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Proximus can't be held responsible for any damages due to the use of an outdated version of this specification.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

Every update of this document results in a complete new version with new version number and release date.

Version	Date	Main or important changes since previous version
1.0	February 14, 2011	First version
1.1	February 16, 2011	Correction/addition regarding accepted number formats
1.2	March 02, 2011	Addition emphasizing the importance to use a domain in the Request-URI (rather than an IP address)
1.3	May 16, 2011	Correction to the cover sheet
1.4	June 29, 2011	References added for support of multipart message bodies Updates regarding P-Asserted-ID handling
1.5	July 04, 2011	Redundancy procedures added
1.6	September 05, 2011	P-Asserted-ID removed from examples because IMS does not expect to receive this header from an IP-PBX
1.7	December 20, 2011	Domain in Request-URI replaced by IP address of IP-PBX for calls towards IP-PBX
1.8	March 26, 2012	Addition regarding proprietary SIP headers
1.9	October 9, 2012	Addition of a warning concerning the use of the Retry-After header in 503 response
1.10	Januari 13, 2016	Changed "Belgacom" in "Proximus"
1.11	September 05, 2016	Made support of both methods for DTMF transport mandatory
1.12	November 24, 2016	Update due to name change "Bizz IP telephony multi" into "Enterprise voice multi"
1.13	June 28, 2018	Clarification concerning the Max-Forwards header The use of Diversion header added.
2.0	December 18, 2018	Example flows updated
2.1	April 17, 2019	Moved chapter on emergency to PXM IMS Corporate VOIP - UNI specification – General Corrected typo errors Included International Business Trunking information
2.2	May 25, 2019	Document name changed from BGC to PXM
2.3	June 06,2019	Small corrections based on comments from the IP-PBX team
2.4	September 19,2019	Update of SW versions in Scope
2.5	November 20, 2020	Update concerning the use of the Privacy header

Table 1: document history

1. Scope

This document defines the SIP signalling over the VoIP interface between the Proximus IMS Network and large IP-P(A)BXs, 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-P(A)BXs. Other documents in this set are:

> PXM IMS Corporate VoIP – UNI specification – General [1]
> PXM IMS Corporate VoIP – UNI specification – SIP signaling – Wirless Office Extended [2]
> PXM IMS Corporate VoIP – UNI specification – SIP signaling – Enterprise Voice Multi [3]
> 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

1	Proximus	PXM IMS Corporate VoIP – UNI specification – General
2	Proximus	PXM IMS Corporate VoIP – UNI specification – SIP signalling – Wireless Office Extended
3	Proximus	PXM IMS Corporate VoIP – UNI specification – SIP signalling – Enterprise Voice Multi
4	3GPP TS 24.229	IP Multimedia call control protocol based on SIP and SDP, Stage 3 Release 9
5	3GPP TS 23.167	IP Multimedia Subsystem (IMS) emergency sessions, Release 9
6	SIP forum	The SIP connect 1.1 technical recommendation (draft)
7	ETSI TS 182 025	Business Trunking; architecture and functional description v2.1.1
8	ITU-T E.164	The international telecommunication numbering plan
9	IETF RFC 3261	SIP: Session Initiation Protocol
10	IETF RFC 3262	Reliability of Provisional Responses in the Session Initiation Protocol (SIP)
11	IETF RFC 3264	An Offer/Answer Model with the Session Description Protocol (SDP)
12	IETF RFC 3265	Session Initiation Protocol (SIP)-Specific Event Notification
13	IETF RFC 4566	SDP: Session Description Protocol
14	IETF RFC 2976	The SIP INFO Method
15	IETF RFC 3311	The Session Initiation Protocol (SIP) UPDATE Method
16	IETF RFC 3323	A Privacy Mechanism for the Session Initiation Protocol (SIP)
17	IETF RFC 3325	Private Extensions to SIP for Asserted Identity within Trusted Networks
18	IETF RFC 3326	The Reason Header Field for the Session Initiation Protocol (SIP)
19	IETF RFC 3455	Private header extensions for SIP for 3GPP
20	IETF RFC 3515	The Session Initiation Protocol (SIP) REFER Method
21	IETF RFC 3891	The Session Initiation Protocol (SIP) "Replaces" Header
22	IETF RFC 3892	The Session Initiation Protocol (SIP) Referred-By Mechanism
23	IETF RFC 3960	Early Media and Ringing Tone Generation in SIP
24	IETF RFC 4028	Session Timers in the Session Initiation Protocol (SIP)
25	IETF RFC 2617	HTTP Authentication: Basic and Digest Access Authentication
26	IETF RFC 1321	The MD5 Message-Digest Algorithm
27	IETF RFC 3550	RTP: A Transport Protocol for Real-Time Applications
28	IETF RFC 3551	RTP Profile for Audio and Video Conferences with Minimal Control
29	IETF RFC 4733	RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals
30	IETF RFC 4734	Definition of Events for Modem, FAX and Text Telephony signals
31	IETF RFC 5806	Diversion indication in SIP
32	IETF RFC 6044	Mapping and Interworking of Diversion Information between Diversion and History-Info Headers in the Session Initiation Protocol (SIP)
33	IETF RFC 4244	An Extension to SIP for Request History Information
34	IETF RFC 3966	The Tel URI for Telephone Numbers
35	IETF draft	Applying Loose Routing to Session Initiation Protocol (SIP) User Agents (UA)" (expired)
36	Proximus	PXM IMS VoIP – UNI specification – Fax over IP
37	ETSI TS 183 011	Anonymous communication rejection (ACR) and communication barring (CB)
38	IETF RFC 5621	Message body handling in SIP
39	IETF RFC 5876	Updates to Asserted Identity in the Session Initiation Protocol (SIP)
40	Proximus	PXM IMS Corporate VOIP - UNI specification - Address templates

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 it's own domain name e.g. mycompany.com is under study.

Note: EnterpriseDomain may also be an IPaddress 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:

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

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]

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- RFC 6044 Mapping and Interworking of Diversion Information between Diversion and History-Info Headers in the Session Initiation Protocol (SIP) [32]
- RFC 4244 An Extension to SIP for Request History Information [33]
- RFC 3966 The Tel URI for Telephone Numbers [34]
- Draft Applying Loose Routing to Session Initiation Protocol (SIP) User Agents (UA)" (expired) [35]
- RFC 5621 Message Body Handling in SIP [38]
    Since more and more SIP applications use multipart message bodies, the correct support and handling of multipart message bodies is very important.
- RFC 5876 Updates to Asserted Identity in the Session Initiation Protocol (SIP) [39]

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]

- Content-Type   according to [4] and [9]
- Content-Disposition   according to [4] and [9]
- Content-Length   according to [4] and [9]
- MIME-Version   according to [4] and [9]
- Supported   according to [4] and [9]
- Require   according to [4] and [9]
- Expires   according to [4] and [9]
- Unsupported   according to [4] and [9]
- Allow   according to [4] and [9]
- Retry-After   according to [4] and [9]
- In-Reply-To   according to [4] and [9]
- Authorization   according to [4] and [9]
- Proxy-Authenticate   according to [4] and [9]
- WWW-Authenticate   according to [4] and [9]
- Min-Expires   according to [4] and [9]
- Proxy-Authorization   according to [4] and [9]
- Alert-Info   according to [4] and [9]
- Warning   according to [4] and [9]
- Accept   according to [4] and [9]
- Call-Info   according to [4] and [9]
- RSeq   according to [4] and [10]
- RAck   according to [4] and [10]
- Allow-Events   according to [4] and [12]
- Event   according to [4] and [12]
- Subscription-State   according to [4] and [12]
- Refer-To   according to [4] and [20]
- Privacy   according to [4] and [16]
- P-Asserted-Identity   according to [4] and [17]
- Reason   according to [4] and [18]
- P-Called-Party-ID   according to [4] and [19]
- P-Access-Network-Info   according to [4] and [19]
- P-Associated-URI   according to [4] and [19]
- Replaces   according to [4] and [21]
- Referred-By   according to [4] and [22]
- Session Expires   according to [4] and [24]
- Min-Se   according to [4] and [24]
- Diversion   according to [31]

