This specification describes the situation of the Proximus network and services. It will be subject to modifications for corrections or when the network or the services will be modified. Please take into account that modifications can appear at any moment. Therefore, the reader is requested to check regularly with the most recent list of available specifications that the document in one’s possession is the latest version.

Proximus can’t be held responsible for any damages due to the use of an outdated version of this specification.

Whilst every care has been taken in the preparation and publication of this document, errors in content, typographical or otherwise, may occur. If you have remarks concerning its accuracy, please send a mail to the following address proximus.uni.spec@proximus.com and your remark will be transmitted to the right Proximus department.
IMS CORPORATE VoIP
SIP SIGNALING

Business Trunking with IMS services
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## 0. Document History

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<td>References added for support of multipart message bodies</td>
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<td>Updates regarding P-Asserted-ID handling</td>
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<td>1.5</td>
<td>July 04, 2011</td>
<td>Redundancy procedures added</td>
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<td>1.6</td>
<td>September 05, 2011</td>
<td>P-Asserted-ID removed from examples because IMS does not expect to receive this header from an IP-PBX</td>
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<td>1.7</td>
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<td>Domain in Request-URI replaced by IP address of IP-PBX for calls towards IP-PBX</td>
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<td>March 26, 2012</td>
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<td>October 9, 2012</td>
<td>Addition of a warning concerning the use of the Retry-After header in 503 response</td>
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<td>January 13, 2016</td>
<td>Changed “Belgacom” in “Proximus”</td>
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<td>Update due to name change “Bizz IP telephony multi” into “Enterprise voice multi”</td>
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Table 1: document history
1. Scope

This document defines the SIP signalling over the VoIP interface between the Proximus IMS Network and large IP-(A)PBXs, connected as SIP Business Trunk or as SIP International Business Trunk. The specifications listed in this document are not exhaustive but have to be interpreted as "minimal requirements for compliance to the Proximus IMS Corporate VoIP services".

The specifications are applicable for the following IMS equipment and software packages:

- Nokia (Alcatel-Lucent) ISC – software package Release 13
- Oracle SBC 4600 – Software Version SCZ8.1.0 MR-1 patch 12
- Broadsoft application server – BroadWorks R22

This document is part of a set of documents describing the UNI interface of the Proximus IMS Network, for IP-(A)PBXs. Other documents in this set are:

- PXM IMS Corporate VoIP – UNI specification – General [1]
- PXM IMS Corporate VoIP – UNI specification – Testing
- PXM IMS VoIP – UNI specification – Fax over IP [36]
- PXM IMS Corporate VOIP - UNI specification - Address templates [40]
2. References

Whenever a date of edition is mentioned, the document with this date should be consulted. If no date is present, the latest version of this document should be consulted.

2.1. Normative references

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Table 2: normative references
2.2. Informative references

Table 3: informative references

3. Symbols, Definitions and Abbreviations

3.1. Symbols

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

None.

3.2. Definitions

For the purpose of the present document, the following definitions apply:

**IP-P(A)BX:** The IP P(A)BX constitutes an Enterprise’s collection of network elements that provides packetized voice call origination and termination services using the Session Initiation Protocol (SIP) and the Session Description Protocol (SDP) for signalling and the Real-time Transport Protocol (RTP) for media traffic.

**pbxPUID:** The public user identity referring to the IP P(A)BX as a whole. The pbxPUID will/can be used as host part of the SIP URI used by the IP-P(A)BX.

**PBXName:** The same as pbxPUID.

**Dialled-SubB-dn:** destination number as dialled by the originating user. The format can be:
- +<CC><NSN>
- 0<NSN>
- 00<CC><NSN>
- <1AB> (emergency numbers)
- <1ABC> (short code services)

**Norm-SubB-dn:** destination E.164 number in international format (i.e. +<Country Code><Area Code><DN> ex: +32227970231).

**Norm-SubA-dn:** originating E.164 number in international format (i.e. +<Country Code><Area Code><DN> ex: +32227970231).

**Dialled-SubC-dn:** forwarded-to number as programmed by the forwarding user. The format can be the same as the Dialled-SubB-dn.
Norm-SubC-dn: forwarded to E.164 number in international format (i.e. +<Country Code><Area Code><DN> ex: +32227974563).

DisplayName: the name of the user.

EnterpriseDomain: the public domain name used by the enterprise. Currently the default domain name is ims.belgacom.be. The possibility for the IP-P(A)BX to use, in the future, as public domain name its own domain name e.g. mycompany.com is under study.

Note: EnterpriseDomain may also be an IP address instead of a domain name.

IP-addr-PBXName: the IP address of the PBX with name PBXName.

IP-addr-IMS: the IP address of the Proximus IMS network access point (i.e. the SBC).

1AB: called emergency service e.g. 100, 112, etc.

1ABC: called short code service

3.3. Abbreviations

See §2.2 of “PXM IMS Corporate VoIP – UNI specification – General” [1]

Additionally for the purpose of the present document, the following abbreviations apply:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CC</td>
<td>Country Code</td>
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<tr>
<td>CLIP</td>
<td>Calling Line Identification Presentation</td>
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<td>CLIR</td>
<td>Calling Line Identification Presentation Restriction</td>
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<td>Call Forwarding Unconditional</td>
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<td>CFB</td>
<td>Call Forwarding on Busy</td>
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<td>CFNR</td>
<td>Call Forwarding on No Reply</td>
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<tr>
<td>DN</td>
<td>Directory Number</td>
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<tr>
<td>DTMF</td>
<td>Dual Tone Multi-Frequency</td>
</tr>
<tr>
<td>iDN</td>
<td>Individual directory number i.e. a particular DN within the range of the IP-P(A)BX</td>
</tr>
<tr>
<td>OCB</td>
<td>Outgoing Call Barring</td>
</tr>
<tr>
<td>NSN</td>
<td>National Significant Number</td>
</tr>
<tr>
<td>SBC</td>
<td>Session Border Controller</td>
</tr>
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</table>
4. General

4.1. Structure of the document

The general structure of this document mainly covers the following aspects:

- **SIP profile:** this chapter will contain the list of RFCs and standards to which the Proximus IMS network complies, relevant for IP-P(A)BX interconnection.
- **SIP behaviour:** besides the protocol support also the expected behaviour is important. E.g. how do supplementary services behave? Main topics to be covered in this chapter:
  - Registration/authentication
  - Basic Call
  - Supplementary services
  - Call admission control
  - CLI screening
  - Fax support
  - Emergency calls
  - DTMF
  - Redundancy procedures

4.2. Reference point

See §5.3.1 and §5.3.3 of [1]: “PXM IMS Corporate VoIP – UNI specification – General”.

5. SIP Profile

5.1. Introduction

The following clauses list the SIP related 3GPP and ETSI standards and IETF RFCs to which the IP-P(A)BX shall be compliant.

5.2. 3GPP standards

The Proximus IMS network implements and supports SIP protocol in accordance with:

- TS 24.229 IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP), stage 3 Release 7 [4]
- TS 23.167 IP multimedia subsystem (IMS) emergency sessions, Release 7 [5]
Although this is a registration configuration, emergency registrations are not applicable.

5.3. ETSI TISPAN standards

The Proximus IMS network implements and supports SIP protocol in accordance with:

- TS 182 025 Business Trunking; architecture and functional description'', v2.1.1 (2008-09) [7]

5.4. IETF RFCs

The Proximus IMS network implements and supports SIP/SDP protocol in accordance with:

- RFC 3261 SIP: session initiation protocol [9]
- RFC 3262 Reliability of provisional responses in SIP [10]
- RFC 3264 an offer/answer model with SDP [11]
- RFC 3265 SIP–specific event notification [12]
  Only the NOTIFY method is supported, the SUBSCRIBE method and the 489 "bad event" response are not supported.
  Because the NOTIFY method is a rather generic method usable in many different functions (e.g. message waiting indication) it can not be guaranteed that the behaviour will be correct for every possible functionality using the NOTIFY method.
- RFC 4566 SDP: session description protocol [13]
- RFC 2976 SIP INFO method [14]
  Because the INFO method is a rather generic method usable in many different functions it can not be guaranteed that the behaviour will be correct for every possible functionality using the INFO method. For example DTMF transport in the INFO method doesn’t work properly. Therefore it is mandatory to support the mechanisms for DTMF transport listed in § 6.9
- RFC 3311 SIP UPDATE Method [15]
- RFC 3323 A Privacy Mechanism for the Session Initiation Protocol (SIP) [16]
- RFC 3325 Private Extensions to SIP for Asserted Identity within Trusted Networks [17]
- RFC 3326 SIP reason header [18]
- RFC 3455 3GPP P-headers [19]
- RFC 3515 SIP REFER Method [20]
- RFC 3891 The Session Initiation Protocol (SIP) "Replaces" Header [21]
- RFC 3892 The Session Initiation Protocol (SIP) Referred-By Mechanism [22]
- RFC 3960 Early Media and Ringing Tone Generation in SIP [23]
- RFC 4028 Session Timers in the SIP [24]
- RFC 2617 HTTP Authentication: Basic and Digest Access Authentication [25]
- RFC 1321 The MD5 Message-Digest Algorithm [26]
- RFC 3550 RTP: A Transport Protocol for Real-Time Applications [27]
- RFC 3551 RTP Profile for Audio and Video Conferences with Minimal Control [28]
- RFC 4733 RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals [29]
  This RFC is the successor of RFC 2833. Please refer to the abstract of RFC 4733 for indications about backwards compatibility.
- RFC 4734 Definition of Events for Modem, FAX and Text Telephony signals [30]
- RFC 5806 Diversion indication in SIP [31]
5.4.1. **Supported methods**

The Proximus NGN network supports the following methods:

- INVITE according to [4] and [9]
- ACK according to [4] and [9]
- BYE according to [4] and [9]
- CANCEL according to [4] and [9]
- REGISTER according to [4] and [9]
- OPTIONS according to [4] and [9]
- PRACK according to [4] and [10]
- NOTIFY according to [4] and [12]
- REFER according to [4] and [20]
- UPDATE according to [4] and [15]
- INFO according to [4] and [14]

5.4.2. **Supported responses**

**Provisional responses (1xx):**

- 100 Trying according to [4] and [9]
- 180 Ringing according to [4] and [9]
- 181 Call Is Being Forwarded according to [4] and [9]
- 182 Queued according to [4] and [9]
- 183 Session Progress according to [4] and [9]

**Successful responses (2xx):**

- 200 OK according to [4] and [9]
- 202 Accepted according to [4] and [12]

**Redirection responses (3xx):**

- 302 Moved Temporarily according to [4] and [9]

**Request Failure responses (4xx):**

- 400 Bad Request according to [4] and [9]
- 401 Unauthorized according to [4] and [9]
- 402 Payment Required according to [4] and [9]
- 403 Forbidden according to [4] and [9]
- 404 Not Found according to [4] and [9]
- 405 Method Not Allowed according to [4] and [9]
• 406 Not Acceptable according to [4] and [9]
• 407 Proxy Authentication Required according to [4] and [9]
• 408 Request Timeout according to [4] and [9]
• 410 Gone according to [4] and [9]
• 413 Request Entity Too Large according to [4] and [9]
• 414 Request-URI Too Long according to [4] and [9]
• 415 Unsupported Media Type according to [4] and [9]
• 416 Unsupported URI Scheme according to [4] and [9]
• 420 Bad Extension according to [4] and [9]
• 421 Extension Required according to [4] and [9]
• 423 Interval Too Brief according to [4] and [9]
• 480 Temporarily Unavailable according to [4] and [9]
• 481 Call/Transaction Does Not Exist according to [4] and [9]
• 482 Loop Detected according to [4] and [9]
• 483 Too Many Hops according to [4] and [9]
• 484 Address Incomplete according to [4] and [9]
• 485 Ambiguous according to [4] and [9]
• 486 Busy Here according to [4] and [9]
• 487 Request Terminated according to [4] and [9]
• 488 Not Acceptable Here according to [4] and [9]
• 491 Request Pending according to [4] and [9]
• 493 Undecipherable according to [4] and [9]

Server Failure responses (5xx):
• 500 Server Internal Error according to [4] and [9]
• 501 Not Implemented according to [4] and [9]
• 502 Bad Gateway according to [4] and [9]
• 503 Service Unavailable according to [4] and [9]
• 504 Server Time-out according to [4] and [9]
• 505 Version Not Supported according to [4] and [9]
• 513 Message Too Large according to [4] and [9]

Global Failures responses (6xx):
• 600 Busy Everywhere according to [4] and [9]
• 603 Decline according to [4] and [9]
• 604 Does Not Exist Anywhere according to [4] and [9]
• 606 Not Acceptable according to [4] and [9]

5.4.3. Supported headers
• Via according to [4] and [9]
• To according to [4] and [9]
• From according to [4] and [9]
• CSeq according to [4] and [9]
• Call-Id according to [4] and [9]
• Contact according to [4] and [9]
• Max-Forwards according to [4] and [9]

As recommended in RFC 3261 [9] clause 20.22 the IP-PBX shall use as initial value of the Max-Forwards header the value 70.
• Route according to [4] and [9]
• Record-Route according to [4] and [9]
5.4.4. Unsupported headers

Proprietary SIP headers (i.e. headers starting with "X-" or "x-") are never supported and shall not be sent on the interface.

5.4.5. Supported bodies

Multipart message bodies are supported and used in the Proximus IMS network. Therefore, message body handling according to RFC 5321 [38] is mandatory.

In any case correct support and usage of SIP response 415 "Unsupported Media type" as specified in RFC 3261 [9] is mandatory.
5.5. Timer values

The Proximus IMS network supports the timers described in [4] and [9] with the following (default) settings:

- T1 = 500 msec
- T2 = 4 seconds
- T4 = 5 seconds
- Timer D = 32 seconds
- Timer H = 32 seconds

All other timers are derived from these, according to [4] and [9].

5.6. Transport protocol

The Proximus IMS network supports SIP over UDP only.

Important remark: In case SIP message length approaches the MTU size, [4] and [9] specify that UDP transport should be replaced by TCP transport. This shall NOT be applied by the IP-P(A)BX.

6. SIP Behaviour

6.1. Introduction

Besides the Standards and RFCs describing the protocol supported, also the expected behaviour is important. E.g. how does registration exactly take place, which information is expected in the “From” header, etc.

Business trunking corresponds to the Peering based business trunking as described in [7].

IMPORTANT:

SIP signalling serves the call set-up/teardown of calls/sessions as well as the description of session parameters (through the use of SDP) and the invocation of features and services. This means that the exchange of SIP signalling between an IP-PBX and the Proximus network shall serve one of the above purposes. In other words, SIP signalling shall be meaningful and the sending of useless SIP messages shall to be avoided!

Example of useless SIP signalling: A re-INVITE in an established session without any SDP included is often useless because typically re-INVITE is used to re-negotiate/change the session parameters. So, if there is no need to re-negotiate/change the session parameters no re-INVITE should be transmitted.
6.2. Registration/Authentication

IP-P(A)BX devices connected to the Proximus IMS network by use of Business Trunking or International Business Trunking shall not use registration. The identification and authentication of the IP-P(A)BX is done by making use of the one-to-one mapping of fixed IP-addresses. This is done through configuration in the Session Border Controller (SBC) of the Proximus IMS network.

Internal in the corporate network SIP end devices e.g. SIP phones, may register with the IP-P(A)BX itself. These registrations with the IP P(A)BX shall remain invisible to the Proximus IMS network.

Each IP-P(A)BX will be assigned one PBX public user identity (pbxPUID), aka Pilot ID aka PBXName. This is a non-dialable public identity.

An IP-P(A)BX has usually allocated to it one or more contiguous DN ranges.

Authentication procedures will not be requested for INVITE (session authentication).

