Push to talk over Cellular (PoC) - Architecture

Candidate Version 1.0 – 17 March 2005

Open Mobile Alliance
OMA-AD_PoC-V1_0-20050317-C

© 2005 Open Mobile Alliance Ltd. All Rights Reserved.

Used with the permission of the Open Mobile Alliance Ltd. under the terms as stated in this document. [OMA-Template-Spec-20030824]

Contents

Figures

Tables

1. Scope

The scope of the Push to talk over Cellular (PoC) architecture document is to define the architecture for the PoC service enabler. This architecture is based on the requirements listed for the system in the PoC requirements document [PoC RD V1.0].

The architecture of the SIP/IP Core and the underlying access network for PoC is out of scope of this document. When SIP/IP Core corresponds to the 3GPP IMS the architecture the 3GPP enablers for OMA PoC services are described in [3GPP TR 23.979].

2. References

2.1   Normative References

[RFC2119]	IETF RFC 2119: "Key words for use in RFCs to Indicate Requirement Levels". S. Bradner. March 1997. URL:http://www.ietf.org/rfc/rfc2119.txt
[RFC3261]	IETF RFC 3261: "SIP: Session Initiation Protocol", J. Rosenberg et al, June 2002. URL:http://www.ietf.org/rfc/rfc3261.txt
[RFC3265]	IETF RFC 3265: "Session Initiation Protocol (SIP)-Specific Event Notification", A. B. Roach, June 2002. URL: http://www.ietf.org/rfc/rfc3265.txt?number=3265
[RFC3320]	IETF RFC 3320: "Signaling Compression (SigComp)", January 2003 URL: http://www.ietf.org/rfc/rfc3320.txt
[RFC3321]	IETF RFC 3321: "Signaling Compression (SigComp) - Extended Operations", January 2003 URL: http://www.ietf.org/rfc/rfc3321.txt
[RFC3325]	IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks", C. Jennings et al, November 2002 URL:http://www.ietf.org/rfc/rfc3325.txt**Error! Hyperlink reference not valid.**
[RFC3485]	IETF RFC 3485: "The Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Static Dictionary for Signaling Compression (SigComp)", February 2003 URL:http://www.ietf.org/rfc/rfc3485.txt
[RFC3486]	IETF RFC 3486: "Compressing the Session Initiation Protocol (SIP)", February 2003 URL:http://www.ietf.org/rfc/rfc3486.txt
[RFC3966]	"The tel URI for Telephone Numbers", H. Schulzrinne, December 2004.-12-22 URL: http://www.ietf.org/rfc/rfc3966.txt
[3GPP TS 23.002]	3GPP TS 23.002; Network architecture URL: http://www.3gpp.org/
[3GPP TS 23.060]	3GPP TS 23.060, General Packet Radio Service (GPRS); Service Description; Stage 2 URL: http://www.3gpp.org/
[3GPP TS 23.107]	3GPP TS 23.107, Quality of Service (QoS) concept and architecture URL: http://www.3gpp.org/
[3GPP TS 23.228]	3GPP TS 23.228, IP Multimedia Subsystem (IMS); Stage 2 URL: http://www.3gpp.org/
[3GPP TS 24.229]	3GPP TS 24.229, IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 URL: http://www.3gpp.org/
[3GPP TS 26.235]	3GPP TS 26.235; Packet switched conversational multimedia applications; Default codecs (Release 6)" URL: http://www.3gpp.org/
[3GPP TS32.240]	3GPP TS 32.260 Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging (Release 6) URL: http://www.3gpp.org/
[3GPP TS32.260]	3GPP TS 32.260 Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging (Release 6) URL: http://www.3gpp.org/

[3GPP TS 32.272]	3GPP TS 32.272; Push-to-Talk over Cellular (PoC) Charging URL: http://www.3gpp.org/
[3GPP2 S.R0100-0]	3GPP2 S.R0100-0 Push-to-Talk over Cellular (PoC) System Requirements, (v1.0). URL:http://www.3gpp2.org/
[3GPP2 X.S0013.2]	3GPP2 X.S0013.2 IP Multimedia Subsystem (IMS); Stage 2 URL:http://www.3gpp2.org/
[3GPP2 X S0013.4]	3GPP2 X.S0013.4 IP Multimedia Call Control Protocol, Based on SIP and SDP stage 3 URL:http://www.3gpp2.org/
[ITU-T E.164]	"The international public telecommunication numbering plan", ITU-T Recommendation E.164. URL: http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=T-REC-E.164
[OMA DM]	OMA Device Management, V1.1.2 (based on SyncML DM) URL:http://www.openmobilealliance.com/
[Provisioning Architecture]	OMA – Provisioning Architecture Overview V1.1 URL:http://www.openmobilealliance.com/
[Provisioning Content]	OMA – Provisioning Content V1.1 URL:http://www.openmobilealliance.com/
[Provisioning UA]	OMA – Provisioning User Agent Behaviour V1.1 URL:http://www.openmobilealliance.com/
[Provisioning Bootstrap]	OMA - Provisioning Bootstrap V1.1 URL:http://www.openmobilealliance.com/
[XDM AD]	OMA Group Management Architecture V1.0 URL:http://www.openmobilealliance.com/
[Presence-AD]	OMA – Presence using SIMPLE V1.1, OMA-TS-Presence-SIMPLE-AD-V1_0 URL:http://www.openmobilealliance.com/
[PoC RD V1.0]	OMA Push to Talk over Cellular Requirements V1.0 URL:http://www.openmobilealliance.com/
[OMA PoC UP]	OMA – Push to talk over Cellular (PoC) – User Plane. OMA-TS-POC-UserPlane-V1_0. URL:http://www.openmobilealliance.com/
[OMA PoC CP]	OMA – Push to talk over Cellular (PoC) - Control Plane Document. OMA-TS-POC-ControlPlane-V1_0. URL:http://www.openmobilealliance.com/
[PoC XDM]	OMA PoC XDM Specification V1.0 URL:http://www.openmobilealliance.com/

2.2   Informative References

[WAPARCH]	"WAP Architecture". Open Mobile Alliance™. WAP-210-WAPArch. URL:http//www.wapforum.org/
[3GPP TR 23.979]	3GPP TR 23.979"3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; 3GPP enablers for OMA PoC Services; Stage 2 (Release 6)"

3. Terminology and Conventions

3.1 Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

All clauses and appendixes, except *"Scope"* and *"Introduction"*, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

For the purposes of the PoC specifications, the following terms and definitions apply.

1-1 PoC Session	A feature enabling a PoC User to establish a PoC Session with another PoC User.
1-many Session	A PoC Group Session that is not a 1-many-1 Session.
1-many-1 Session	A PoC Group Session for a Pre-arranged PoC Group in which one Participant is a Distinguished Participant and each other Participant is an Ordinary Participant.
Access Control	User specified rules that restrict the set of other users that may establish PoC Sessions to the user.
Ad-hoc PoC Group	An Ad-hoc PoC Group Session is a PoC Session for multiple PoC Users that does not involve the use or definition of a Pre-arranged or Chat Group.
Answer Mode	The current Answer Mode setting preference of the PoC User.
Answer Mode Indication	The Answer Mode Indication is the current Answer Mode PoC service setting of the PoC Client.
Application Server	An Application Server in 3GPP IMS or 3GPP2 MMD is a functional entity that implements the service logic for SIP sessions. When the SIP/IP Core used for the PoC service is according to 3GPP IMS or 3GPP2 MMD specifications, the PoC Server implements the Application Server functionality
Automatic Answer Mode	Automatic Answer Mode is a PoC Client mode of operation in which the PoC Client accepts a PoC Session establishment request without manual intervention from the user; Media is immediately played when received.
Chat PoC Group	A Chat PoC Group is a persistent Group in which each member individually joins the PoC Session, i.e., the establishment of a PoC Session to a Chat PoC group does not result in other members of the Chat PoC Group being invited.
Chat PoC Group Session	A Chat PoC Group Session is a PoC Session established to a Chat PoC Group.
Confirmed Indication	A Confirmed Indication is a signalling message returned by the PoC Server to confirm that the PoC Server, all other network elements intermediary to the PoC Server and a terminating PoC Client are able and willing to receive Media.
Contact List	A Contact List is a list available to the PoC User that contains the addresses of PoC Users or PoC Groups.
Control Plane	The Control Plane is the specification of the signalling between the PoC Client and PoC Server, and between PoC Servers for the Push to talk over Cellular (PoC) service.
Controlling PoC Function	The Controlling PoC Function is implemented in a PoC Server and provides centralized PoC Session handling, which includes RTP Media distribution, Talk Burst Control, policy enforcement for participation in Group Sessions, and the Participant information.
Conversation	A Conversation is a series of Talk Bursts within a PoC Session in which the inter-arrival spacing of the Talk Bursts is less than a defined time interval; typically, the Talk Bursts are associated to a logical exchange between two or more users.
Distinguished Participant	The Distinguished Participant is a Participant in a 1-many-1 Session that sends RTP Media to all Ordinary Participants, and that receives RTP Media from any Ordinary Participant.

Group	A Group is a predefined set of PoC users that is identified by a SIP URI. A PoC Client uses the Group to establish PoC Sessions and to define PoC Session access policy.
Group Advertisement	A Group Advertisement is a feature that provides the capability to inform other PoC Users of the existence of a PoC Group.
Group List	A list of members in a Pre-arranged or restricted Chat PoC Group. Each member is identified by a SIP URI or a TEL URI.
Home PoC Network	The Home PoC Network is a network comprising a SIP/IP Core and PoC Server, both operated by the user's PoC service provider. The Home PoC Network is the same as the Home Network defined in IMS and MMD specifications.
Home PoC Server	The Home PoC Server is the PoC Server owned by service provider that provides PoC service to the user.
Incoming Instant Personal Alert Barring	Incoming Instant Personal Alert Barring is a PoC service setting for the PoC Client that conveys the PoC User's desire for the PoC service to block all incoming Instant Personal Alerts.
Incoming PoC Session Barring	Incoming PoC Session Barring is a PoC service setting for the PoC Client that conveys the PoC User's desire for the PoC service to block all incoming PoC Session requests.
Instant Personal Alert	Instant Personal Alert is a feature in which a PoC User sends a SIP based instant message to a PoC User requesting a 1-1 PoC Session.
Inviting PoC Client	An Inviting PoC Client is a PoC Client that invites other PoC User(s) to a PoC Session.
Manual Answer Mode	An Inviting PoC Client is a PoC Client that invites other PoC User(s) to a PoC Session.
Media Parameters	Media Parameters are SIP/SDP based information exchanged between the PoC Server and the PoC Client that specify the characteristics of the media for a PoC Session being established or that already exists.
On-demand Session	An On-Demand Session is a PoC Session set-up mechanism in which all Media Parameters are negotiated at PoC Session establishment.
Ordinary Participant	An Ordinary Participant is a Participant in a 1-many-1 Session that is only able to send media to the Distinguished Participant, and that likewise is only able to receive media from the Distinguished Participant.
Participant	A Participant is a PoC User in a PoC Session.
Participating PoC Function	The Participating PoC Function is implemented in a PoC Server, and provides PoC Session handling, which includes policy enforcement for incoming PoC Sessions and relays Talk Burst Control messages between the PoC Client and the PoC Server performing the Controlling PoC Function. The Participating PoC Function may also relay RTP Media between the PoC Client and the PoC Server performing the Controlling PoC Function.
PoC Address	A PoC Address identifies a PoC User. The PoC Address can be used by one PoC User to request communication with other PoC Users.
PoC Client	A PoC Client is a PoC functional entity that resides on the PoC User Equipment that supports the PoC service.
PoC Group	A PoC Group is a predefined set of PoC Users together with its attributes. A PoC Group is identified by a SIP URI.
PoC Group Identity	The PoC Group Identity is a SIP URI of the Pre-arranged PoC Group or Chat PoC Group.
PoC Group Session	A PoC Group Session is a Pre-arranged PoC Group, Ad-hoc PoC Group or Chat PoC Group Session.
PoC Server	The PoC Server implements the 3GPP IMS and 3GPP2 MMD application level network functionality for the PoC service. A PoC Server may perform the role of the Controlling PoC Function or Participating PoC Function, or both at the same time.
PoC Service Setting	The PoC Service Settings are Answer Mode Indication, Incoming PoC Session Barring and Incoming Instant Personal Alert Barring.
PoC Session	A PoC Session is a SIP Session established by the procedures of this Specification. This Specification supports the following types of PoC Sessions: 1-1 PoC, Ad-hoc PoC Group, Pre-