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-negociate/change the session parameters. So, if there is no need to re-negociate/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:
  - o 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
  - o sip:Norm-SubA-dn@IP-addr-PBXName, or

o   sip:PBXName@IP-addr-PBXName

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.
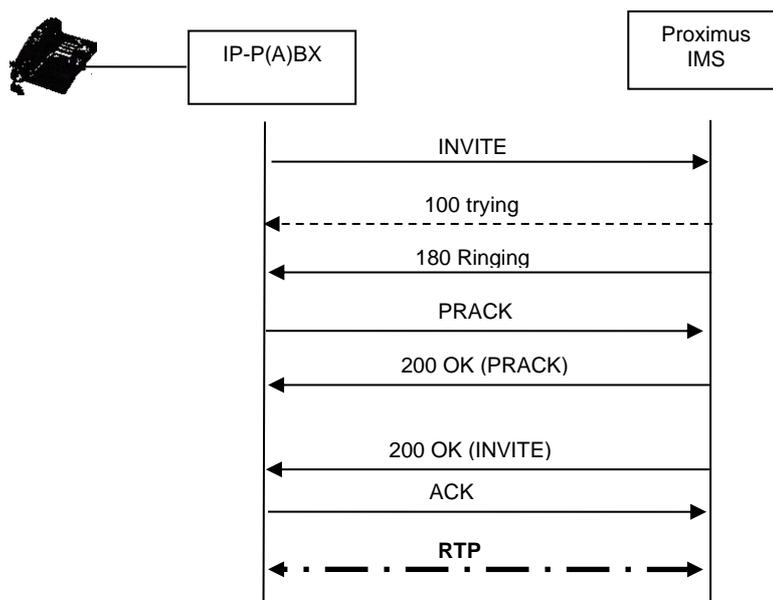
Figure 1: Basic call/session set-up (public on-net)

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

Note 2: The *DisplayName* in the *From and Contact* header is optional

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
  Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
  Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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

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 *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=426662155353bf59d2bccf32155e1e45
  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=426662155353bf59d2bccf32155e1e45
  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-00000be1"
 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: 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 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-f0.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=426662155353bf59d2bccf32155e1e45
Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
CSeq: 1383567066 PRACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206aab37b27286bf39f2ca91
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.

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
  Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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).

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
  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>
  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

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

<u>Live example</u>

Request-Line: ACK sip:10.127.249.182:5060;
    ue-addr=impbasilab1-sig-f0.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=426662155353bf59d2bccf32155e1e45
  Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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.
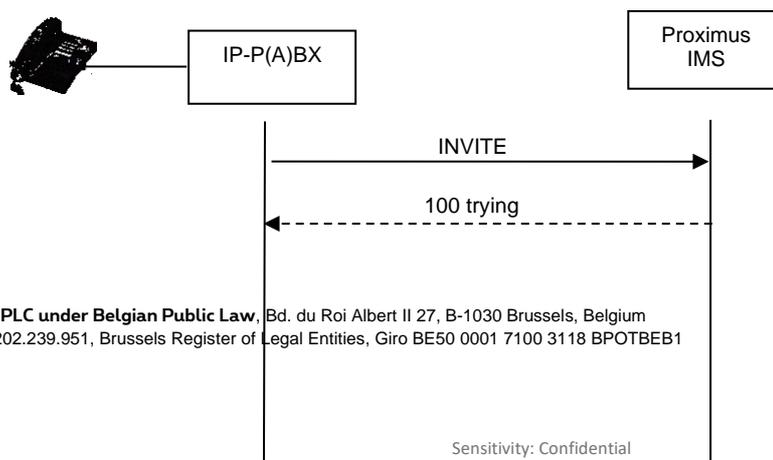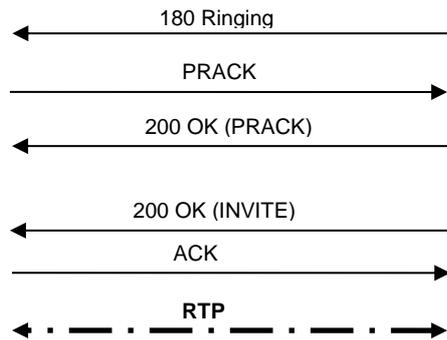
Figure 2: Basic call/session set-up (public off-net)

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* 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

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

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
   Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
   Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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
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 *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>

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
   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=426662155353bf59d2bccf32155e1e45
   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-f0.ims.ims.be;transport=udp>
   RSeq: 233532262
   P-Charging-Vector: icid-value="ICSF:10.127.68.19-4cf4b1dd-00000be1"
   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: 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 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

<u>Live example</u>

    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=426662155353bf59d2bccf32155e1e45
      Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
      CSeq: 1383567066 PRACK
      Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKde778ed4206aab37b27286bf39f2ca91
      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.

<u>Live example</u>

    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=426662155353bf59d2bccf32155e1e45
      Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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).

<u>Live example</u>

    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=426662155353bf59d2bccf32155e1e45
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-f0.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

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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-f0.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=426662155353bf59d2bccf32155e1e45
Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
CSeq: 1383567065 ACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKad4e5c69afe6b05b3277ada24769e6da
Max-Forwards: 70
Content-Length: 0
```

6.3.3.   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.
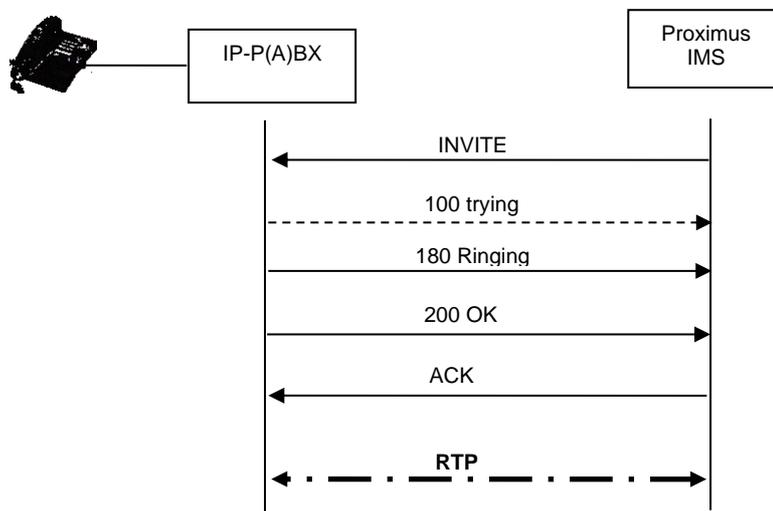
Figure 3: Basic call/session set-up (public on-net)

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).

<u>Live example</u>

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: BW081233763301110-584809374@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-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

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

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=z9hG4bKa059e4b6gk0p229740cg3ga540
    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=21c665a7c589ff21c4d9c02b3c72d533
    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=z9hG4bKa059e4b6gk0p229740cg3ga540
    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=21c665a7c589ff21c4d9c02b3c72d533
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=z9hG4bKa059e4b6gk0p229740cg3ga540
Content-Length: 217
Message body
    Session Description Protocol
        Session Description Protocol Version (v): 0
        Owner/Creator, Session Id (o): OXE 1291112216 1291112216 IN IP4 10.127.249.4
            Owner Username: OXE
            Session ID: 1291112216
            Session Version: 1291112216
            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=z9hG4bKd2jakiu3s4n2m3tsq7r4am4260-doqp8pg5
   From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
      tag=1125622886-1291104753763-
   To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
      tag=21c665a7c589ff21c4d9c02b3c72d533
   Call-ID: BW081233763301110-584809374@10.127.70.20
   CSeq: 233540658 ACK
   Contact: <sip:10.127.249.182>
   Max-Forwards: 68
   Content-Length: 0
   User-Agent: XXXX
```

