiation Protocol

UE User Equipment

# 4 Methodology

## 4.1 General

The signalling flows provided in this document follow the methodology developed in 3GPP TS 24.228 [2]. The following additional considerations apply:

a) 3GPP TS 24.228 [2] shows separate signalling flows with no configuration hiding between networks, and with configuration hiding between networks. Separate signalling flows are not shown in the present document;

b) 3GPP TS 24.228 [2] breaks down the functionality of the various CSCFs. The functionality of the S-CSCF and I-CSCF is not relevant for the session setup procedure. Therefore S-CSCFs and I-CSCFs are collapsed into a single entity labelled "Intermediate IM CN subsystem entities".

## 4.2 Key required to interpret signalling flows

The key to interpret signalling flows specified in 3GPP TS 24.228 [2] subclauses 4.1 and 4.2 applies.

Each signalling flow table contains descriptions for headers where the content of the header is new to that signalling flow, as is already performed in 3GPP TS 24.228 [2].

However, 3GPP TS 24.228 [3] includes extensive descriptions for the contents of various headers following each of the tables representing the contents of the signalling flows. Where the operation of the header is identical to that shown in 3GPP TS 24.228 [2], then such text is not reproduced in the present document.

Additional text may also be found on the contents of headers within 3GPP TS 24.228 [2] in addition to the material shown in the present document.

In order to differentiate between messages for SIP and media, the notation in figure 4.1-1 is used.



Figure 4.1-1: Signalling flow notation

# 5 Signalling flows for session initiation

## 5.1 Establishing a session when UE#1 and UE#2 do not have required resources available

### 5.1.1 Introduction

The following flows show the establishment of a session where UE#1 and UE#2 do not yet have the required local resources available and need to perform resource reservation. In subclause 5.1.2 both UEs will initiate the IP-CAN bearer setup. In subclause 5.1.3 the network will initiate the IP-CAN bearer setup for UE#1.

It is assumed that both the originating UE and terminating UE are using a dedicated IP-CAN bearer for SIP signalling and a dedicated IP-CAN bearer for media.

The box "Intermediate IM CN subsystem entities" stands for the combination of I-CSCF/S-CSCF on the originating and on the terminating side. Routing of messages between those nodes is not described in the flow below.

### 5.1.2 UE initiated IP-CAN bearer setup

#### 5.1.2.1 Introduction

This subclause shows the establishment of a session where UE#1 and UE#2 need to reserve local resources. In subclause 5.1.2.3 the SDP capability negotiations [10] mechanism is used and supported by both UE#1 and UE#2. In sublcause 5.1.2.4 only UE#1 supports the mechanism.

#### 5.1.2.2 SDP capability negotiation not supported by UE#1



Figure 5.1.2.2-1: IMS session setup, resource reservation on both sides

NOTE: Support for SDP capability negotiation is only optional for 3GPP release 7 and release 8 UEs and non-IMS UEs.

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.1.2.2-1**

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. For the video stream AVPF is offered and for the audio stream AVP is offered.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

UE#2 supports both AVP and AVPF and supports SDP capability negotiation and since only AVPF is being offered for video and only AVP is offered for audio UE#2 therefore accepts AVPF for video and AVP for audio.

For this example it is assumed, that signalling encryption was negotiated between UE and P‑CSCF in the security mode set-up procedure during the last successful authentication. This option will only be shown in this example.

Table 5.1.2.2-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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/AVPF 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

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**Security-Verify:** The Security-Verify contains the content of the Security-Server header as received during last successful authentication. It indicates that integrity protection and encryption are in use for this session.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.1.2.2-2**

Table 5.1.2.2-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.1.2.2-3**

Table 5.1.2.2-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.1.2.2-4**

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

Table 5.1.2.2-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. 183 (Session Progress) response (UE#2 to P-CSCF) - - see example in table 5.1.2.2-5**

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#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.1.2.2-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74c;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/AVPF 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

10. **Reserve IP-CAN bearer for media**

The terminating UA sets up the bearer in accordance with the media description received SDP.

11. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

12. **183 (session progress) response (P-CSCF#" to S-CSCF#2) – see example in table 5.1.2.2-6**

Table 5.1.2.2-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

13. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.1.2.2-7**

Table 5.1.2.2-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

14. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

15. **183 (Session Progress) response (P-CSCF to UE) – see example in table 5.1.2.2-8**

Table 5.1.2.2-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

16. **Reserve IP-CAN bearer for media**

The originating UE sets up the bearer in accordance with the media description received SDP.

17 -24. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

25. **UPDATE request (UE#1 to P-CSCF#1) - see example in table 5.1.2.2-9**

UE#1 indicates that it can send and receive media as the necessary resources are available.

Table 5.1.2.2-9: UPDATE request (UE#1 to P-CSCF#1)

UPDATE <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrececv

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/AVPF 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

26. **UPDATE request (P-CSCF#1 to S-CSCF#1 ) - see example in table 5.1.2.2-10**

Table 5.1.2.2-10: UPDATE request (P-CSCF#1 to S-CSCF#1)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

27. **UPDATE request (S-CSCF#2 to P-CSCF#2 ) - see example in table 5.1.2.2-11**

Table 5.1.2.2-11: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

28. **UPDATE request (P-CSCF#2 to UE#2 ) - see example in table 5.1.2.2-12**

Table 5.1.2.2-12: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

29. **200 (OK) response (UE#2 to P-CSCF#1) - see example in table 5.1.2.2-13**

UE acknowledges the UPDATE request with a 200 (OK) response.

UE indicates that the local resources are available

Table 5.1.2.2-13: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=0 0

m=video 3400 RTP/AVPF 98

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

30. **200 (OK) response (P-CSCF#2 to S-CSCF#2 ) - see example in table 5.1.2.2-14**

Table 5.1.2.2-14: 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 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:

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=

a=

a=

31. **200 (OK) response (S-CSCF#1 to P-CSCF#21) - see example in table 5.1.2.2-15**

Table 5.1.2.2-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

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=

a=

a=

32. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.1.2.2-16**

Table 5.1.2.2-16: 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:

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=

a=

a=

33 -36 . **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) does not have a SDP and therefore need not to be sent reliable.

37 –40 .**200 (OK) response**

When the called party answers the UE sends a 200 (OK) response final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

40-44 **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

#### 5.1.2.3 SDP capability negotiation supported by UE#1 and UE#2

NOTE: Service specific information is not shown in the messages.



Figure 5.1.2.3-1: IMS session setup, resource reservation on both sides

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.1.2.3-1**

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#1 indicates, using the SDP capability negotiation mechanism, that it supports and is willing to use AVPF transport for the video stream and the audio stream while offering AVP in the media line.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

UE#2 supports both AVP and AVPF and also supports SDP capability egotiation and since AVPF is being offered for both video and audio using the SDP capability negotiation mechanism UE#2 therefore accepts AVPF for both video and audio.

For this example it is assumed, that signalling encryption was negotiated between UE and P‑CSCF in the security mode set-up procedure during the last successful authentication. This option will only be shown in this example.

Table 5.1.2.3-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

a=tcap:1 RTP/AVPF

a=pcfg:1 t=1

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

a=tcap:1 RTP/AVPF

a=pcfg:1 t=1

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

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**Security-Verify:** The Security-Verify contains the content of the Security-Server header as received during last successful authentication. It indicates that integrity protection and encryption are in use for this session.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.1.2.3-2**

Table 5.1.2.3-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.1.2.3-3**

Table 5.1.2.3-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Supported:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.1.2.3-4**

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

Table 5.1.2.3-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. 183 (Session Progress) response (UE#2 to P-CSCF) - - see example in table 5.1.2.3-5**

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#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 supports the SDP capability negotiation mechanism, and is willing to use AVPF transport. It indicates the selection of AVPF in the SDP answer.

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.1.2.3-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid: 2ad8950e-48a5-4a74-8d99-ad76cc7fc74c;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/AVPF 98

a=acfg:1 t=1

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/AVPF 97 96

a=acfg:1 t=1

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

10. **Reserve IP-CAN bearer for media**

The terminating UA sets up the bearer in accordance with the media description received SDP.

11. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

12 **183 (session progress) response (P-CSCF#" to S-CSCF#2) – see example in table 5.1.2.3-6**

Table 5.1.2.3-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

13. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.1.2.3-7**

Table 5.1.2.3-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

14. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

15 **183 (Session Progress) response (P-CSCF to UE) – see example in table 5.1.2.3-8**

Table 5.1.2.3-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

16. **Reserve IP-CAN bearer for media**

The originating UE sets up the bearer in accordance with the media description received SDP.

17 -24. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

25. **UPDATE request (UE#1 to P-CSCF#1) - see example in table 5.1.2.3-9**

UE#1 indicates that it can send and receive media as the necessary resources are available.

UE#1 indicates that AVPF transport is used for the video stream and the audio stream.

Table 5.1.2.3-9: UPDATE request (UE#1 to P-CSCF#1)

UPDATE <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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/AVPF 98

b=AS:75

a=curr:qos local sendrececv

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/AVPF 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

26 **UPDATE request (P-CSCF#1 to S-CSCF#1 ) - see example in table 5.1.2.3-10**

Table 5.1.2.3-10: UPDATE request (P-CSCF#1 to S-CSCF#1)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

27. **UPDATE request (S-CSCF#2 to P-CSCF#2 ) - see example in table 5.1.2.3-11**

Table 5.1.2.3-11: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

28. **UPDATE request (P-CSCF#2 to UE#2 ) - see example in table 5.1.2.3-12**

Table 5.1.2.3-12: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

29. **200 (OK) response (UE#2 to P-CSCF#1) - see example in table 5.1.2.3-13**

UE#2 acknowledges the UPDATE request with a 200 (OK) response.