	arranged PoC Group, or Chat PoC Group Session.
PoC Session Identifier	The PoC Session Identifier is an identifier in the User Plane associated with a PoC Session that uniquely distinguishes a particular PoC Session from all other PoC Sessions, including those that currently exist and those that do not.
PoC Session Identity	SIP URI received by the PoC Client during the PoC Session establishment in the Contact header and in the TBCP Connect message in case of using Pre-established Session.
PoC Session Owner	The PoC Session Owner in the case of 1-1 PoC Session and Ad-hoc PoC Group Session is the initiator of the PoC Session. In the case of a Chat PoC Group and a Pre-arranged PoC Group Session, the PoC Session Owner is the creator of the PoC Group.
PoC Subscriber	A PoC Subscriber is one whose service subscription includes the PoC service. NOTE: In [PoC RD V1.0] the term "PoC Subscriber" is sometimes used to mean the same as term "PoC User" in [OMA PoC AD], [OMA PoC CP] and [OMA PoC UP].
PoC User	A PoC User is a user of the PoC service. NOTE: In [PoC RD V1.0] the term "PoC Subscriber" is sometimes used to mean the same as term "PoC User" in [OMA PoC AD], [OMA PoC CP] and [OMA PoC UP].
Pre-arranged PoC Group	A Pre-arranged PoC Group is a persistent PoC Session Identity that has an associated set of PoC members. The establishment of a PoC Session to a prearranged PoC Group results in all members being invited.
Pre-established Session	The Pre-established Session is a SIP Session established between the PoC Client and the PoC Server that performs the Participating PoC Function. The PoC Client establishes the Pre-established Session prior to making requests for PoC Sessions to other PoC users. To establish a PoC Session based on a SIP request from the user, the PoC Server conferences other PoC Servers/Users to the Pre-established Session so as to create an end-to-end connection.
Primary PoC Session	The Pre-established Session is a SIP Session established between the PoC Client and the PoC Server that performs the Participating PoC Function. The PoC Client establishes the Pre-established Session prior to making requests for PoC Sessions to other PoC users. To establish a PoC Session based on a SIP request from the user, the PoC Server conferences other PoC Servers/Users to the Pre-established Session so as to create an end-to-end connection.
Restricted Group	A Group that can be joined only by a PoC User that is a member of the Group. A Restricted Group has a Group List.
RTP Media	RTP Media is the media carried in an RTP payload.
Secondary PoC Session	A Secondary PoC Session is a PoC Session for which the PoC User receives media when there is no media present on the Primary PoC Session.
Served PoC User	A PoC User that obtains a PoC service from a PoC Server located in the Home PoC Network
Service Instance	A Service Instance is the instantiation of a logical connection across the radio interface associated with a particular protocol stack. Service Instances, as logical connections, are mapped onto the physical layer radio connections. A Service Instance may be closely tied to a single application level flow, e.g., a voice service instance, or may support multiple application level flows, e.g., a best effort packet data service instance.
SigComp	SIGCOMP is a signalling compression mechanism specified in [RFC3320]; SIGCOMP in PoC provides for the compression of SIP requests and responses.
Simultaneous PoC Session	When a PoC User is a Participant in more then one PoC Session simultaneously using the same PoC Client.
SIP Session	A SIP Session is a SIP dialog. From RFC 3261, a SIP dialog is defined as follows: A dialog is a peer-to-peer SIP relationship between two UAs that persists for some time. A dialog is established by SIP messages, such as a 2xx response to an INVITE request. A dialog is identified by a call identifier, local tag, and a remote tag. A dialog was formerly known as a call leg in RFC 2543.
SIP URI	From RFC 3261: "A SIP or SIPS URI identifies a communications resource" and "follows the guidelines in RFC 2396 [5]". PoC uses SIP URIs to identify PoC Clients, PoC Servers, and PoC Sessions, resource lists that point to URI lists, etc.

Talk Burst	A Talk Burst is the flow of media from a PoC Client while that has the permission to send media.
Talk Burst Control	Talk Burst Control is a control mechanism that arbitrates requests from the PoC Clients, for the right to send media.
	NOTE: In [PoC RD V1.0] the term "Floor Control" is used to mean the same as term "Talk Burst Control" in [OMA PoC AD], [OMA PoC CP] and [OMA PoC UP].
Talk Burst Control Protocol	Talk Burst Control Protocol (TBCP) is a protocol for performing Talk Burst Control, and is defined in these specifications.
Talker Identification	Talker Identification is the procedure by which the current talker's identity is determined and made known to listeners on the PoC Session.
Unconfirmed Indication	The Unconfirmed Indication is an indication returned by the PoC Server to confirm that it is able to receive media and believes the PoC Client is able to accept media; the PoC Server sends the Unconfirmed Indication prior to determining that all egress elements are ready or even able to receive media.
Unrestricted Group	An Unrestricted Group is a PoC Group that any PoC User may join.
User	A User is any entity that uses the described features through the User Equipment.
User Equipment	User Equipment is a hardware device that supports a PoC Client e.g., a wireless phone.
User Plane	The User Plane includes the media and media control signalling (e.g., Talk Burst Control Protocol) between the PoC Client and PoC Server.

3.3   Abbreviations

For the purposes of the PoC specifications, the following abbreviations apply:

AMR	Adaptive Multi Rate
EVRC	Enhanced Variable Rate Codec
CCF	Charging Collection Function
CDR	Charging Data Record
CS	Circuit-switched
DM	Device Management
DMS	Device Management Server
EBCF	Event Based Charging Function
GPRS	General Packet Radio Service
IAB	Incoming Instant Personal Alert Barring
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identifier
ISC	IMS Service Control Interface
MSISDN	Mobile Subscriber International Integrated Services Digital Network Number
OMA	Open Mobile Alliance
PDN	Packet Data Network
PDP	Packet Data Protocol
PoC	Push to talk over Cellular
QoS	Quality of Service
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol

SIP	Session Initiation Protocol
UE	User Equipment
UP	User Plane
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
XCAP	XML Configuration Access Protocol
XDM	XML Document Management
XDMS	XML Document Management Server
XML	Extensible Mark-up Language

4. Introduction

Push to talk over Cellular (PoC) is intended to provide rapid communications for business and consumer customers of mobile networks. PoC will allow user voice and data communications shared with a single recipient, (1-to-1) or between groups of recipients as in a group chat session, (1-to-many) such as in *Figure 1 "Example of a PoC 1-to-many Group session (voice transmission"* below.
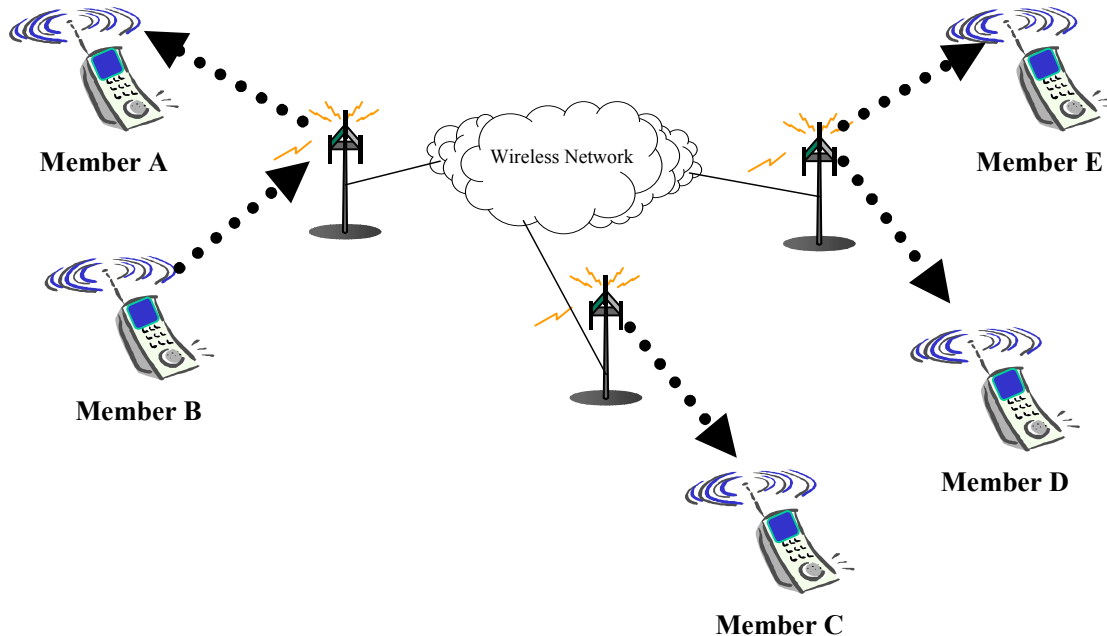
Figure 1: Example of a PoC 1-to-many Group Session (voice transmission)

Existing solutions that offer walkie-talkie like services typically consist of mobile terminals with dedicated talk buttons, supported by networks that support the exchange of signalling messages to establish and maintain a push to talk call, report the presence of users, etc. Such implementations use proprietary messaging protocol among the various entities, such as the mobile terminal and the network.

OMA-PoC seeks interoperability among the network entities to avoid market fragmentation, by realising the PoC service in a widely acceptable and standardised manner.