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.
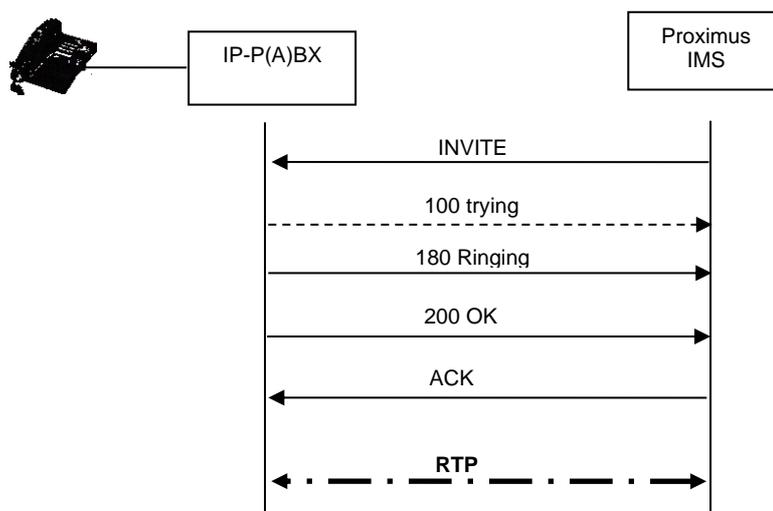
Figure 4: Basic call/session set-up (public off-net)

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-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=z9hG4bK9793a2qhj96k3tsjh13ev10je1
   Call-ID: BW0813020223011101713503167@10.127.70.20
   To: "3227970251
3227970250"<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
   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=S9C40-20101130091301-00001250;
     icid-generated-at=149.204.0.1;orig-ioi="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;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 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

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 Proximus IMS network expects a *100 Trying* response, followed by a *180 Ringing,* when the destination user is reached.

<u>Live example</u>

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: BW081302022301110171350316@10.127.70.20
  CSeq: 233554788 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev1oje1
  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=bfa96316b7c5086ca9aef18f7c0e568f
  From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>;
      tag=1581897935-1291104782022-
  Call-ID: BW081302022301110171350316@10.127.70.20
  CSeq: 233554788 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev1oje1
  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).

<u>Live example</u>

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=bfa96316b7c5086ca9aef18f7c0e568f
From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>;
    tag=1581897935-1291104782022-
Call-ID: BW0813020223011101713503167@10.127.70.20
CSeq: 233554788 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bK9793a2qhj96k3tsjh13ev1oje1
Content-Length: 217
Message body
  Session Description Protocol
    Session Description Protocol Version (v): 0
    Owner/Creator, Session Id (o): OXE 1291112244 1291112244 IN IP4 10.127.249.4
      Owner Username: OXE
      Session ID: 1291112244
      Session Version: 1291112244
      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.

<u>Live example</u>

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=z9hG4bK8luolm5j0ttdf9d9hho7trs7m6-doq7cih5

From: "+3223379020" <sip:+3223379020@ims.belgacom.be;user=phone>;
     tag=1581897935-1291104782022-
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
     tag=bfa96316b7c5086ca9aef18f7c0e568f
Call-ID: BW0813020223011101713503167@10.127.70.20
CSeq: 233554788 ACK
Contact: <sip:10.127.249.182>
Max-Forwards: 68
Content-Length: 0
User-Agent: XXXX

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.
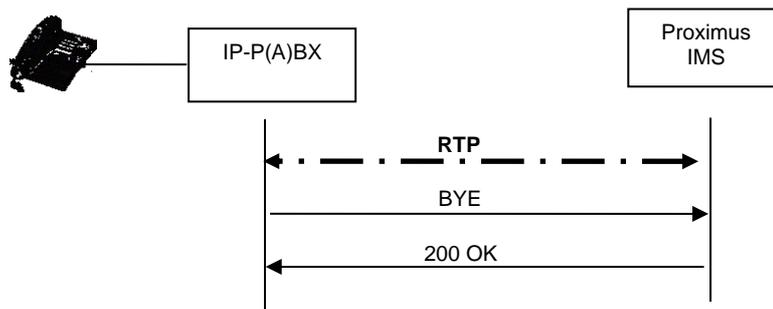
Figure 5: Basic call/session forward teardown

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

<u>Live example</u>

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:023379020@ims.belgacom.be;user=phone>;
     tag=2080276901-1291104736973
  From: <sip:+3227970251@ims.belgacom.be;user=phone>;
     tag=426662155353bf59d2bccf32155e1e45
  Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
  CSeq: 1383567067 BYE
  Via: SIP/2.0/UDP 10.127.249.4;
     branch=z9hG4bK2c9bd4e8223bb2ff9509146905018884
  Max-Forwards: 70

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Sensitivity: Confidential

Content-Length: 0

The Proximus IMS network returns a *200 OK* response.

<u>Live example</u>

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=426662155353bf59d2bccf32155e1e45
　Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@10.127.249.4
　Via: SIP/2.0/UDP 10.127.249.4;
　　　branch=z9hG4bK2c9bd4e8223bb2ff9509146905018884
　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.
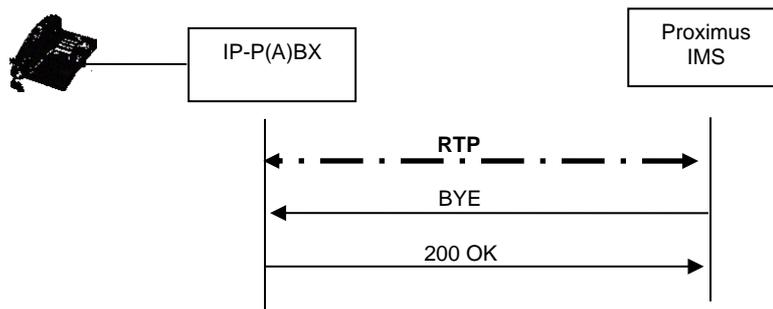
Figure 6: Basic call/session backward teardown

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

<u>Live example</u>

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=z9hG4bKd2jakiu3s4n2m3tsq7r4am4260-doqp0pk5
　From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
　　　tag=1125622886-1291104753763-
　To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
　　　tag=21c665a7c589ff21c4d9c02b3c72d533
　Call-ID: BW081233763301110-584809374@10.127.70.20
　CSeq: 233540659 BYE
　Max-Forwards: 68
　Content-Length: 0

User-Agent: XXXX

The IP-P(A)BX returns a *200 OK* response.

Live example

Status-Line: SIP/2.0 200 OK
Message Header
  Allow: INVITE, ACK, CANCEL, BYE, PRACK, NOTIFY, SUBSCRIBE, OPTIONS, UPDATE
  Supported: replaces,timer,100rel
  User-Agent: XXXX
  To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
      tag=21c665a7c589ff21c4d9c02b3c72d533
  From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
      tag=1125622886-1291104753763-
  Call-ID: BW081233763301110-584809374@10.127.70.20
  CSeq: 233540659 BYE
  Via: SIP/2.0/UDP 10.127.249.182:5060;
      branch=z9hG4bKd2jakiu3s4n2m3tsq7r4am4260-doqpopk5
  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".