6.3. Basic call

In Corporate VoIP several call types are possible:

- Private on-net calls are completely treated by the IP-P(A)BX and hence out of scope of this document.
- Public on-net calls are treated by the Proximus IMS network. This is a call between an IP-P(A)BX extension and an IMS user not part of the same IP-P(A)BX.
- Public off-net calls are treated by the Proximus IMS network. This is a call between an IP-P(A)BX extension and a non-IMS user (e.g. PSTN/ISDN, Mobile,..).

Basic call set-up and tear down complies with normal SIP behaviour as described in the relevant Standards and RFCs [4][9][10][11][13].

Basic call set-up in the SIP Business Trunking case happens without authentication. Since fixed IP addresses are used the Proximus IMS network identifies and authorizes the IP-P(A)BX based on the IP address.

Basic call set-up may use the mechanism for reliable transport of 1XX responses according to IETF RFC 3262 "Reliability of Provisional Responses in the Session Initiation Protocol (SIP)" [10], but it is not mandatory. The procedures for announcing the capability and use are described in [10].

Basic call set-up may use the mechanism for session timer according to IETF RFC 4028 "Session Timers in the Session Initiation Protocol (SIP)" [24], but it is not mandatory. The procedures for announcing the capability and use are described in [24].

The IP-P(A)BX shall use a Request-URI to originate a call as specified in PXM IMS Corporate VOIP - UNI specification - Address templates [40].

The IP-P(A)BX shall use the following own identity to originate a call:

- From header:
  - sip: Norm-SubA-dn@EnterpriseDomain; user=phone

  The From header shall always contain a valid PUID, even when the CLIR service is to be invoked.

- Contact header
  - sip:Norm-SubA-dn@IP-addr~PBXName, or
The IP address of the IP-P(A)BX in the Contact header MUST be the same as used in the configuration of the Proximus SBC because the Proximus IMS network uses this for admission control.

Remark: According to SIP Connect 1.1 [6], it is recommended that the IP-P(A)BX includes a P-Asserted-ID header in the INVITE request. The Proximus IMS network does not expect to receive this header and if received this header will be overwritten by the Proximus IMS network with the correct P-Asserted-ID.

Note: as “Norm-SubA-dn” any DN within the range of the IP-P(A)BX can be used.

6.3.1. Public on-net originating call set-up

Figure 1 shows the expected message flow for a public on-net originating call set-up.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

To set-up a public on-net call the IP-P(A)BX sends an INVITE message to the Proximus IMS network with the following headers:

- Request-URI as specified in PXM IMS Corporate VOIP - UNI specification - Address templates [40]
- To = <sip:Dialled-SubB-dn@ims.belgacom.be;user=phone>
- From = DisplayName <sip:Norm-SubA-dn@EnterpriseDomain;user=phone>
- Via = IP-addr-PBXName
- Contact = DisplayName <sip:Norm-SubA-dn@IP-addr-PBXName>

Note 1: The Request-URI may use the national dialling format in Belgium, as shown in the example below, but it is not recommended.
Live example

Request-Line: INVITE sip:023379020@ims.belgacom.be;user=phone SIP/2.0
Message Header
  Route: <sip:10.127.249.182;lr>
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE,
         OPTIONS, UPDATE
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  Session-Expires: 1800;refresher=uac
  Min-SE: 900
  Content-Type: application/sdp
  To: <sip:023379020@ims.belgacom.be;user=phone>
  From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
       tag=4266215533bf59d2bce321553e1e45
  Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
  Call-ID: 686e67c13e0cc50ad6e5f0ab9eb7555@10.127.249.4
  CSeq: 1383567065 INVITE
  Via: SIP/2.0/UDP 10.127.249.4;
       branch=z9hG4bKd851c2507af7ec54d5c39dab3f8e9f91
  Max-Forwards: 70
  Content-Length: 291
Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1291112196 1291112196 IN IP4 10.127.249.4
  Owner Username: OXE
  Session ID: 1291112196
  Session Version: 1291112196
  Owner Network Type: IN
  Owner Address Type: IP4
  Owner Address: 10.127.249.4
  Session Name (s): abs
  Connection Information (c): IN IP4 10.127.249.16
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.16
  Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
  Media Description, name and address (m): audio 32514 RTP/AVP 8 18 101
  Media Type: audio
  Media Port: 32514
  Media Proto: RTP/AVP
  Media Format: ITU-T.G.711 PCMA
  Media Format: ITU-T.G.729
  Media Format: 101
  Media Attribute (a): sendrecv
  Media Attribute (a): rtpmap:8 PCMA/8000
  Media Attribute Fieldname: rtpmap
  Media Format: 8
  MIME Type: PCMA
  Media Attribute (a): ptime:20
  Media Attribute Fieldname: ptime
  Media Attribute Value: 20
The INVITE contains SDP information regarding the proposed call parameters (e.g. codec, IP address and port number on which the IP-P(A)BX user wants to receive RTP).

The Proximus IMS network first returns a 100 Trying response and performs normal call routing to the destination. When the destination is reached a 180 Ringing response is returned to the IP-P(A)BX.

Remark: Because the initial INVITE sent by the IP-P(A)BX announced support for 100rel, the Proximus IMS network decides to apply this mechanism. The 180 Ringing response contains SDP information regarding the accepted call parameters and the following headers:

- Require = 100rel
- Rseq = <Rseqvalue>

**Live example**

**Status-Line:** SIP/2.0 100 Trying
**Message Header**
To: <sip:023379020@ims.belgacom.be;user=phone>  
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>; tag=426662155353bf59d2bc6c32155e1e45  
Call-ID: 686e67c13e03cc50ad6e650ba9eb7c55@10.127.249.4  
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ee545c39dab3f8e9f91  
CSeq: 1383567065 INVITE  
Content-Length: 0

**Status-Line:** SIP/2.0 180 Ringing
**Message Header**
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973  
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>; tag=426662155353bf59d2bc6c32155e1e45  
Call-ID: 686e67c13e03cc50ad6e650ba9eb7c55@10.127.249.4  
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ee545c39dab3f8e9f91  
CSeq: 1383567065 INVITE  
Contact: <sip:10.127.249.182;transport=udp>  
RSeq: 233532262
The IP-P(A)BX shall send a PRACK request to the Proximus IMS network in order to acknowledge the receipt of the 180 response.

The PRACK request contains the following headers:

- **Rack** = <Rseqvalue as received> <Rackvalue> INVITE

**Live example**

```
Request-Line: PRACK sip:10.127.249.182:5060;
            ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
    Supported: replaces,timer
    User-Agent: XXXX
    Rack: 233532262 1383567065 INVITE
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
```
The Proximus IMS network shall send a 200 OK response to the IP-P(A)BX in order to properly close the PRACK transaction.

Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=426662155353bf59d2bcca3f2155e1e45
Call-ID: 6866713e0c50ade6e5f0bab4eb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206aab37b27286bf39f2ca91
CSeq: 1383567066 PRACK
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0

When the call is answered the Proximus IMS network returns a 200 OK response containing SDP information regarding the accepted call parameters (e.g. codec, IP address and port number on which the destination wants to receive RTP).

Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=426662155353bf59d2bcca3f2155e1e45
Call-ID: 6866713e0c50ade6e5f0bab4eb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206aab37b27286bf39f2ca91
CSeq: 1383567065 INVITE
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1;sig-fo.ims.ims.be;transport=udp>
P-Charging-Vector: icid-value="ICSF:10.127.68.19-4cf4b1dd-00000be1"
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Type: application/sdp
Content-Length: 177
Server: Alcatel-Lucent-HPSS/3.0.3

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88810 2 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 88810
Session Version: 2
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.182:5060;
ue-addr=imbasilabi-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Contact: sip:10.127.249.4
User-Agent: XXXX
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=4266215535bf59d2bccf32155e1e45
Call-ID: 686e67c13e00c05ad6e50ba9ebb7c55@10.127.249.4
CSeq: 1383567065 ACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKad4e5c69afe6b05b3277ada24769e6da
Max-Forwards: 70
Content-Length: 0

6.3.2. Public off-net originating call set-up

Figure 2 shows the expected message flow for a public off-net originating call set-up.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.
To set-up a public off-net call the IP-P(A)BX sends an INVITE message to the Proximus IMS network with the following headers:

- **Request-URI** specified in PXM IMS Corporate VOIP - UNI specification - Address templates [40]
- **To** = <sip:Dialled-SubB-dn@ims.belgacom.be;user=phone>
- **From** = DisplayName <sip:Norm-SubA-dn@EnterpriseDomain;user=phone>
- **Via** = IP-addr-PBXName
- **Contact** = DisplayName <sip:Norm-SubA-dn@IP-addr-PBXName>

**Note 1:** The **Request-URI** may use the national dialling format in Belgium, as shown in the example below, but it is not recommended

**Note 2:** The **DisplayName** in the **From**, **Contact** and **P-Asserted-ID** header is optional

**Live example**

```
Request-Line: INVITE sip:023379020@ims.belgacom.be;user=phone SIP/2.0
Message Header
  Route: <sip:10.127.249.182;lr>
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE,
  OPTIONS, UPDATE
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  Session-Expires: 1800;refresher=uac
  Min-SE: 900
  Content-Type: application/sdp
  To: <sip:023379020@ims.belgacom.be;user=phone>
  From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
    tag=42662155353bf59d2b8c5f321555e1e45
  Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
  Call-ID: 686e67c13e0c50ad6e50ba9ebb7c55@10.127.249.4
  CSeq: 1383567065 INVITE
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ec54d5c39dab3f8e9f91
  Max-Forwards: 70
  Content-Length: 291
Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1291112196 1291112196 IN IP4 10.127.249.4
  Owner Username: OXE
  Session ID: 1291112196
```

The INVITE contains SDP information regarding the proposed call parameters (e.g. codec, IP address and port number on which the IP-P(A)BX user wants to receive RTP).

The Proximus IMS network first returns a 100 Trying response and performs normal call routing to the destination. When the destination is reached a 180 Ringing response is returned to the IP-P(A)BX.

Remark: Because the initial INVITE sent by the IP-P(A)BX announced support for 100rel, the Proximus IMS network decides to apply this mechanism. The 180 Ringing response contains SDP information regarding the accepted call parameters and the following headers:
• Require = 100rel
• Rseq = <Rseqvalue>

Live example

Status-Line: SIP/2.0 100 Trying
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42666215533bf59d2beccf32155e1e45
Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ec54d5c39dab3f8e9f91
CSeq: 1383567065 INVITE
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42666215533bf59d2beccf32155e1e45
Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ec54d5c39dab3f8e9f91
CSeq: 1383567065 INVITE
Contact: <sip:10.127.249.182:5060;
ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
RSeq: 233532262
P-Charging-Vector: icid-value="ICSF:10.127.68.19-4cf4b1dd-00000001"
Require: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Content-Type: application/sdp
Content-Length: 177
Server: Alcatel-Lucent-HPSS/3.0.3

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88810 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 88810
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
Media Description, name and address (m): audio 15188 RTP/AVP 8 101
  Media Type: audio
  Media Port: 15188
  Media Proto: KTP/AVP
  Media Format: ITU-T G.711 PCMA
  Media Format: 101
Media Attribute (a): ptime:20
The IP-P(A)BX shall send a PRACK request to the Proximus IMS network in order to acknowledge the receipt of the 180 response.

The PRACK request contains the following headers:

- **Rack** = `<Rseqvalue as received> <Rackvalue> INVITE`

```
Live example
```

```
Request-Line: PRACK sip:10.127.249.182:5060;
ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Supported: replaces,timer
User-Agent: XXXX
RACK: 233532262 1383567065 INVITE
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42662155353bf59d2bcfc32155e1e45
Call-ID: 686e67c13e0cc50a8e65f0aeb7c55@10.127.249.4
CSeq: 1383567066 PRACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206a37b27286bf39f2ca91
Max-Forwards: 70
Content-Length: 0
```

The Proximus IMS network shall send a 200 OK response to the IP-P(A)BX in order to properly close the PRACK transaction.

```
Live example
```

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42662155353bf59d2bcfc32155e1e45
Call-ID: 686e67c13e0cc50a8e65f0aeb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206a37b27286bf39f2ca91
CSeq: 1383567066 PRACK
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0
```

When the call is answered the Proximus IMS network returns a 200 OK response containing SDP information regarding the accepted call parameters (e.g. codec, IP address and port number on which the destination wants to receive RTP).

```
Live example
```

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
```

The IP-P(A)BX shall send a PRACK request to the Proximus IMS network in order to acknowledge the receipt of the 180 response.

The PRACK request contains the following headers:

- **Rack** = `<Rseqvalue as received> <Rackvalue> INVITE`

```
Live example
```

```
Request-Line: PRACK sip:10.127.249.182:5060;
ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Supported: replaces,timer
User-Agent: XXXX
RACK: 233532262 1383567065 INVITE
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42662155353bf59d2bcfc32155e1e45
Call-ID: 686e67c13e0cc50a8e65f0aeb7c55@10.127.249.4
CSeq: 1383567066 PRACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206a37b27286bf39f2ca91
Max-Forwards: 70
Content-Length: 0
```

The Proximus IMS network shall send a 200 OK response to the IP-P(A)BX in order to properly close the PRACK transaction.

```
Live example
```

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42662155353bf59d2bcfc32155e1e45
Call-ID: 686e67c13e0cc50a8e65f0aeb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206a37b27286bf39f2ca91
CSeq: 1383567066 PRACK
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0
```

When the call is answered the Proximus IMS network returns a 200 OK response containing SDP information regarding the accepted call parameters (e.g. codec, IP address and port number on which the destination wants to receive RTP).

```
Live example
```

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
```
From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone;tag=4266621553bf59d2b2c5f32155e1e45>
Call-ID: 6866713300cc49af6sigmoideb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd85tc507af7e54d5e9dab3f8e9f91
CSeq: 1383567065 INVITE
Contact: <sip:10.127.249.182:5060;ue-addr=impbaslab1-sig-fo.ims.ims.be;transport=udp>
P-Charging-Vector: icid-value="ICSF:10.127.68.19-4cf4b1dd-00000be1"
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Type: application/sdp
Content-Length: 177
Server: Alcatel-Lucent-HPSS/3.0.3

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88810 2 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 88810
Session Version: 2
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s):
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15188 RTP/AVP 8 101
Media Type: audio
Media Port: 15188
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: 101
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event

The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.182:5060;ue-addr=impbaslab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Contact: sip:10.127.249.4
6.3.3. Public on-net terminating call set-up

Figure 3 shows the expected message flow for a public on-net terminating call set-up.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

To set-up a call to the IP-P(A)BX, the Proximus IMS network sends an INVITE message to the IP-P(A)BX with the following headers:

- **Request-URI** = sip:Norm-SubB-dn@IP-addr-PBXName;user=phone
- **To** = <sip:Norm-SubB-dn@EnterpriseDomain;user=phone>
- **From** = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- **Via** = IP-addr-IMS
- **Contact** = <sip:IP-addr-IMS>
- **P-Asserted-ID** = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- **P-called-party-id** = <tel:Norm-SubB-dn>

Note 1: The **DisplayName** in the **From** header is optional

Note 2: The **P-asserted-id** header and **P-called-party-id** header are optional

Remark: Any incoming basic call to an IP-P(A)BX may have undergone diversion before it reaches the IP-P(A)BX. Therefore a diverting number can be present in the INVITE message in the **Diversion** header (the Diversion Top header contains the Redirecting Number, while the Diversion Bottom header contains the Original Called Number). The Diversion header has been documented in IETF RFC 5806 Diversion indication in SIP [31].
The INVITE contains SDP information regarding the proposed call parameters (e.g. codec, IP address and port number on which the Proximus IMS network wants to receive RTP).