5. Architecture

In PoC 1.0, PoC Client and PoC Server use and interact with certain enablers as shown in the Figure 2 *"Logical architecture of PoC"*.
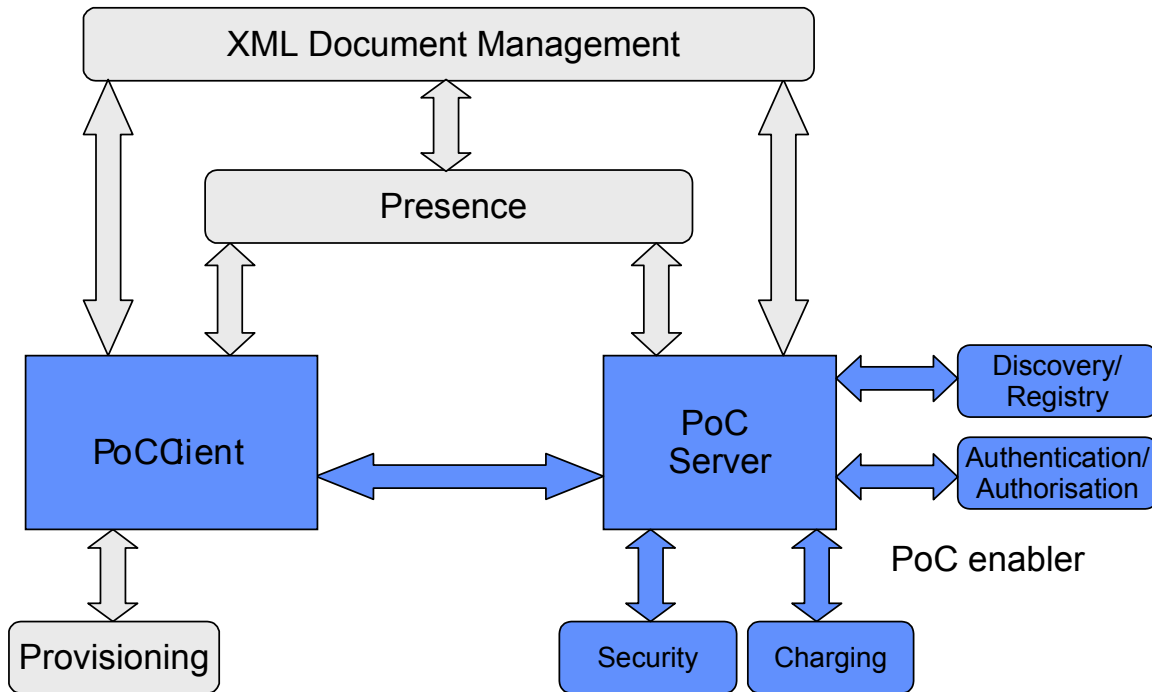
Figure 2: Logical architecture of PoC.

The XML Document Management service enabler is described in [XDM AD]. The XDM functional entities are the Aggregation Proxy (as specified in subclause 6.2.3 *"Aggregation Proxy"*) and Shared XDMS (as specified in subclause 6.2.2 *"Shared XML Document Management Server (XDMS)"*). The PoC Server interacts with the Shared XDMS over the POC-2, XDM-2, and POC-5 reference points.

The Presence service enabler is described in [Presence AD]. The Presence functional entities are the Presence Server (as specified in subclause 6.2.4 *"Presence Server"*), Presence Source (as specified in subclause 6.2.5 *"Presence Source"*), and Watcher (as specified in subclause 6.2.6 *"Watcher"*). The PoC Server can assume the role of a Presence Source and/or Watcher, and interacts with the Presence Server over the POC-2 and PRS-3 reference points. The PoC service interactions with Presence service functionality are further specified in subclause 8.17 "*Presence*".

Discovery/Registry functionality is described in the subclauses 8.5 *"Registration"*. The Authentication/Authorization is described in the subclause 8.7 *"Security"*. Charging functionality is described in the subclause 8.15 *"Charging"*. Security is described in the subclause 8.7 *"Security"*. Provisioning functionality is described in the subclause 8.24 *"PoC service provisioning"*.

Figure 3: PoC architecture" describes the functional entities and reference points that are involved in the support of the PoC service.
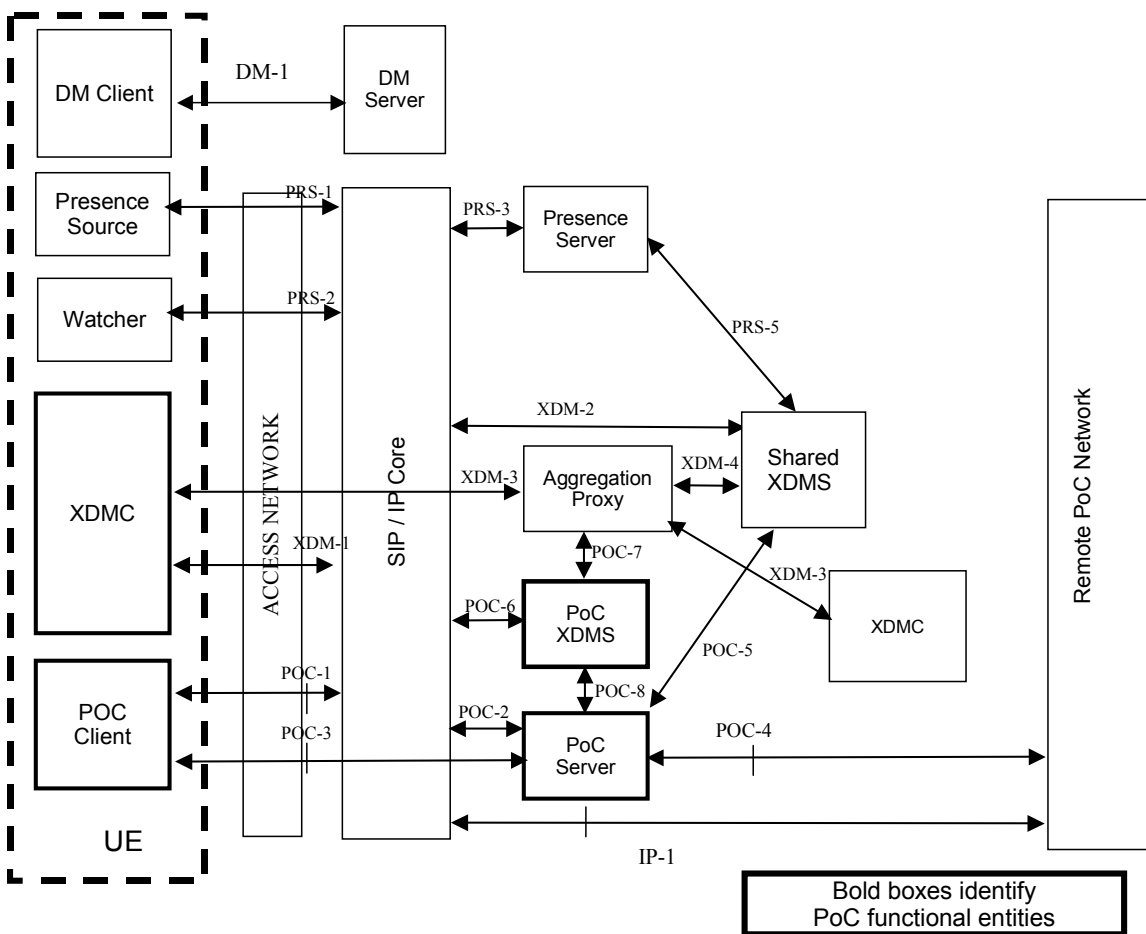
Note: There are other interfaces in addition to those shown on the figure.

Figure 3: PoC architecture

Reference Point	Usage	Protocol
POC-1	PoC Client to SIP/IP Core Session signalling	SIP
POC-2	SIP/IP Core to PoC Server Session signalling	SIP
POC-3	Media and Talk Burst Control	RTP RTCP The media transport utilizes RTP protocol. Talk Burst Control protocol utilizes RTCP APP message protocol. The access network used by the PoC architecture includes both the radio access as well as the other nodes required to gain IP connectivity and IP mobility.

POC-4	Media and Talk Burst Control between networks	RTP RTCP The media transport utilizes RTP protocol. Talk Burst Control protocol utilizes RTCP APP message protocol.
POC-5	Shared XDMS to PoC Server	XCAP
POC-6	SIP/IP Core to PoC XDMS	SIP
POC-7	PoC XDMS to Aggregation proxy	XCAP
POC-8	PoC Server to PoC XDMS	XCAP
XDM-1	XDMC to SIP/IP Core	See [XDM AD]
XDM-2	Shared XDMS to SIP/IP Core	See [XDM AD]
XDM-3	XDMC to Aggregation Proxy	See [XDM AD]
XDM-4	Aggregation Proxy to the Shared XDMS	See [XDM AD]
PRS-1	Presence Source to SIP/IP Core	See [Presence AD]
PRS-2	Watcher to SIP/IP Core	See [Presence AD]
PRS-3	SIP/IP Core to Presence Server	See [Presence AD]
PRS-5	Shared XDMS to Presence Server	See [Presence AD]
IP-1	Session signalling between networks	SIP
DM-1	DM Client to DM Server	See [OMA-DM]

Table 1: Reference points and associated protocols.

PoC SHALL utilize SIP/IP Core based on capabilities from IMS as specified in 3GPP ([3GPP TS 23.228]) and 3GPP2 ([3GPP2 X.S0013.2]).

6. Description of functional entities

6.1 PoC functional entities

6.1.1 PoC Client

The PoC Client resides on the mobile terminal and is used to access the PoC service.

The PoC Client SHALL be able to:

- Allow PoC Session initiation, (e.g. codec negotiation), participation (e.g., talk or listen), and release.

- Perform registration with the SIP/IP Core.

- Authentication of the PoC User to the SIP/IP Core.

- Generate and send Talk Bursts by recording and encoding audio.

- Receive Talk Bursts and generate audio by decoding the received Talk Bursts.

- Support Talk Burst Control procedures and Talk Burst Control Protocol negotiation.

- Incorporate PoC configuration data provided by the DM Client.

- Support the capability of a PoC User to set the Answer Mode Indication (Manual Answer, Automatic Answer) the Incoming PoC Session Barring and Incoming Instant Personal Alert Barring.

- Support User Plane adaptation procedures if initiated by the PoC Server.

- Support receiving of Instant Personal Alert.

The PoC Client MAY:

- Support sending of Instant Personal Alert

- Provide Group Advertisement

- Support multiple Talk Burst Control Protocols.

- Support Talk Burst request queuing that may be based on priority or timestamp.

- Send quality feedback reports after end of Talk Burst.

- Support for Pre-established Sessions.

- Support Simultaneous Sessions.

- Support Session on-hold procedures.

- Request privacy for User identity.

6.1.2 XML Document Management Client

The XML Document Management Client (XDMC) is an XCAP client which manages XML documents stored in the network (e.g. PoC-specific documents in the PoC XDMS, URI lists used as e.g. Contact Lists in the Shared XDMS, etc). Management features include operations such as create, modify, retrieve, and delete.

The XDMC is also able to subscribe to changes made to XML documents stored in the network, such that it will receive notifications when those documents change.

The XDMC can be implemented in a UE or fixed terminal.

This entity is specified in [XDM AD].

6.1.3   PoC Server

The PoC Server implements the application level network functionality for the PoC service.

The PoC Server performs a Controlling PoC Function and/or Participating PoC Function. The Controlling PoC Function and Participating PoC Function are different roles of the PoC Server. The figures in this subclause show the flow of signalling traffic and media and media-related signalling traffic between Controlling PoC Function and Participating PoC Function in various configurations. Unless otherwise noted, the traffic flows shown in each figure apply to both signalling traffic and media and media-related signalling traffic in that configuration.