<u>Live example</u>

```
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: BW081233763301110-584809374@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-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
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

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=426662155353bf59d2bccf32155e1e45
    Contact: <sip:+3227970251@10.127.249.4;transport=UDP>
    Call-ID: 686e67c13e0cc50ad6e5f0ba9ebb7c55@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
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

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.
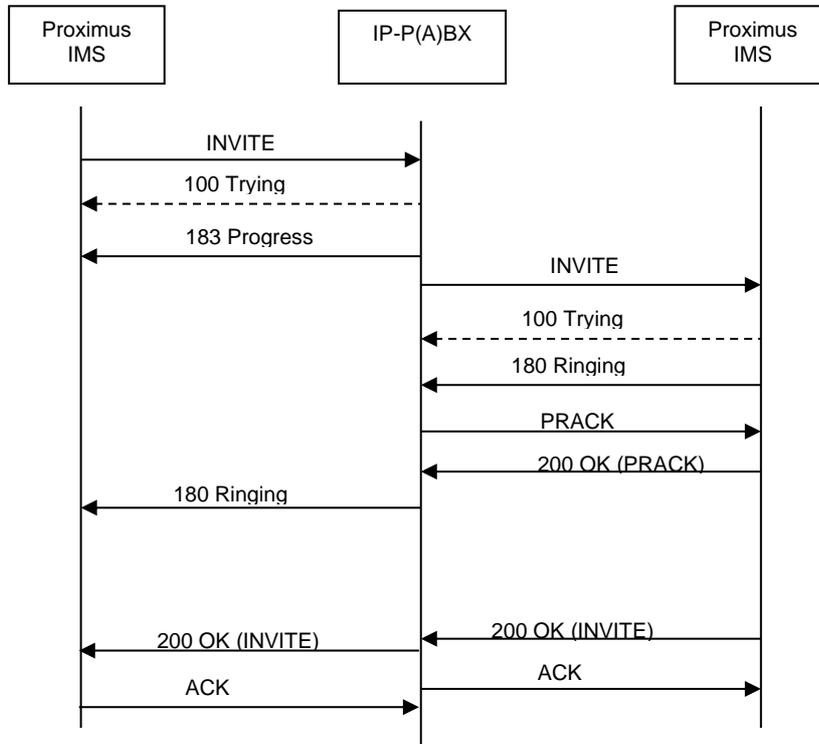
Figure 7: Call forward via new outgoing call

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=z9hG4bKe1ejg691mr8a0r09c9baj4u5l7
    Call-ID: BW085430966120111151946121@10.127.70.20
    To: "3227970251
3227970250"<sip:+3227970251@ims.belgacom.be;user=phone>
    From: "+3223379031"<sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=1827139038-1294822470966-
    CSeq: 1018657436 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: 182
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 3194421 1 IN IP4 10.127.249.182
      Owner Username: BroadWorks
      Session ID: 3194421
      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 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): 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: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
    tag=1827139038-1294822470966-
  Call-ID: BW0854309661201115194612l@10.127.70.20
  CSeq: 1018657436 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8a0r09c9baj4u5l7
  Content-Length: 0

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: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=1827139038-1294822470966-
  Call-ID: BW0854309661201115194612l@10.127.70.20
  CSeq: 1018657436 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKe1ejg691mr8a0r09c9baj4u5l7
  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:Dialled-SubC-dn@EnterpriseDomain;user=phone>

<u>Live example</u>

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: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
  CSeq: 869438703 INVITE
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9d56c1b14509e02867eacf8f3d9ec870
  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=z9hG4bK9d56c1b14509e02867eacf8f3d9ec870
  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..

Live example

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=bd17b50474bf2c5caaab3b3107494be4
  Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9d56c1b14509e02867eacf8f3d9ec870
  CSeq: 869438703 INVITE
  Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
fo.ims.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.ims.be;transport=udp SIP/2.0
Message Header
  Supported: replaces,timer
  User-Agent: XXXX
  RAck: 1018658879 869438703 INVITE

```
To: <sip:023379021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
From: <sip:+3227970251@ims.belgacom.be;user=phone>;
    tag=bd17b50474bf2c5caaab3b3107494be4
Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
CSeq: 869438704 PRACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKca9fe2795912907ebbf0f5b3e0883325
Max-Forwards: 70
Content-Length: 0
```

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

<u>Live example</u>

```
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=bd17b50474bf2c5caaab3b3107494be4
    Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
    Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKca9fe2795912907ebbf0f5b3e0883325
    CSeq: 869438704 PRACK
    Server: Alcatel-Lucent-HPSS/3.0.3
    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.

<u>Live example</u>

```
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=1827139038-1294822470966-
    Call-ID: BW0854309661201115194612.1@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.

<u>Live example</u>

```
Status-Line: SIP/2.0 200 OK
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=bd17b50474bf2c5caaab3b3107494be4
    Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
    Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9d56c1b14509e02867eacf8f3d9ec870
    CSeq: 869438703 INVITE
    Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
fo.ims.ims.be;transport=udp>
```

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Sensitivity: Confidential

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): 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

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".

<u>Live example</u>

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:023379021@ims.belgacom.be;user=phone>;tag=1787430291-1294822473854
From: "testteam P&P" <sip:+3227970251@ims.belgacom.be;user=phone>;
        tag=bd17b50474bf2c5caaab3b3107494be4
Call-ID: 3f1979b5d1e4fde70afa60fa65a35fd3@10.127.249.4
CSeq: 869438703 ACK
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK8dacfe7784855923bdaac44a1b94d878
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.

<u>Live example</u>

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=35e6f75a8c3510817253a92aa13b7c55
 From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
  tag=1827139038-1294822470966-
 Call-ID: BW085430966120111151946121@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

MIME Type: telephone-event
Media Attribute (a): sendrecv

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

<u>Live example</u>

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=z9hG4bKlauopcs6osac3t4blvo2gbnor2-spdl7ei5
From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
    tag=1827139038-1294822470966-
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
    tag=35e6f75a8c3510817253a92aa13b7c55
Call-ID: BW085430966120111151946121@10.127.70.20
CSeq: 1018657436 ACK
Contact: <sip:10.127.249.182>
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.
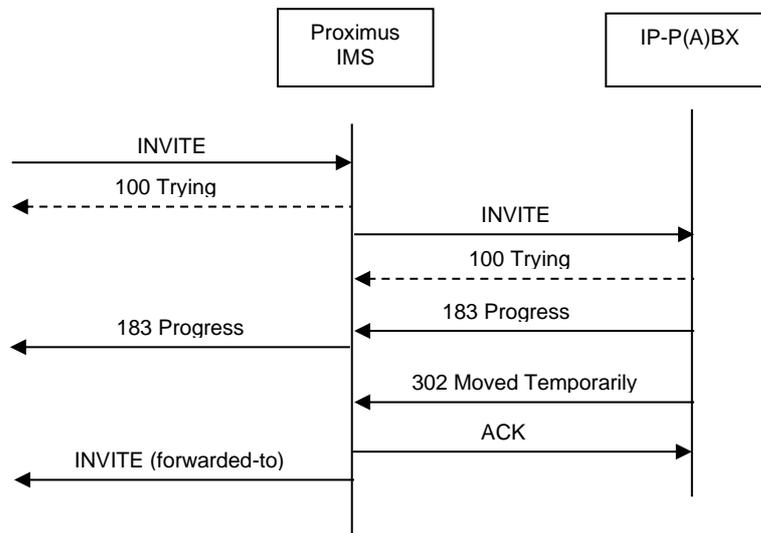

Figure 8: Call forward via *302 moved temporarily*

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.

<u>Live example</u>

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=z9hG4bKcomoapgj9qqk2v6cdn7gai0s07
   Call-ID: LU-1294828919149874@imsgroup0-003.ilasm.ims.ims.be
   **To: "3227970142 3227970142"
    <sip:+3227970142@ims.belgacom.be;user=phone>**
    From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
     tag=4d22c245-1294828919149881-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

Media Attribute Fieldname: maxptime
Media Attribute Value: 30

Status-Line: SIP/2.0 100 Trying
Message Header
    Allow: PRACK,ACK,CANCEL,BYE,SUBSCRIBE,NOTIFY,INVITE,REFER,
        OPTIONS,INFO,UPDATE,REGISTER
    Call-ID: LU-1294828919149874@imsgroup0-003.ilasm.ims.ims.be
    CSeq: 1 INVITE
    From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=4d22c245-1294828919149881-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=z9hG4bKcomoapgj9qqk2v6cdn7gai0s07
    Content-Length: 0

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>

<u>Live example</u>

Status-Line: SIP/2.0 183 Session Progress
Message Header
    Call-ID: LU-1294828919149874@imsgroup0-003.ilasm.ims.ims.be
    CSeq: 1 INVITE
    From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=4d22c245-1294828919149881-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=z9hG4bKcomoapgj9qqk2v6cdn7gai0s07
    Content-Length: 0

Status-Line: SIP/2.0 302 Moved Temporarily
Message Header
    Call-ID: LU-1294828919149874@imsgroup0-003.ilasm.ims.ims.be
    Contact: <sip:023379021@ims.belgacom.be:5060;user=phone>
    CSeq: 1 INVITE
    From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=4d22c245-1294828919149881-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=z9hG4bKcomoapgj9qqk2v6cdn7gai0s07
    Content-Length: 0

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

<u>Live example</u>

Request-Line: ACK sip:+3227970142@10.127.239.214:42470;user=phone SIP/2.0
Message Header
    Call-ID: LU-1294828919149874@imsgroup0-003.ilasm.ims.ims.be
    From: "+3223379031" <sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=4d22c245-1294828919149881-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=z9hG4bKcom0apgj9qqk2v6cdn7gai0so7
    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>

<u>Live example</u>

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=z9hG4bKBroadWorks.-1plbjsr-10.127.68.25V5060-0-1021881667-584009114-1294828919429-
    From:"+3223379031"<sip:+3223379031@ims.belgacom.be;user=phone>;
        tag=584009114-1294828919429-
    To:<sip:+3223379021@ims.belgacom.be;user=phone>
    Call-ID:BW104159429120111-702712322@10.127.70.20
    CSeq:1021881667 INVITE
    Contact:<sip:impbasilab1-sig-f0.ims.ims.be>
    P-Asserted-Identity:<tel:+3223379031>
    Privacy:none
    Diversion:"3227970142 3227970142"<sip:+3227970142@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.
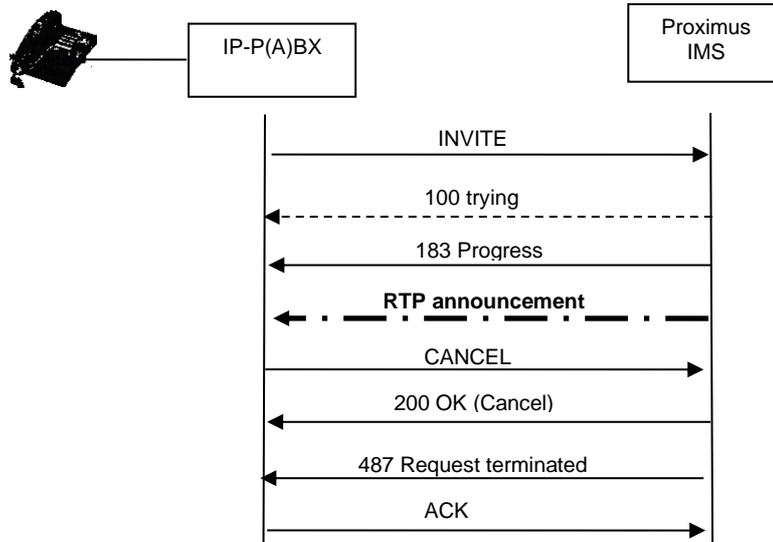
Figure 9: Basic call/session set-up to barred destination

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): rtcp:1025
    Media Attribute Fieldname: rtcp
    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): fmtp:101 0-15
    Media Attribute Fieldname: fmtp
    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=z9hG4bK0cd3_INVITE;rport=5060
    From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
    To: <sip:0035316791650@ims.belgacom.be>
    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=z9hG4bK0cd3_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
    Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>

Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
Content-Type: application/sdp
Content-Length: 189
Server: Alcatel-Lucent-HPSS/3.0.3
Session: Media
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 882 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 882
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15798 RTP/AVP 18 101
Media Type: audio
Media Port: 15798
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 101
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
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): fmtp:101 0-15
Media Attribute Fieldname: fmtp
Media Format: 101 [telephone-event]
Media format specific parameters: 0-15

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.

<u>Live example</u>

Request-Line: CANCEL 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 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=z9hG4bK0cd3_INVITE;rport=5060
    From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
    To: <sip:0035316791650@ims.belgacom.be>;tag=aprqrjmtc-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.

<u>Live example</u>