UE#2 indicates that the local resources are available.

UE#2 indicates that AVPF transport is used for the video stream and the audio stream.

Table 5.1.2.3-13: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=0 0

m=video 3400 RTP/AVPF 98

b=AS:75

a=curr:qos local sendrececv

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/AVPF 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

30. **200 (OK) response (P-CSCF#2 to S-CSCF#2 ) - see example in table 5.1.2.3-14**

Table 5.1.2.3-14: 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 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:

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=

a=

a=

31. **200 (OK) response (S-CSCF#1 to P-CSCF#21) - see example in table 5.1.2.3-15**

Table 5.1.2.3-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

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=

a=

a=

32. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.1.2.3-16**

Table 5.1.2.3-16: 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:

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=

a=

a=

33 -36 . **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) does not have a SDP and therefore need not to be sent reliable.

37 –40 .**200 (OK) response**

When the called party answers the UE sends a 200 (OK) response final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

40-44 **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

#### 5.1.2.4 SDP capability negotiation only supported by UE#1

NOTE: Service specific information is not shown in the messages.



Figure 5.1.2.4-1: IMS session setup, resource reservation on both sides

NOTE: Support for SDP capability negotiation is only optional for 3GPP release 7 and release 8 UEs and non-IMS UEs.

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.1.2.4-1**

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#1 indicates, using the SDP capability negotiation mechanism, that it supports and is willing to use AVPF transport for the video stream and the audio stream. while offering AVP in the media line

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

UE#2 supports both AVP and AVPF but since it does not support SDP capability negotiation it cannot understand that AVPF is also being offered for video and therefore accepts AVP for video.

For this example it is assumed, that signalling encryption was negotiated between UE and P‑CSCF in the security mode set-up procedure during the last successful authentication. This option will only be shown in this example.

Table 5.1.2.4-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

a=tcap:1 RTP/AVPF

a=pcfg:1 t=1

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

a=tcap:1 RTP/AVPF

a=pcfg:1 t=1

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

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**Security-Verify:** The Security-Verify contains the content of the Security-Server header as received during last successful authentication. It indicates that integrity protection and encryption are in use for this session.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

1. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.1.2.4-2**

Table 5.1.2.4-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.1.2.4-3**

Table 5.1.2.4-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Supported:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.1.2.4-4**

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

Table 5.1.2.4-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. 183 (Session Progress) response (UE#2 to P-CSCF) - - see example in table 5.1.2.4-5**

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#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 does not support the SDP capability negotiation mechanism, and is not aware that UE#1 is willing to use AVPF transport. It indicates the selection of AVP in the SDP answer.

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.1.2.4-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;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

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

10. **Reserve IP-CAN bearer for media**

The terminating UA sets up the bearer in accordance with the media description received SDP.

11. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

12 **183 (session progress) response (P-CSCF#" to S-CSCF#2) – see example in table 5.1.2.4-6**

Table 5.1.2.4-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

13. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.1.2.4-7**

Table 5.1.2.4-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

14. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

15 **183 (Session Progress) response (P-CSCF to UE) – see example in table 5.1.2.4-8**

Table 5.1.2.4-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

16. **Reserve IP-CAN bearer for media**

The originating UE sets up the bearer in accordance with the media description received SDP.

17 -24. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

25. **UPDATE request (UE#1 to P-CSCF#1) - see example in table 5.1.2.4-9**

UE#1 indicates that it can send and receive media as the necessary resources are available.

Table 5.1.2.4-9: UPDATE request (UE#1 to P-CSCF#1)

UPDATE <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrececv

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

26 **UPDATE request (P-CSCF#1 to S-CSCF#1 ) - see example in table 5.1.2.4-10**

Table 5.1.2.4-10: UPDATE request (P-CSCF#1 to S-CSCF#1)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

27. **UPDATE request (S-CSCF#2 to P-CSCF#2 ) - see example in table 5.1.2.4-11**

Table 5.1.2.4-11: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

28. **UPDATE request (P-CSCF#2 to UE#2 ) - see example in table 5.1.2.4-12**

Table 5.1.2.4-12: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

29. **200 (OK) response (UE#2 to P-CSCF#1) - see example in table 5.1.2.4-13**

UE#2 acknowledges the UPDATE request with a 200 (OK) response.

UE#2 indicates that the local resources are available.

Table 5.1.2.4-13: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

30. **200 (OK) response (P-CSCF#2 to S-CSCF#2 ) - see example in table 5.1.2.4-14**

Table 5.1.2.4-14: 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 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:

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=

a=

a=

31. **200 (OK) response (S-CSCF#1 to P-CSCF#21) - see example in table 5.1.2.4-15**

Table 5.1.2.4-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

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=

a=

a=

32. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.1.2.4-16**

Table 5.1.2.4-16: 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:

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=

a=

a=

33 -36 . **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) does not have a SDP and therefore need not to be sent reliable.

37 –40 .**200 (OK) response**

When the called party answers the UE sends a 200 (OK) response final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

40-44 **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.1.3 Network initiated IP-CAN bearer setup

****

**Figure** 5.1.3-1: IMS session setup, resource reservation on both sides

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.1.3-1**

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#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

For this example it is assumed, that signalling encryption was negotiated between UE and P‑CSCF in the security mode set-up procedure during the last successful authentication. This option will only be shown in this example.

Table 5.1.3-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

**Supported:** The UE indicates support for the "precondition" mechanism,the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**Security-Verify:** The Security-Verify contains the content of the Security-Server header as received during last successful authentication. It indicates that integrity protection and encryption are in use for this session.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

1. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.1.3-2**

Table 5.1.3-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.1.3-3**

Table 5.1.3-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.1.3-4**

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

Table 5.1.3-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. 183 (Session Progress) response (UE#2 to P-CSCF) - - see example in table 5.1.3-5**

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#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.1.3-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;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

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

10. **Reserve IP-CAN bearer for media**

The terminating UA sets up the bearer in accordance with the media description received SDP.

11. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

12 **(session progress) response (P-CSCF#" to S-CSCF#2) – see example in table 5.1.3-6**

Table 5.1.3-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

13. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.1.3-7**

Table 5.1.3-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

14-15. **Authorize QoS and initiate IP-CAN bearer**

P-CSCF authorises the respective IP flows and provides the QoS requirements for the resources necessary for this session.

In this case, this triggers the IP-CAN to initiate the reservation of required resources, including the initiation of an IP-CAN bearer setup or the modification of an existing one.

1. **183 (Session Progress) response (P-CSCF to UE) – see example in table 5.1.3-8**

Table 5.1.3-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

17 -24. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

25. **UPDATE request (UE#1 to P-CSCF#1) - see example in table 5.1.3-9**

UE#1 indicates, when it has received from the network an indication that an IP-CAN with necessary quality of service has been established, that it can send and receive media as the necessary resources are available.

Table 5.1.3-9: UPDATE request (UE#1 to P-CSCF#1)

UPDATE <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrececv

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

26 **UPDATE request (P-CSCF#1 to S-CSCF#1 ) - see example in table 5.1.3-10**

Table 5.1.3-10: UPDATE request (P-CSCF#1 to S-CSCF#1)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

27. **UPDATE request (S-CSCF#2 to P-CSCF#2 ) - see example in table 5.1.3-11**

Table 5.1.3-11: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

28. **UPDATE request (P-CSCF#2 to UE#2) - see example in table 5.1.3-12**

Table 5.1.3-12: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

29. **200 (OK) response (UE#2 to P-CSCF#1) - see example in table 5.1.3-13**

UE acknowledges the UPDATE request with a 200 (OK) response.

UE indicates that the local resources are available

Table 5.1.3-13: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

30. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 5.1.3-14**

Table 5.1.3-14: 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 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:

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=

a=

a=

31. **200 (OK) response (S-CSCF#1 to P-CSCF#21) - see example in table 5.1.3-15**

Table 5.1.3-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

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=

a=

a=

32. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.1.3-16**

Table 5.1.3-16: 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:

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=

a=

a=

33 -36. **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) response does not have a SDP and therefore need not to be sent reliable.

37 –40. **200 (OK) response**

When the called party answers the UE sends a 200 (OK) response final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

40-44. **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

## 5.2 Establishing a session when UE#1 does not have required resources available while UE#2 has resources already available

### 5.2.1 Introduction

The flow in subclause 5.2.2 shows the establishment of a session where does not yet have the required local resources available and UE#1 needs perform to resource reservation (e.g. using a GRPS IP-CAN) while UE#2 already has the required local resources available and does not need to perform resource reservation (e.g. connected via IWLAN IP-CAN). This call flow assumes that UE#1 does not have resource ready before sending the PRACK request to the first reliable provisional response.

The flow in subclause 5.2.3 shows the establishment of a session where UE#1 needs to reserve local resources while UE#2 does not need to perform resource reservation (e.g. connected via IWLAN IP-CAN). This call flow assumes that the UE#1 has resources ready before sending the PRACK request to the first reliable provisional response.

The box "Intermediate IM CN subsystem entities" stands for the combination of I-CSCF/S-CSCF on the originating and on the terminating side. Routing of messages between those nodes is not described in the flow below.