Figure 4 *"Relationship between Controlling PoC Function, Participating PoC Functions and the PoC Clients"* shows the distribution of the functionality during a 1-1 PoC Session in a single Network. A PoC Server MAY perform both a Controlling PoC Function and a Participating PoC Function at the same time.
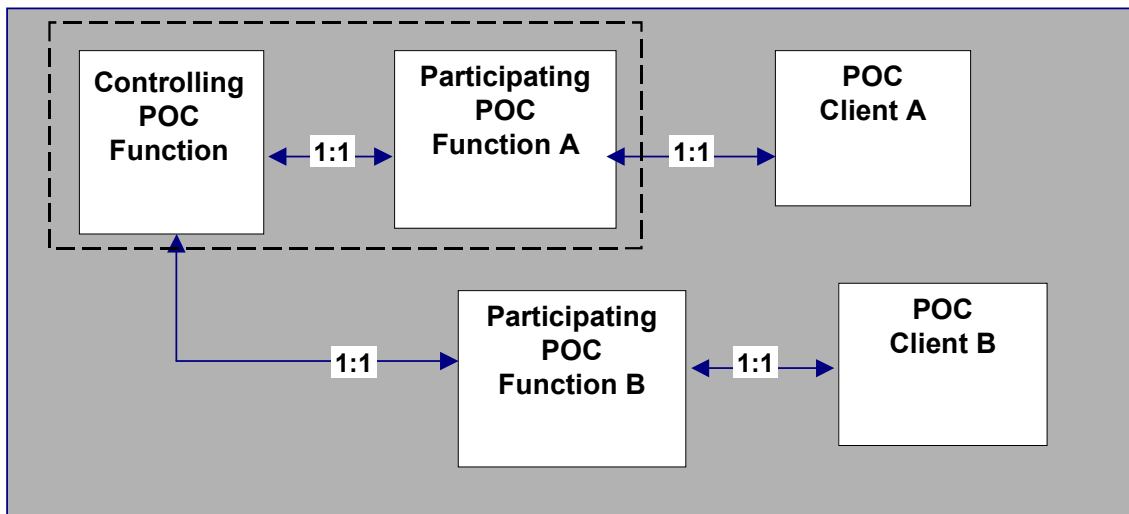
Figure 4: Relationship between Controlling PoC Function, Participating PoC Functions and the PoC Clients

The determination of the PoC Server role (Controlling PoC Function and Participating PoC Function) takes place during the PoC Session setup and lasts for the duration of the whole PoC Session. In case of 1-1 PoC Session and Ad-hoc PoC Group Session the PoC Server of the inviting User SHALL perform the Controlling PoC Function. In case of the Chat PoC Group and Pre-arranged Group Session the PoC Server owning/hosting the Group Identity SHALL perform the Controlling PoC Function.
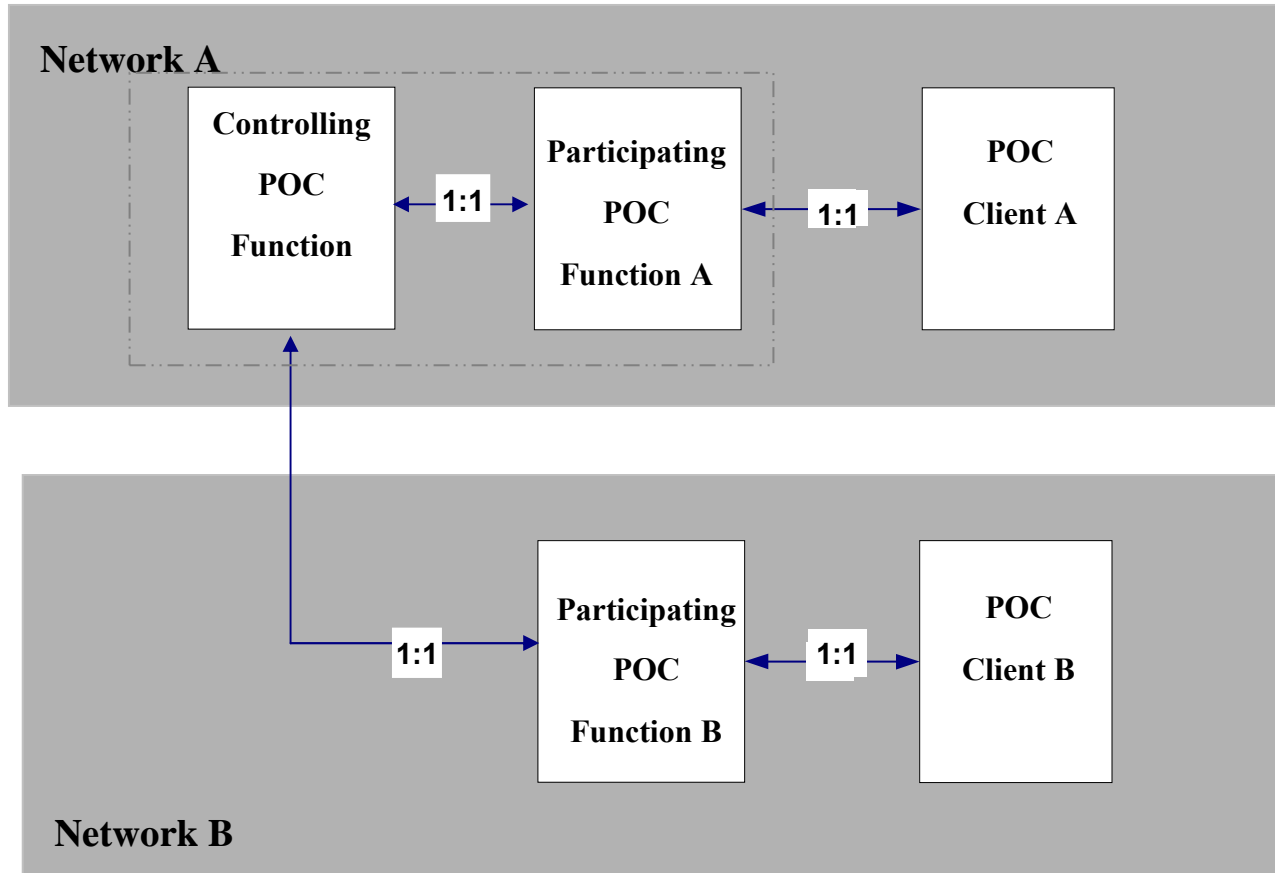
Figure 5: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for 1-1 PoC Session

In a PoC Session there SHALL be only one PoC Server performing the Controlling PoC Function. There MAY be one or more PoC Servers performing the Participating PoC Function in the PoC Session. Figure 5 *"Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for 1-1"* shows the distribution of the functionality during a 1-1 PoC Session in a multiple network environment.

The PoC Server performing the Controlling PoC Function has *N* number of SIP Sessions and media and Talk Burst Control communication paths in one PoC Session, where *N* is number of Participants in the PoC Session. The PoC Server performing the PoC Controlling Function will have no direct communication to the PoC Client for PoC Session signalling, but will interact with the PoC Client via the PoC Server performing the Participating Functioning for the PoC Client.

The PoC Server performing the Controlling PoC Function will normally also route media and media-related signalling such as Talk Burst Control messages to the PoC Client via the PoC Server performing the Participating PoC Functioning for the PoC Client. However, local policy in the PoC Server performing the Participating PoC Function MAY allow the PoC Server performing the Controlling PoC Function to have a direct communication path for media and media-related signalling to each PoC Client. Figure 6 *"Direct media flow between Controlling PoC Function and PoC Client"* shows the signalling and media paths in this configuration for a Controlling PoC Function, Participating PoC Function and PoC Client served in the same network.

A PoC Server performing the Participating PoC Function has always a direct communication path with a PoC Client and a direct communication path with the PoC Server performing the Controlling PoC Function for PoC Session signalling.
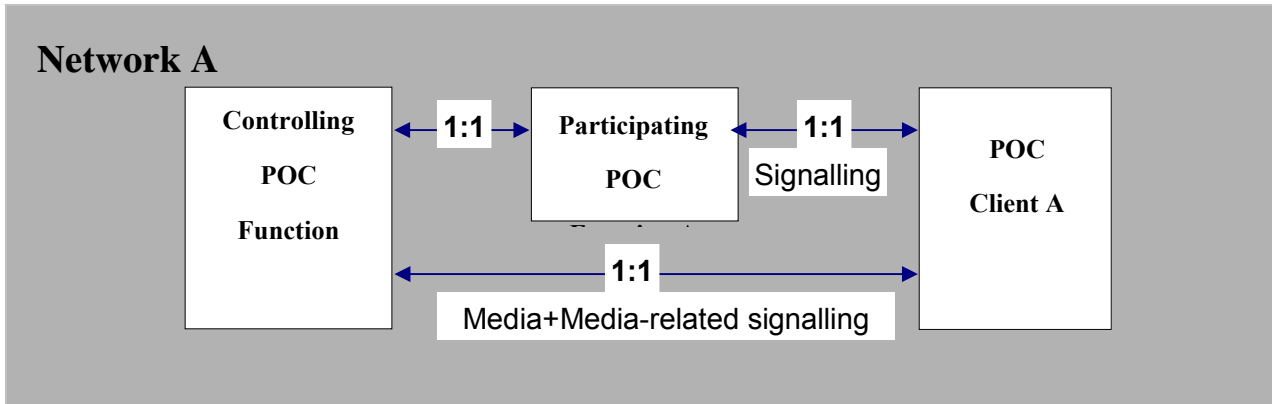
Figure 6: Direct media flow between Controlling PoC Function and PoC Client

Figure 7 *"Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for PoC Group Session"* depicts the relation between the Controlling PoC Function, Participating PoC Function and the PoC Client in multiple network environment for a PoC Group Session.
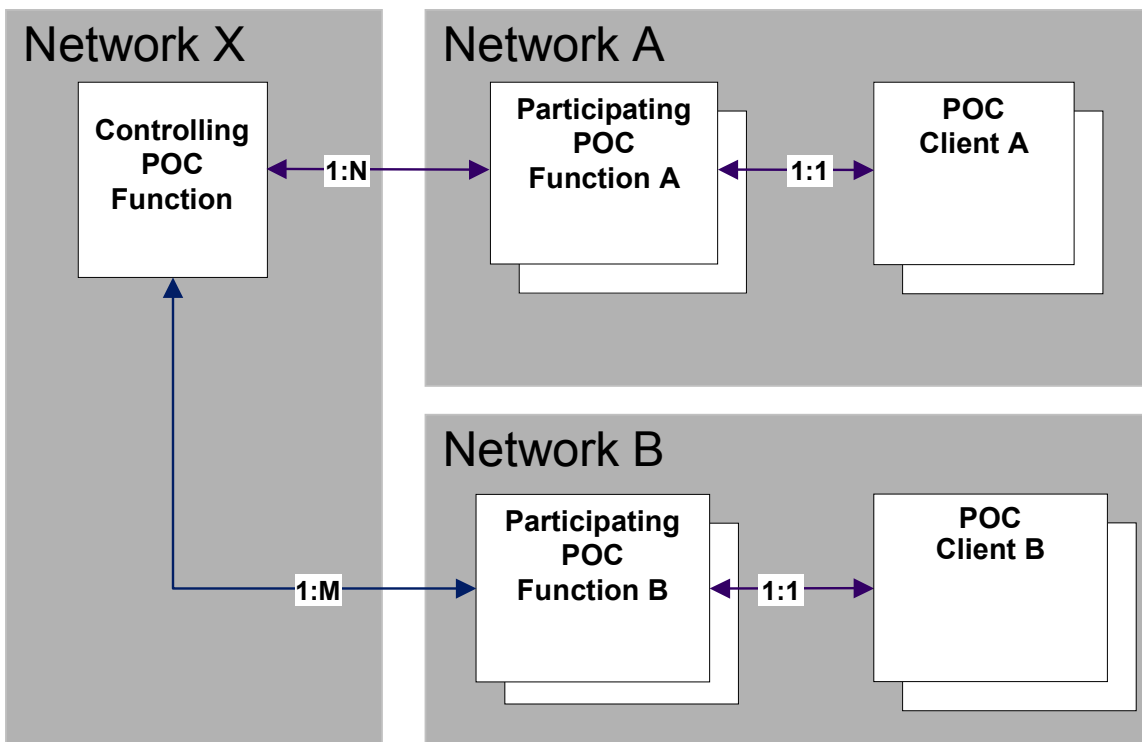
Figure 7: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for PoC Group Session

6.1.3.1   Controlling PoC Function

The PoC Server SHALL perform the following functions when it fulfils the Controlling PoC Function:

- Provides centralized PoC Session handling

- Provides the centralized media distribution

- Provides the centralized Talk Burst Control functionality including Talker Identification

- Provides SIP Session handling, such as SIP Session origination, release, etc.