```
Status-Line: SIP/2.0 487 Request terminated
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=1073695206-1294838189960
    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.

<u>Live example</u>

```
Request-Line: ACK 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>;tag=1073695206-1294838189960
    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.

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Sensitivity: Confidential
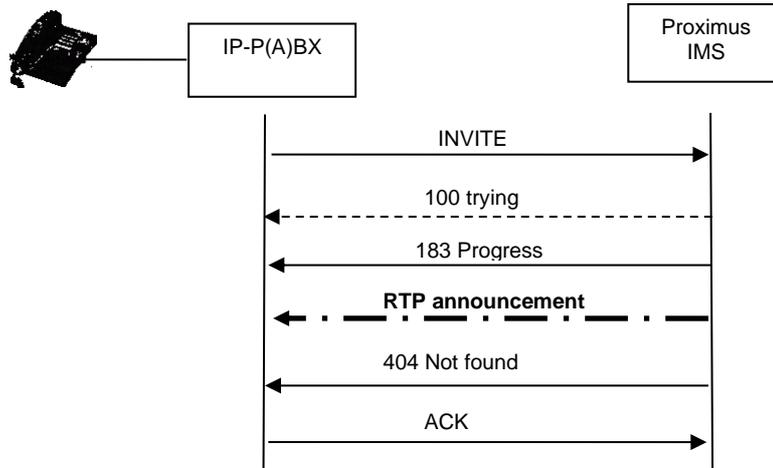
Figure 10: Basic call/session set-up to barred destination

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.

<u>Live example</u>

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): rtcp:1025
    Media Attribute Fieldname: rtcp
    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): fmtp:101 0-15
    Media Attribute Fieldname: fmtp
    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=z9hG4bK0cd3_INVITE;rport=5060
  From: <sip:+3227979451@ims.belgacom.be>;tag=9fxced76sl
  To: <sip:0035316791650@ims.belgacom.be>
  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.

<u>Live example</u>

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=z9hG4bK0cd3_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
  Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-fo.ims.ims.be;transport=udp>
  Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
  Content-Type: application/sdp
  Content-Length: 189

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Sensitivity: Confidential

Server: Alcatel-Lucent-HPSS/3.0.3
Session: Media
Message body
Session Description Protocol
Session Description Protocol Version (v): 0
Owner/Creator, Session Id (o): BroadWorks 882 1 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 882
Session Version: 1
Owner Network Type: IN
Owner Address Type: IP4
Owner Address: 10.127.249.182
Session Name (s): -
Time Description, active time (t): 0 0
Session Start Time: 0
Session Stop Time: 0
Media Description, name and address (m): audio 15798 RTP/AVP 18 101
Media Type: audio
Media Port: 15798
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 101
Connection Information (c): IN IP4 10.127.249.182
Connection Network Type: IN
Connection Address Type: IP4
Connection Address: 10.127.249.182
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): fmtp:101 0-15
Media Attribute Fieldname: fmtp
Media Format: 101 [telephone-event]
Media format specific parameters: 0-15

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=1073695206-1294838189960
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.

<u>Live example</u>

Request-Line: ACK 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>;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.

<u>Note</u>: 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* attibute 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.
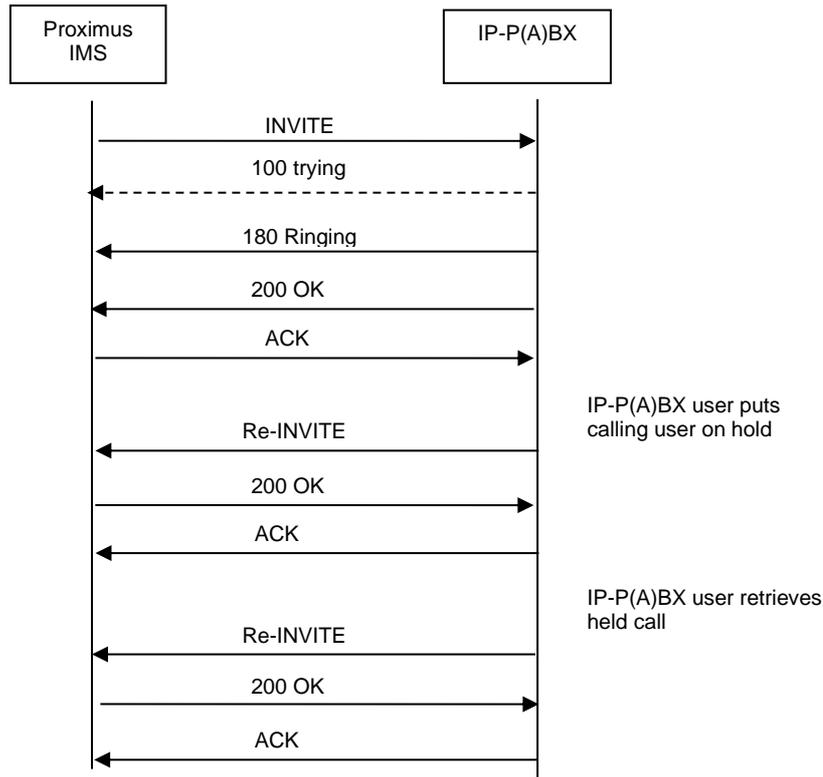
Figure 11: Hold/retrieve by IP-P(A)BX user example

An incoming cal 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>

<u>Live example</u>