### 5.2.2 Signalling flow with UPDATE request



Figure 5.1-1: IMS session setup, resource reservation on originating side only

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.2-1**

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 H.263 codec. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

Table 5.2-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

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

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

**Supported:** The UE indicates support for the "precondition" mechanism,the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3**. INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.2-2**

Table 5.2-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.2-3**

Table 5.2-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.2-4**

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

Table 5.2-4: INVITE request (P-CSCF#2 to UE#2

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8. **100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9. **183 (Session Progress) response (UE#2 to P-CSCF) - - see example in table 5.2-5**

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#2 supports both offered media streams

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

UE#2 has all necessary resources available and indicates that in the SDP

Table 5.2-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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: IEEE-802.11a

Privacy: none

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

CSeq:

Require: 100rel, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;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

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=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 sendrecv

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

10. **183 (session progress) response (P-CSCF#2 to S-CSCF#2) – see example in table 5.2-6**

Table 5.2-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

11. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.2-7**

Table 5.2-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

12. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

13**. 183 (Session Progress) response (P-CSCF to UE) – see example in table 5.2-8**

Table 5.2-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

14. **Reserve IP-CAN bearer for media**

The originating UE sets up the bearer in accordance with the media description received SDP.

15 -22. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

23. **UPDATE request (UE#1 to P-CSCF#1 ) - see example in table 5.2-9**

UE#1 indicates that it can send and receive media as the necessary resources are available.

Table 5.2-9: UPDATE request (UE#1 to P-CSCF#1)

UPDATE <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree,precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi=87654321; port1=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

24. **UPDATE request (P-CSCF#1 to S-CSCF#1 ) - see example in table 5.2-10**

Table 5.2-10: UPDATE request (P-CSCF#1 to S-CSCF#1)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

25. **UPDATE request (S-CSCF#2 to P-CSCF#2 ) - see example in table 5.2-11**

Table 5.2-11: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

26. **UPDATE request (P-CSCF#2 to UE#2 ) - see example in table 5.2-12**

Table 5.2-12: UPDATE request (S-CSCF#2 to P-CSCF#2)

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:

Require:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

27. **200 (OK) response (UE#1 to P-CSCF#1) - see example in table 5.2-13**

UE acknowledges the UPDATE request with a 200 (OK) response.

UE indicates that the local resources are available

Table 5.2-13: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

28. **200 (OK) response (P-CSCF#2 to S-CSCF#2 ) - see example in table 5.2-14**

Table 5.2-14: 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 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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

29. **200 (OK) response (S-CSCF#1 to P-CSCF#21) - see example in table 5.2-15**

Table 5.2-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

30. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.2-16**

Table 5.2-16: 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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

31 -34 . **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) response does not have a SDP and therefore need not to be sent reliable.

35 –38 .**200 (OK) response**

When the called party answers the UE sends a 200 (OK) response final response to the INVITE request (6) to P-CSCF, and starts the media flow(s) for this session.

39-42 **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.2.3 Signalling flow without UPDATE request



Figure 5.2.3-1: IMS session setup, resource reservation on originating side only

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.2.3-1**

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 H.263 codec. The audio stream supports the EVRC codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

Table 5.2.3-1: INVITE request (UE#1 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: 3GPP2-1X-HRPD; ci-3gpp2=1234123412341234123412341234123411

Privacy: none

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+1-212-555-2222>

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 127 INVITE

Require: sec-agree

Supported: precondition, 100rel, gruu, 199

Proxy-Require: sec-agree

Accept: application/sdp,application/3gpp-ims+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:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

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

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 EVRC/8000

a=ptime:20

a=rtpmap:96 telephone-event

**Supported:** The UE indicates support for the "precondition" mechanism,the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3**. INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.2.3-2**

Table 5.2.3-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.2.3-3**

Table 5.2.3-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.2.3-4**

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

Table 5.2.3-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8. **100 (Trying) response (UE#2 to P-CSCF#2)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9. **183 (Session Progress) response (UE#2 to P-CSCF#2) - - see example in table 5.2.3-5**

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#2 supports both offered media streams

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. UE#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

UE#2 has all necessary resources available and indicates that in the SDP

Table 5.2.3-5: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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: IEEE-802.11a

Privacy: none

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

CSeq:

Require: 100rel, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;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

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=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 sendrecv

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 EVRC/8000

a=ptime:20

a=rtpmap:96 telephone-event

10. **183 (session progress) response (P-CSCF#2 to S-CSCF#2) – see example in table 5.2.3-6**

Table 5.2.3-6: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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:

P-Asserted-Identity: "John Smith" <sip:user2\_public1@home2.net>

P-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

11. **183 (session progress) response (S-CSCF#1 to P-CSCF#1) – see example in table 5.2.3-7**

Table 5.2.3-7: 183 (Session Progress) response (P-CSCF#2 to S-CSCF#2)

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-Access-Network-Info:

P-Charging-Vector: icid-value="AyretyU0dm+6O2IrT5tAFrbHLso=023551024"

Privacy:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

RSeq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

12**. 183 (Session Progress) response (P-CSCF#1 to UE#1) – see example in table 5.2.3-8**

Table 5.2.3-8: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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=

13. **Resource Reservation Completed**

The originating UE has finished setting up resources in accordance with the media description required for the session.

14. **PRACK request (UE#1 to P-CSCF#1) - see example in table 5.2.3-9**

UE#1 indicates that it can send and receive media as the necessary resources are available.

Table 5.2.3-9: PRACK request (UE#1 to P-CSCF#1)

PRACK <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 128 PRACK

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; spi=87654321; port1=7531

RAck: 9021 127 INVITE

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrececv

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 EVRC/8000

a=ptime:20

15. **PRACK request (P-CSCF#1 to S-CSCF#1) - see example in table 5.2.3-10**

Table 5.2.3-10: PRACK request (P-CSCF#1 to S-CSCF#1)

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:

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:

Require: Precondition

RAck:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

16. PRACK **request (S-CSCF#2 to P-CSCF#2) - see example in table 5.2.3-11**

Table 5.2.3-11: PRACK request (S-CSCF#2 to P-CSCF#2)

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:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

17. **PRACK request (P-CSCF#2 to UE#2) - see example in table 5.2-12**

Table 5.2.3-12: PRACK request (S-CSCF#2 to P-CSCF#2)

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:

Contact:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

18. **200 (OK) response (UE#2 to P-CSCF#2) - see example in table 5.2.3-13**

UE#2 acknowledges the PRACK request with a 200 (OK) response.

UE#2 indicates that the local resources are available.

Table 5.2.3-13: 200(OK) response (UE#2 to P-CSCF#2)

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

P-Access-Network-Info: IEEE-802.11a

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 128 PRACK

Require: precondition

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=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=curr:qos local sendrececv

a=curr:qos remote sendrecv

a=des:qos mandatory local sendrecv

a=des:qos mandatory remote sendrecv

a=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=sendrecv

a=rtpmap:97 EVRC/8000

a=ptime:20

19. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 5.2.3-14**

Table 5.2.3-14: 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 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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

20. **200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 5.2.3-15**

Table 5.2.3-15: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

21. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.2.3-16**

Table 5.2.3-16: 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:

Require:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

22 - 25 . **180 (Ringing) response**

UE#2 sends the 180 (Ringing) response.

26 - 29 .**200 (OK) response**

When the called party answers, the UE#2 sends a 200 (OK) response final response to the INVITE request and starts the media flow(s) for this session.

30 - 33 .**ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

## 5.3 Establishing a session when UE#1 has resources available while UE#2 does not have required resources available

### 5.3.1 Introduction

The following flows show the establishment of a session where UE#1 already has all necessary local resources available (e.g. having an appropriate PDP context for the desired media available) and does not need to perform resource reservation while UE#2 does not yet have the required resources available and has to perform resource reservation.

Flow 5.3.2 shows the case where UE#2 performs resource reservation and uses a 200 (OK) response to the INVITE Request to send the SDP Answer. Flow 5.3.3 shows the case where UE#2 performs resource reservation and uses a 180 Ringing response to the INVITE Request to send the SDP Answer. Finally, Flow 5.3.4 shows the case where the IP-CAN performs the resource reservation for UE#2 and UE#2 uses a 183 Session Progress response to the INVITE Request to send the SDP Answer.

The box "Intermediate IM CN subsystem entities" stands for the combination of I-CSCF/S-CSCF on the originating and on the terminating side. Routing of messages between those nodes is not described in the flow below.

### 5.3.2 Signalling Flow (with SDP answer in 200 (OK) response for INVITE request)



Figure 5.3-1: IMS session setup, resource reservation only on terminating side

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.3-1**

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 H.263 codec. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does have available the resources that are necessary to transport the media.

Table 5.3-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel,gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrecv

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

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 none remote sendrecv

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

**Supported:** The UE indicates support for the "precondition" mechanism,the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

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

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.3-2**

Table 5.3-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.3-3**

Table 5.3-3: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.3-4**

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

Table 5.3-4: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. Reserve IP-CAN bearer for media**

The terminating UE sets up the bearer in accordance with the media description.

10. – 13. **180 (Ringing) response**

UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) response does not have a SDP and therefore need not to be sent reliable.