Live example

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKa059e4b6gk0p22974ocg3ga540
Call-ID: BW081233763301110-584809374@10.127.70.20
To: "3227970251" sip:+3227970251@ims.belgacom.be;user=phone
From: "RV-027970315" sip:+3227970315@ims.belgacom.be;user=phone;tag=112562886-12911047363
CSeq: 233540658 INVITE
Max-Forwards: 68
Content-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1 sig-fo.ims.ims.be;transport=udp>
Privacy: none
P-Charging-Vector: icid-value="PCSF:10.127.68.10-4cf4b1f1-0004f523";
     orig-ioi="bgc_ims"
P-Access-Network-Info: ADSL2+
Supported: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Length: 227
User-Agent: XXXX
Route: <sip:+3227970251;tgrp=tg_af750f_0101uri;trunk-context=sbc1.ims.ims.be@10.127.249.4:5060;user=phone;lr>

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88815 1 IN IP4 10.127.249.182
     Owner Username: BroadWorks
     Session ID: 88815
     Session Version: 1
     Owner Network Type: IN
     Owner Address Type: IP4
     Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
     Connection Network Type: IN
     Connection Address Type: IP4
     Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
     Session Start Time: 0
     Session Stop Time: 0
Media Description, name and address (m): audio 15190 RTP/AVP 8 18 101
     Media Type: audio
     Media Port: 15190
     Media Proto: RTP/AVP
     Media Format: ITU-T G.711 PCMA
     Media Format: ITU-T G.729
     Media Format: 101
     Media Attribute (a): rtpmap:8 PCMA/8000
     Media Attribute Fieldname: rtpmap
     Media Format: 8
The Proximus IMS network expects a **100 Trying** response, followed by a **180 Ringing**, when the destination user is reached.

**Live example**

```
Status-Line: SIP/2.0 100 Trying
```  
```
Message Header
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>
From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
tag=1125622886-1291104753763-
Call-ID: BW081233763301110-584809374@10.127.70.20
CSeq: 233540658 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;
branch=z9hG4bKa059e4b6gk0p22974ocg3ga540
Content-Length: 0
```

When the call is answered the Proximus IMS network expects a **200 OK** response containing SDP information regarding the accepted call parameters (e.g. codec, IP address and port number on which the destination wants to receive RTP).

**Live example**

```
Status-Line: SIP/2.0 200 OK
```  
```
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
User-Agent: XXXX
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=21e66547589ff21e4d9c02b3c72d533
From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
tag=1125622886-1291104753763-
Call-ID: BW081233763301110-584809374@10.127.70.20
CSeq: 233540658 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;
branch=z9hG4bKa059e4b6gk0p22974ocg3ga540
Content-Length: 0
```
The Proximus IMS network sends an ACK message to the IP-P(A)BX in order to properly close the INVITE transaction.

Live example
6.3.4. Public off-net terminating call set-up

Figure 4 shows the expected message flow for a public off-net terminating call set-up.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

To set-up a call to the IP-P(A)BX, the Proximus IMS network sends an INVITE message to the IP-P(A)BX with the following headers:

- Request-URI = sip:Norm-SubB-dn@IP-addr~PBXName;user=phone
- To = <sip:Norm-SubB-dn@EnterpriseDomain;user=phone>
- From = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- Via = IP-addr~IMS
- Contact = <sip:IP-addr~IMS>
- P-asserted-id = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone> or <tel:Norm-SubA-dn>
- P-called-party-id = <tel:Norm-SubB-dn>

Note 1: The DisplayName in the From header is optional
Note 2: The P asserts id header and P called party id header are optional

**Remark:** Any incoming basic call to an IP P(A)BX may have undergone diversion before it reaches the IP P(A)BX. Therefore, a diverting number can be present in the INVITE message in the Diversion header (the Diversion Top header contains the Redirecting Number, while the Diversion Bottom header contains the Original Called Number). The Diversion header has been documented in IETF RFC 5806 Diversion indication in SIP [31]. The INVITE contains SDP information regarding the proposed call parameters (e.g. codec, IP address and port number on which the Proximus IMS network wants to receive RTP).

**Live example**

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev10je1
Call-ID: BW08130202230110173503167@10.127.70.20
To: "3227970251"@sip:+3227970251@ims.belgacom.be;user=phone
From: "+3223379020"<sip:+3223379020@ims.belgacom.be;user=phone>;tag=1581897935-1291104782022-
CSeq: 233554788 INVITE
Max-Forwards: 68
Conten-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue=addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
Privacy: none
P-Charging-Vector: icid-value=S9C40-20101130091301-00001250;
icid-generated-at=149.204.0.1;orig-oi="bgc_ims"
Supported: 100rel
Allow: ACK, BYE, CANCEL, INFO, INVITE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
Accept: multipart/mixed, application/media _control+xml, application/sdp
Content-Length: 180
User-Agent: XXXX
Route: <sip:+3227970251;tggrp=tg4f750f_0101uri;trunk-context=sbc1.ims.ims.be@10.127.249.4:5060;user=phone;lr>

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88822 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 88822
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15192 RTP/AVP 8 18 101
Media Type: audio
Media Port: 15192
Media Proto: RTP/AVP
The Proximus IMS network expects a 100 Trying response, followed by a 180 Ringing, when the destination user is reached.

Live example

Status-Line: SIP/2.0 100 Trying
Message Header
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>
From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>; tag=1581897935-1291104782022
Call-ID: BW081302022301101713503167@10.127.70.20
CSeq: 233554788 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev10je1
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
User-Agent: XXXX
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bf6963168c50886ca9aef18f7c0e56f8
From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>;
tag=1581897935-1291104782022
Call-ID: BW081302022301101713503167@10.127.70.20
CSeq: 233554788 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev10je1
Content-Length: 0

When the call is answered the Proximus IMS network expects a 200 OK response containing SDP information regarding the accepted call parameters (e.g. codec, IP address and port number on which the destination wants to receive RTP).

Live example

Status-Line: SIP/2.0 200 OK
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
Supported: replaces,timer,100rel
User-Agent: XXXX
Session-Expires: 1800;refresher=uas
Content-Type: application/sdp
To: "+3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bfa96316b7e5086ca9aef8f7ce0568f
From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>;
tag=1581897935-1291104782022-
Call-ID: BW08130202230110173503167@10.127.70.20
CSeq: 233554788 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k35j9h13ev10je1
Content-Length: 217

Message body

Session Description Protocol

Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): OXE 1291112444 1291112444 IN IP4 10.127.249.4
Owner Username: OXE
Session Id: 1291112444
Session Version: 1291112444
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): abs
Connection Information (c): IN IP4 10.127.249.16
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.16
Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
Media Description, name and address (m): audio 32514 RTP/AVP 8 101
  Media Type: audio
  Media Port: 32514
  Media Proto: RTP/AVP
  Media Format: ITU-T G.711 PCMA
  Media Format: 101
  Media Attribute (a): rtpmap:8 PCMA/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 8
    MIME Type: PCMA
  Media Attribute (a): ptime:20
    Media Attribute Fieldname: ptime
    Media Attribute Value: 20
  Media Attribute (a): maxptime:30
    Media Attribute Fieldname: maxptime
    Media Attribute Value: 30
  Media Attribute (a): rtpmap:101 telephone-event/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 101
    MIME Type: telephone-event
    Media Attribute (a): sendrecv

The Proximus IMS network sends an ACK message to the IP-P(A)BX in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;
  branch=z9hG4bK8lu0lm5j0ttdf9d9hh07trs7m6-doq7cjh5
6.3.5. Forward call tear down

Figure 5 shows the expected message flow for a call tear down initiated by the IP-P(A)BX user.

![Basic call/session forward teardown diagram](image)

To end a public on-net or a public off-net call the IP-P(A)BX sends a BYE message to the Proximus IMS network.

- **CallID** = matches the CallID of the concerned call
- **Cseq** = is incremented with regard to the previous transaction related to this call

**Live example**

```
Request-Line: BYE sip:10.127.249.182:5060;
   ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
   Supported: replaces,timer,100rel
   User-Agent: XXXX
To: <sip:+3227970251@ims.belgacom.be;user=phone>;
   tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
   tag=426662155353bf59d2bccf32155e1e45
   Call-ID: 686ee67c1360050a66e5f0ba9ebb7c55@10.127.249.4
   CSeq: 1383567067 BYE
   Via: SIP/2.0/UDP 10.127.249.4;
      branch=z9hG4bK2c9bd4e8223bb2ff9509146905018884
Max-Forwards: 70
```
The Proximus IMS network returns a 200 OK response.

Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379020@ims.belgacom.be;user=phone>;tag=2080276901-1291104736973
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=426662155353bf59d2b6cf321551e145
Call-ID: 686e67c13e0cc50ad6e50fa9eb7c55@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;
branch=z9hG4bK2c9bd4e8223bb2f9509146905018884
CSeq: 1383567067 BYE
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0

6.3.6. Backward call tear down

Figure 6 shows the expected message flow for a call tear down initiated by the Proximus IMS network.

To end a public on-net or a public off-net call the Proximus IMS network sends a BYE message to the IP-P(A)BX.

- CallID = matches the CallID of the concerned call
- Cseq = is incremented with regard to the previous transaction related to this call

Live example

Request-Line: BYE sip:10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;
branch=z9hG4bKd2jakiu3s4n2m3tsq74am4260-doqpopk5
From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
tag=112562886-1291104753763
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=21c665a7c589ff21c4d9c02b3c72d533
Call-ID: BW08123376330110-584809374@10.127.70.20
CSeq: 233540659 BYE
Max-Forwards: 68
Content-Length: 0
6.4. Supplementary services

All supplementary services shall be executed at and managed by the IP-P(A)BX. There is no individual user profile in the Proximus IMS network for the extensions behind the IP-P(A)BX.

Services executed by the IP-P(A)BX and involving internal users only shall not be visible for the Proximus IMS network.

Services executed by the IP-P(A)BX involving external users need particular interaction with the Proximus IMS network. The expected behaviour is discussed in the following clauses.

6.4.1. Calling Line Identity Presentation (CLIP)

The Calling Line Identification Presentation service is enabled by default and applies to all PBX iDN and to the pbxPUID.

Note: the pbxPUID is in fact a non-dialable public identity and hence in practice it will not be used as CLI.

6.4.1.1. Incoming call to the IP-P(A)BX

The CLIP service sends the identity of the calling line to the IP-P(A)BX. The calling line identity can be provided by the network or it can include identity information supplied by the caller and validated by the network.

The calling line identity can be contained in the From and P-Asserted-Id headers in the INVITE message sent to the IP-P(A)BX. The presentation information of the calling line identity, which establishes the identity type (Presentation Allowed or Presentation Restricted) is contained in the Privacy header in the INVITE message.

The format of the calling line identity information in the From and P-Asserted-Id headers in the INVITE message is:
• From = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
• P-Asserted-ID = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone> or <tel:Norm-SubA-dn>

Note 1: The DisplayName in the From header and P-Asserted-ID header is optional.

Note 2: The Norm-SubA-dn in the From header and P-Asserted-ID header is not necessarily the same. For example in case of interworking with legacy ISDN two calling line identities may be delivered.

The Privacy header in the INVITE message has the value "none". The absence of the Privacy header equally means "no privacy".

Live example

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;
branch=z9hG4bKa059e4b6gk0p229740cg3ga540
Call-ID: BW08123763301110-584809374@10.127.70.20
To: "3227970251 3227970250"<sip:+3227970251@ims.belgacom.be;user=phone>
From: "RV-027970315"<sip:+3227970315@ims.belgacom.be;user=phone>;
tag=1125622886-1291104753763-
CSeq: 233540658 INVITE
Max-Forwards: 68
Content-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
Privacy: none
P-Charging-Vector: icid-value="PCSF:10.127.68.10-4cf4b1f1-0004f523";
orig-roi="bgc_ims"
P-Access-Network-Info: ADSL2+
Supported: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Length: 227
User-Agent: XXXX
Route: <sip:+3227970251;tgrp=tg_af750f_0101uri;trunk-context=sbc1.ims.ims.be@10.127.249.4:5060;user=phone;lr>

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 88815 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 88815
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15190 RTP/AVP 8 18 101
Media Type: audio
6.4.1.2. Outgoing call from the IP-P(A)BX

The calling line identity shall be contained in the From header in the INVITE message sent by the IP-P(A)BX.

- From = DisplayName <sip:Norm-SubA-dn@EnterpriseDomain;user=phone>

Note: The DisplayName in the From header is optional.

**Live example**

```
Request-Line: INVITE sip:023379020@ims.belgacom.be;user=phone SIP/2.0
Message-Header
    Route: <sip:10.127.249.182;lr>
    Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE,
          OPTIONS, UPDATE
    Supported: replaces,timer,100rel
    User-Agent: XXXX
    Session-Expires: 1800;refresher=uac
    Min-SE: 900
    Content-Type: application/sdp
    To: <sip:023379020@ims.belgacom.be;user=phone>
    From: "testteam" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=42666215533bf59d2bcf32155e1e45
    Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
    Call-ID: 686e67c13e0c50ad6e5f0ba9eb7e55@10.127.249.4
    CSeq: 1383567065 INVITE
    Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd851c2507af7ee54d5c39dab3f8e9f91
    Max-Forwards: 70
    Content-Length: 291
    Message-body
    Session Description Protocol
    Session Description Protocol Version (v): 0
```
Note: According to SIP Connect 1.1 [6], it is recommended that the IP-P(A)BX includes a P-Asserted-ID header in the INVITE request. The Proximus IMS network does not expect to receive this header and if received this header will be overwritten by the Proximus IMS network with the correct P-Asserted-ID.
6.4.2.  Calling Line Identity presentation Restriction (CLIR)

The Calling Line Identity presentation Restriction (CLIR) service can be invoked on a call by call basis per individual number.

6.4.2.1.  Incoming call to the IP-P(A)BX

In case the CLIR service has been invoked by the calling user of an incoming call to the IP-P(A)BX, the From header in the INVITE will not contain the identity information of the calling user and the P-Asserted-Id header will not be present in the INVITE. The presentation information of the calling line identity, which establishes the identity type (Presentation Allowed or Presentation Restricted) is contained in the Privacy header in the INVITE message.

- From = DisplayName <sip:Anonymous@anonymous.invalid>
- Privacy = id and/or header and/or User

Note: if present DisplayName will have the value “Anonymous”.

6.4.2.2.  Outgoing call from the IP-P(A)BX

In order to prevent the presentation of the calling user’s identity (invoke CLIR) the IP-P(A)BX shall include a Privacy header in the INVITE. The value of the Privacy header in the INVITE shall be id and/or header and/or User

In any case the From header shall always contain a PUID, even when the CLIR service is to be invoked.

- From = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- Privacy = id and/or header and/or User

Note 1: the values) of the Privacy header shall be chosen in accordance with RFC 3323 [16] and RFC 3325 [17].

Note 2: for the invocation of the CLIR service it is recommended to use at least the Privacy value “user”.

6.4.3.  Call Forwarding Services

The call forwarding feature(s) shall be managed and handled by the IP-P(A)BX.

The following behaviour is valid for all flavours (e.g. unconditional (CFU), on busy (CFB), on no reply (CFNR), ...) of call forwarding executed by the IP-P(A)BX.

In case an incoming call to the IP-P(A)BX is forwarded to a destination external to the IP-P(A)BX, the IP-P(A)BX shall:

- either create the forwarding by setting-up a new (forwarded) call. The incoming call and the outgoing (forwarded) call are considered being 2 separate calls. A Diversion header may be included in the outgoing (forwarded) call in which case the calling line identity possibly shown to the forwarded-to destination will be the original calling line identity, else the calling line identity possibly shown to the forwarded-to destination will be the identity of the forwarding IP-P(A)BX user (or the IP-P(A)BX general number). The History-info header MUST NOT be included in the outgoing (forwarded) call.
- or return a 302 Moved Temporarily response containing the forwarded-to-number in the Contact header. The Proximus IMS network will then redirect the call to the forwarded-to-
number. The calling line identity possibly shown to the forwarded-to destination will be the identity of the original calling user.
6.4.3.1. Call forward via new (outgoing) call

Figure 7 shows the expected message flow for a call forward via a new call.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

In order to set-up a call to an IP-P(A)BX the Proximus IMS network sends an INVITE message to the IP-P(A)BX with:

- **From** = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- **To** = DisplayName <sip:Norm-SubB-dn@EnterpriseDomain;user=phone>

The IP-P(A)BX returns a 100 Trying response.