```
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-
f0.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;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 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

Sensitivity: Confidential

CSeq: 1026747643 INVITE
Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKnp4puui5chjojd23vv4fjvp600
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=556801c19d0ea6c82d8462336e5fed10
  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=z9hG4bKnp4puui5chjojd23vv4fjvp600
  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=556801c19d0ea6c82d8462336e5fed10
  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=z9hG4bKnp4puui5chjojd23vv4fjvp600
  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

          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
         Media Format: 101
         MIME Type: telephone-event
       Media Attribute (a): sendrecv

     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=z9hG4bK29b28at9mmuhqs31fi2lg6mpl7-thcoutj5
       From: "RV-027970315" <sip:+3227970315@ims.belgacom.be;user=phone>;
         tag=330868717-1294838651382-
       To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
         tag=556801c19d0ea6c82d8462336e5fed10
       Call-ID: BW132411381120111-1617987323@10.127.70.20
       CSeq: 1026747643 ACK
       Contact: <sip:10.127.249.182>
       Max-Forwards: 68
       Content-Length: 0
       User-Agent: XXXX

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.

   <u>Live example</u>

     Request-Line: INVITE sip:10.127.249.182:5060;
        ue-addr=impbasilab1-sig-fo.ims.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=556801c19d0ea6c82d8462336e5fed10
Call-ID: BW132411381120111-1617987323@10.127.70.20
CSeq: 1910404660 INVITE
Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK2575fe925680e5498560cd71c24ec450
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): 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 *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>;
      tag=556801c19d0ea6c82d8462336e5fed10
  Call-ID: BW132411381120111-1617987323@10.127.70.20
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK2575fe925680e5498560cd71c24ec450
  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: 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): rcvonly
    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:+3227970315@ims.belgacom.be;user=phone>;tag=330868717-1294838651382-
    From: <sip:+3227970251@ims.belgacom.be;user=phone>;
        tag=556801c19d0ea6c82d8462336e5fed10
    Call-ID: BW132411381120111-1617987323@10.127.70.20
    CSeq: 1910404660 ACK
    Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKf8b9b658c838e1e13801099b69b81194
    Max-Forwards: 70
    Content-Length: 0

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

<u>Live example</u>

    Request-Line: INVITE sip:10.127.249.182:5060;
        ue-addr=impbasilab1-sig-f0.ims.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=556801c19d0ea6c82d8462336e5fed10
    Call-ID: BW132411381120111-1617987323@10.127.70.20
    CSeq: 1910404661 INVITE
    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

Media Type: audio
Media Port: 32514
Media Proto: RTP/AVP
Media Format: ITU-T G.729
Media Format: 101
Media Attribute (a): sendrecv
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 *200 OK* response acknowledging the changed media description parameters: The media attribute is set to *sendrecv*.

- *Media Attribute* = sendrecv

<u>Live example</u>

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=556801c19d0ea6c82d8462336e5fed10
  Call-ID: BW132411381120111-1617987323@10.127.70.20
  Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bKd264cabb885780ea32045b42a9a8c298
  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;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 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 (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.

<u>Live example</u>

```
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>;
          tag=556801c19d0ea6c82d8462336e5fed10
   Call-ID: BW132411381120111-1617987323@10.127.70.20
   CSeq: 1910404661 ACK
   Via: SIP/2.0/UDP 10.127.249.4;branch=z9hG4bK9e84b5f5925a65cebbc2a86ade920b76
   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.
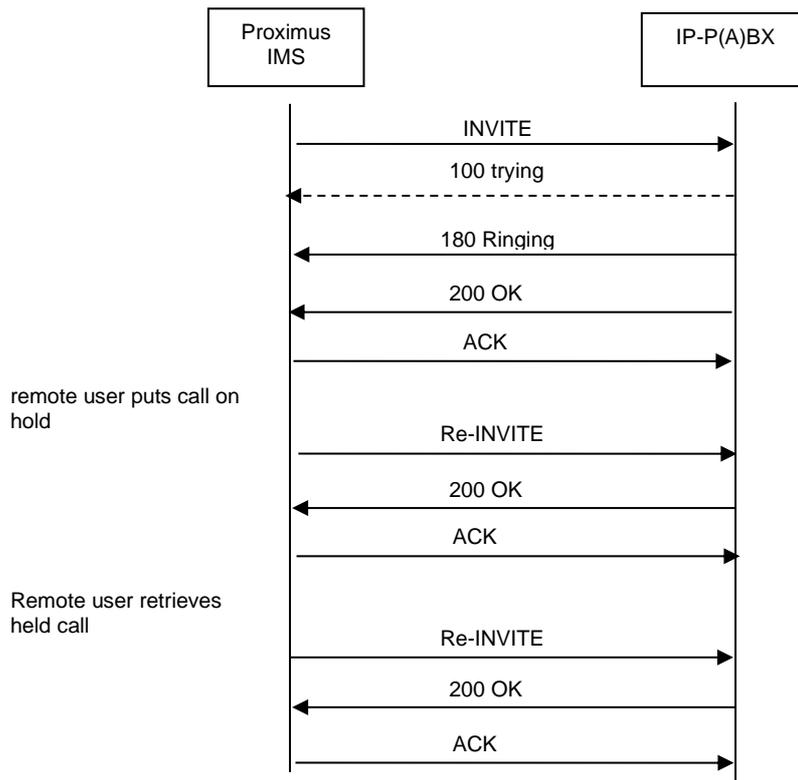
Figure 12: Hold/retrieve by remote user

An incoming cal 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=z9hG4bKph03u02vj950f0p0bh2p3cl611
    Call-ID: BW133301110120111102747137@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;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 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: BW133301110120111102747137@10.127.70.20
  CSeq: 1027012508 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02vj950f0p0bh2p3cl611
  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: BW133301110120111102747137@10.127.70.20
  CSeq: 1027012508 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02vj950f0p0bh2p3cl611
  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: BW133301110120111102747137@10.127.70.20
  CSeq: 1027012508 INVITE
  Via: SIP/2.0/UDP 10.127.249.182:5060;branch=z9hG4bKph03u02vj950f0p0bh2p3cl611
  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

Media Format: 101
MIME Type: telephone-event
Media Attribute (a): sendrecv

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-thdefei5
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
tag=1961511564-1294839181110-
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=50df8b3c8093c30f5a8086f69dd1275c
Call-ID: BW133301110120111102747137@10.127.70.20
CSeq: 1027012508 ACK
Contact: <sip:10.127.249.182>
Max-Forwards: 68
Content-Length: 0
User-Agent: XXXX

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=z9hG4bKu0lamu17lmqd3iup75lfcqf1a2-thdevee5
Call-ID: BW133301110120111102747137@10.127.70.20
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
tag=50df8b3c8093c30f5a8086f69dd1275c
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
tag=1961511564-1294839181110-
CSeq: 1027012509 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 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

<u>Live example</u>

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=z9hG4bKu0lamu17lmqd3iup75lfcqf1a2-
thdevee5
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

Session Version: 1294846748
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
Media Format: 101
MIME Type: telephone-event
Media Attribute (a): rcvonly

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-thdevei5
From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
    tag=1961511564-1294839181110-
To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
    tag=50df8b3c8093c30f5a8086f69dd1275c
Call-ID: BW133301110120111102747137@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.

<u>Live example</u>