1. **200 (OK) response (UE#2 to P-CSCF#2) - see example in table 5.3-5**

UE indicates that the local resources are available

Table 5.3-5: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From:

To:

Call-ID:

Cseq:

Require: precondition

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=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=curr:qos local sendrececv

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=fmtp:97 mode-set=0,2,5,7; maxframes

1. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 5.3-6**

Table 5.3-6: 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.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=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

1. **200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 5.3-7**

Table 5.3-7: 200(OK) response (S-CSCF#1 to P-CSCF#1)

SIP/2.0 200 OK

Via: 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=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

1. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.3-8**

Table 5.3-8: 200(OK) response (P-CSCF#1 to UE#1)

SIP/2.0 200 OK

Via: [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=

b=

a=

a=

a=

a=

a=

a=

a=

18. –21**.** . **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.3.3 Signalling Flow (with SDP answer in reliable 180 Ringing) response

In the call flow shown in subclause 5.3.2, the SDP answer is returned to UE#1 in the final 200 (OK) response. An alternative call flow is shown in this section where SDP answer is returned to UE#1 in a reliable 180 (Ringing) response message.



Figure 5.3-2: IMS session setup, resource reservation only on terminating side

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.3-9**

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 H.263 codec. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does have available the resources that are necessary to transport the media.

Table 5.3-9: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrecv

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

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 none remote sendrecv

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

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

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.3-10**

Table 5.3-10: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.3-11**

Table 5.3-11: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Supported:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.3-12**

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

Table 5.3-12: INVITE request (P-CSCF#2 to UE#2)

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:

From:

To:

Call-ID:

Cseq:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. Reserve IP-CAN bearer for media**

The terminating UE sets up the bearer in accordance with the media description.

10. – 13. **180 (Ringing) response - see example in table 5.3-13**

After the resources have been reserved, UE#2 indicates that it is ringing. Since the message includes the SDP answer, this message is sent reliably.

Table 5.3-13: 180 (Ringing) response (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 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>

From:

To: <tel:+1-212-555-2222>;tag=2236

Call-ID:

Cseq:

Require: 100rel, precondtion

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

RSeq: 9022

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=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=fmtp:97 mode-set=0,2,5,7; maxframes

14. - 17. **PRACK request - see example in table 5.3-14**

UE#1 acknowledges the receipt of the 180 (Ringing). It does not contain SDP as the final codec decision is already made as part of the initial offer/answer exchange

Table 5.3-14: PRACK request (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:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+1-212-555-2222>;tag=2236

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 128 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: 9021 127 INVITE

Content-Length: 0

18 - 21. **200 (OK) response to (PRACK request)**

UE#2 acknowledges the receipt of the PRACK request with the 200 (OK) response

22. **200 (OK) response (UE#2 to P-CSCF#2) - see example in table 5.3-15**

User #2 answers the phone and this triggers UE #2 to send the 200 (OK) response.

Table 5.3-15: 200(OK) response (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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From:

To:

Call-ID:

Cseq: 127 INVITE

Content-Length: 0

23. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 5.3-16**

Table 5.3-16: 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.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

24. **200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 5.3-17**

Table 5.3-17: 200(OK) response (S-CSCF#1 to P-CSCF#1)

SIP/2.0 200 OK

Via: 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

25. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.3-18**

Table 5.3-18: 200(OK) response (P-CSCF#1 to UE#1)

SIP/2.0 200 OK

Via: [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 - 29. **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.3.4 Signalling Flow with SDP answer in reliable 183 Session Progress response for INVITE request when the IP-CAN performs resource reservation for UE#2

When the IP-CAN performs the resource reservation for UE#2, UE#2 uses a 183 Session Progress response to the INVITE Request to send the SDP Answer.

NOTE 1: It will be possible for UE#2 to execute this signalling flow even if UE#2 is responsible to perform resource reservation.



Figure 5.3-3: IMS session setup, resource reservation only on terminating side (NW-initiated)

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.3-19**

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 H.263 codec. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does have available the resources that are necessary to transport the media.

Table 5.3-19: INVITE request (UE#1 to P-CSCF#1)

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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrecv

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

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 none remote sendrecv

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

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

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.3-20**

Table 5.3-20: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.3-21**

Table 5.3-21: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.3-22**

Table 5.3-22: INVITE request (P-CSCF#2 to UE#2)

INVITE sip:user2\_public1@home2.net 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

Route: <sip:scscf2.home2.net;lr>

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:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9**. 183 (Session Progress) response (UE#2 to P-CSCF#2) - - see example in table 5.3-23**

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#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF.

Table 5.3-23: 183 (Session Progress) response (UE#2 to P-CSCF#2)

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;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

b=AS:75

a=curr:qos local none

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 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

10.-11. **Authorize QoS and reserve IP-CAN bearer for media**

P-CSCF authorizes the resources necessary for this session.

NOTE 2: In the case where IP-CAN bearers are managed by the IP-CAN, this triggers the IP-CAN to initiate the reservation of required resources, including the initiation of an IP-CAN bearer setup or the modification of an existing one.

12-13. **183 (session progress) response**

These steps progress in parallel with steps 10-11.

14. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

15.**183 (Session Progress) response (P-CSCF#1 to UE#1) –**

16.-23. **PRACK request / 200(OK) response exchange**

The PRACK request does not carry SDP as the final codec decision is already made as part of the initial offer/answer exchange.

24. **180 (Ringing) response UE#2 to P-CSCF#2) - - see example in table 5.3-24**-

The UE#2 indicates that it is ringing. The UE#2 does not use Require "100rel" as the 180 (Ringing) does not have a SDP and therefore need not to be sent reliable.

NOTE 3: According to RFC 4032 [9] there is no need to send a new offer from the terminating UE to indicate that resources are available since 180 (Ringing) will implicit indicate that resources are available.

Table 5.3-24: 180 (Ringing) response (UE#2 to P-CSCF#2)

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

Privacy: none

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

CSeq:

Require: 100rel

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;comp=sigcomp>

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

RSeq: 9021

Content-Length: 0

25-27. **180 (Ringing) response**

28. **200 (OK) response UE#2 to P-CSCF#2) - - see example in table 5.3-25**

When the called party answers the UE#2 sends a 200 (OK) response final response to the INVITE request (7) to P-CSCF#2, and starts the media flow(s) for this session.

Table 5.3-25: 200 (OK) response (UE#2 to P-CSCF#2)

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

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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;comp=sigcomp>

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

RSeq: 9021

Content-Length: 0

29. –31. **200 (OK) response**

32.-35. **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

## 5.4 Establishing a session when UE#1 does not have required resources available and UE#2 is non-IMS

### 5.4.1 Introduction

The following flows show the establishment of a session where UE#1, connected to the IM CN subsystem, does not yet have the required local resources available and needs to perform resource reservation while SIP UA#2 is a non-IMS UE.

It is assumed that the originating UE uses a dedicated IP-CAN bearer for SIP signalling and dedicated IP-CAN bearer for media.

The box "Intermediate IM CN subsystem entities" stands for the combination of I-CSCF/S-CSCF on the originating Routing of messages between those nodes is not described in the flow below.

As the topology on the non-IMS, terminating side is not known, only a UE is shown on the terminating side. However, this does not rule out the possibility that there are proxies in the terminating signalling path.

In subclause 5.4.2 the UE#1 establish a multimedia session comprising a video stream and an audio stream. The AVP transport is offered for the audio stream and the video stream in initial INVITE request. SIP UA#2 does not support the preconditions framework.

In subclause 5.4.3 the UE#1 establish a multimedia session comprising a video stream and an audio stream. The AVP transport is offered for the audio stream and the AVPF transport is offered for the video stream in initial INVITE request. SIP UA#2 supports the preconditions framework.

In subclause 5.4.4 the UE#1 establish a multimedia session comprising a video stream and an audio stream. The AVP transport is offered for the audio stream and the AVPF transport is offered for the video stream in initial INVITE request. SIP UA#2 does not support the preconditions framework.

### 5.4.2 Signalling Flow



Figure 5.4-1: IMS session setup, resource reservation on originating side

The details of the signalling flows are as follows:

**1. INVITE request (UE#1 to P-CSCF#1) see example in table 5.4-1**

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 the H.263 coded. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

Table 5.4-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

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

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

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**2. 100 (Trying) response (P-CSCF#1 to UE#1)**

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

**3. INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.4-2**

Table 5.4-2: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

**4. 100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

**5. INVITE request (S-CSCF#1 to UE#2) see example in table 5.4-3**

Table 5.4-3: INVITE request(S-CSCF#1 to UE#2)

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: 66

Route: <sip:pcscf2.visited2.net;lr>

Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

P-Asserted-Identity:

Privacy:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

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=

**6 -8 . 180 (Ringing) response**

UE#2 indicates that it is ringing. It is assumed that UE#2 does not support the "100rel" extension and therefore the 180 (Ringing) response is not sent reliable, i.e. no SDP is sent in the 180 (Ringing) response.

**9. 200 (OK) response (UE#2 to S-CSCF) - see example in table 5.4-5**

User on the terminating side goes off hook.

UE#2 ignores the precondition that it received in the INVITE request as it does not support them. No preconditions are included in the SDP answer.

Table 5.4-5: 200(OK) response (UE#2 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:

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

Cseq:

Content-Type: application/sdp

Content-Length: (…)

v=0

o=- 2987933615 2987933615 IN IP6 5555::eee:fff:ggg:hhh

s=-

c=IN IP6 5555::eee:fff:ggg:hhh

t=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=rtpmap:98 H263

a=fmtp:98 profile-level-id=0

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes

**10. 200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 5.4-6**

Table 5.4-6: 200(OK) response (S-CSCF#1 to P-CSCF#1)

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:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

**11. 200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.4-7**

Table 5.4-7: 200(OK) response (P-CSCF to UE#1)

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:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

**13 . Reserve IPCAN bearer for media**

The originating UE sets up the bearer in accordance with the media description received SDP.