**Live example**

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0
Message-Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8aor09c9baj4u5l7
Call-ID: BW0854309661201151946121@10.127.70.20
To: "3227970251"
3227970251@ims.belgacom.be;user=phone>
From: "+3223379031"<sip:+3223379031@ims.belgacom.be;user=phone>; tag=1827139034-1294822470966-
CSeq: 1018657436 INVITE
Max-Forwards: 68
Content-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.belgacom.be;transport=udp>
Privacy: none
When the IP-P(A)BX invokes the call forward feature, a 183 Progress response is sent to the Proximus IMS network.

Live example
Status-Line: SIP/2.0 183 Session Progress
Message Header
   Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
   Contact: sip:+3227970251@ims.belgacom.be;user=phone;
tag=3566f75a8e3510817253a92aa13b7e55
   From: "3227970251" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=1827139038-1294822470966-
   Call-ID:BW08543096612011151946121@10.127.70.20
   CSeq:1018657436 INVITE
   Via:SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8a0r09c9ba34u517
   Content-Length: 0

The IP-P(A)BX starts a new call to the “forwarded-to-destination” by sending an INVITE message to the Proximus IMS network with:

- **From** = DisplayName <sip:Norm-SubB-dn@EnterpriseDomain;user=phone>
- **To** = <sip:Dialed-SubC-dn@EnterpriseDomain;user=phone>

**Live example**

Request-Line: INVITE sip:023379021@ims.belgacom.be;user=phone SIP/2.0
Message Header
   Route: <sip:10.127.249.182;lr>
   Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
   Supported: replaces,timer,100rel
   User-Agent: XXXX
   Session-Expires: 1800;refresher=uac
   Min-SE: 900
   Content-Type: application/sdp
   To: <sip:023379021@ims.belgacom.be;user=phone>
   From: "testteam P&P" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bd17b50474bf2c5caaab3b3107494be4
   Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
   Call-ID: 3f979b5d1e4fde70afa60fa65a35fd5@10.127.249.4
   CSeq: 869438703 INVITE
   Via:SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd56c1b14509e02867eac8f3d9ec870
   Max-Forwards: 70
   Content-Length: 292

Message body
   Session Description Protocol
   Session Description Protocol Version (v): 0
   Owner/Creator, Session Id (o): OXE 1294830037 1294830037 IN IP4 10.127.249.4
   Owner Username: OXE
   Session ID: 1294830037
   Session Version: 1294830037
   Owner Network Type: IN
   Owner Address Type: IP4
   Owner Address: 10.127.249.4
   Session Name (s): abs
   Connection Information (c): IN IP4 10.127.249.182
      Connection Network Type: IN
      Connection Address Type: IP4
      Connection Address: 10.127.249.182
   Time Description, active time (t): 0 0
   Session Start Time: 0
   Session Stop Time: 0
Media Description, name and address (m): audio 15694 RTP/AVP 8 18 101
Media Type: audio
Media Port: 15694
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): sendrecv
Media Attribute (a): rtpmap:8 PCMA/8000
Media Attribute Fieldname: rtpmap
Media Format: 8
MIME Type: PCMA
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30
Media Attribute (a): rtpmap:18 G729/8000
Media Attribute Fieldname: rtpmap
Media Format: 18
MIME Type: G729
Media Attribute (a): fmtp:18 annexb=no
Media Attribute Fieldname: fmtp
Media Format: 18 [G729]
Media format specific parameters: annexb=no
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:40
Media Attribute Fieldname: maxptime
Media Attribute Value: 40
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event

The Proximus IMS network returns a 100 Trying response to the IP-P(A)BX.

Live example

Status-Line: SIP/2.0 100 Trying
Message Header
To: <sip:023379021@ims.belgacom.be;user=phone>
From: "testteam P&P" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bd17b50474bf2c5caaab3b3107494be4
Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9d56c1b14509e02867eacf8f3d9ee870
CSeq: 869438703 INVITE
Content-Length: 0

When the "forwarded-to-destination" is reached the Proximus IMS network returns a 180 Ringing response to the IP-P(A)BX.

In this case the 180 Ringing response contains a Require header with value 100rel, which means that reliable transport of 1XX responses is required. Consequently the IP-P(A)BX must send a PRACK message to the Proximus IMS network in order to confirm the receipt of the 180 Ringing response.
Status-Line: SIP/2.0 180 Ringing
Message Header
To: <sip:023379021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
From: "testteam P&P" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bd1b50474bf2e5caab3b3107494be4
Call-ID: 3f197b5d1e4fde70af60a65a35fd3@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bk9d56cb1b14509e02867eaf8f3d9ec870
CSeq: 869438703 INVITE
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.be;transport=udp>
RSeq: 1018658879
Require: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Content-Type: application/sdp
Content-Length: 179
Server: Alcatel-Lucent-HPSS/3.0.3
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 3194424 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 3194424
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15696 RTP/AVP 8 101
Media Type: audio
Media Port: 15696
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: 101
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event
Request-Line: PRACK sip:10.127.249.182:5060;
ue-addr=impbasilab1-sig-fo.ims.be;transport=udp SIP/2.0
Message Header
Supported: replaces,timer
User-Agent: XXXX
RACK: 1068658879 869438703 INVITE
The Proximus IMS network returns a 200 OK response to the IP-P(A)BX in order to properly close the PRACK transaction.

Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bd1b7b50474bf2e5caab3b3107494be4
Call-ID: 3f197b95d1e4fd7e0af60fa65a35fd3@10.127.249.4
CSeq: 869438704 PRACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKca9fe2795912907ebbf0f5b3e0883325
Max-Forwards: 0
Content-Length: 0

After the successful PRACK transaction the IP-P(A)BX returns a 180 Ringing response to the Proximus IMS network for the original incoming INVITE message.

Live example

Status-Line: SIP/2.0 180 Ringing
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
User-Agent: XXXX
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;tag=35e6f75a8c3510817253a92aa13b7c55
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
tag=182719038-1294822470966-
Call-ID: BW08543096612011151946121@10.127.70.20
CSeq: 1018657436 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8a0r09c9baj4u5l7
Content-Length: 0

When the "forwarded-to-destination" answers the call, the Proximus IMS network sends a 200 OK response to the IP-P(A)BX.

Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:023379021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=bd1b7b50474bf2e5caab3b3107494be4
Call-ID: 3f197b95d1e4fd7e0af60fa65a35fd3@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9d56c1b145091e02867eacf8f3d9ec870
CSeq: 869438703 INVITE
Contact: <sip:+3227970251@ims.belgacom.be;transport=udp;transport=udp>
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Type: application/sdp
Content-Length: 179
Server: Alcatel-Lucent-HPSS/3.0.3

Message body
Session Description Protocol

Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 3194424 2 IN IP4 10.127.249.182
  Owner Username: BroadWorks
  Session ID: 3194424
  Session Version: 2
  Owner Network Type: IN
  Owner Address Type: IP4
  Owner Address: 10.127.249.182

Session Name (s):
  Connection Information (c): IN IP4 10.127.249.182
    Connection Network Type: IN
    Connection Address Type: IP4
    Connection Address: 10.127.249.182

Time Description, active time (t):
  Session Start Time: 0
  Session Stop Time: 0

Media Description, name and address (m):
  Media Type: audio
  Media Port: 15696
  Media Proto: RTP/AVP
  Media Format: ITU-T G.711 PCMA
  Media Format: 101
  Media Attribute (a):
    ptime:20
    Media Attribute Fieldname: ptime
    Media Attribute Value: 20
  Media Attribute (a):
    maxptime:30
    Media Attribute Fieldname: maxptime
    Media Attribute Value: 30
  Media Attribute (a):
    rtpmap:101 telephone-event/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 101
  MIME Type: telephone-event

The IP-P(A)BX returns an ACK message in order to properly close the INVITE transaction of the call to the "forwarded-to-destination".

Live example

Request-Line: ACK sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;
            transport=udp SIP/2.0
Message Header
  Contact: sip:10.127.249.4
  User-Agent: XXXX
  To: <sip:023739021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
  From: "testteam P&P" <sip:+3227970251@ims.belgacom.be;user=phone>;
      tag=bd17b50474bf2e5caab3b3107494be4
  Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
  CSeq: 869438703 ACK
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK8dacefe7784855923bdac44a1b94d878
  Max-Forwards: 70
  Content-Length: 0
The IP-P(A)BX sends a 200 OK response to the Proximus IMS network for the original INVITE transaction.

**Live example**

Status-Line: SIP/2.0 200 OK
Message Header
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
  Contact: sip:10.127.249.4
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  Session-Expires: 1800;refresher=uas
  Content-Type: application/sdp
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=3566f75a8c3510817253a92aa13b7c55
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
tag=1827139038-1294822470966-
  Call-ID: BW0854300661201151946121@10.127.70.20
  CSeq: 1018657436 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8a0r09c9baj4u5l7
  Content-Length: 218
Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1294830036 1294830036 IN IP4 10.127.249.4
    Owner Username: OXE
    Session ID: 1294830036
    Session Version: 1294830036
    Owner Network Type: IN
    Owner Address Type: IP4
    Owner Address: 10.127.249.4
  Session Name (s): abs
  Connection Information (c): IN IP4 10.127.249.182
    Connection Network Type: IN
    Connection Address Type: IP4
    Connection Address: 10.127.249.182
  Time Description, active time (t): 0 0
    Session Start Time: 0
    Session Stop Time: 0
  Media Description, name and address (m): audio 15696 RTP/AVP 8 101
    Media Type: audio
    Media Port: 15696
    Media Proto: RTP/AVP
    Media Format: ITU-T G.711 PCMA
    Media Format: 101
  Media Attribute (a): rtpmap:8 PCMA/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 8
    MIME Type: PCMA
  Media Attribute (a): ptime:20
    Media Attribute Fieldname: ptime
    Media Attribute Value: 20
  Media Attribute (a): maxptime:30
    Media Attribute Fieldname: maxptime
    Media Attribute Value: 30
  Media Attribute (a): rtpmap:101 telephone-event/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 101
The Proximus IMS network returns an ACK message in order to properly close the INVITE transaction of the original call.

Live example

Request-Line: ACK sip:10.127.249.4;user=phone SIP/2.0
Message Header
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKluopcs6osac3t4blv02gbn0r2-spd17ei5
  From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;tag=1827139038-129482470966-
  To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;tag=3566f75a8c351081725392aa13b7655
  Call-ID: BW08543096612011151946121@10.127.70.20
  CSeq: 1018657436 ACK
  Max-Forwards: 68
  Content-Length: 0
  User-Agent: XXXX

6.4.3.2. Call forward via 302 Moved temporary response

Figure 8 shows the expected message flow for a call forward via a 302 Moved temporarily response. Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

In order to set-up a call to an IP-P(A)BX the Proximus IMS network sends an INVITE message to the IP-P(A)BX with:

- From = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- To = DisplayName <sip:Norm-SubB-dn@ims.belgacom.be;user=phone>
The IP-P(A)BX returns a 100 Trying response.

Live example

Request-Line: INVITE sip:+3227970142@10.127.239.214:42470;user=phone SIP/2.0
Message-Header
Via: SIP/2.0/UDP 10.127.244.46:5060;branch=z9hG4bKcomqpg9qqkzv6cdn7gai507
Call-ID: LU-12948289149874@imsgrroup-003.ilasm.ims.be
To: "3227970142 3227970142" <sip:+3227970142@ims.belgacom.be;user=phone>
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
tag=4d22c245-12948289149881-gm-pt-lucentPCSF-024135
CSeq: 1 INVITE
Max-Forwards: 67
Content-Type: application/sdp
Contact: <sip:10.127.244.46:5060;transport=udp>
P-Asserted-Identity: <tel:+3223379031>
Privacy: none
Supported: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Length: 180
P-Called-Party-ID: <tel:+3227970142>
User-Agent: XXXX

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 3195280 1 IN IP4 10.127.244.46
Owner Username: BroadWorks
Session ID: 3195280
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.244.46
Session Name (s): -
Connection Information (c): IN IP4 10.127.244.46
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.244.46
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 11926 RTP/AVP 8 18 101
Media Type: audio
Media Port: 11926
Media Proto: RTP/AVP
Media Format: ITU-T.G.711 PCMA
Media Format: ITU-T.G.729
Media Format: 101
Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: TELEPHONE-EVENT
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
When the IP-P(A)BX invokes the call forward feature, a 183 Progress response is sent to the Proximus IMS network, followed by a 302 Moved temporarily response containing:

- **Contact** = <sip:Dialled-SubC-dn@ims.belgacom.be;user=phone>

**Live example**

**Status-Line:** SIP/2.0 183 Session Progress  
**Message Header**  
- Call-ID: LU-1294828919149874@imsgrupo-003.ilasm.ims.be  
- CSeq: 1 INVITE  
- From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>; tag=4d2c2e45-1294828919149881-gm-pt-lucentPCSF-024135  
- To: "3227970142 3227970142" <sip:+3227970142@ims.belgacom.be;user=phone>  
- Via: SIP/2.0/UDP 10.127.244.46:5060;received=10.127.244.46;  
  branch=z9h4bKcomoagpjj9qqk2v6cdn7gaios07  
- Content-Length: 0

**Status-Line:** SIP/2.0 302 Moved Temporarily  
**Message Header**  
- Call-ID: LU-1294828919149874@imsgrupo-003.ilasm.ims.be  
- Contact: <sip:023379021@ims.belgacom.be:5060;user=phone>  
- CSeq: 1 INVITE  
- From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;  
  tag=4d2c2e45-1294828919149881-gm-pt-lucentPCSF-024135  
- To: "3227970142 3227970142" <sip:+3227970142@ims.belgacom.be;user=phone>;tag=6C15  
- Via: SIP/2.0/UDP 10.127.244.46:5060;received=10.127.244.46;  
  branch=z9h4bKcomoagpjj9qqk2v6cdn7gaios07  
- Content-Length: 0

The Proximus IMS network returns an ACK message in order to properly close the INVITE transaction.