```
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=z9hG4bKu0lamu17lmqd3iup75lfcqf1a2-
thdeffe5
    Call-ID: BW13330111012011102747137@10.127.70.20
    To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
        tag=50df8b3c8093c30f5a8086f69dd1275c
    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
```

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): sendrecv

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

<u>Live example</u>

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: 1027012510 INVITE
    Via: SIP/2.0/UDP 10.127.249.182:5060;
        branch=z9hG4bKu0lamu17lmqd3iup75lfcqf1a2-thdeffe5
    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

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
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.

<u>Live example</u>

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-thdeffi5
   From: "+3227972030" <sip:+3227972030@ims.belgacom.be;user=phone>;
      tag=1961511564-1294839181110-
   To: "3227970251 3227970250" <sip:+3227970251@ims.belgacom.be;user=phone>;
      tag=50df8b3c8093c30f5a8086f69dd1275c
   Call-ID: BW13330111012011110274737137@10.127.70.20
   CSeq: 1027012510 ACK
   Contact: <sip:10.127.249.182>
   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:
  - 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).
  - 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.
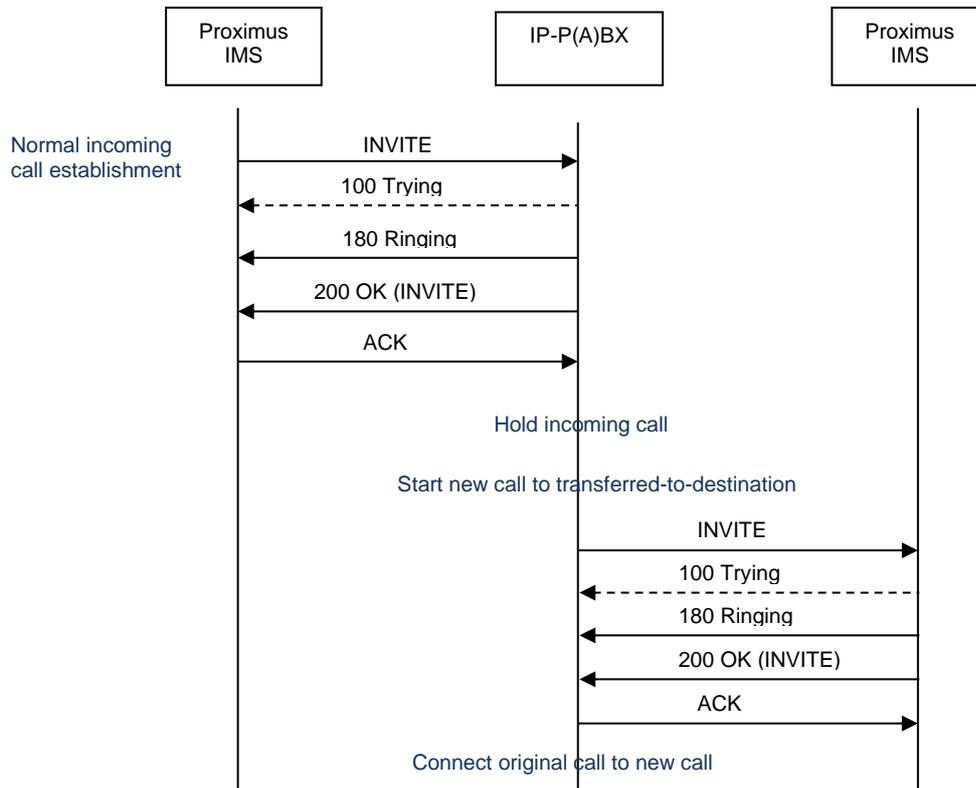

Figure 13: Call transfer without using re-*INVITE*

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.
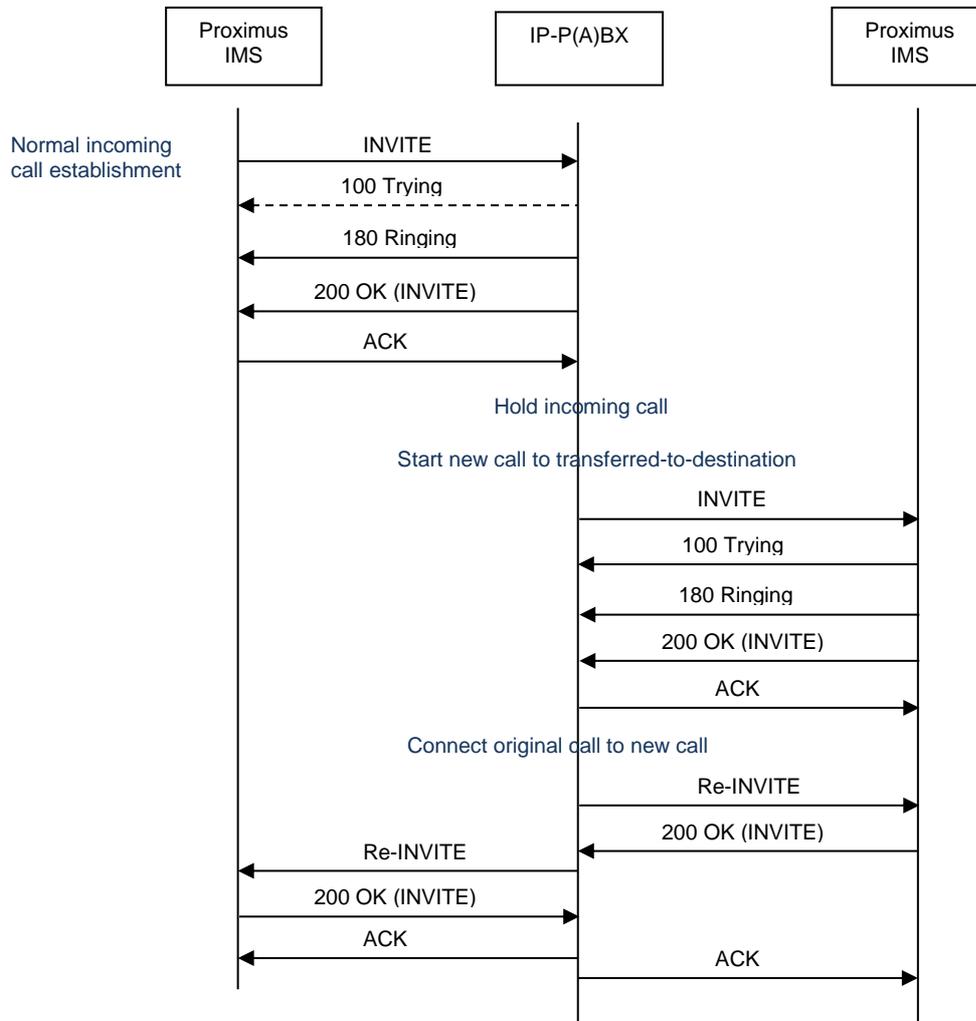

Figure 14: Call transfer using re-*INVITE*

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

<u>Live example</u>

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=z9hG4bKvqg5bgihsqgqgl51rhra354g40

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Sensitivity: Confidential

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-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: 178
User-Agent: XXXX
Route: <sip:+3227979383;tgrp=tg_af700f_000;
     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=z9hG4bKvqg5bgihsqgqgl51rhra354g40
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=0a23e829ef0703f4559ace5458222b38
    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=z9hG4bKvqg5bgihsqgqgl51rhra354g40
    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;refresher=uas
    P-Asserted-Identity: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
    To: "First83 Last83" <sip:+3227979383@ims.belgacom.be;user=phone>;
        tag=0a23e829ef0703f4559ace5458222b38
    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=z9hG4bKvqg5bgihsqgqgl51rhra354g40
    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 **32000** 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=z9hG4bKk21b5lo8pbdikoi8i2csnfpbg0-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:10.127.249.182>
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

<u>Live example</u>

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: BW082907082240111-1255895887@10.127.70.20
CSeq: 1057090886 INVITE
Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bKca2449647e3584c68b5ada9a751486a5
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 - - - -

Media Attribute Fieldname: silenceSupp
Media Attribute Value: 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: BW082907082240111-1255895887@10.127.70.20
  Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
       branch=z9hG4bKca2449647e3584c68b5ada9a751486a5
  CSeq: 1057090886 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): recvonly
    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: 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: "TEL 027979383" <sip:3227979383@10.127.249.4;user=phone>
   User-Agent: XXXX
   To: <sip:+3223379031@ims.belgacom.be;user=phone>;tag=2029194627-1295857747082-
   From: <sip:+3227979383@ims.belgacom.be;user=phone>;
        tag=0a23e829ef0703f4559ace5458222b38
   Call-ID: BW082907082240111-1255895887@10.127.70.20
   CSeq: 1057090886 ACK
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK3f39b3bfd2a071438f9147e61ffc3c73
   Max-Forwards: 70
   Content-Length: 0
```