**14.-16. .ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.4.3 Signalling flow (preconditions used, SDP capability negotiation not supported by UE#1, 2nd SDP offer offering AVP transport for video)



Figure 5.4.3-1: IMS session setup, resource reservation on both sides

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.4.3-1**

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. The UE#1 is willing to establish the video stream using AVPF or AVP transport and the audio stream using AVP transport. The UE#1 does not support SDP capability negotiation.

UE#1 indicates that it supports and is willing to use AVPF transport for the video stream and AVP transport for the audio stream.

UE#1 indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

For this example it is assumed, that signalling encryption was negotiated between UE and P‑CSCF in the security mode set-up procedure during the last successful authentication. This option will only be shown in this example.

Table 5.4.3-1: INVITE request (UE#1 to P-CSCF#1)

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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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/AVPF 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

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**Security-Verify:** The Security-Verify contains the content of the Security-Server header as received during last successful authentication. It indicates that integrity protection and encryption are in use for this session.

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities) - see example in table 5.4.3-3**

Table 5.4.3-3: INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities)

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:

Supported:

Accept:

Contact:

Allow:

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=

4. **100 (Trying) response (intermediate IM CN subsystem entities to P-CSCF#1)**

The intermediate IM CN subsystem entities respond to the INVITE request with a 100 (Trying) provisional response.

5. **INVITE request (intermediate IM CN subsystem entities to SIP UA#2) - see example in table 5.4.3-5**

Intermediate IM CN subsystem entities forward the INVITE request to SIP UA#2.

Table 5.4.3-5: INVITE request (intermediate IM CN subsystem entities to SIP UA#2)

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: 65

Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

P-Asserted-Identity:

Privacy:

From:

To:

Call-ID:

Cseq:

Require:

Supported:

Accept:

Contact:

Allow:

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=

**6. 100 (Trying) response (SIP UA#2 to intermediate IM CN subsystem entities)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

7**. 183 (Session Progress) response (SIP UA#2 to intermediate IM CN subsystem entities) - - see example in table 5.4.3-7**

As SIP UA#2 does not support AVPF transport, the SIP UA#2 does not accept the video stream. For audio stream, the SIP UA#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. SIP UA#2 makes the codec selection and chooses AMR.

SIP UA#2 responds with a 183 (Session Progress) response containing SDP back to the originator. This response is sent to P-CSCF. SIP UA#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.4.3-7: 183 (Session Progress) response (SIP UA#2 to intermediate IM CN subsystem entities)

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: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, precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74c;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 0 RTP/AVPF 98

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

8. **Reserve IP-CAN bearer for audio stream**

The terminating UA sets up the bearer for the audio stream in accordance with the media description received SDP.

9. **183 (session progress) response (intermediate IM CN subsystem entities to P-CSCF#1) – see example in table 5.4.3-13**

Table 5.4.3-9: 183 (Session Progress) response (intermediate IM CN subsystem entities to P-CSCF#1)

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-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=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

a=

10. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

11. **183 (Session Progress) response (P-CSCF#1 to UE#1) – see example in table 5.4.3-11**

Table 5.4.3-11: 183 (Session Progress) response (P-CSCF#1 to UE#1)

SIP/2.0 183 Session Progress

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

P-Asserted-Identity:

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=

a=

12. **Reserve IP-CAN bearer for audio stream**

The originating UE sets up the bearer for audio stream in accordance with the media description received SDP.

13. **PRACK request (UE#1 to P-CSCF#1) - see example in table 5.4.3-13**

Since SIP UA#2 did not accept the video stream UE#1 includes a new SDP offer in the PRACK request.

UE#1 indicates that it supports and is willing to use AVP transport for the video stream and AVP transport for the audio stream. The video stream supports two codecs, either H.263 or MPEG-4 Visual. The audio stream supports the AMR codec.

UE#1 does not have available the resources that are necessary to transport the media.

Table 5.4.3-13: PRACK request (UE#1 to P-CSCF#1)

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;lr>, <sip:scscf1.home1.net;lr>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 128 PRACK

RAck: 9021 127 INVITE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

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

**SDP** The SDP contains an offer of AVP for video and a set of codecs supported by UE#1 for video and desired by the user at UE#1 for this session. For audio media the SDP is the same as what was accepted in the initial SDP answer.

14. **PRACK request (P-CSCF#1 to intermediate IM CN subsystem entities) - see example in table 5.4.3-14**

Table 5.4.3-14: PRACK request (P-CSCF#1 to intermediate IM CN subsystem entities)

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

Via: SIP/2.0/UDP pcscf1.visited1.net;branch=z9hG4bK240g34.1, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Max-Forwards: 69

Route: <sip:scscf1.home1.net;lr>

From:

To:

Call-ID:

Cseq:

RAck:

Require:

Proxy-Require:

Security-Verify:

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=

15. **PRACK request (intermediate IM CN subsystem entities to SIP UA#2) - see example in table 5.4.3-15**

Table 5.4.3-15: PRACK request (intermediate IM CN subsystem entities to SIP UA#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.visited1.net;branch=z9hG4bK240f34.1, SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Max-Forwards: 67

From:

To:

Call-ID:

Cseq:

RAck:

Require:

Proxy-Require:

Security-Verify:

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=

**16. 200 (OK) response to PRACK request (SIP UA#2 to intermediate IM CN subsystem entities) - - see example in table 5.4.3-16**

SIP UA#2 support AVP so it can accept the offered video stream.

The SIP UA#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 PRACK request. SIP UA#2 makes the codec selection and chooses AMR and H.263.

SIP UA#2 responds with a 200 (OK) response to PRACK containing SDP back to the originator. This response is sent to P-CSCF. SIP UA#2 uses a conf line in the SDP to request a confirmation from UE#1 when the local resources are available at UE#1.

Table 5.4.3-16: 200 (OK) response to PRACK request (SIP UA#2 to intermediate IM CN subsystem entities)

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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From:

To:

Call-ID:

CSeq:

Require: precondition

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74c;comp=sigcomp>

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

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

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 sendrecv

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. **Reserve IP-CAN bearer for video stream**

The terminating UA sets up the bearer for video stream in accordance with the media description received SDP.

18**. 200 (OK) response to PRACK request (intermediate IM CN subsystem entities to P-CSCF#1) - - see example in table 5.4.3-18**

Table 5.4.3-18: 200 (OK) response to PRACK request (intermediate IM CN subsystem entities to P-CSCF#1)

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

P-Access-Network-Info:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

a=

19. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

20**. 200 (OK) response to PRACK request (P-CSCF#1 to UE#1) - - see example in table 5.4.3-20**

Table 5.4.3-20: 200 (OK) response to PRACK request (intermediate IM CN subsystem entities to P-CSCF#1)

SIP/2.0 200 OK

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

P-Access-Network-Info:

From:

To:

Call-ID:

CSeq:

Require:

Contact:

Allow:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

m=

b=

a=

a=

a=

a=

a=

a=

a=

a=

a=

21. **Reserve IP-CAN bearer for video stream**

The originating UE sets up the bearer for video stream in accordance with the media description received SDP.

22. **UPDATE request (UE#1 to P-CSCF#1) - see example in table 5.4.3-22**

UE#1 indicates that it can send and receive media once the necessary resources for both audio and video are available.

Table 5.4.3-22: UPDATE request (UE#1 to P-CSCF#1)

UPDATE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Max-Forwards: 70

Route: <sip:pcscf1.visited1.net;lr>, <sip:scscf1.home1.net;lr>

From: <sip:user1\_public1@home1.net>; tag=171828

To: <tel:+12125552222> tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: sec-agree, precondition

Proxy-Require: sec-agree

Security-Verify: ipsec-3gpp; q=0.1; alg=hmac-sha-1-96; ealg=aes-cbc; spi-c=98765432; spi-s=87654321; port-c=8642; port-s=7531

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

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

23. **UPDATE request (P-CSCF#1 to intermediate IM CN subsystem entities) - see example in table 5.4.3-23**

Table 5.4.3-23: UPDATE request (P-CSCF#1 to intermediate IM CN subsystem entities)

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>

From:

To:

Call-ID:

Cseq:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

24. **UPDATE request (intermediate IM CN subsystem entities to SIP UA#2 ) - see example in table 5.4.3-24**

Table 5.4.3-24: UPDATE request (intermediate IM CN subsystem entities to SIP UA#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.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=

25. **200 (OK) response (SIP UA#2 to intermediate IM CN subsystem entities) - see example in table 5.4.3-25**

UE acknowledges the UPDATE request with a 200 (OK) response.

UE indicates that the local resources are available

Table 5.4.3-25: 200(OK) response (SIP UA#2 to intermediate IM CN subsystem entities)

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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+12125552222>;tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 129 UPDATE

Require: precondition

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=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=fmtp:97 mode-set=0,2,5,7; maxframes

26. **200 (OK) response (intermediate IM CN subsystem entities to S-CSCF#2 ) - see example in table 5.4.3-26**

Table 5.4.3-26: 200(OK) response (intermediate IM CN subsystem entities to P-CSCF#1)

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:

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=

a=

a=

27. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

28. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.4.3-28**

Table 5.4.3-28: 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:

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=

a=

a=

29 -31. **180 (Ringing) response**

SIP UA#2 indicates that it is ringing. The SIP UA#2 does not use Require "100rel" as the 180 (Ringing) does not have a SDP and therefore need not to be sent reliable.