**Live example**

**Request-Line:** ACK sip:+3227970142@10.127.239.214:42470;user=phone SIP/2.0  
**Message Header**  
- Call-ID: LU-1294828919149874@imsgrupo-003.ilasm.ims.be  
- From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;  
  tag=4d2c2e45-1294828919149881-gm-pt-lucentPCSF-024135
To: "3227970142 3227970142"
<sip:+3227970142@ims.belgacom.be;user=phone>;tag=6C15
Via: SIP/2.0/UDP 10.127.244.46:5060;received=10.127.244.46;
branch=z9hG4bkcomoapgj9qqk2v6cdn7gaioso7
CSeq: 1 ACK
Max-Forwards: 67
Content-Length: 0

The Proximus IMS network starts a new call towards the forwarded-to-destination received in the Contact header of the 302 Moved temporarily response:

- Request-URI = <sip:Norm-SubC-dn@ims.belgacom.be;user=phone>
- From = DisplayName <sip:Norm-SubA-dn@ims.belgacom.be;user=phone>
- To = DisplayName <sip:Norm-SubC-dn@ims.belgacom.be;user=phone>
- Diversion = DisplayName <sip:Norm-SubB-dn@ims.belgacom.be;user=phone>

Live example

Request-Line: INVITE sip:+3223379021@ims.belgacom.be;user=phone SIP/2.0
Message Header
Via:SIP/2.0/UDP 10.127.70.20;
branch=584009114-584009114-129482919429-
From:"+3223379031"<sip:+3223379031@ims.belgacom.be;user=phone>;tag=584009114-129482919429-
To:<sip:+3223379021@ims.belgacom.be;user=phone>
Call-ID:BW104159429120111-7027123222@10.127.70.20
CSeq:1021881667 INVITE
Contact:<sip:imbasilab1-sig-fo.ims.ims.be>
P-Asserted-Identity:<tel:+3223379031>
Privacy:none
Diversion:"3227970142 3227970142" sip:+3223379031@ims.belgacom.be;
user=phone>;user-id="btu3227970142@ims.belgacom.be";
privacy=off;reason=unknown;counter=1
Route:<sip:scsf-stdn.imsgroup0-004.ilasm.ims.ims.be:5060;lr;orig>
P-Charging-Vector:icid-value=S9C40-20110112114158-00015308;icid-generated-at=149.204.0.1
P-Charging-Function-Addresses:ecf="charge.ilasm.ims.ims.be";ecf="charge.ilasm.ims.ims.be"
Supported:100rel
Allow:ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
P-Served-User-Identity:<sip:pilotpuid27970140@ims.belgacom.be>
Accept:multipart/mixed,application/media_control+xml,application/sdp
Max-Forwards: 70
Content-Type:application/sdp
Content-Length: 180
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 3195280 1 IN IP4 10.127.72.114
Owner Username: BroadWorks
Session ID: 3195280
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.72.114
Session Name (s): -
Connection Information (c): IN IP4 10.127.72.114
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.72.114
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 40864 RTP/AVP 8 18 101
  Media Type: audio
  Media Port: 40864
  Media Proto: RTP/AVP
  Media Format: ITU-T G.711 PCMA
  Media Format: ITU-T G.729
  Media Format: 101
Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
  Media Attribute Fieldname: rtpmap
  Media Format: 101
  MIME Type: TELEPHONE-EVENT
Media Attribute (a): ptime:20
  Media Attribute Fieldname: ptime
  Media Attribute Value: 20
Media Attribute (a): maxptime:30
  Media Attribute Fieldname: maxptime
  Media Attribute Value: 30

The remainder of the message sequence is like any other normal basic call.

6.4.4.  Outgoing Call Barring

In case the IP-P(A)BX applies Outgoing Call Barring to one of his users, the call shall not be sent to the Proximus IMS network.

Additionally, a network Outgoing Call Barring can be programmed for the complete IP-P(A)BX and/or for each iDN. This OCB is offered on a permanent basis only and can not be activated or de-activated via a dialled command.

In case a IP-P(A)BX user tries to make a call to a barred destination, an announcement will be played in the Proximus IMS network. To end the call 2 scenarios are possible:

- During the announcement the calling user ends the call by sending a Cancel message.
- At the end of the announcement the Proximus IMS network tears down the call by sending a 404 Not found response.

Remark: According to ETSI TS 183 011 [37] the response in case of OCB should be 603 Decline. In future evolution of the Proximus IMS network the usage of 603 Decline instead of 404 Not found is considered.

6.4.4.1.  OCB with call teardown during announcement

Figure 9 shows the expected message flow for an OCB with call teardown during announcement.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.
In order to set-up a call the IP-P(A)BX sends an INVITE message to the Proximus IMS network. The Proximus IMS network returns a 100 Trying response.

Live example

Request-Line: INVITE sip:0035316791650@ims.belgacom.be SIP/2.0
Message Header
   Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bK0cd3_INVITE;rport
   From: <sip:+3227979451@ims.belgacom.be>;tag=9fced76sl
   To: <sip:0035316791650@ims.belgacom.be>
   Call-ID: 1122-0-3293-5041460@csip
   CSeq: 3871 INVITE
   Contact: <sip:+3227979450@10.127.249.20>
   P-Preferred-identity: <sip:+3227979450@ims.belgacom.be>
   Max-Forwards: 70
   User-Agent: XXXX
   Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, INFO, REFER, NOTIFY
   Content-Type: application/sdp
   Accept: application/sdp, multipart/mixed, application/dtmf-relay
   Content-Length: 239
Message body
   Session Description Protocol
   Session Description Protocol Version (v): 0
   Owner/Creator, Session Id (o): root 3112 3112 IN IP4 10.127.249.21
       Owner Username: root
       Session ID: 3112
       Session Version: 3112
       Owner Network Type: IN
       Owner Address Type: IP4
       Owner Address: 10.127.249.21
   Session Name (s): session
   Connection Information (c): IN IP4 10.127.249.21
       Connection Network Type: IN
       Connection Address Type: IP4
       Connection Address: 10.127.249.21
   Time Description, active time (t): 0 0
When the Proximus IMS network invokes the OCB feature it returns a 183 Progress response to the IP-P(A)BX and an announcement is played.

### Live example

#### Status-Line: SIP/2.0 183 Session Progress

**Message Header**
- Via: SIP/2.0/UDP 10.127.249.20:5060;received=10.127.249.20;
- branch=z9hG4bKocd3_INVITE;rport=5060
- From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
- To: <sip:0035316791650@ims.belgacom.be>;tag=1073695206-129483819960
- Call-ID: 1122-0-3293-5041460@csip
- CSeq: 3871 INVITE
- Content-Length: 0

When the Proximus IMS network invokes the OCB feature it returns a 183 Progress response to the IP-P(A)BX and an announcement is played.
During the announcement the calling user ends the call and the IP-P(A)BX sends a CANCEL message to the Proximus IMS network.

The Proximus IMS network returns a 200 OK response in order to properly close the CANCEL transaction.

**Live example**

```
Request-Line: CANCEL sip:0035316791650@ims.belgacom.be SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bKoed3_INVITE;rport
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>
Call-ID: 1122-0-3293-5041460@esip
CSeq: 3871 CANCEL
Contact: <sip:+3227979450@10.127.249.20>
```
Max-Forwards: 70
User-Agent: XXXX
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, INFO, REFER, NOTIFY
Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;received=10.127.249.20;
    branch=z9hG4bKocd3_INVITE;rport=5060
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=aprqjimtc-a5dain20003u1
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 CANCEL
Content-Length: 0

The Proximus IMS network sends a 487 Request terminated response to the IP-P(A)BX in order to indicate that the INVITE transaction is terminated.

Live example

Status-Line: SIP/2.0 487 Request terminated
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bKocd3_INVITE;rport=5060
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=aprqjimtc-a5dain20003u1
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 INVITE
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0

The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:0035316791650@ims.belgacom.be SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bKocd3_INVITE;rport
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=aprqjimtc-a5dain20003u1
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 ACK
Content-Length: 0

6.4.4.2. OCB with call teardown at end of announcement

Figure 10 shows the expected message flow for an OCB with call teardown at end of announcement.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.
In order to set up a call the IP-P(A)BX sends an INVITE message to the Proximus IMS network. The Proximus IMS network returns a 100 Trying response.

**Live example**

Request-Line: INVITE sip:0035316791650@ims.belgacom.be SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bK0cd3_INVITE;rport
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 INVITE
Contact: <sip:+3227979450@10.127.249.20>
P-preferred-identity: <sip:+3227979450@ims.belgacom.be>
Max-Forwards: 70
User-Agent: XXXX
Allow: INVITE, ACK, CANCEL, OPTIONS, BYE, INFO, REFER, NOTIFY
Content-Type: application/sdp
Accept: application/sdp, multipart/mixed, application/dtmf-relay
Content-Length: 239

Message body

Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): root 3112 3112 IN IP4 10.127.249.21
  Owner Username: root
  Session ID: 3112
  Session Version: 3112
  Owner Network Type: IN
  Owner Address Type: IP4
  Owner Address: 10.127.249.21
Session Name (s): session
Connection Information (c): IN IP4 10.127.249.21
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.21
Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
Media Description, name and address (m): audio 1024 RTP/AVP 18 8 101
Media Type: audio
Media Port: 1024
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: ITU-T G.711 PCMA
Media Format: 101
Media Attribute (a): rtp:1025
Media Attribute Fieldname: rtp
Media Attribute Value: 1025
Media Attribute (a): rtpmap:18 G729/8000
Media Attribute Fieldname: rtpmap
Media Format: 18
MIME Type: G729
Media Attribute (a): rtpmap:8 PCMA/8000
Media Attribute Fieldname: rtpmap
Media Format: 8
MIME Type: PCMA
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event
Media Attribute (a): fmp:101 0-15
Media Attribute Fieldname: fmp
Media Format: 101 [telephone-event]
Media format specific parameters: 0-15
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20

Status-Line: SIP/2.0 100 Trying
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;received=10.127.249.20;
branch=z9hG4bKcd3_INVITE;rport=5060
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=1073695206-1294838189960
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 INVITE
Content-Length: 0

When the Proximus IMS network invokes the OCB feature it returns a 183 Progress response to the IP-P(A)BX and an announcement is played.

Live example

Status-Line: SIP/2.0 183 Session Progress
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;received=10.127.249.20;
branch=z9hG4bKcd3_INVITE;rport=5060
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=1073695206-1294838189960
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 INVITE
Content-Type: application/sdp
Content-Length: 189
After the announcement the Proximus IMS network ends the call and sends a 404 Not found response to the IP-P(A)BX.

**Live example**

```
Status-Line: SIP/2.0 404 Not found
Message Header
Via: SIP/2.0/UDP 10.127.249.20:5060;received=10.127.249.20;
    branch=z9hG4bK0cd3_INVITE;rport=5060
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=1073695206-129483819960
Call-ID: 1122-0-3293-5041460@esip
CSeq: 3871 INVITE
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0
```

The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.
Live example

Request-Line: ACK sip:0035316791650@ims.belgacom.be SIP/2.0
Message-Header
Via: SIP/2.0/UDP 10.127.249.20:5060;branch=z9hG4bK0ced3_INVITE;rport
From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
To: <sip:0035316791650@ims.belgacom.be>;tag=1073695206-1294838189960
Call-ID: 1122-0-3293-5041460@csip
CSeq: 3871 ACK
Content-Length: 0

6.4.5. Call Hold

The call hold feature shall be managed and handled by the IP-P(A)BX.

An IP-P(A)BX user may place an active call on hold and may retrieve a held call. The IP-P(A)BX shall provide “music on hold” or play an announcement for the held user. For these purposes, the Proximus IMS supports the use of re-INVITE transactions to modify the media description parameters for a call according to the held/retrieved state.

An IP-P(A)BX user involved in an active call may be placed on hold and may be retrieved. Depending on the holding user (external to the IP-P(A)BX) either the Proximus IMS or the holding user’s equipment is responsible to provide “music on hold” or to play an announcement for the held IP-P(A)BX user. For these purposes, the Proximus IMS supports the use of re-INVITE transactions to modify the media description parameters for a call according to the held/retrieved state.

6.4.5.1. Call Hold initiated by IP-P(A)BX user

An established public on-net or public off-net call can be put on Hold by the IP-P(A)BX user. The user which is put on hold will receive music or an announcement, provided by the IP-P(A)BX. There are two methods of providing music/announcements on hold:

- the IP-P(A)BX may connect the user on hold to its media resource (the music/announcement generator) using the re-INVITE mechanism to change the media description parameters:
  - announce a different IP address (used for sourcing the RTP stream containing the music/announcement
  - add an a=sndonly attribute to the media description in order to stop receiving RTP from the external user.
  In this case resuming the call is accomplished using the re-INVITE mechanism again in order to restore the original media description parameters:
   - use the original IP address for the RTP stream
   - add an a=sendrecv attribute to the media description in order to resume both way RTP traffic.
- the IP-P(A)BX may connect the user on hold to its media resource (the music/announcement generator) without further signalling between the IP-P(A)BX and the Proximus IMS network. Resuming the call is accomplished also without further signalling.

In case the media stream (RTP) for music/announcement is sourced by the IP-P(A)BX from a different IP address then the media stream for voice the usage of the re-INVITE mechanism is mandatory in order to avoid problems with the security features (e.g. pinholing) performed at the edge of the Proximus IMS network.

In all other cases the usage of the re-INVITE mechanism is strongly recommended in order to avoid useless RTP streams.
Note: In the context of the Call Hold service putting a line on hold can also be accomplished by sending a re-INVITE containing in the SDP information 0.0.0.0 as IP address. The 200 OK response should contain in the SDP information an a=inactive attribute as a result. As this is an old mechanism it is strongly discouraged and support of this mechanism is being discontinued.

Figure 11 shows the expected message flow for a hold/retrieve performed by an IP-P(A)BX user.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

An incoming call to an IP-P(A)BX user is set-up. When answering the call the 200 OK response contains in the SDP part the IP address of the called IP-P(A)BX user used for the media stream:

- **Connection Information** = IN IP4 <IP address of called user>

**Live example**

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0
Message-Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKnp4puui5chjojd23vv4fjvp600
Call-ID: BW132411381120111-1617987323@10.127.70.20
To: "3227970251 3227970250"<sip:+3227970251@ims.belgacom.be;user=phone>
From: "RV-027970315"<sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
CSeq: 1026747643 INVITE
Max-Forwards: 68
Content-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
Privacy: none
P-Access-Network-Info: ADSL2+
Supported: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Length: 225
User-Agent: XXXX
Route: <sip:+3227970251;tr= tg_af750f_0101uri;trunk-context=sbc1.ims.ims.be@10.127.249.4:5060;user=phone;lr>

Message body

Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 946 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 946
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15724 RTP/AVP 8 18 101
Media Type: audio
Media Port: 15724
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): rtpmap:8 PCMA/8000
Media Attribute Fieldname: rtpmap
Media Format: 8
MIME Type: PCMA
Media Attribute (a): rtpmap:18 G729/8000
Media Attribute Fieldname: rtpmap
Media Format: 18
MIME Type: G729
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event
Media Attribute (a): sendrecv
Media Attribute (a): fmtp:101 0-11
Media Attribute Fieldname: fmtp
Media Format: 101 [telephone-event]
Media format specific parameters: 0-11

Status-Line: SIP/2.0 100 Trying
Message Header
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>
From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>
tag="330868717-1294838651382-
Call-ID: BW132411381120111-1617987323@10.127.70.20
CSeq: 1026747643 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKnp4puui5chjojd23vvf4vjp600
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
- Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
- Contact: sip:10.127.249.4
- User-Agent: XXXX
- To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=556801e98e6a682d84623365fed10
- From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
tag=330868717-1294858651382-
- Call-ID: BW132411381120111-1617987323@10.127.70.20
- CSeq: 1026747643 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKnp4puui5chjojd23vvf4vjp600
Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
- Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
- Contact: sip:10.127.249.4
- Supported: replaces,timer,100rel
- User-Agent: XXXX
- Session-Expires: 1800;refresher=uas
- Privacy: user
- Content-Type: application/sdp
- To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=556801e98e6a682d84623365fed10
- From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
tag=330868717-1294858651382-
- Call-ID: BW132411381120111-1617987323@10.127.70.20
- CSeq: 1026747643 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKnp4puui5chjojd23vvf4vjp600
Content-Length: 240

Message body
- Session Description Protocol
- Session Description Protocol Version (v): 0
- Owner/Creator, Session Id (o): OXE 1294846217 1294846217 IN IP4 10.127.249.4
- Owner Username: OXE
- Session ID: 1294846217
- Session Version: 1294846217
- Owner Network Type: IN
- Owner Address Type: IP4
- Owner Address: 10.127.249.4
- Session Name (s): abs
  - Connection Information (c): IN IP4 10.127.249.16
    - Connection Network Type: IN
    - Connection Address Type: IP4
    - Connection Address: 10.127.249.16
    - Time Description, active time (t): 0 0
    - Session Start Time: 0
    - Session Stop Time: 0
- Media Description, name and address (m): audio 32514 RTP/AVP 18 101
  - Media Type: audio
  - Media Port: 32514
  - Media Proto: RTP/AVP
  - Media Format: ITU-T G.729
When putting the call on hold the IP-P(A)BX sends a (re)INVITE message to the Proximus IMS network in order to change the session description parameters. The connection information is changed to contain the IP address of the media resource of the IP-P(A)BX that will be sourcing the "music on hold" and the media attribute is set to `sndonly`.