- Provides policy enforcement for participation in Group Sessions

- Provides the Participants information

- Provides for privacy of the PoC Addresses of Participants

- Collects and provides centralized media quality information

- Provides centralized charging reports

- Supports User Plane adaptation procedures

- Support Talk Burst Control Protocol negotiation.

The PoC Server MAY perform the following function when it fulfils the Controlling PoC Function:

- Provide transcoding between different codecs.

6.1.3.2   Participating PoC Function

The PoC Server SHALL perform the following functions when it fulfils the Participating PoC Function:

- Provides PoC Session handling

- Supports the User Plane adaptation procedures

- Provides SIP Session handling, such as SIP Session origination, release, etc, on behalf of the represented PoC Client

- Provides policy enforcement for incoming PoC Session (e.g. Access Control, Incoming PoC Session Barring, availability status, etc)

- Provides the Participant charging reports

- Supports Talk Burst Control Protocol negotiation

- Stores the current Answer Mode, Incoming PoC Session Barring and Incoming Instant Personal Barring preferences of the PoC Client.

- Provides for privacy of the PoC Addresses of Participants

The PoC Server MAY perform the following functions when it fulfils the Participating PoC Function:

- Provide the Talk Burst Control message relay function between PoC Client and PoC Server performing Controlling PoC Function

When the Participating PoC Function is on the media path, the PoC Server SHALL:

- relay RTP Media packets between the PoC Client and the PoC Server performing the Controlling PoC Function

- provide the Talk Burst Control message relay function between PoC Client and PoC Server performing the Controlling PoC Function

- collect and provide media quality information

When the Participating PoC Function is on the media path, the PoC Server MAY:

- provide filtering of the media streams in the case of Simultaneous PoC Sessions

- provide transcoding between different codecs

The Participating PoC Function is performed once per PoC Client for all incoming/outgoing PoC Sessions.

The Participating PoC Function MAY support Simultaneous PoC Sessions for the PoC Client. The Participating PoC Function MAY have 0 to M number of PoC Sessions for the PoC Client, where M is the maximum number of Simultaneous PoC Sessions permitted to a single PoC Client. The maximum number of possible Simultaneous PoC Sessions MAY be limited by the operator or the PoC Client configuration.

Figure 8 *"Participating PoC Function with Simultaneous PoC Session support (informative)"* illustrates the Participating PoC Function sub-structure, which is informative for clarification.
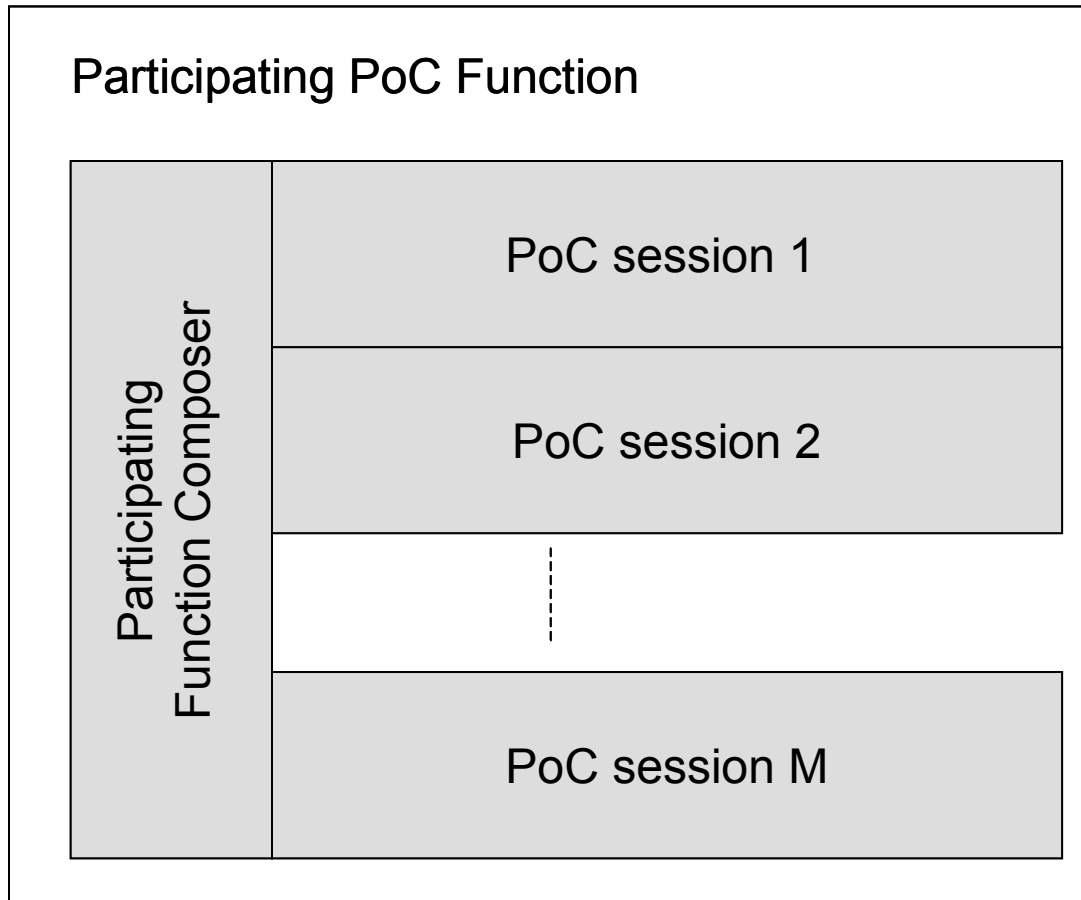
Figure 8: Participating PoC Function with Simultaneous PoC Session support (informative)

The composer MAY provide the following functions for the Participating PoC Function:

- policy enforcement for PoC Sessions (e.g. Access Control, availability status, …)

- dynamic session status information for PoC Sessions the User is currently involved in (e.g. listening, speaking, Talk Burst requesting)

- support for Simultaneous PoC Sessions (e.g. storage of multiple-session settings, priority status of all active sessions, media flow control based on priorities (optionally))

6.1.3.3 Presence functionality

The PoC Server performing the Participating PoC Function MAY act as Presence Source and Watcher towards the Presence Server on behalf of the PoC Client. The presence handling is performed via the reference points POC-2 and PRS-3. Communication between PoC Server and Presence Server is accomplished using SIP and the SIP specific event notification mechanism as specified in [RFC3261] and [RFC3265]. The details are specified in [Presence AD].

The PoC Server MAY perform the following functions when it assumes the role of a Presence Source:

- Mapping of dynamic PoC status information into Presence attributes describing the availability of the user to communicate via PoC Service

- Publish PoC-related presence information to the Presence service (on behalf of PoC Client) based on this mapping function

The PoC Server MAY perform the following functions when it assumes the role of a Watcher:

- Get/request presence information from Presence service in order to provide the mediation of presence attributes into meaning for PoC Session setup's policy enforcement (e.g. PoC Client "not reachable" status, respecting PoC Clients manually updated PoC presence settings (e.g. appear offline))

PoC Server MAY support policy enforcement for PoC Session handling based on PoC-related or general presence information (e.g. status "not reachable").

6.1.3.4 XML Document Management functionality

The PoC Server supports the following XDM functions:

- Retrieval of POC-specific XML documents from the PoC XDMS.

- Retrieval of URI lists (e.g. used as Contact Lists) from the Shared XDMS

- Subscription to the modification of XML documents stored in the PoC XDMS or Shared XDMS.

6.1.4 PoC XML Document Management Server

The PoC XDMS is an XCAP Server that manages XML documents (e.g. PoC Groups), which are specific to the PoC Service enabler (see [PoC XDM]). Management features include operations such as create, modify, retrieve, and delete.

The PoC XDMS is also able to accept subscriptions and notify watchers of changes to the stored PoC-specific documents.

The POC XDMS supports the following functions:

- Performs authorization of incoming SIP and XCAP requests.

- Manages XML documents (e.g. PoC Groups and authorization rules), which are specific to the POC service enabler.

- Enables single subscription to changes to multiple documents stored in the PoC XDMS.

- Notifies subscribers of changes to the PoC-specific documents stored in the network.

6.2   External entities providing services to PoC system

6.2.1   SIP/IP Core

The SIP/IP Core includes a number of SIP proxies and SIP registrars. The SIP/IP Core performs the following functions that are needed in support of the PoC service:

Routes the SIP signalling between the PoC Client and the PoC Server:

- Provides discovery and address resolution services

- Supports SIP compression

- Performs authentication and authorization of the PoC User at the PoC Client based on the PoC User's service profile

- Maintains the registration state

- Provides support for identity privacy on the Control Plane

- Provides charging information

- Provides capabilities to lawful interception.

Part of the lawful interception functionality MAY be supported by the access network.

When SIP/IP Core is based on the 3GPP IMS or 3GPP2 MMD, the SIP/IP Core architecture is specified in [3GPP TS 23.228] or [3GPP2 X.P0013.2] respectively.

6.2.2   Shared XML Document Management Server (XDMS)

The Shared XDMS is an XCAP server that manages XML documents (e.g. Contact Lists) that are needed for the PoC service, and which may be shared with other service enablers (e.g. Presence). Management features include operations such as create, modify, retrieve, and delete.

The Shared XDMS is also able to accept subscriptions and notify Watchers of changes to the stored shared documents.

This entity is specified in [XDM AD].

6.2.3   Aggregation Proxy

The Aggregation Proxy acts as the single contact point for the XDMC. The Aggregation Proxy performs authentication of the XDMC, and routes individual XCAP requests to the correct XDMS. The Aggregation Proxy MAY optionally support charging and compression of XML documents over the radio interface.

This entity is specified in [XDM AD].

6.2.4   Presence Server

The Presence Server is an entity that accepts, stores, and distributes presence information about PoC Clients. The presence information MAY be published by the Presence Source in the UE, or by the PoC Server on behalf of the PoC Client. The presence information MAY be fetched or subscribed to by the Watcher in the UE, or by the PoC Server on behalf of the PoC Client.

NOTE: The address of the Presentity for PoC presence information needs to be the same as the PoC Address.

This entity is specified in [Presence AD].

6.2.5   Presence Source

The Presence Source is an entity that provides (publishes) presence information to a Presence service.

This entity is specified in [Presence AD].

6.2.6   Watcher

A watcher is an entity that requests presence information about a Presentity, or Watcher Information about a Watcher, from the Presence service.

This entity is specified in [Presence AD].

6.2.7   Charging Entity

This is an external entity, which MAY reside in the operator's domain. This entity takes various roles, which network operators and/or service providers need to perform the charging activities.

6.2.8   Device Management Client

The DM Client resides on the mobile terminal and is used to access the Device Management Server.

The Device Management Client is able to:

- receive the initial parameters needed for PoC service sent by service provider by using mechanisms specified in [Provisioning Architecture].

- update the parameters needed for PoC service sent by service provider by using [OMA-DM].

The exact syntax and definition of parameters needed for PoC service are specified in [Provisioning Content]. The bootstrap mechanism defined in [Provisioning Bootstrap] and [OMA-DM] SHALL be used to enhance the security of the provisioning.

6.2.9   Device Management Server

The Device Management Server (DMS) performs the following functions that are needed in support of the PoC service:

- Initialises and updates all the configuration parameters necessary for the PoC Client.

- Supports software update for application upgradeable handsets.