32 –34. **200 (OK) response**

When the called party answers the SIP UA#2 sends a 200 (OK) response to the INVITE request and starts the media flow(s) for this session.

35-37. **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.4.4 Signalling Flow (preconditions not supported by SIP UA#2, SDP capability negotiation not supported by UE#1, 2nd SDP offer offering AVP transport for video)



Figure 5.4.4-1: IMS session setup, resource reservation on both sides

The details of the signalling flows are as follows:

**1. INVITE request (UE#1 to P-CSCF#1) see example in table 5.4.4-1**

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 the H.263 codec. The audio stream supports the AMR codec. The UE#1 is willing to establish the video stream using AVPF or AVP transport and the audio stream using AVP transport. In the initial SDP offer only AVPF is offered for the video stream since the UE#1 does not support SDP capability negotiation.

UE#1 indicates that it supports and is willing to use AVPF transport for the video stream and AVP transport for the audio stream.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does not have available the resources that are necessary to transport the media.

Table 5.4.4-1: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel

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

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/AVPF 98

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

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

**Supported:** The UE indicates support for the "precondition" mechanism and the support for reliable provisional responses

**SDP** The SDP contains a set of codecs supported by UE#1 and desired by the user at UE#1 for this session. The SDP does not use a direction attribute since sendrecv is the default.

**2. 100 (Trying) response (P-CSCF#1 to UE#1)**

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

**3. INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities) - see example in table 5.4.4-3**

Table 5.4.4-3: INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities)

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:

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=

**4. 100 (Trying) response (intermediate IM CN subsystem entities to P-CSCF#1)**

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

**5. INVITE request (intermediate IM CN subsystem entities to SIP UA#2) see example in table 5.4.4-5**

Table 5.4.4-5: INVITE request (intermediate IM CN subsystem entities to SIP UA#2)

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: 66

Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

P-Asserted-Identity:

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=

a=

a=

**6 -8 . 180 (Ringing) response**

SIP UA#2 indicates that it is ringing. It is assumed that SIP UA#2 does not support the "100rel" extension and therefore the 180 (Ringing) response is not sent reliable, i.e. no SDP is sent in the 180 (Ringing) response.

**9. 200 (OK) response (SIP UA#2 to S-CSCF) - see example in table 5.4.4-10**

User on the terminating side accepts the call.

As SIP UA#2 does not support AVPF transport, the SIP UA#2 does not accept the video stream.

SIP UA#2 ignores the precondition that it received in the INVITE request as it does not support them. No preconditions are included in the SDP answer.

Table 5.4.4-9: 200(OK) response (SIP UA#2 to intermediate IM CN subsystem entities)

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:

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

Cseq:

Content-Type: application/sdp

Content-Length: (…)

v=0

o=- 2987933615 2987933615 IN IP6 5555::eee:fff:ggg:hhh

s=-

c=IN IP6 5555::eee:fff:ggg:hhh

t=0 0

m=video 0 RTP/AVPF 98

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes

**10. 200 (OK) response (intermediate IM CN subsystem entities to P-CSCF#1) - see example in table 5.4.4-11**

Table 5.4.4-10: 200(OK) response (intermediate IM CN subsystem entities to P-CSCF#1)

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:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

m=

b=

a=

a=

a=

11. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

**12. 200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.4.4-13**

Table 5.4.4-12: 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

Record-Route:

From:

To:

Call-ID:

Cseq:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

m=

b=

a=

a=

a=

**13 . Reserve IPCAN bearer for audio stream**

The originating UE sets up the bearer for audio stream in accordance with the media description received SDP.

**14.-16. ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

**17. INVITE request (UE#1 to P-CSCF#1) - see example in table 5.4.4-18**

UE#1 sends re-INVITE to add video stream, it indicates that it supports and is willing to use AVP transport for the video stream and AVP transport for the audio stream.

As SIP UA#2 does not support preconditions, UE#1 does not include preconditions in the SDP.

Table 5.4.4-17: INVITE request (UE#1 to P-CSCF#1)

INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>; tag=314159

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 128 INVITE

Require: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=rtpmap:98 H263

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

**18. INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities) see example in table 5.4.4-19**

Table 5.4.4-18: INVITE request (P-CSCF#1 to intermediate IM CN subsystem entities)

INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

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>

From:

To:

Call-ID:

Cseq:

Supported:

Contact:

Allow:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

m=

b=

a=

a=

a=

**19. INVITE request (intermediate IM CN subsystem entities to SIP UA#2) see example in table 5.4.4-20**

Table 5.4.4-19: INVITE request (S-CSCF#1 to SIP UA#2)

INVITE sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp

Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332x23.1, 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:

Record-Route: <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

From:

To:

Call-ID:

Cseq:

Supported:

Contact:

Allow:

Content-Type:

Content-Length:

v=

o=

s=

c=

t=

m=

b=

a=

a=

m=

b=

a=

a=

a=

**20. 200 (OK) response (SIP UA#2 to intermediate IM CN subsystem entities) - see example in table 5.4.4-22**

SIP UA#2 confirms the new SDP offer.

Table 5.4.4-20: 200(OK) response (SIP UA#2 to intermediate IM CN subsystem entities)

SIP/2.0 200 OK

Via: SIP/2.0/UDP scscf1.home1.net;branch=z9hG4bK332x23.1, 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:

Content-Type: application/sdp

Content-Length: (…)

v=0

o=- 2987933615 2987933615 IN IP6 5555::eee:fff:ggg:hhh

s=-

c=IN IP6 5555::eee:fff:ggg:hhh

t=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=rtpmap:98 H263

a=fmtp:98 profile-level-id=0

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes

**21. 200 (OK) response (intermediate IM CN subsystem entities to P-CSCF#1) - see example in table 5.4.4-23**

Table 5.4.4-21: 200(OK) response (intermediate IM CN subsystem entities to P-CSCF#1)

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:

Content-Type:

Content-Length:(…)

v=

o=

s=

c=

t=

a=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

22. **Authorize QoS**

P-CSCF authorizes the resources necessary for this session.

**23. 200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.4.4-25**

Table 5.4.4-23: 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

Record-Route:

From:

To:

Call-ID:

Cseq:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

a=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

**24 . Reserve IPCAN bearer for video stream**

The originating UE sets up the bearer for video stream in accordance with the media description received SDP.

## 5.5 Establishing a session when UE#1 is non-IMS and UE#2 does not have required resources available

### 5.5.1 Introduction

The following flow shows the establishment of a session where UE#1 is a non-IMS UE. i.e. is plain SIP while UE#2 is connected to the IM CN subsystem, does not yet have the required local resources available and needs to perform resource reservation.

It is assumed that the terminating UE uses a dedicated IP-CAN bearer for SIP signalling and dedicated IP-CAN bearer for media.

The box "Intermediate IM CN subsystem entities" stands for the combination of I-CSCF/S-CSCF on the terminating side Routing of messages between those nodes is not described in the flow below.

As the topology on the non-IMS, originating side is not known, only a UE is shown on the terminating side. However, this does not rule out the possibility that there are proxies in the originating signalling path.

### 5.5.2 Signalling Flow



Figure 5.5-1: IMS session setup, resource reservation on terminating side

The details of the signalling flows are as follows:

**1. INVITE request (UE#1 to P-CSCF#1) see example in table 5.5-1**

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 the H.263 coded. The audio stream supports the AMR codec.

UE# does not indicate that it supports precondition and does not indicate support for the 100rel extension.

Table 5.5-1: INVITE request (UE#1 to IM CN Subsystem entities)

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

Accept: application/sdp,application/3gpp-ims+xml

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;comp=sigcomp>

Allow: INVITE, ACK, CANCEL, BYE, 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

b=AS:75

a=rtpmap:98 H263

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

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

**2. 100 (Trying) response**

The IM CN subsystem respond to the INVITE request with a 100 (Trying) provisional response.

**3. INVITE request (S-CSCF to P-CSCF) - see example in table 5.5-2**

Table 5.5-2: INVITE request (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 [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>

From:

To:

Call-ID:

Cseq:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

**4. 100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

**5. INVITE request (P-CSCF to UE) see example in table 5.5-3**

Table 5.5-3: INVITE request (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 [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>

From:

To:

Call-ID:

Cseq:

Accept:

Require:

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=

**6. . Reserve IPCAN bearer for media**

The IMS UE sets up the bearer in accordance with the media description received SDP and if necessary its codec decision.

**7 -9 . 180 (Ringing) response**

UE#2 indicates that it is ringing..

**10. 200 (OK) response (UE#2 to P-CSCF) - see example in table 5.5-4**

UE#2 does not use preconditions as they are not supported by the originating side.