- **Connection Information** = IN IP4 <IP address of the media resource of the IP-P(A)BX>
- **Media Attribute** = `sndonly`

Note: changing the media attribute from `sendrecv` to `sndonly` is not mandatory but recommended in order to stop an unnecessary media stream.

**Live example**

Request-Line: INVITE sip:10.127.249.182;transport=udp SIP/2.0
Message Header
- Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
- Contact: sip:10.127.249.182
- Supported: replaces,timer,100rel
- User-Agent: XXXX
- Session-Expires: 1800;refresher=uac
- Min-SE: 900
Content-Type: application/sdp
To: <sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=556801c190e6c82d8462336e56ed20
Call-ID: BW132411381120011-1617987323@10.127.70.20
CSeq: 191040660 INVITE
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK2575fe9235498560cd71ec24ec450
Max-Forwards: 70
Content-Length: 240
Message-body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): OXE 1294846217 1294846218 IN IP4 10.127.249.4
Owner Username: OXE
Session ID: 1294846217
Session Version: 1294846218
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): abs
Connection Information (c): IN IP4 10.127.249.22
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.22
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 32696 RTP/AVP 18 101
Media Type: audio
Media Port: 32696
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): sndonly
Media Attribute (a): rtpmap:18 G729/8000
Media Attribute Fieldname: rtpmap
Media Format: 18
MIME Type: G729
Media Attribute (a): fmp:18 annexb=no
Media Attribute Fieldname: fmp
Media Format: 18 [G729]
Media format specific parameters: annexb=no
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:40
Media Attribute Fieldname: maxptime
Media Attribute Value: 40
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event

The Proximus IMS network returns a 200 OK response acknowledging the changed media description parameters: The media attribute is set to rcvonly.

- **Media Attribute = rcvonly**
Live example

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
From: <sip:+3227970251@ims.belgacom.be;user=phone>
Call-ID: BW132411381120111-1617987323@10.127.70.20
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK2575fe925680e54985606d71c24ec450
CSeq: 1910404660 INVITE
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
fo.ims.ims.be;transport=udp>
Content-Type: application/sdp
Content-Length: 184
Server: Alcatel-Lucent-HPSS/3.0.3
Message body
Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): BroadWorks 946 2 IN IP4 10.127.249.182
    Owner Username: BroadWorks
    Session ID: 946
    Session Version: 2
    Owner Network Type: IN
    Owner Address Type: IP4
    Owner Address: 10.127.249.182
  Session Name (s): -
  Connection Information (c): IN IP4 10.127.249.182
    Connection Network Type: IN
    Connection Address Type: IP4
    Connection Address: 10.127.249.182
  Time Description, active time (t): 0 0
    Session Start Time: 0
    Session Stop Time: 0
  Media Description, name and address (m): audio 15724 RTP/AVP 18 101
    Media Type: audio
    Media Port: 15724
    Media Proto: KTP/AVP
    Media Format: ITU-T G.729
    Media Format: 101
    Media Attribute (a): rtpmap:18 G729/8000
      Media Attribute Fieldname: rtpmap
      Media Format: 18
      MIME Type: G729
    Media Attribute (a): revonly
      Media Attribute (a): rtpmap:101 telephone-event/8000
      Media Attribute Fieldname: rtpmap
      Media Format: 101
      MIME Type: telephone-event

The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.182:5060;
  ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
  Contact: sip:10.127.249.4
  User-Agent: XXXX
  To: <sip:+3227979315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
  From: <sip:+3227970251@ims.belgacom.be;user=phone>; 
  tag=556801c19d0ea6c82d84623365fed10
  Call-ID: BW13241181120111-1617987323@10.127.70.20
  CSeq: 1910404660 ACK
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd264cabb885780ea32045b42a9a8c298
  Max-Forwards: 70
  Content-Length: 240

Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1294846217 1294846219 IN IP4 10.127.249.4
  Owner Username: OXE
  Session ID: 1294846217
  Session Version: 1294846219
  Owner Network Type: IN
  Owner Address Type: IP4
  Owner Address: 10.127.249.4
  Session Name (s): abs
  Connection Information (c): IN IP4 10.127.249.16
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.16
  Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
  Media Description, name and address (m): audio 32514 RTP/AVP 18 101

When retrieving the held call the IP-P(A)BX sends a (re)INVITE message to the Proximus IMS network in order to change the session description parameters. The connection information is changed back to contain the IP address of the called user and the media attribute is set to sendrecv.

- **Connection Information** = IN IP4 <IP address of called user>
- **Media Attribute** = sendrecv

**Live example**

Request-Line: INVITE sip:10.127.249.182:5060;
  ue-addr=impbasilab1-sig-fo.ims.be;transport=udp SIP/2.0
Message Header
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
  Contact: sip:10.127.249.4
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  Session-Expires: 1800;refresher=uac
  Min.SE: 900
  Content-Type: application/sdp
  To: <sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
  From: <sip:+3227970251@ims.belgacom.be;user=phone>; 
  tag=556801c19d0ea6c82d84623365fed10
  Call-ID: BW13241181120111-1617987323@10.127.70.20
  CSeq: 1910404661 INVITE
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKf8b9b658c838e1e13801099b69b81194
  Max-Forwards: 70
  Content-Length: 0

Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1294846217 1294846219 IN IP4 10.127.249.4
  Owner Username: OXE
  Session ID: 1294846217
  Session Version: 1294846219
  Owner Network Type: IN
  Owner Address Type: IP4
  Owner Address: 10.127.249.4
  Session Name (s): abs
  Connection Information (c): IN IP4 10.127.249.16
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.16
  Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
  Media Description, name and address (m): audio 32514 RTP/AVP 18 101
The Proximus IMS network returns a 200 OK response acknowledging the changed media description parameters: The media attribute is set to sendrecv.

- **Media Attribute = sendrecv**

**Live example**

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382
From: <sip:+3227970251@ims.belgacom.be;user=phone>;tag=556801c19d0ea6c82d84623365fed10
Call-ID: BW13241138120111-1617987323@10.127.70.20
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd264cabb885780ea32045b42a9a8e298
CSeq: 1910404661 INVITE
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Contact: <sip:10.127.249.182:5060;transport=udp>  
Content-Type: application/sdp
Content-Length: 184
Server: Alcatel-Lucent-HPSS/3.0.3
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 946 3 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 946
Session Version: 3
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): - 
```
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15724 RTP/AVP 18 101
   Media Type: audio
   Media Port: 15724
   Media Proto: RTP/AVP
   Media Format: ITU-T G.729
   Media Format: 101
Media Attribute (a): rtpmap:18 G729/8000
   Media Attribute Fieldname: rtpmap
   Media Format: 18
   MIME Type: G729
Media Attribute (a): sendrecv
   Media Attribute Fieldname: rtpmap
   Media Format: 101
   MIME Type: telephone-event

The IP-P(A)BX sends an ACK message to the Proximus IMS network in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.182:5060;
   ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
   Contact: sip:10.127.249.4
   User-Agent: XXXX
   To: <sip:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
   From: <sip:+3227970251@ims.belgacom.be;user=phone>;
   Call-ID: BW132411381120111-1617987323@10.127.70.20
   CSeq: 1910404661 ACK
   Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9e84b5f5925a65ceb2a86ade920b76
   Max-Forwards: 70
   Content-Length: 0

6.4.5.2. Call Hold initiated by a user external to the IP-P(A)BX

Figure 12 shows the expected message flow for a hold/retrieve performed by an external user.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.
An incoming call to an IP-P(A)BX user is set up. When answering the call the 200 OK response contains in the SDP part the IP address of the called IP-P(A)BX user used for the media stream:

- **Connection Information** = IN IP4 <IP address of called user>

**Live example**

Request-Line: INVITE sip:+3227970251@10.127.249.4;user=phone SIP/2.0

Message Header

- Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02v9j50foqo8bh2p3cl611
- Call-ID: BW13330111012011102747137@10.127.70.20
- To: "3227970251 3227970250"<sip:+3227970251@ims.belgacom.be;user=phone>
- From: "+3227972030"<sip:+3227972030@ims.belgacom.be;user=phone>;tag=1961511564-1294839181110-
- CSeq: 1027012508 INVITE
- Max-Forwards: 68
- Content-Type: application/sdp
- Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
- Privacy: none
- Supported: 100rel
- Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
- Accept: multipart/mixed,application/media_control+xml,application/sdp
- Content-Length: 179
- User-Agent: XXXX
- Route: <sip:+3227970251;tgpr=tg_af750f_0101uri;trunk-context=sbc1.ims.ims.be@10.127.249.4;5060;user=phone;lr>

Message body

Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 1019 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 1019
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15736 RTP/AVP 8 18 101
Media Type: audio
Media Port: 15736
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: TELEPHONE-EVENT
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30

Status-Line: SIP/2.0 100 Trying
Message Header
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>
tag=1961511564-1294839181110
Call-ID: BW13330111012011102747137@10.127.70.20
CSeq: 1027012508 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02vj950f0p0bh2p3c1f611
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
User-Agent: XXXX
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>
tag=50df8b3c8093c30f5a8086f69dd1275c
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>
tag=1961511564-1294839181110
Call-ID: BW13330111012011102747137@10.127.70.20
CSeq: 1027012508 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02vj950f0p0bh2p3c1f611
Content-Length: 0
Status-Line: SIP/2.0 200 OK
Message Header
Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
Contact: sip:10.127.249.4
Supported: replaces,timer,100rel
User-Agent: XXXX
Session-Expires: 1800;refresher=uas
P-Asserted-Identity: "SIP IMS" <sip:SIP%20IMS@10.127.249.4>
Privacy: user
Content-Type: application/sdp
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>; tag=50df8b3c8093c30f5a8086f69dd1275c
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>; tag=1961511564-1294839181110-
Call-ID: BW13330111012011102747137@10.127.70.20
CSeq: 1027012508 INVITE
Via: SIP/2.0/UDP 10.127.249.182;branch=z9hG4bKph03u02vj950fop0bh2p3cf61
Content-Length: 240
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): OXE 1294846747 1294846747 IN IP4 10.127.249.4
Owner Username: OXE
Session ID: 1294846747
Session Version: 1294846747
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): abs
Connection Information (c): IN IP4 10.127.249.16
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.16
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 32514 RTP/AVP 18 101
Media Type: audio
Media Port: 32514
Media Proto: RTP/AVP
Media Format: ITU-T.G.729
Media Format: 101
Media Attribute (a): rtpmap:18 G729/8000
Media Attribute Fieldname: rtpmap
Media Format: 18
MIME Type: G729
Media Attribute (a): fmtp:18 annexb=no
Media Attribute Fieldname: fmtp
Media Format: 18 [G729]
Media format specific parameters: annexb=no
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:40
Media Attribute Fieldname: maxptime
Media Attribute Value: 40
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap

Sensitivity: Confidential
When the call is put on hold by the remote user the IP-P(A)BX receives a (re)INVITE message from the Proximus IMS network in order to change the session description parameters. The media attribute is set to `sndonly`.

- **Media Attribute** = `sndonly`

Note: The IP-P(A)BX user will receive “music on hold” provided by the media resource function of the Proximus IMS network. Connection to this media resource is invisible for the IP-P(A)BX and the media stream IP address used on the UNI interface remains the same. Therefore, the Connection Information is not changed.

**Live example**

Request-Line: INVITE sip:10.127.249.4;user=phone SIP/2.0
Message Header
    Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKuolamu17mqd3iu75fqcq1a2-thdefei5
    Call-ID: BW133301101012011102747137@10.127.70.20
    CSeq: 1027012509 INVITE
    Max-Forwards: 68
    Content-Length: 191
    User-Agent: XXXX

Message body

Session Description Protocol
    Session Description Protocol Version (v): 0
    Owner/Creator, Session Id (o): BroadWorks 1019 2 IN IP4 10.127.249.182
    Owner Username: BroadWorks
    Session ID: 1019
    Session Version: 2
    Owner Network Type: IN
    Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name(s): -
Connection Information (c): IN IP4 10.127.249.182
  Connection Network Type: IN
  Connection Address Type: IP4
  Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
  Session Start Time: 0
  Session Stop Time: 0
Media Description, name and address (m): audio 15736 RTP/AVP 8 18 101
  Media Type: audio
  Media Port: 15736
  Media Proto: RTP/AVP
  Media Format: ITU-T G.711 PCMA
  Media Format: ITU-T G.729
  Media Format: 101
  Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 101
    MIME Type: TELEPHONE-EVENT
  Media Attribute (a): ptime:20
    Media Attribute Fieldname: ptime
    Media Attribute Value: 20
  Media Attribute (a): maxptime:30
    Media Attribute Fieldname: maxptime
    Media Attribute Value: 30
  Media Attribute (a): sndonly

The IP-P(A)BX shall return a 200 OK response to the Proximus IMS network in order to acknowledge the changed media description parameter and shall suspend sending RTP packets.

- `Media Attribute = rcvonly`

Live example

Status-Line: SIP/2.0 200 OK
Message Header
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
  Contact: sip:10.127.249.4
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  Session-Expires: 1800;refresher=uas
  Content-Type: application/sdp
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=50df8b3c8093c30f5a8086f69dd1275c
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
tag=1961511564-1294839181110
  Call-ID: BW133301110120111102747137@10.127.70.20
  CSeq: 1027012509 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=29hG4bKuoLamui7lmqd3iup75lfqfia2-thdewe5
  Content-Length: 240
Message body
  Session Description Protocol
  Session Description Protocol Version (v): 0
  Owner/Creator, Session Id (o): OXE 1294846747 1294846748 IN IP4 10.127.249.4
  Owner Username: OXE
  Session ID: 1294846747
The Proximus IMS network sends an ACK message to the IP-P(A)BX in order to properly close the INVITE transaction.

Live example

Request-Line: ACK sip:10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKu0lamu17lmqd3iup75lfcqf1a2-thdevi5
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
tag=1961511564-1294839181110
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=50df8b3c8093c3f5a8086f69dd1275c
Call-ID: BW13330111012011102747137@10.127.70.20
CSeq: 1027012509 ACK
Contact: <sip:10.127.249.182>
Max-Forwards: 68
Content-Length: 0
User-Agent: XXXX
When the call is retrieved by the remote user the IP-P(A)BX receives a (re)INVITE message from the Proximus IMS network in order to change the session description parameters. The media attribute is set to sendrecv.

- **Media Attribute = sendrecv**

Note: The IP-P(A)BX user will be reconnected to the remote user by the Proximus IMS network. This is invisible for the IP-P(A)BX and the media stream IP address used on the UNI interface remains the same. Therefore, the Connection Information is not changed.

**Live example**

```
Request-Line: INVITE sip:10.127.249.4;user=phone SIP/2.0
Message-Header
   Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKuolamu17lmqd3iup751fcqf1a2-thdefe5
   Call-ID: BW13330111012011102747137@10.127.70.20
   To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>; tag=50df8b3c8093c30f5a8086f699d1275c
   From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>; tag=1961511564-1294839181110-
   CSeq: 1027012510 INVITE
   Max-Forwards: 68
   Content-Type: application/sdp
   Contact: <sip:10.127.249.182;transport=udp>
   Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
   Accept: multipart/mixed,application/media_control+xml,application/sdp
   Content-Length: 191
   User-Agent: XXXX