- Supports the details of the protocol, especially the security mechanisms, that depend on the network technology as specified in [OMA-DM]

7. Description of the reference points

7.1 Reference point POC-1: PoC Client – SIP/IP Core

The POC-1 reference point supports the communication between the PoC Client and the SIP/IP Core. The protocol for the POC-1 reference point is SIP.

This reference point SHALL support the following:

- PoC Session signalling between the PoC Client and the PoC Server

- Provides discovery and address resolution services

- Provides SIP compression

- Performs authentication and authorization of the PoC User at the PoC Client based on the PoC User's service profile

- Provides PoC Client registration

- Indication of capabilities for PoC

- Relaying PoC Service Settings (Answer Mode Indication, Incoming PoC Session Barring and Incoming Instant Personal Alert Barring) to the PoC Server

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-1 reference point SHALL conform to the Gm reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.2 Reference point POC-2: SIP/IP Core – PoC Server

The protocols over POC-2 reference point support the communication between the SIP/IP Core and the PoC Server for SIP Session control. The POC-2 reference point is based on SIP.

The POC-2 reference point SHALL support the following:

- PoC Session signalling between the PoC Client and the PoC Server

- Provides address resolution services

- Provides charging information

- Publication of Presence information from the PoC Server to the Presence Server

- Subscription to Presence information by the PoC Server to the Presence Server

- Notification of Presence information by the Presence Server to the PoC Server

- Indication of capabilities for PoC

- Relaying of PoC Service Settings (Answer Mode Indication, Incoming PoC Session Barring and Incoming Instant Personal Alert Barring) from the PoC Client

- Subscription to the modification of XML documents stored in the PoC XDMS or Shared XDMS.

- Notification of modifications made to documents stored in the PoC XDMS or Shared XDMS.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-2 reference point SHALL conform to the ISC reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.3   Reference point POC-3: PoC Client-PoC Server

The POC-3 reference point is between the PoC Client and the PoC Server. The protocols for the POC-3 reference point are RTP/RTCP [RFC3550]. RTP protocol will be used for media transport, RTCP APP messages shall be supported for the transport of the Talk Burst Control procedures. Other protocols for the Talk Burst Control procedure may be negotiated.

The POC-3 reference point SHALL support:

- media transport

- Talk Burst Control procedures

- feedback of the quality of received media.

The POC-3 reference point SHALL exist between a PoC Client and a PoC Server accessing the SIP/IP Core serving the PoC Client. The POC-3 reference point MAY exist between a PoC Client and a PoC Server accessing different SIP/IP Cores, e.g. to allow direct media flow between the PoC Client and the PoC Server supplying the Controlling PoC Function.

NOTE: Provision of a POC-3 reference point between a PoC Client and a PoC Server accessing different SIP/IP Cores, when the SIP/IP Cores are controlled by different operators, may be subject to an inter-operator agreement.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-3 reference point SHALL use the services of the Mb reference point [3GPP TS 23.002] and ii reference point [3GPP2 X.S0013.2].

7.4   Reference point POC-4: PoC Server – PoC Server

The POC-4 reference point supports the User Plane communication between the PoC Servers. The protocols for the POC-4 reference point are RTP/RTCP [RFC3550]. RTP protocol will be used for media transport, RTCP APP messages shall be supported for the transport of the Talk Burst Control procedures. Other protocols for the Talk Burst Control procedure may be negotiated.

The POC-4 reference point SHALL support the following:

- media transport

- Talk Burst Control procedures

- feedback of the quality of received media.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-4 reference point SHALL use the services of the Mb reference point [3GPP TS 23.002], [3GPP2 X.S0013.2].

7.5   Reference point POC-5: PoC Server – Shared XDMS

The POC-5 reference point supports communication between the Shared XDMS and the POC server. The protocol for the POC-5 reference point is XCAP.

The POC-5 reference point provides the following functions:

- Retrieval of URI Lists from the Shared XDMS.

7.6   Reference point POC-6: SIP/IP Core – PoC XDMS

The POC-6 reference point supports communication between the POC XDMS and the SIP/IP Core. The protocol for the POC-6 reference point is SIP.

The POC-6 reference point provides the following functions:

- Subscription to the modification of POC-specific XML documents.

- Notification of the modification of POC-specific XML documents.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the XDM-8 reference point SHALL conform to the ISC reference point [3GPP TS 23.002, 3GPP2 X.S0013.0].

7.7 Reference point PoC-7: Aggregation Proxy – PoC XDMS

The POC-7 reference point supports communication between the Aggregation Proxy and the POC XDMS. The protocol for the POC-7 reference point is XCAP.

The POC-7 reference point provides the following functions:

- POC-specific XML document management (e.g. create, modify, retrieve, delete).

7.8 Reference point POC-8: PoC Server – PoC XDMS

The POC-8 reference point supports communication between the POC Server and the POC XDMS. The protocol for the POC-8 reference point is XCAP.

The POC-8 reference point supports the following:

- Retrieval of POC-specific XML documents from the POC XDMS.

7.9 Reference point XDM-1: XDM Client – SIP/IP Core

The functionality of the XDM-1 reference point is specified in [XDM AD].

7.10 Reference point XDM-2: Shared XDMS – SIP/IP Core

The functionality of the XDM-2 reference point is specified in [XDM AD].

7.11 Reference point XDM-3: XDM Client – Aggregation Proxy

The functionality of the XDM-3 reference point is specified in [XDM AD].

7.12 Reference point XDM-4: Aggregation Proxy – Shared XDMS

The functionality of the XDM-4 reference point is specified in [XDM AD].

7.13 Reference point PRS-1: Presence Source – SIP/IP Core

The functionality of the PRS-1 reference point is specified in [Presence AD].

7.14 Reference point PRS-2: Watcher - SIP/IP Core

The functionality of the PRS-2 reference point is specified in [Presence AD].

7.15 Reference point PRS-3: SIP/IP Core – Presence Server

The functionality of the PRS-3 reference point is specified in [Presence AD].

7.16 Reference point PRS-5: Shared XDMS – Presence Server

The functionality of the PRS-5 reference point is specified in [Presence AD].

7.17 Reference point IP-1: SIP/IP Core – SIP/IP Core

The IP-1 reference point supports the communication between the SIP/IP Cores. The IP-1 reference point is based on SIP.

The IP-1 reference point SHALL support the following:

  • communication and forwarding of SIP signalling messaging between SIP/IP Cores

  • transfer of inter-provider charging information.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the IP-1 reference point SHALL conform to the Mw reference point [3GPP TS 23.002] and [3GPP2 X.S0013.2].

7.18 Reference point C-5: PoC Server - Charging entity

The C-5 reference point supports the communication between the PoC Server and the Charging entity to perform the PoC-related charging activity.

When SIP/IP Core corresponds with 3GPP IMS or 3GPP2 MMD, then the C-5 reference point SHALL include the functionality provided over the Ro, Rf reference points as described in 3GPP TS 32.200 or the Ro and Rf reference points as described in 3GPP2 X.S0013-007, respectively.

7.19 Reference point DM-1: DM Client – DM Server

The DM-1 reference point supports the communication between the DM Client and the DM Server. The DM-1 reference point SHALL support

  • Transfer of the PoC Client configuration data from the DM Server.

OMA provides a general framework, which shall be used [OMA- DM] for this interface.

8. System concepts

8.1 Identification

8.1.1 PoC Address

Each PoC User SHALL have one or more PoC Addresses. A PoC Address SHALL be used by any PoC User to request communication with other PoC Users. A PoC Address is in the format of either a SIP URI or a TEL URI. At least one PoC Address SHALL be in the format of a SIP URI. The PoC Address SHALL comply either with the specification of a SIP URI in [RFC 3261], or with the specification of a TEL URI in [RFC3966]. Note that the SIP/IP Core will translate a TEL URI to a SIP URI for routing.

A PoC Address SHALL be registered with the SIP/IP Core as described in subclause 8.5 *"Registration"*. Registration of one PoC Address associated with a PoC User MAY imply registration of other PoC Addresses associated with the same User.

The PoC Address is used for PoC and other SIP based service.

Examples of PoC Addresses are:

- sip:joe.doe@operator.net;

- sip:buss2.city@operator.net;

- sip:buss2.city@poc.operator.net;

- tel:+16195551212;

- tel:5551212; phone-context = pbx.net.

8.1.2 Private User identity

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the private User identity shall be used as described in [3GPP TS 24.229, 3GPP2 X.S0013.4].

8.1.3 PoC Group Identities

A PoC Group is identified with a PoC Group Identity. The PoC Client uses group identities for addressing PoC Group sessions. The Group identity is associated with individual PoC Addresses of all the Group members. The Group identity SHALL take the form of SIP URI as defined in [RFC3261] and [RFC2396]. It SHALL be possible to create a Group identity statically and dynamically.

- An operator SHALL be able to create a static Group identity which is stored in the PoC XDMS for use in PoC Group Sessions.
- A PoC User SHALL be able to create a PoC Group which is stored in the PoC XDMS for use in PoC Group Sessions.
- The PoC User SHALL be able to create and store a Group List in the Shared XDMS as a URI list.

8.2 Addressing

8.2.1 Phone numbers

Phone numbers MAY be used as a user public identity. A PoC User MAY address another PoC User by a phone number. The PoC Client SHALL send the phone number to the SIP/IP Core in a TEL URI [RFC3966].

NOTE: Pre-arranged PoC Groups and Chat PoC Groups are addressed with SIP URIs.

The phone number MAY use the international E.164 [ITU-T E.164] format (prefixed with a '+' sign), or a local format according to rules and procedures of [RFC3966]. The SIP Core shall interpret the phone number with a leading '+' to be an E.164 number.

Addressing by TEL URI for a PoC Session requires that the PoC Server can resolve the TEL URI to a SIP URI, for instance by using DNS/ENUM or other local data base. A phone number in a local format SHALL be converted to the E.164 format before DNS/ENUM is used.

8.2.2   SIP URI

A PoC User MAY address another PoC User, Pre-arranged PoC Groups and Chat PoC Groups by a SIP URI.

8.3   Identification of inviting PoC User

The PoC Server SHALL maintain the PoC Address of the inviting PoC User used in the originating request (SIP URI, TEL URI, nick name or combination SIP URI + nick name). The PoC Server SHALL identify the Groups by SIP URI and MAY identify them by nick name.

In the case of the PoC Group Session the PoC Server SHALL provide the Group identity to the invited PoC Client(s).

The home PoC Server SHALL replace the nick name provided by the inviting PoC Client, if the nick name is configured in the home PoC Server of the inviting PoC User.

In the case the PoC Address is restricted subclause 8.8 *"Privacy"* applies.

8.4   Talker Identification

To provide the PoC Address and nick name of the Participant who has been permitted to send a Talk Burst to all listening Participants in the PoC Session the PoC Server SHALL support Talker Identification.

The Controlling PoC Server SHALL collect the PoC Address and nick name of the Participants engaged in the PoC Session when in the process of establishing the PoC Sessions with the PoC Clients, including the initiators PoC Address and nick name, which is received in the initial PoC Session establishment phase.

The Controlling PoC Server SHALL provide the address of the talking PoC Client to the listening PoC Client in the Talker Arbitration message called receiving Talk Burst indication.

In the case the PoC Address is restricted subclause 8.8 *"Privacy"* applies.