Table 5.5-4: 200(OK) response (UE#2 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 [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

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:

Contact: <sip:user2\_public1@home2.net:gr=urn:uuid:2ad8950e-48a5-4a74-8d99-ad76cc7fc74;comp=sigcomp>

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

RSeq: 9021

Content-Type: application/sdp

Content-Length: (…)

v=0

o=- 2987933615 2987933615 IN IP6 5555::eee:fff:ggg:hhh

s=-

c=IN IP6 5555::eee:fff:ggg:hhh

t=0 0

m=video 3400 RTP/AVP 98

b=AS:75

a=rtpmap:98 H263

a=fmtp:98 profile-level-id=0

m=audio 3456 RTP/AVP 97 96

b=AS:25.4

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes

**11. 200 (OK) response (P-CSCF to S-CSCF) - see example in table 5.5-5**

Table 5.5-5: 200(OK) response (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 [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

P-Access-Network-Info:

Privacy:

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

Cseq:

Contact:

Allow:

RSeq:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

**12. 200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.5-6**

Table 5.5-6: 200(OK) response (S-CSCF to UE#1)

SIP/2.0 200 OK

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route:

Privacy:

From:

To: <tel:+1-212-555-2222>;tag=314159

Call-ID:

Cseq:

Contact:

Allow:

RSeq:

Content-Type: application/sdp

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

m=

b=

a=

a=

a=

**13.-15. ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

## 5.6 Establishing a session when UE#1 and UE#2 have resources already available

### 5.6.1 Introduction

The following flows show the establishment of a session where both UE#1 and UE#2 are connected to the IM CN subsystem and already have the required local resources available so they do not need to perform resource reservation. The example that does not use preconditions is based on the Push to Talk over Cellular (PoC) on demand session establishment automatic answer scenario from OMA PoC 1.0 enabler but with a confirmed indication (no media buffering performed by the PoC Server). The example in subclause 5.6.3 shows the scenario where UE#1 has resources already reserved but supports the precondition mechanism and initiates session establishment following the procedures defined in 3GPP TS 24.229 [1] for when the originating UE supports preconditions. During session establishment the originating UE is unaware if the other endpoint requires the use of the preconditions mechanism or whether the other endpoint is required to reserve resources. In this example, the other endpoint, UE#2, also has its resources ready before answering the INVITE request with the first provisional response.

It is assumed that the both UEs uses a dedicated IP-CAN bearer for SIP signalling and dedicated IP-CAN bearer for media.

The box "Intermediate IM CN subsystem entities" stands for the combination of P-CSCF/I-CSCF/S-CSCF nodes in the network. Routing of messages between those nodes is not described in the flow below.

### 5.6.2 Signalling Flow (preconditions are not used)



Figure 5.6-1: IMS session setup, no resource reservation, no preconditions

The details of the signalling flows are as follows:

**1. INVITE request (UE#1 to P-CSCF#1) see example in table 5.6-1**

For this example, it is assumed that UE#1 is willing to establish a multimedia session comprising an audio stream. The audio stream supports the AMR codec.

UE# does not indicate that it supports precondition and does not indicate support for the 100rel extension.

Within the Intermediate IM CN subsystem entities are two PoC Servers that acts as B2BUAs

Table 5.6-1: INVITE request (UE#1 to IM CN Subsytem entities)

INVITE sip:PoCConferenceFactoryURI.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>

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

Accept: application/sdp,application/3gpp-ims+xml

Require: sec-agree,recipient-list-invite

Supported: timer, gruu, 199

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;comp=sigcomp>;+g.poc.talkburst

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE, SUBSCRIBE, NOTIFY, PUBLISH

Accept-Contact: \*;+g.poc.talkburst;require;explicit

User-Agent: PoC-client/OMA1.0 Acme-Talk5000/v1.01

Session-Expires: 1800;refresher=uac

Content-Type: multipart/mixed

Content-Length: (…)

--boundary1

Content-Type: application/sdp

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

b=AS:25.4

a=rtpmap:97 AMR

a=rtcp:5560

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

m=application 2000 udp TBCP

a=fmtp:TBCP queuing=1; tb\_priority=2; timestamp=1

--boundary1

Content-Type: application/resource-lists+xml

Content-Disposition: recipient-list

<?xml version="1.0" encoding="UTF-8"?>

<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists">

<list>

<entry uri="tel:+1-212-555-2222"/>

</list>

</resource-lists>

--boundary1--

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

**Resource List** The Resource List contains the URI of UE#2 being invited by the user at UE#1 for this session.

**2. 100 (Trying) response**

The IM CN subsystem respond to the INVITE request with a 100 (Trying) provisional response.

**3. INVITE request (P-CSCF to UE) see example in table 5.6-2**

Table 5.6-2: INVITE request (IM CN Subsytem entities 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 PoC-SessionABCDEF@pocserver2.home2.net;session=1-1

Max-Forwards: 68

Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>

From: <sip:user1\_public1@home1.net>;tag=487651

To:

Call-ID: 03a0sdcglkj433s09a290bf3

Cseq: 10227 INVITE

Accept: application/sdp,application/3gpp-ims+xml

Supported: norefersub,timer, 199

Contact: <PoC-SessionABCDEF@pocserver2.home2.net;session=1-1>;+g.poc.talkburst

Allow:

P-Called-Party-ID: <sip:user2\_public1@home2.net>

Accept-Contact: \*;+g.poc.talkburst; require;explicit

User-Agent: PoC-serv/OMA1.0

Session-Expires: 1800;refresher=uas

Answer-Mode: Auto

Content-Type: application/sdp

Content-Length: (…)

v=

o=- 3361529879 3361529879 IN IP6 60333::ddd:ccc:aaa:bbb

s=

c=IN IP6 5555::ddd:ccc:aaa:bbb

t=

m=audio audio 63776 RTP/AVP 97

b=AS:25.4

a=rtpmap:97 AMR

a=rtcp:6390

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

m=application 60000 udp TBCP

a=fmtp:TBCP queuing=1; tb\_priority=2; timestamp=1

**4. 200 (OK) response (UE#2 to IM CN Subsytem entities) - see example in table 5.6-3**

UE#2 does not use preconditions as they are not supported by the originating side.

Table 5.6-3: 200(OK) response (UE#2 to IM CN Subsytem entities)

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 SessionABCDEF@pocserver2.home2.net;session=1-1

Record-Route: <sip:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.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:timer

Contact: <sip:[5555::eee:fff:aaa:bbb]:8805;comp=sigcomp>;+g.poc.talkburst

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

Server: PoC-client/OMA1.0 Acme-Talk5000/v1.01

Session-Expires: 1800;refresher=uas

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=0 0

m=audio 3456 RTP/AVP 97

b=AS:25.4

a=rtpmap:97 AMR

a=rtcp:75000

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

m=application 75590 udp TBCP

a=fmtp:TBCP queuing=1; tb\_priority=2; timestamp=1

**5. 200 (OK) response (IM CN Subsytem entities** **to UE#1) - see example in table 5.6-4**

Table 5.6-4: 200(OK) response (IM CN Subsytem entities to UE#1)

SIP/2.0 200 OK

Via: SIP/2.0/UDP [5555::aaa:bbb:ccc:ddd]:1357;comp=sigcomp;branch=z9hG4bKnashds7

Record-Route: <sip:scscf1.home1.net;lr>,<sip:pcscf1.visited1.net:7531;lr;comp=sigcomp>

Privacy:

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+1-212-555-2222>;tag=257645

Call-ID: cb03a0s09a2sdfglkj490333

Cseq: 127 INVITE

Contact: <sip:PoC-SessionABCDEF@PoC-ServerA.home1.net;session=1-1>;+g.poc.talkburst

Allow:

Content-Type: application/sdp

Content-Length: (…)

v=0

o=- 3362987915 3362987915 IN IP6 57777::eee:fff:aaa:bbb

s=-

c=IN IP6 57777::eee:fff:aaa:bbb

t=0 0

m=audio 57787 RTP/AVP 97

b=AS:25.4

a=rtpmap:97 AMR

a=rtcp:57000

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

m=application 57790 udp TBCP

a=fmtp:TBCP queuing=1; tb\_priority=2; timestamp=1

**6.-7. .ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

### 5.6.3 Signalling Flow (preconditions are used)



Figure 5.6-2: IMS session setup, no resource reservation, preconditions are used

The details of the signalling flows are as follows:

1. **INVITE request (UE#1 to P-CSCF#1) see example in table 5.6-5**

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 H.263 codec. The audio stream supports the AMR codec.

UE#1indicates that it supports precondition and it indicates that it supports reliable provisional responses. However, it does not use the "Require" header for these capabilities.

UE#1 does have available the resources that are necessary to transport the media.

Table 5.6-5: INVITE request (UE#1 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: sec-agree

Supported: precondition, 100rel, gruu, 199

Accept: application/sdp,application/3gpp-ims+xml

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

Contact: <sip:user1\_public1@home1.net;gr=urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6;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

b=AS:75

a=curr:qos local sendrecv

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

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 none remote sendrecv

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=rtpmap:96 telephone-event

**Supported:** The UE indicates support for the "precondition" mechanism, the support for reliable provisional responses and the support for the 199 (Early Dialog Terminated) response code.

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

2. **100 (Trying) response (P-CSCF#1 to UE#1)**

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

3. **INVITE request (P-CSCF#1 to S-CSCF#1) - see example in table 5.6-7**

Table 5.6-7: INVITE request (P-CSCF#1 to S-CSCF#1)

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:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

4. **100 (Trying) response (S-CSCF#1 to P-CSCF#1)**

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

5. **INVITE request (S-CSCF#2 to P-CSCF#2) see example in table 5.6-8**

Table 5.6-8: INVITE request (S-CSCF#2 to P-CSCF#2)

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:

Supported:

Accept:

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=

6. **100 (Trying) response (P-CSCF#2 to S-CSCF#2)**

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

7. **INVITE request (P-CSCF#2 to UE #2) - see example in table 5.6-9**

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

Table 5.6-9: INVITE request (P-CSCF#2 to UE#2)

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:

From:

To:

Call-ID:

Cseq:

Supported:

Accept:

Contact:

Allow:

Content-Type:

Content-Length: (…)

v=

o=

s=

c=

t=

m=

b=

a=

a=

a=

a=

a=

a=

8**. 100 (Trying) response (UE#2 to P-CSCF)**

The UE responds to the INVITE request with a 100 (Trying) provisional response.