Message body
Session Description Protocol
   Session Description Protocol Version (v): 0
   Owner/Creator, Session Id (o): BroadWorks 1019 3 IN IP4 10.127.249.182
      Owner Username: BroadWorks
      Session ID: 1019
      Session Version: 3
      Owner Network Type: IN
      Owner Address Type: IP4
      Owner Address: 10.127.249.182
   Session Name (s): -
   Connection Information (c): IN IP4 10.127.249.182
      Connection Network Type: IN
      Connection Address Type: IP4
      Connection Address: 10.127.249.182
   Time Description, active time (t): 0 0
      Session Start Time: 0
      Session Stop Time: 0
   Media Description, name and address (m): audio 15736 RTP/AVP 8 18 101
      Media Type: audio
      Media Port: 15736
      Media Proto: RTP/AVP
      Media Format: ITU-T G.711 PCMA
      Media Format: ITU-T G.729
      Media Format: 101
   Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
      Media Attribute Fieldname: rtpmap
      Media Format: 101
```
The IP-P(A)BX shall return a 200 OK response to the Proximus IMS network in order to acknowledge the changed media description parameter and shall resume sending RTP packets.

- **Media Attribute** = `sendrecv`

### Live example

**Status-Line:** SIP/2.0 200 OK

**Message Header**

- **Allow:** INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
- **Contact:** sip:10.127.249.4
- **Supported:** replaces,timer,100rel
- **User-Agent:** XXXX
- **Session-Expires:** 1800;refresh=refresh
- **Content-Type:** application/sdp

**Content-Length:** 240

**Message body**

**Session Description Protocol**

- **Session Description Protocol Version (v):** 0
- **Owner/Creator, Session Id (o):** OXE 1294846747 1294846749 IN IP4 10.127.249.4
- **Owner Username:** OXE
- **Session ID:** 1294846747
- **Session Version:** 1294846749
- **Owner Network Type:** IN
- **Owner Address Type:** IP4
- **Owner Address:** 10.127.249.4

- **Session Name (s):** abs
- **Connection Information (c):** IN IP4 10.127.249.16
- **Connection Network Type:** IN
- **Connection Address Type:** IP4
- **Connection Address:** 10.127.249.16

- **Time Description, active time (t):** 0 0
- **Session Start Time:** 0
- **Session Stop Time:** 0

- **Media Description, name and address (m):** audio 32514 RTP/AVP 18 101
- **Media Type:** audio
- **Media Port:** 32514
- **Media Proto:** RTP/AVP
- **Media Format:** ITU-T G.729
- **Media Format:** 101

- **Media Attribute (a):** rtpmap:18 G729/8000
The Proximus IMS network sends an ACK message to the IP-P(A)BX in order to properly close the INVITE transaction.

**Live example**

```
Request-Line: ACK sip:10.127.249.4;user=phone SIP/2.0
Message-Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKu0lamu17lmqd3iup75lfeqf1a2-thdeffij
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;tag=1961511564-1294839181110-
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;tag=501f8bf3c8043eef7a8086f69dd1275e
Call-ID: BW13330111012011102747137@10.127.70.20
CSeq: 1027012510
ACK
Max-Forwards: 68
Content-Length: 0
User-Agent: XXXX
```

### 6.4.6. Conference call

The conference feature shall be managed and handled by the IP-P(A)BX. In case external users are involved in a conference call, the incoming and/or outgoing calls to/from the IP-P(A)BX will be treated like normal basic calls by the Proximus IMS.

### 6.4.7. Call transfer

The call transfer feature shall be managed and handled by the IP-P(A)BX.

The following behaviour is valid for all flavours (e.g. with or without consultation) of call transfer executed by the IP-P(A)BX.

In case a call involving an IP-P(A)BX user is transferred (by that IP-P(A)BX user) to a destination external to the IP-P(A)BX, the IP-P(A)BX shall:
- Either set-up a new call to the transferred-to destination, and:
  o either use a re-INVITE to transfer the RTP stream of the original call to the new
destination. No Diversion header nor History-info header shall be included in the
outgoing call. The calling line identity possibly shown to the transferred-to destination
will be the identity of the forwarding IP-P(A)BX user (or the IP-P(A)BX general number).
  o or not use a re-INVITE and handle the transfer of the RTP streams autonomously.
- or use a REFER message containing the Referred-by header and Referred-to header in order to
allow the Proximus IMS network to redirect the call to the transferred-to-number. The calling
line identity possibly shown to the transferred-to destination will be the identity of the original
calling user.

6.4.7.1. Call transfer without using re-INVITE

Figure 13 shows the expected message flow for a call transfer without using re-INVITE.
Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not)
differences may occur.

In this call transfer scenario, the transfer is in fact completely invisible for the Proximus IMS network. The
IP-P(A)BX acts on 2 independent calls and remains in the call path, for signaling as well as for the RTP
streams even after the call transfer has been completed. Consequently this scenario is not optimal from a
bandwidth usage point of view.
6.4.7.2. Call transfer using re-INVITE

Figure 14 shows the expected message flow for a call transfer using re-INVITE.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.

To transfer an incoming established call the IP-P(A)BX first puts the established call on hold and then sends an INVITE message to the Proximus IMS network in order to start a new call to the transferred-to-destination.

The initial call is set-up according to § 6.3.3 or § 6.3.4 above. The SDP information in the INVITE message contains the IP address and port number on which the Proximus IMS network (i.e. the SBC) wants to receive the RTP stream. The SDP information in the 200 OK response contains the IP address and port number on which the IP-P(A)BX user wants to receive the RTP stream.

**Live example**

Request-Line: INVITE sip:+3227979383@10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKvg5bgihsgqgg1rhr354g40
Call-ID: BW082907082240111-1255895887@10.127.70.20
To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>; tag=2029194627-1295857747082-
CSeq: 462553670 INVITE
Max-Forwards: 68
Content-Type: application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sigfo.ims.be;transport=udp>
Privacy: none
Supported: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Length: 178
User-Agent: XXXX
Route: <sip:+3227979383;tgrp=tg_af700f_0;trunk-context=sbc1.ims.ims.be@10.127.249.4:5060;user=phone;lr>

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 160 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 160
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s):
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 10658 RTP/AVP 8 18 101
Media Type: audio
Media Port: 10658
Media Proto: RTP/AVP
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): rtpmap:101 TELEPHONE-EVENT/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: TELEPHONE-EVENT
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30

Status-Line: SIP/2.0 100 Trying
Message Header
To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>; tag=2029194627-1295857747082-
Call-ID: BW082907082240111-1255895887@10.127.70.20
CSeq: 462553670 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKvg5bgihseqqgl51rhra354g40
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
Contact: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
Supported: from-change
User-Agent: XXXX
P-Asserted-Identity: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>;
tag=0a23e829ef070f4559ace5458222b38
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
tag=2029194627-1295877747082-
Call-ID: BW082907082240111-1255895887@10.127.70.20
CSeq: 462553670 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKvg5bgihseqqgl51rhra354g40
Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
Content-Type: application/sdp
Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
Contact: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
Supported: 100rel, timer, from-change
User-Agent: XXXX
Session-Expires: 43200;refresh=us
P-Asserted-Identity: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>;
tag=0a23e829ef070f4559ace5458222b38
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
tag=2029194627-1295877747082-
Call-ID: BW082907082240111-1255895887@10.127.70.20
CSeq: 462553670 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKvg5bgihseqqgl51rhra354g40
Content-Length: 240

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): default 1295857800 1295857800 IN IP4 10.127.249.4
Owner Username: default
Session ID: 1295857800
Session Version: 1295857800
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.7
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.7
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 320000 RTP/AVP 8 101
Media Type: audio
Media Port: 32000
Media Proto: RTP/AVP
Media Format: ITU-T.G.711 PCMA
Media Format: 101
Media Attribute (a): sendrecv
Media Attribute (a): rtpmap:101 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 101
MIME Type: telephone-event
Media Attribute (a): fmtp:101 0-15
Media Attribute Fieldname: fmtp
Media Format: 101 [telephone-event]
Media format specific parameters: 0-15
Media Attribute (a): silenceSupp:off - - -
Media Attribute Fieldname: silenceSupp
Media Attribute Value: off - - -
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:30
Media Attribute Fieldname: maxptime
Media Attribute Value: 30

Request-Line: ACK sip:+3227979383@10.127.249.4;user=phone SIP/2.0
Message Header
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKk21b5lo8pbdi0i8i2esnfphgo-rg4503h5
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>; tag=2029194627-1295857747082-
To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>; tag=0a23e829ef0703f4559ace5458222b38
Call-ID: BW082907082240111-1255895887@10.127.70.20
CSeq: 462553670 ACK
Contact: <sip:+3227979383@10.127.249.4;transport=UDP;user=phone>
Max-Forwards: 68
Content-Length: 0
User-Agent: XXXX

When putting the initial call on hold, the IP-P(A)BX uses a re-INVITE message in order to connect the calling user to its media resource responsible for providing "music on hold". The re-INVITE message contains:

- **Connection information** = the IP address of the media resource of the IP-P(A)BX
- **Media port** = the port number of the media resource of the IP-P(A)BX
- **Media Attribute** = sendonly

**Live example**

Request-Line: INVITE sip:10.127.249.182:5060;
ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Route: <sip:10.127.249.182;lr>
Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
Supported: 100rel,from-change,timer
User-Agent: XXXX
Session-Expires: 43200;refresher=uac
Contact: "TEL 027979383"
<sip:+3227979383@10.127.249.4;transport=UDP;user=phone>
Content-Type: application/sdp
To: <sip:+3223379031@ims.belgacom.be;user=phone>;tag=2029194627-1295857747082-
From: <sip:+3227979383@ims.belgacom.be;user=phone>;
tag=0a23e829ef0703f4559ace5458222b38
Call-ID: BW682907062240111-1255895887@10.127.70.20
CSeq: 1057090886 INVITE
Via: SIP/2.0/UDP
10.127.249.4:rport;branch=z9hG4bKca2449647e3584c68b5ada9a75486a5
Max-Forwards: 70
Content-Length: 276

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): default 1295857800 1295857801 IN IP4 10.127.249.4
Owner Username: default
Session ID: 1295857800
Session Version: 1295857801
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.4
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.4

Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0

Media Description, name and address (m): audio 32000 RTP/AVP 18 106 4 8 0
Media Type: audio
Media Port: 32000
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 106
Media Format: ITU-T G.723
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.711 PCMU

Media Attribute (a): sndonly
Media Attribute (a): fmtp:18 annexb=no
Media Attribute Fieldname: fmtp
Media Format: 18
Media format specific parameters: annexb=no
Media Attribute (a): rtpmap:106 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 106
MIME Type: telephone-event
Media Attribute (a): fmtp:106 0-15
Media Attribute Fieldname: fmtp
Media Format: 106 [telephone-event]
Media format specific parameters: 0-15
Media Attribute (a): fmtp:4 annexa=no
Media Attribute Fieldname: fmtp
Media Format: 4 [telephone-event]
Media format specific parameters: annexa=no
Media Attribute (a): maxptime:90
Media Attribute Fieldname: maxptime
Media Attribute Value: 90
Media Attribute (a): silenceSupp:off - - -
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:+3223379031@ims.belgacom.be;user=phone>;tag=2029194627-1295857747082-
From: <sip:+3227979383@ims.belgacom.be;user=phone>;
tag=0a23e829ef0703f4559ace5458222b38
Call-ID: BW08290768224011-1255895887@10.127.70.20
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
branch=z9hG4bKca244947e358468b5a9a75486a5
CSeq: 1057000886 INVITE
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
fo.ims.ims.be;transport=udp>
Content-Type: application/sdp
Content-Length: 205
Server: Alcatel-Lucent-HPSS/3.0.3
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 160 2 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 160
Session Version: 2
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 10658 RTP/AVP 18 106
Media Type: audio
Media Port: 10658
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 106
Media Attribute (a):ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a):maxptime:60
Media Attribute Fieldname: maxptime
Media Attribute Value: 60
Media Attribute (a):recononly
Media Attribute (a):rtpmap:106 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 106
MIME Type: telephone-event
Media Attribute (a):fntf:106 0-15
Media Attribute Fieldname: fntf
Media Format: 106 [telephone-event]
Media format specific parameters: 0-15
The new call to the transferred to destination is set-up according to § 6.3.3 or § 6.3.4 above. The SDP information in the INVITE message contains the IP address and port number on which the IP-P(A)BX user wants to receive the RTP stream. The SDP information in the 200 OK response contains the IP address and port number on which the Proximus IMS network (i.e. the SBC) wants to receive the RTP stream.

**Live example**

Request-Line: INVITE sip:023379042@ims.belgacom.be;user=phone SIP/2.0
Message Header
Route: <sip:10.127.249.182:182;lr>
Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
Supported: 100rel, from-change, timer
User-Agent: XXXX
Session-Expires: 43200
To: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
Content-Type: application/sdp
CSeq: 2038789414 INVITE
Via: SIP/2.0/UDP 10.127.249.4;rport;branch=z9hG4bK3f39b3bf0d2a071438f9147e61ff3c373
Max-Forwards: 70
Content-Length: 276
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): default 1295857819 1295857819 IN IP4 10.127.249.4
Owner Username: default
Session ID: 1295857819
Session Version: 1295857819
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.7
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.7
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0

Media Description, name and address (m): audio 32000 RTP/AVP 18 106 4 8 0
Media Type: audio

**Media Port: 32000**
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 106
Media Format: ITU-T G.723
Media Format: ITU-T G.711 PCMA
Media Format: ITU-T G.711 PCMU
Media Attribute (a): sendrecv
Media Attribute (a): fmtp:18 annexb=no
Media Attribute Fieldname: fmtp
Media Format: 18
Media format specific parameters: annexb=no
Media Attribute (a): rtmap:106 telephone-event/8000
Media Attribute Fieldname: rtmap
Media Format: 106
MIME Type: telephone-event
Media Attribute (a): fmtp:106 0-15
Media Attribute Fieldname: fmtp
Media Format: 106 [telephone-event]
Media format specific parameters: 0-15
Media Attribute (a): fmtp:4 annexa=no
Media Attribute Fieldname: fmtp
Media Format: 4 [telephone-event]
Media format specific parameters: annexa=no
Media Attribute (a): maxptime:90
Media Attribute Fieldname: maxptime
Media Attribute Value: 90
Media Attribute (a): silenceSupp:off - - - -
Media Attribute Fieldname: silenceSupp
Media Attribute Value: off - - - -

Status-Line: SIP/2.0 100 Trying
Message Header
To: <sip:02379042@ims.belgacom.be;user=phone>
From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ec27edcc71170c0372a@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
branch=z9h46k3e4fbc8f0937f6a950807703b5e467
CSeq: 2038789414 INVITE
Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
To: <sip:02379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ec27edcc71170c0372a@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
branch=z9h46k3ea4fbc8f0937f6a950807703b5e467
CSeq: 2038789414 INVITE
Contact: <sip:10.127.249.182:5060;transport=udp>
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 167 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 167
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 10660 RTP/AVP 18 106
Media Type: audio
Media Port: 10660
Media Protocol: RTP/AVP
Media Format: ITU-T G.729
Media Format: 106
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:60
Media Attribute Fieldname: maxptime
Media Attribute Value: 60
Media Attribute (a): rtpmap:106 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 106
MIME Type: telephone-event
Media Attribute (a): fmtp:106 0-15
Media Attribute Fieldname: fmtp
Media Format: 106 [telephone-event]
Media format specific parameters: 0-15
Request-Line: PRACK sip:023379042@ims.belgacom.be;user=phone SIP/2.0
Message Header
Route: <sip:10.127.249.182;lr>
RAck: 462569717 2038789414 INVITE
User-Agent: XXXX
To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
From: <sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ce27edcc711170c09372a@10.127.249.4
CSeq: 2038789415 PRACK
Via: SIP/2.0/UDP 10.127.249.4;port=1024 branch=z9hG4bKc25a2aab6891478c0957b7824c7fa1bc
Max-Forwards: 70
Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:02379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
From: <sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ce27edccd711170009372a@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rtport=5060;
branch=z9hG4bK3ea4fbc8f693766ae95087703b5e467
CSeq: 2038798414 INVITE
Server: Alcatel-Lucent-HPSS/3.0.3
Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:02379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ce27edccd711170009372a@10.127.249.4
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rtport=5060;
branch=z9hG4bK3ea4fbc8f693766ae95087703b5e467
CSeq: 2038798414 INVITE
Contact: <sip:10.127.249.182:5060;ueaddr=impbasilab1-sigfo.ims.be;transport=udp>
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Content-Type: application/sdp
Content-Length: 193
Server: Alcatel-Lucent-HPSS/3.0.3

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 167 2 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 167
Session Version: 2
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (n): -

Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4

Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 10660 RTP/AVP 18 106
Media Type: audio

Media Port: 10660
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Port: 106
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:60
To perform the call transfer, the IP-P(A)BX sends an INVITE message without SDP information to the transferred-to destination, in order to collect the SDP information.

**Live example**

Request-Line: INVITE sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0

Message Header
- Route: <sip:10.127.249.182;lr>
- Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
- Supported: 100rel, from-change, timer
- User-Agent: XXXX
- Session-Expires: 43200;refresher=uac
- Contact: "+3223379031" <sip:+3223379031@10.127.249.4;transport=UDP;user=phone>

To: <sip:+3223379031@10.127.249.4;transport=UDP;user=phone>;tag=964148310-1295857779178

From: <sip:+3223379031@10.127.249.4;transport=UDP;user=phone>

Call-ID: a067107e28ce27edcc711170c09372a@10.127.249.4

CSeq: 2038789414 INVITE

Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060

Max-Forwards: 70

Content-Length: 0

Status-Line: SIP/2.0 200 OK

Message Header
- To: <sip:+3223379031@10.127.249.4;transport=UDP;user=phone>

To perform the call transfer, the IP-P(A)BX sends an INVITE message without SDP information to the transferred-to destination, in order to collect the SDP information.
The IP-P(A)BX sends an INVITE message to the original calling user, including the collected SDP information.

- **Connection information** = the IP address of the media resource of the Proximus IMS network
- **Media port** = the port number of the media resource of the Proximus IMS network
- **Media Attribute** = sendrecv

**Live example**