8.5   Registration

8.5.1   General

Prior to using the PoC service the UE hosting the PoC Client SHALL perform SIP registration to the SIP/IP Core according to rules and procedures of [RFC3261], which indicates the support of PoC service in the REGISTER request. The registration function is provided in the SIP/IP Core and the registration/deregistration MAY be visible to the PoC Server via the POC-2 reference point. After a successful registration a user is able to use a registered PoC Address:

- to originate PoC communication including session and session unrelated procedures;
- to receive PoC communication including session and session unrelated procedures.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS then it is possible for the network on behalf of PoC UE to register additional PoC Addresses during a SIP registration of a single PoC Address. Registering multiple PoC Addresses at once is called implicit registration. The PoC Address that is used in the registration SHALL be SIP URI according to [RFC3261] while the PoC Addresses to be registered implicitly MAY be SIP URIs or TEL URIs.

The PoC Client is responsible for maintaining its registration active by using a re-registration procedure. If the PoC Client fails to perform a successful re-registration before a registration timer expires the registration is terminated.

The PoC Client SHALL be able to terminate its registration at any point of time by using a deregistration procedure. The SIP/IP Core MAY terminate User's registration at any point of time by using a network initiated deregistration procedure.

The PoC Client SHALL indicate in the REGISTER request that this is a PoC registration so that it is possible for the SIP/IP Core to route the terminating requests to the PoC Client.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Client SHALL use 3GPP/3GPP2 IMS registration mechanisms as defined in [3GPP TS 24.229]/ [3GPP2 X.S0013.4].

8.6   Session establishment

8.6.1   General

The mobile originated procedures describe how requests are transported from the originating PoC User to the PoC Server serving the originating PoC User.

The mobile terminated procedures describe how requests are transported from the PoC Server serving the originating PoC User to the terminating PoC User.

The PoC Client, SIP/IP Core, PoC Server SHOULD be able use 3GPP/3GPP2 IMS routing mechanisms as defined in [3GPP TS 24.229][3GPP2 X.S0013.4].

8.6.1.1   Originated procedures

The PoC Client SHALL send all requests to the SIP/IP Core. The PoC Client SHALL indicate in the request that it communicates using PoC so that it is possible for the SIP/IP Core to route the request to the PoC Server.

8.6.1.2   Terminated procedures

The PoC Server SHALL send all requests to the same SIP/IP Core that it received the originating request from. The PoC Server SHALL indicate in the request that it communicates using PoC.

When the PoC Server in the terminating network receives the request it performs the necessary terminating service control. If the service control determines that the session establishment SHOULD continue then the terminating PoC Server routes the request to the terminating client via the terminating SIP/IP Core.

> NOTE: Routing of requests between domains is a function of the SIP/IP Core and is out of the scope of this specification.

8.7   Security

The security mechanism provides the protection to the PoC service environment. There are two aspects: SIP signalling security and User Plane security.

8.7.1   SIP signalling security

The PoC Client SHALL be authenticated prior to accessing the PoC service. The PoC Server SHOULD rely on the security mechanisms provided by the underlying SIP/IP Core, for securing the service environments e.g. authentication of the service usage. It is assumed that the access level security is provided by the SIP/IP Core as defined in [RFC3261] to support the integrity and confidentiality protection of SIP signalling. The SIP/IP Core needs to ensure during registration that the registered PoC Address is allocated and authorised to be used by that User in order to prevent spoofing attacks as identified in Appendix C. When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, and the user equipment contains USIM/ISIM or UIM/R-UIM, the mutual authentication SHALL be applied as specified in [3GPP TS 33.203]/[3GPP2 S.R0086-0]. For further SIP signalling, the integrity protection mechanism SHALL be used as been specified in [3GPP TS 33.203]/[3GPP2 S.R0086-0].

> NOTE: [RFC3261] mandates the support for HTTP digest authentication [RFC2617] if authentication is performed.

8.7.2   User Plane security

The PoC service User Plane communication between PoC Client and PoC Server, and between PoC Servers is protected with existing mechanisms being defined for radio access (3GPP GPRS or 3GPP2 PDN) and with secured connections between the network domains.

User Plane confidentiality is not specified in OMA PoC Release 1.

8.8   Privacy

A PoC User MAY request privacy for the identity of the user meaning that the PoC Address of the user is hidden from other PoC Users. The PoC Client SHALL use mechanisms defined in [RFC3325] to request privacy for the identity, i.e. the PoC User's PoC Address.

If an inviting, invited or joining PoC User requests privacy of his PoC Address then the following procedures SHALL take place in the system operating in the trusted domain(s):

- The PoC Server performing the Controlling PoC Function SHALL retain privacy information of the PoC Participants for the duration of the PoC Session.

- The SIP/IP Core serving the invited PoC User SHALL provide the privacy of the PoC Address of the inviting PoC User on Control Plane at the POC-1 reference point.

- The PoC Server performing the Controlling PoC Function SHALL provide the privacy of the PoC Addresses of PoC Participants when providing the Participant information notifications.

- The PoC Server performing the Controlling PoC Function SHALL provide the privacy of the PoC Address of the talking user at the POC-3 and POC-4 reference points.

If privacy for the identity is not requested then PoC Servers and SIP/IP Core passes the PoC Address of the inviting PoC User to the invited PoC User.

If privacy for the identity is not allowed in the PoC group authorization rules as specified in [PoC XDM], the involved entity SHALL reject the request.

If PoC Server or SIP/IP Core is sending or receiving SIP signalling or media traffic to/from a party which is not trusted then the involved entity SHALL remove the user's PoC Address prior sending the SIP signalling or media traffic further. When SIP/IP Core corresponds with 3GPP/3GPP2 IMS then privacy mechanisms as defined in [3GPP TS 24.229]/[3GPP2 X.S0013.4] are used.

8.9   Talk Burst Control

The half duplex nature of the PoC service requires that before a PoC Client can send a Talk Burst the PoC Client SHALL negotiate the permission to send a Talk Burst.

The PoC Server performing the Controlling PoC Function SHALL cause Talk Bursts to be arbitrated between PoC Clients as follows.

- The PoC Client SHALL send a request for the permission to send a Talk Burst to the PoC Server.

- The PoC Server SHOULD confirm the request to send a Talk Burst if no other PoC Client has the permission to send a Talk Burst. The PoC Server MAY reject a request to send a Talk Burst due to policy decision by the PoC Server.

- The PoC Server SHALL reject the request to send a Talk Burst if another PoC Client has the permission to send a Talk Burst and the PoC Server or the PoC Client does not support queuing. The PoC Server MAY queue a request to send a Talk Burst if queuing is supported by the PoC Client. The PoC Server MAY place a request in the queue depending on the priority and timestamp of the Talk Burst Request. The PoC Server MAY limit the number of positions in a Talk Burst queue.

- If the PoC Server supports more than one level of priority, the PoC Server SHALL place a request in a Talk Burst request queue according to the priority of the Participant at the PoC Client. The priority level SHALL be determined by the PoC Server and MAY be subject to a priority request received from the PoC Client. Priority levels are defined in subclause 8.9.1 *"Talk Burst request priority levels"*.

- The PoC Server MAY limit the number of positions in a Talk Burst request queue. The PoC Server SHOULD support a number of queue positions per session that is at least equal to the number of Participants in a PoC Session, up to the permitted maximum number of Participants.

- At any time there SHALL be at most one request to send a Talk Burst queued for each PoC Client in each PoC Session. If a second request is received from a PoC Client when a request is already queued and the second request has a different priority than the queued request, the PoC Server SHOULD remove the first request and queue the second request.

- The PoC Server SHALL supervise the length of a Talk Burst and SHALL revoke the permission to talk if the length exceeds a configurable maximum Talk Burst duration.

The PoC Client and the PoC Server SHALL support the following requests/responses/indications:

- Talk Burst request:

  The request is sent by the PoC Client to the PoC Server in order to request permission to send a Talk Burst. The

  request MAY include:
  o   Priority level request indicator, if queuing is supported by the PoC Client and the client requests a priority level

  o   A PoC Session identifier.

- Talk Burst Confirm response:

  The response is sent by the PoC Server to the PoC Client in order confirm that the PoC Client has obtained permission to send one Talk Burst. The response MAY include:
  o   A PoC Session identifier.

- Talk Burst Reject response:

  The response is sent by the PoC Server to the PoC Client to reject a request to send a Talk Burst. The Talk Burst reject includes:
  o   A possible reject reason SHALL include:

  o   Another PoC Client already has been given permission to send a Talk Burst and no queuing of the request is allowed;

  o   Another PoC Client already has been given permission to send a Talk Burst and the queue is full.

  o   The PoC Client is not allowed to request permission to send a Talk Burst at the moment; and,

  o   Only one Participant in the PoC Session. For example if only one Participant is left in a PoC Session

  o   A PoC Session identifier.

- Talk Burst Completed indication:

  The indication is sent by the PoC Client to the PoC Server in order to indicate that the sending of the Talk Burst is completed. The Talk Burst completed indication MAY include:
  o   A PoC Session identifier.

- No Talk Burst indication:

  The indication is sent by the PoC Server to all PoC Clients in order to inform the PoC Clients that no one has requested for the permission to send a Talk Burst at the moment and, if queuing is supported, that there is no one in the queue. The no Talk Burst indication includes:

- o   A PoC Session identifier.

- Receiving Talk Burst indication:

  The indication is sent by the PoC Server to all PoC Clients (with the exception of the PoC Client with the permission to send a Talk Burst) in a PoC session in order to inform them that another PoC Client has the permission to send a Talk Burst and that the PoC Client(s) shall prepare for receiving a Talk Burst. In case of Pre-established Session is used, the first receiving Talk Burst indication in the PoC Session is used as an indication of the incoming PoC Session.

  The receiving Talk Burst indication SHALL include:
  - o   The identity of the PoC Participant at the PoC Client sending the Talk Burst. The identity provided SHALL allow the PoC Client to determine:

  - o   The PoC Address in the case the sender don't want to be anonymous; and,

  - o   The nick name of the PoC Participant at the PoC Client sending a Talk Burst.

  - o   Receiving Talk Burst indication MAY include:

  - o   A PoC Session identifier

  - o   Acknowledgement request

  - o   Group Session identity.

- Stop Talk Burst indication:

  The indication is sent by the PoC Server to the PoC Client who has the permission to send a Talk Burst in order to revoke the permission to talk.
  The stop Talk Burst indication SHALL include:

  - o   A PoC Session identifier.

  The Stop Talk Burst indication MAY include:

  - o   Reason code. Possible reject reason MAY be:

  - o   Only one User in the PoC Session. For example if only one Participant is left in a PoC Session; and,

  - o   Talk Burst too long indicating that the Talk Burst has exceeded the maximum duration.

NOTE 1:   The maximum duration time is a configurable parameter.

  - o   A retry-after time value indicating how long the PoC Client has to wait before a request to send a Talk Burst will be confirmed. The parameter is only present if the permission to send a Talk Burst is revoked due to "Talk Burst is too long".

NOTE 2:   The retry-after time is a configurable parameter.

- Talk Burst Acknowledgement:

  The indication is sent by the PoC Client to the PoC Server as a response to the Receiving Talk Burst, e.g. when used as an indication of the incoming PoC Session in case of Pre-established session.
  The Talk Burst Acknowledgement SHALL include:

  - o   A PoC Session identifier.

If the PoC Server and the PoC Client support queuing of the Talk Burst Request some or all of the following requests/responses/indications SHALL be supported:

- Talk Burst Request Queue Posotion Status message:

  The response is sent by the PoC Server to the PoC Client to indicate that the Talk Burst request is queued, or to indicate changes in the status of the Talk Burst request. The indication MAY include:
  - o   Queue position.

  - o   Request priority indication

  - o   A PoC Session identifier.