9. – 12. **180 (Ringing) response - see example in table 5.6-10**

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. UE#2 makes the final codec selection and chooses H.263 and AMR.

UE#2 responds with a 180 (Ringing) response containing SDP sent reliably back to the originator. This response is sent to P-CSCF. The SDP answer indicates that resources are reserved at both endpoints.

Table 5.6-10: 180 (Ringing) response (UE#2 to P-CSCF#2)

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>

From:

To: <tel:+1-212-555-2222>;tag=2236

Call-ID:

Cseq:

Require: 100rel, preconditions

Allow: INVITE, ACK, CANCEL, BYE, PRACK, UPDATE, REFER, MESSAGE

RSeq: 9022

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=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=fmtp:97 mode-set=0,2,5,7; maxframes

13. - 16. **PRACK request - see example in table 5.6-11**

UE#1 acknowledges the receipt of the 180 (Ringing) response with a PRACK request sent to UE#2. If UE#1 determines to make any further change in the media flows, it may include a new SDP answer in the PRACK request. In this example, the PRACK request does not contain SDP as the final codec decision is already made as part of the initial offer/answer exchange.

Table 5.6-11: PRACK request (UE#1 to P-CSCF#1)

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:pcscf2.visited2.net:5088;lr;comp=sigcomp>, <sip:scscf2.home2.net;lr>, <sip:scscf1.home1.net;lr>, <sip:pcscf1.visited1.net;lr>

From: <sip:user1\_public1@home1.net>;tag=171828

To: <tel:+1-212-555-2222>;tag=2236

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-Length: 0

17 - 20. **200 (OK) response (PRACK request)**

UE#2 acknowledges the receipt of the PRACK request with the 200 (OK) response

21. **200 (OK) response (UE#2 to P-CSCF#2) - see example in table 5.6-12**

User #2 answers the phone and this triggers UE #2 to send the 200 (OK) response to answer the INVITE request.

Table 5.6-12: 200(OK) response (UE#2 to P-CSCF#2)

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

P-Access-Network-Info: 3GPP-UTRAN-TDD; utran-cell-id-3gpp=234151D0FCE11

From:

To:

Call-ID:

Cseq: 127 INVITE

Content-Length: 0

22. **200 (OK) response (P-CSCF#2 to S-CSCF#2) - see example in table 5.6-13**

Table 5.6-13: 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.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

23. **200 (OK) response (S-CSCF#1 to P-CSCF#1) - see example in table 5.6-14**

Table 5.6-14: 200 (OK) response (S-CSCF#1 to P-CSCF#1)

SIP/2.0 200 OK

Via: 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

24. **200 (OK) response (P-CSCF#1 to UE#1) - see example in table 5.6-15**

Table 5.6-15: 200 (OK) response (P-CSCF#1 to UE#1)

SIP/2.0 200 OK

Via: [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

25 - 28. **ACK request**

The calling party responds to the 200 (OK) response with an ACK request.

Annex A (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2006-02 |  |  |  |  | skeleton of the TR | 0.0.0 | 0.0.0 |
| 2006-02 |  |  |  |  | Version 0.1.0 created as a result of CT1#41  The following CR's were incorporated and the editor adopted their content / structure to the revised TR structure:  C1-060227 - only UE#1 needs to perform resource reservation  C1-060537 - UE#1 and UE#2 need to perform resource reservation  C1-060538 - only UE#2 needs to perform resource reservation | 0.0.0 | 0.1.0 |
| 2006-05 |  |  |  |  | The following CR's were incorporated and the editor adopted their content / structure to the revised TR structure:  C1-060701 - Establishing a session when UE#1 need to reserve resources and UE#2 is non-IMS  C1-060703 - Miscellaneous Corrections against 24.930  C1-061066 - Establishing a session when UE#1 is non-IMS and UE#2 needs to reserve resources | 0.1.0 | 0.2.0 |
| 2006-09 |  |  |  |  | The following CR's were incorporated and the editor adopted their content / structure to the revised TR structure:  C1-061640 - PoC Session Establishment Flow  C1-061757 - show encryption in Security-Verify  C1-061878 - Call flow when originator has resources reserved and the called party needs to reserve resources | 0.2.0 | 0.3.0 |
| 2006-09 | CT-33 | CP-060451 |  |  | Version 1.0.0 created for presentation to CT#33 | 0.3.0 | 1.0.0 |
| 2006-11 |  |  |  |  | Version 1.1.0 created as a result of CT1#44  The following CR's were incorporated and the editor adopted their content / structure to the TR.  C1-062323 - Editorial Tidy up of TR 24.930  C1-062330 - Editorial Changes | 1.0.0 | 1.1.0 |
| 2006-11 | CT-34 |  |  |  | V2.0.0 created by MCC to present TR for approval | 1.1.0 | 2.0.0 |
| 2006-12 |  |  |  |  | V7.0.0 created by MCC as V2.0.0 was approved in CP-060651 | 2.0.0 | 7.0.0 |
| 2007-03 | CT-35 | CP-070140 | 0001 |  | REmoval of SDP in 200 (OK) INVITE | 7.0.0 | 7.1.0 |
| 2007-06 | CT-36 | CP-070374 | 0003 | 2 | Network initiated IP-CAN bearer setup | 7.1.0 | 7.2.0 |
| 2007-06 | CT-36 | CP-070374 | 0002 | 3 | Additional call flow for establishing a session when both endpoints do not need to reserve resources | 7.1.0 | 7.2.0 |
| 2007-06 | CT-36 | CP-070469 | 0004 | 2 | Editorial Updates to Session Establishment Flows | 7.1.0 | 7.2.0 |
| 2007-12 | CT-38 | CP-070799 | 0006 | 3 | Clarification on Network initiated IP-CAN bearer setup | 7.2.0 | 7.3.0 |
| 2008-03 | CT-39 | CP-080120 | 0009 |  | No P-Media-Authorization header | 7.3.0 | 7.4.0 |
| 2008-03 | CT-39 | CP-080140 | 0011 | 2 | Alternative call flow when originating UE needs to reserve resource | 7.4.0 | 8.0.0 |
| 2008-06 | CT-40 | CP-080341 | 0015 | 2 | Addition of call flow using the SDP Capability Negotiation mechanism | 8.0.0 | 8.1.0 |
| 2008-06 | CT-40 | CP-080343 | 0013 | 4 | Session Set-up when UE#1 has resources available and the IP-CAN initiates resource reservation for UE#2. | 8.0.0 | 8.1.0 |
| 2008-12 | CT-42 | CP-080846 | 0016 |  | SIP message flow fix | 8.1.0 | 8.2.0 |
| 2008-12 | CT-42 | CP-080848 | 0017 | 1 | Aligning initial INVITE request's Accept header field with TS 24.229 | 8.1.0 | 8.2.0 |
| 2008-12 | CT-42 | CP-080848 | 0018 |  | SIP message modification for Max-Forwards header | 8.1.0 | 8.2.0 |
| 2008-12 | CT-42 | CP-080848 | 0019 |  | Indication of 199 (Early Dialog Terminated) support in call flows | 8.1.0 | 8.2.0 |
| 2008-12 | CT-42 |  |  |  | Editorial cleanup by MCC | 8.1.0 | 8.2.0 |
| 2009-12 | CT-46 |  |  |  | Upgrade to Rel-9 | 8.2.0 | 9.0.0 |
| 2011-03 | CT-51 |  |  |  | Upgrade to Rel-10 | 9.0.0 | 10.0.0 |
| 2011-12 | CT-54 | CP-110863 | 0025 | 1 | Alignment of SDPCapNeg flows with modified video session procedures | 10.0.0 | 10.1.0 |
| 2011-12 | CT-54 | CP-110863 | 0027 |  | Session establishment flows to align with modified video session procedures | 10.0.0 | 10.1.0 |
| 2012-09 | CT-57 |  |  |  | Upgrade to Rel-11 | 10.1.0 | 11.0.0 |
| 2014-06 | CT-64 | CP-140322 | 0028 | 1 | SDP answer unnecessarily included both in reliable 183 response and in 200 response | 11.0.0 | 12.0.0 |
| 2014-06 | CT-64 | CP-140322 | 0029 | 1 | Relationship at P-CSCF between forwarding the 18x response and the initiation of resource reservation | 11.0.0 | 12.0.0 |
| 2014-06 | CT-64 | CP-140330 | 0030 | 1 | Corrections to headers in flows | 11.0.0 | 12.0.0 |
| 2015-03 | CT-67 | CP-150060 | 0031 | 1 | Deprecating "inactive" | 12.0.0 | 12.1.0 |
| 2015-12 | CT-70 |  |  |  | Upgrade to Rel-13 | 12.1.0 | 13.0.0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-03 | SA#75 |  |  |  |  | Upgrade to Rel-14 | 14.0.0 |
| 2018-06 | SA#80 | - | - | - |  | Update to Rel-15 version (MCC) | 15.0.0 |
| 2020-07 | SA#88e | - | - | - |  | Update to Rel-16 version (MCC) | **16.0.0** |