```
Request-Line: INVITE sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;
transport=udp SIP/2.0
Message Header
Route: <sip:10.127.249.182;lr>
Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
```
Supported: 100rel, from-change, timer
User-Agent: XXXX
Session-Expires: 43200; refresher=uac
Contact: <sip:+3227979383@10.127.249.4;transport=UDP;user=phone>
Content-Type: application/sdp
To: <sip:+3223379031@ims.belgacom.be;user=phone>; tag=2029194627-1295857747082-
From: <sip:+3227979383@ims.belgacom.be;user=phone>;
tag=0a23e829ef0703f4559ace5458222b38
Call-ID: BWO82907682240111-1255895887@10.127.70.20
CSeq: 105709887 INVITE
Via: SIP/2.0/UDP
10.127.249.4;rport;branch=29hG4bK5aa09ceb34af866139b05d4b57fb9a8
Max-Forwards: 70
Content-Length: 237
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): default 1295857800 1295857802 IN IP4 10.127.249.4
Owner Username: default
Session ID: 1295857800
Session Version: 1295857802
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s): -
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 10660 RTP/AVP 18 106
Media Type: audio
Media Port: 10660
Media Proto: RTP/AVP
Media Format: ITU-T.G.729
Media Format: 106
Media Attribute (a): sendrecv
Media Attribute (a): rtpmap:106 telephone-event/8000
Media Attribute Fieldname: rtpmap
Media Format: 106
MIME Type: telephone-event
Media Attribute (a): rtpmap:106 0-15
Media Attribute Fieldname: rtpmap
Media Format: 106 [telephone-event]
Media format specific parameters: 0-15
Media Attribute (a): ptime:20
Media Attribute Fieldname: ptime
Media Attribute Value: 20
Media Attribute (a): maxptime:60
Media Attribute Fieldname: maxptime
Media Attribute Value: 60
The Proximus IMS network returns a 200 OK response including SDP information.

**Live example**

```
Status-Line: SIP/2.0 200 OK
Message Header
To: <sip:+322379031@ims.belgacom.be;user=phone>;tag=2029194627-1295857747082-
    tag=0a23e829ef0703f4559ace5458222b38
From: <sip:+3227979383@ims.belgacom.be;user=phone>
    Call-ID: BWo82907082240111-1255895887@10.127.70.20
Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
    branch=z9hG4bK5a06ce866139b05d4b575f9a8
CSeq: 1057090887 INVITE
Accept: multipart/mixed,application/media_control+xml,application/sdp
Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
    fo.ims.be;transport=udp>
Content-Type: application/sdp
Content-Length: 205
Server: Alcatel-Lucent-HPSS/3.0.3
```

**Message body**

```
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 160 3 IN IP4 10.127.249.182
    Owner Username: BroadWorks
    Session ID: 160
    Session Version: 3
    Owner Network Type: IN
    Owner Address Type: IP4
    Owner Address: 10.127.249.182
Session Name (s):
Connection Information (c): IN IP4 10.127.249.182
    Connection Network Type: IN
    Connection Address Type: IP4
Connection Address: 10.127.249.182
Time Description, active time (t): 0 0
    Session Start Time: 0
    Session Stop Time: 0
Media Description, name and address (m): audio 10658 RTP/AVP 18 106
    Media Type: audio
    Media Port: 10658
    Media Proto: RTP/AVP
    Media Format: ITU-T G.729
    Media Format: 106
Media Attribute (a): ptime:20
    Media Attribute Fieldname: ptime
    Media Attribute Value: 20
Media Attribute (a): maxptime:60
    Media Attribute Fieldname: maxptime
    Media Attribute Value: 60
Media Attribute (a): sendrecv
Media Attribute (a): rtpmap:106 telephone-event/8000
    Media Attribute Fieldname: rtpmap
    Media Format: 106
    MIME Type: telephone-event
Media Attribute (a): fmtp:106 0-15
    Media Attribute Fieldname: fmtp
    Media Format: 106 [telephone-event]
```
The IP-P(A)BX uses the SDP information received from the Proximus IMS network in order to shortcut the 2 RTP streams.

- **Connection information** = the IP address of the media resource of the Proximus IMS network
- **Media port** = the port number of the media resource of the Proximus IMS network
- **Media Attribute** = sendrecv

**Live example**

Request-Line: ACK sip:10.127.249.182;5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp SIP/2.0
Message Header
Route: <sip:10.127.249.182;lr>
Contact: <sip:+3223379031@10.127.249.4;user=phone>
User-Agent: XXXX
Content-Type: application/sdp
To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
From: <sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
Call-ID: a067107e28ce7edcd711170c9372a@10.127.249.4
CSeq: 2038789416 ACK
Via: SIP/2.0/UDP 10.127.249.4;rport;branch=9zhG4bK6b8a3d2088b4f0b5de9d760a470717
Max-Forwards: 70
Content-Length: 237

Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): default 1295857819 1295857820 IN IP4 10.127.249.4
Owner Username: default
Session ID: 1295857819
Session Version: 1295857820
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.4
Session Name (s):
  **Connection Information (c):** IN IP4 10.127.249.182
  Connection Network Type: IN
  Connection Address Type: IP4
  **Connection Address:** 10.127.249.182
6.4.7.3. Call transfer using REFER

Figure 15 shows the expected message flow for a call transfer using REFER.

Note: depending on the call scenario (e.g. whether reliability of provisional responses is used or not) differences may occur.
6.5. Call admission control

Call Admission Control concerns controlling the number of simultaneous calls that can be issued or received by an IP-P(A)BX. The maximum number of simultaneous calls can be set per IP-P(A)BX and per Trunk Group.

6.5.1.Incoming call to the IP-P(A)BX rejected by call admission control

In case an incoming call to an IP-P(A)BX exceeds the maximum number of simultaneous calls:

- either the call is rejected in the Proximus IMS network. The call will not be offered to the IP-P(A)BX. The calling party will receive a busy indication.
- or the “forced” rerouting feature forwards the call to a new destination, without offering the call to the IP-P(A)BX.
6.5.2. Outgoing call from the IP-P(A)BX rejected by call admission control

In case an outgoing call from an IP-P(A)BX is rejected in the Proximus IMS network by call admission control, the Proximus IMS network will return a 403 Forbidden response to the IP-P(A)BX.

6.6. CLI screening

The identity of the calling user received from the IP-P(A)BX in the From header and P-asserted-ID, is verified by the Proximus IMS network by means of a screening function. This function consists of checking if the calling number belongs to the number range(s) defined for the IP-P(A)BX.

If the screening check gives a negative result, the network overwrites the calling identity in the From header and P-asserted-ID header with a default value for the IP-P(A)BX.

As some services at the destination side may depend on the calling identity it is important that the IP-P(A)BX sends the correct information in the From header and the P-Asserted-ID header.

6.7. FAX support

See “PXM IMS VoIP – UNI specification – Fax over IP” [36]

6.8. Emergency calls

Please refer to document “PXM IMS Corporate VOIP – UNI specification - General” [1] version 2.0 or later, chapter 14.

6.9. DTMF

For transport of DTMF the following capabilities exist:

- Usage of RFC 4733 (inband signalling in RTP by use of events)
- Usage of G.711 codec (inband signalling in RTP)

Both methods of transporting DTMF shall be supported.

Evolution: Usage of the SIP INFO message (outband signalling: the info follows the path of signalling) is currently under study and may be announced in a later version of this document.
6.10. Redundancy procedures

6.10.1. Introduction

For redundancy reasons pairs of session border controllers will be installed as entry point to the IMS Core network. At present 1 pair is installed in Brussels at the locations Marais and Stro. These SBCs will be Acme Session Director 9200s and will be deployed as 2 units (1 Active and 1 Hot Standby) at each location.

The IP PBXs can be deployed according to different redundancy schemes, according to the high availability requirements set by the enterprise. The Proximus IMS Geographic Redundancy functionality is able to handle the following PBX connectivity & redundancy schemes:
- Centralised call handling (all telephony services are handled by 1 IP-PBX)
  - Single IP-PBX – Active/Active SBCs
- Distributed call handling (all telephone services are handled by multiple IP-PBXs in a multisite environment)
  - Active/Standby IP-PBX(s) – Active/Active SBCs
  - Active/Active IP-PBX(s) – Active/Active SBCs

6.10.1.1. Single IP-PBX – Active/Active SBCs

This scheme also known as load sharing over both SBCs, will protect against SBC device & connectivity failures, but it does not protect against complete PBX failure.

The IP-PBX needs to be able to contact at least 2 SIP gateways (SBCs) using 2 SIP trunks. Under normal conditions the IP-PBX shall distribute equally the traffic over both SIP trunks/SBCs.

In case of failure of one SIP trunk i.e. failure of one SBC (or the connectivity to it), all traffic shall be sent to the other SIP trunk/SBC.

Note; In some case it can be allowed to use another distribution of traffic e.g. 75% - 25% or even 100% - 0% instead of 50% - 50%. However, the requirement to support 2 SIP trunks simultaneously remains the same. It is obvious that in the 100% - 0% case the SIP trunk with 0% of normal traffic will carry SIP OPTIONS messages only (see 6.10.2)

6.10.1.2. Active/Standby IP-PBX – Active/Active SBCs

This configuration contains multiple IP-PBXs in active/standby redundancy (duplication). This scheme allows the switch over from one IP-PBX to another. One IP-PBX is active (and primary server) and the other server is constantly in watchdog mode on standby. If the primary server fails, the standby automatically takes over.

Both IP-PBXs need to be able to contact at least 2 SIP gateways (SBCs) using 2 SIP trunks. Under normal conditions the active IP-PBX shall distribute equally the traffic over both SIP trunks/SBCs. In case of failure of one SIP trunk i.e. failure of one SBC (or the connectivity to it), all traffic shall be sent to the other SIP trunk/SBC.

In case of IP-PBX failure the standby IP-PBX will take over and shall distribute the traffic over both SIP trunks/SBCs

Note; In some case it can be allowed to use another distribution of traffic e.g. 75% - 25% or even 100% - 0% instead of 50% - 50%. However, the requirement to support 2 SIP trunks simultaneously remains the same. It is obvious that in the 100% - 0% case the SIP trunk with 0% of normal traffic will carry SIP OPTIONS messages only (see 6.10.2)
6.10.1.3. **Active/Active IP-PBX – Active/Active SBCs**

This configuration contains multiple IP-PBXs in active/active redundancy (duplication). They act as a single IP-PBX system and are all actively processing calls. Both IP-PBXs need to be able to contact at least 2 SIP gateways (SBCs) using 2 SIP trunks. Under normal conditions both IP-PBXs shall distribute equally their traffic over both SIP trunks/SBCs.

In case of failure of one SIP trunk i.e. failure of one SBC (or the connectivity to it), all traffic shall be sent to the other SIP trunk/SBC.

In case of IP-PBX failure the other IP-PBX will take over and shall distribute the traffic over both SIP trunks/SBCs.

Note: In some cases it can be allowed to use another distribution of traffic e.g. 75%-25% or even 100%-0% instead of 50%-50%. However, the requirement to support 2 SIP trunks simultaneously remains the same. It is obvious that in the 100%-0% case the SIP trunk with 0% of normal traffic will carry SIP OPTIONS messages only (see 6.10.2).

6.10.2. **Availability monitoring**

6.10.2.1. **Failure detection by SBC**

In order to detect a SIP trunk failure the SBC uses normal traffic and SIP OPTIONS messages.

As long as there is normal traffic on the SIP trunk no OPTIONS messages will be sent.

Under normal conditions i.e. the IP-PBX sends non 5XX responses to the SBC.

In case of failure the IP-PBX might send a 5XX response or no response at all. In the latter case the SBC applies the normal retransmission mechanism as described in IETF RFC 3261.

In case of a 5XX response the SBC will propagate the response into the IMS network allowing a re-attempt via a different route.

**WARNING!**

In case of a 503 response with Retry-After header the SBC will consider the SIP link with the IP-PBX as out-of-service for the duration of the Retry-After header.

The SBC will not send/receive any traffic over the SIP link during this out-of-service period causing a temporary total outage!

In order to avoid long outages of the SIP link it is strongly advised not to use the Retry-After header in any 5XX response, or to use a duration of less than 5 seconds.

After 1 minute without normal traffic on the SIP trunk the SBC sends an OPTIONS message.

Under normal conditions i.e. the IP-PBX sends a SIP response to the OPTIONS message the OPTIONS message is repeated after 1 minute as long as normal traffic is absent.

In case the IP-PBX fails to send a SIP response the SBC applies the normal retransmission mechanism as described in IETF RFC 3261. If there is still no response at the end of the retransmission scheme, the SBC will consider the SIP trunk as “out of service”
6.10.2.2. Recovery detection by SBC

In order to detect a SIP trunk recovery the SBC uses SIP OPTIONS messages. 2 minutes after the failing OPTIONS message the SBC will send a new OPTIONS message. If this is successful the SIP trunk is considered to be “in service”, else the SBC will repeat the OPTIONS message every 4 minutes.

6.10.2.3. Failure detection by IP-PBX

In order to detect a SIP trunk failure the IP-PBX shall use SIP OPTIONS messages. As long as there is normal traffic on the SIP trunk there is no need to send OPTIONS messages. The first OPTIONS message shall be sent after 1 minute without normal traffic on the SIP trunk.

Under normal conditions i.e. the SBC sends a SIP response to the OPTIONS message the OPTIONS message is repeated after 1 minute as long as normal traffic is absent.

In case the SBC fails to send a SIP response the IP-PBX shall apply the normal retransmission mechanism as described in IETF RFC 3261. If there is still no response at the end of the retransmission scheme, the IP-PBX will consider the SIP trunk as “out of service”.

In case the IP-PBX does send OPTIONS messages while there is normal traffic the interval shall be 2 minutes or higher in order not to overload the SBC.

6.10.2.4. Recovery detection by IP-PBX

In order to detect a SIP trunk recovery the IP-PBX uses SIP OPTIONS messages. 2 minutes after the failing OPTIONS message the IP-PBX shall send a new OPTIONS message. If this is successful the SIP trunk is considered to be “in service”, else the IP-PBX will repeat the OPTIONS message every 4 minutes.