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;lr>
   Allow: INVITE, ACK, CANCEL, BYE, OPTIONS, PRACK, REFER, NOTIFY, UPDATE
   Supported: 100rel,from-change,timer
   User-Agent: XXXX
   Session-Expires: 43200
   To: <sip:023379042@ims.belgacom.be;user=phone>
   From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
        tag=97d04fb7109bb1124e29336b8a12ed81
   Contact: "TEL 027979383"
<sip:+3227979383@10.127.249.4;transport=UDP;user=phone>
   Content-Type: application/sdp
   Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
   CSeq: 2038789414 INVITE
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK3ea4fbc8f0937f6ac950807703b5e467
   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): 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 - - - -
   Media Attribute Fieldname: silenceSupp
   Media Attribute Value: off - - - -

Status-Line: SIP/2.0 100 Trying
Message Header
  To: <sip:023379042@ims.belgacom.be;user=phone>
  From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
    tag=97d04fb7109bb1124e29336b8a12ed81
  Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
  Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
    branch=z9hG4bK3ea4fbc8f0937f6ac950807703b5e467
  CSeq: 2038789414 INVITE
  Content-Length: 0

Status-Line: SIP/2.0 180 Ringing
Message Header
  To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
  From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
    tag=97d04fb7109bb1124e29336b8a12ed81
  Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
  Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
    branch=z9hG4bK3ea4fbc8f0937f6ac950807703b5e467
  CSeq: 2038789414 INVITE
  Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
f0.ims.ims.be;transport=udp>

RSeq: 462569717
Require: 100rel
Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY,UPDATE
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 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 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): 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: a067107e28ce27edccd711170c09372a@10.127.249.4
CSeq: 2038789415 PRACK
Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bKc25a2aab6891478c0957b7824c7fa1bc
Max-Forwards: 70

Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
    To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295855779178
    From:
<sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
    Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
    Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
        branch=z9hG4bKc25a2aab6891478c0957b7824c7fa1bc
    CSeq: 2038789415 PRACK
    Server: Alcatel-Lucent-HPSS/3.0.3
    Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
    To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295855779178
    From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
        tag=97d04fb7109bb1124e29336b8a12ed81
    Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
    Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
        branch=z9hG4bK3ea4fbc8f0937f6ac950807703b5e467
    CSeq: 2038789414 INVITE
    Contact: <sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-
fo.ims.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 (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): 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: ACK sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-f0.ims.ims.be;
        transport=udp SIP/2.0
Message Header
   Route: <sip:10.127.249.182;lr>
   Contact: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>
   User-Agent: XXXX
   To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
   From: "TEL 027979383" <sip:+3227979383@10.127.249.4;user=phone>;
        tag=97d04fb7109bb1124e29336b8a12ed81
   Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
   CSeq: 2038789414 ACK
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK36c90df88f23affbf46dc237e5e14017
   Max-Forwards: 70
   Content-Length: 0

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.

<u>Live example</u>

Request-Line: INVITE sip:10.127.249.182:5060;ue-addr=impbasilab1-sig-f0.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:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
   From:
<sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
   Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
   CSeq: 2038789416 INVITE
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK30fc0ce70580565820a26527983d672d
   Max-Forwards: 70
   Content-Length: 0

Status-Line: SIP/2.0 200 OK
Message Header
   To: <sip:023379042@ims.belgacom.be;user=phone>;tag=964148310-1295857779178
   From:
<sip:+3227979383@10.127.249.4;user=phone>;tag=97d04fb7109bb1124e29336b8a12ed81
   Call-ID: a067107e28ce27edccd711170c09372a@10.127.249.4
   Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;

branch=z9hG4bK3ofc0ce70580565820a26527983d672d
CSeq: 2038789416 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: 176
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 3 IN IP4 10.127.249.182
Owner Username: BroadWorks
Session ID: 167
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 **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): rtpmap:106 TELEPHONE-EVENT/8000
Media Attribute Fieldname: rtpmap
Media Format: 106
MIME Type: TELEPHONE-EVENT
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 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: BW082907082240111-1255895887@10.127.70.20
CSeq: 1057090887 INVITE
Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK5aa09ceb34af866139b05d4b575fb9a8
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): 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): 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.

<u>Live example</u>

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: BW082907082240111-1255895887@10.127.70.20
  Via: SIP/2.0/UDP 10.127.249.4;received=10.127.249.4;rport=5060;
      branch=z9hG4bK5aa09ceb34af866139b05d4b575fb9a8
  CSeq: 1057090887 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 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]

Media format specific parameters: 0-15

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:3227979383@10.127.249.4;user=phone>
   User-Agent: XXXX
   To: <sip:+3223379031@ims.belgacom.be;user=phone>;tag=2029194627-1295857747082-
   From: <sip:+3227979383@ims.belgacom.be;user=phone>;
       tag=0a23e829ef0703f4559ace5458222b38
   Call-ID: BW082907082240111-1255895887@10.127.70.20
   CSeq: 1057090887 ACK
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK829544acdcd45c29434646bebc4ca706
   Max-Forwards: 70
   Content-Length: 0

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: "+3223379031" <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: a067107e28ce27edccd711170c09372a@10.127.249.4
   CSeq: 2038789416 ACK
   Via: SIP/2.0/UDP
10.127.249.4;rport;branch=z9hG4bK6b8a3d2088b4f0b5de9d9760ab470717
   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

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): sendrecv
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): ptime:20
  Media Attribute Fieldname: ptime
  Media Attribute Value: 20
Media Attribute (a): maxptime:60
  Media Attribute Fieldname: maxptime
  Media Attribute Value: 60

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.
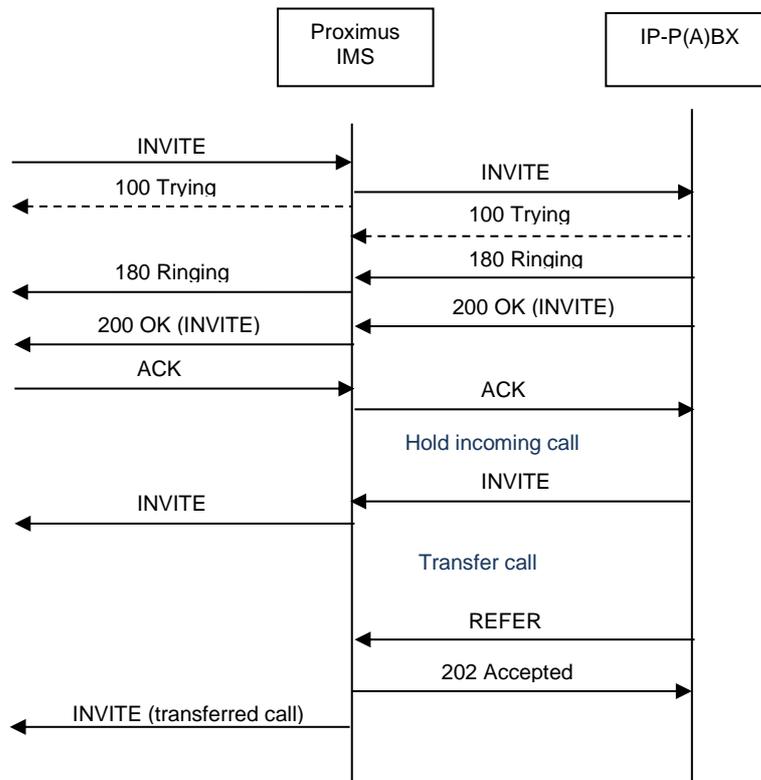
Figure 15: Call transfer using *REFER*

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 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)

6.10.2. 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.

> <u>WARNING !</u>
> 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 sent/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 adviced not to use the Retry-After header in any 5XX response, or to use a duration of less then 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 sent 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 sent 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 shalll sent 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.