- Talk Burst Queue Position request:

  The request is sent by the PoC Client to read the position in the queue. The request MAY include:
  - o   A PoC Session identifier.

  The PoC Server SHALL respond with a Talk Burst request queue position status message

Support for queued Talk Burst Control is transparent to a PoC Server performing the Participating PoC Function that is involved in media processing. The PoC Server performing the Participating PoC Function SHALL relay all messages related to Talk Burst Control to the PoC Server performing the Controlling PoC Function or PoC Client, as appropriate, in any session that is not being filtered by the PoC Server performing the Participating PoC Function, without modification of the content of the messages.

A PoC Server performing Controlling PoC Function capable of supporting queued Talk Burst Control SHOULD support queued Talk Burst Control for those PoC Clients that request it. A PoC Session MAY include both PoC Clients that do not support or request use of queued Talk Burst Control and PoC Clients that request use of queued Talk Burst Control.

8.9.1   Talk Burst request priority levels

A PoC Server or PoC Client which supports pre-emption and/or queuing of talk burst requests MAY additionally support prioritisation of Talk Burst requests.

The following priority levels are defined:

- o   Pre-emptive priority: A request to talk from a Participant with pre-emptive priority SHALL cause the current Talk Burst holder's permission to talk to be revoked immediately it is received, unless the current Talk Burst holder was also confirm response the Talk Burst with pre-emptive priority. When the Talk Burst is released or revoked, Participants with pre-emptive priority who have requested to talk SHALL be granted the Talk Burst in preference to Participants with high or normal priority.

- o   High priority: When the Talk Burst is released or revoked, Participants with high priority who have requested to talk SHALL be granted the Talk Burst in preference to participants with normal priority.

- o   Normal priority: When the talk burst is released or revoked, participants with normal priority who have requested to talk SHALL be granted the Talk Burst if and only if there are no outstanding requests from Participants with higher priority.

- o   Listen-only. A Participant with this priority is only allowed to listen. A request to talk from a Participant with listen-only priority SHALL be rejected.

A PoC Server or PoC Client which supports prioritisation SHALL support normal priority and at least one other priority level.

The PoC Server SHALL determine the highest priority level which can be granted to a PoC Client at the time the PoC Client is invited to join the PoC Session. Requests to talk from PoC Clients at the same priority level SHALL be granted in the order received.

The PoC Client MAY request to talk at a priority level that is the same as or lower than the highest priority permitted to the Participant. A PoC Client authorized for pre-emptive priority SHOULD request to talk at a priority level that is lower than pre-emptive priority unless the Participant explicitly requests to pre-empt the current speaker.

8.10 Handling of Simultaneous PoC Sessions

8.10.1 General

A PoC Client and PoC Server MAY be capable of handling Simultaneous PoC Sessions. PoC Clients capable of handling Simultaneous PoC Sessions MAY become involved in Simultaneous PoC Sessions by inviting, joining or accepting more than one PoC Sessions, if handling of Simultaneous PoC Sessions is supported by the Home PoC Server. The PoC Client SHALL be aware if the Home PoC Server supports Simultaneous PoC Sessions. The PoC Client supporting the Simultaneous PoC Sessions SHOULD learn the support of the Simultaneous PoC Sessions in the Home PoC Network via DM-1 interface. If the Home PoC Network does not support Simultaneous PoC Sessions, then

- The PoC Client SHALL not initiate PoC Session while involved already in a PoC Session

- The PoC Client, when receiving a PoC Session invitation while involved in another PoC Session, SHALL either disconnect the previous one and accept the new one or reject the new one.

If the PoC Server invites a PoC Client that does not support Simultaneous PoC Sessions to a new PoC Session, when the PoC Client is involved in another PoC Session, the PoC Client SHALL either disconnect the previous one and accept the new one or reject the new one.

Each one of the Simultaneous PoC Sessions SHALL have own SIP Session, Talk Burst control and media channel established between the PoC Client and the Home PoC Server.

8.10.2 Simultaneous PoC Session setup and control

The PoC Client, which is capable of handling Simultaneous PoC Sessions, SHALL be able to select the PoC Session priority of two priority levels (primary and secondary). At most one PoC Session MAY be primary. The rest of the PoC Sessions SHALL be secondary. The session priority is used by the Home PoC Server to filter the RTP Media to be sent to the PoC Client. Additionally the PoC Client MAY lock and unlock itself to the selected PoC Session.

Primary/secondary prioritisation SHALL be PoC User and PoC Session specific. It SHALL be possible to change the prioritisation also while the PoC Client is engaged in multiple PoC Sessions. The primary/secondary session configuration SHALL be stored in the Home PoC Server). The setting MAY be made on the session setup or on the session update. When the priority information is received it SHALL be processed by the Home PoC Server). The lock/unlock information MAY be sent by the PoC Client to the PoC Server performing Participating PoC Function similar way. When PoC Client is locked to one PoC Session, then the Home PoC Server performing Participating PoC Function SHALL not send Talk Bursts of any other PoC Session to the PoC Client until unlocked or when PoC Session is ended.

The PoC Server performing Participating PoC Function SHALL identify that the PoC Session priority and/or locking is requested. If the pre-configured setting for the priority level is not defined the PoC Server performing the Participating PoC Function SHALL update the PoC Session priority according to the request. When the session priority is set primary for the user, the possible previous primary session SHALL be automatically changed to the secondary one. If locking is requested and the PoC Server performing the Participating PoC Function allows locking for this PoC Session the PoC Server performing the Participating PoC Function SHALL lock the media stream filtering the way that this PoC Session is by-passed to the PoC Client until the PoC Session ends or it is unlocked. When locked to one PoC Session the PoC Server performing the Participating PoC Function SHALL automatically unlock the possible previous locked PoC Session. The PoC Server performing Participating PoC Function SHALL send the INVITE to the PoC Server performing the Controlling PoC Function, but without Simultaneous PoC Session specific information elements.

The session priority MAY be set also on the Pre-established Session set-up. Locking to the Pre-established Session is not relevant.

8.10.3   Setting session priority/lock-in during a PoC Session

PoC Client MAY change the PoC Session priority also during a PoC Session. In this case the PoC Client SHALL send an UPDATE to the PoC Server performing the Participating PoC Function. In this case the UPDATE SHOULD not be forwarded to the PoC Server performing Controlling PoC Function.

In the case the new PoC Session is either initiated or received, when the PoC Client is locked to another PoC Session, the PoC Client SHALL release the locking of another session by adding the unlocking request to the INVITE/UPDATE message to be able to communicate in the new PoC Session.

The PoC Server performing Participating PoC Function SHALL change the session priority and/or locking, if not permanently pre-configured.

8.10.4   RTP Media filtering of the Simultaneous PoC Sessions

PoC Client MAY participate in Simultaneous PoC Sessions. If there is RTP Media in more than one PoC Session in which the PoC Client is a Participant at the same time, the Participating PoC Function of the Home PoC Server SHALL filter the Talk Bursts so that the PoC User hears a single Conversation.

The Home PoC Server SHALL continue the by-passing the Talk Bursts from the same PoC Session until the Conversation has ended (PoC Session is inactive long enough), or when the PoC Session is put on hold (deactivate Talk Bursts) or a higher priority PoC Session is activated or another PoC Session is locked for talking/listening. On the change of the PoC Session the PoC Client SHALL release the Talk Burst if granted or queued. The RTP Media filtering SHALL be performed by the PoC User's Home PoC Server without affecting to the Controlling PoC Function.

The PoC Server SHALL by-pass the Talk Bursts of the Primary PoC Session immediately when received, even if it was by-passing Talk Burst of a Secondary PoC Session. If the PoC User was talking in a Secondary PoC Session, the Talk Burst SHALL NOT be interrupted, but the Talk Burst Control messages SHOULD be sent to the PoC Client.

Among the Secondary PoC Sessions the PoC Server SHOULD by-pass the Talk Burst of the on-going Conversation. After the silent period the Home PoC Server SHALL select the RTP Media, where Talk Burst starts first. Of the several on-going Talk Bursts the Home PoC Server SHALL select the one according to its own policy. The PoC Client MAY lock itself temporarily into one PoC Session and thus, suspend the listening of any other PoC Session after Conversation has ended, until it is unlocked. The PoC Client MAY send Talk Burst request to any of the Simultaneous PoC Sessions. The possible locking to the previous PoC Session SHALL be released, when requesting Talk Burst to another PoC Session. The PoC Server SHALL be able to grant the Talk Burst and also to start to filter the same PoC Session for sending to the PoC Client.

8.10.5   Participant information delivery

The possible changes in the RTP Media filtering selection in the PoC Server (from one PoC Session to another) SHALL NOT affect the distribution of the Participant information.

When the PoC Server changes the PoC Session being delivered to the PoC Client, the PoC Server SHALL indicate on the User Plane which PoC Session is being delivered to the PoC User. The PoC Client SHALL identify each Simultaneous PoC Session with a unique identifier allocated by the Home PoC Server (Participating PoC Function).

8.10.6   Monitoring

The PoC Server performing the Participating PoC Function SHOULD send the Talk Burst Control messages receiving Talk Burst and no Talk Burst of all Simultaneous PoC Sessions to the PoC Client.

8.10.7   Authorisation

PoC Clients MAY have a provisioned attribute to tell how many Simultaneous PoC Sessions they are allowed to participate. The PoC Server SHALL not establish more PoC Sessions to the PoC Client having already maximum amount of Simultaneous PoC Sessions. In the terminating side the PoC Client SHALL be interpreted to be busy. In the originating side the request SHALL be rejected by the Participating PoC Function.

8.11 Quality feedback

The PoC Client and the PoC Server MAY send quality feedback reports to each other during a PoC Session.

Quality feedback includes the following quality feedback reports:

- Sender Report:

  The sender of a Talk Burst sends the sender report. The sender report includes:
  o   Accumulated number of sent media packets since the start of the PoC Session.

  o   A PoC Session Identifier.

- Receiver Report:

  The receiver of a Talk Burst sends the receiver report. The receiver report includes:
  o   Accumulated number of lost media packets since the start of the PoC Session.

  o   A PoC Session Identifier.

8.12 User Plane adaptation

The available bit rate of the radio interface is influenced by: the type of the access network, different configurative means (e.g. support for IP header compression) and the current conditions on the radio access link.

In order to guarantee a sufficient voice quality, the Talk Burst (User Plane) bit rate must be reduced in case the Talk Burst bit rate is higher than the available end-to-end bit rate. The Talk Bursts bit rate SHOULD be reduced if necessary by re-negotiation within the Control Plane.

Renegotiation SHOULD be avoided during a Talk Burst.

User Plane adaptation describes a set of SIP methods to renegotiate parameters that change the needed throughput for the media by either change the speech coding (e.g. speech codec, codec mode) or the packetizing of speech coder frames. The PoC Client and the Controlling PoC Server SHALL support the User Plane adaptation procedure, if initiated by another side.

Both the PoC Client and the Controlling PoC Server MAY initiate the User Plane adaptation procedure.

8.13 Codecs

For optimum voice quality, end-to-end media coding is recommended for the RTP Media whenever feasible. In case a common speech codec is not utilized (e.g. in inter system communication), the PoC Server or some other network element SHOULD perform the transcoding function. The network entity which performs the transcoding SHALL also alter the RTCP reports sent to it so that the outgoing RTCP report packets reflects the changes in the RTP Media stream imposed by the transcoding. To minimize delay and voice quality reduction, it is recommended only one transcoding function occurs between the talker and any listener in the PoC Session

3GPP mandates the AMR narrowband speech codec as the default speech codec for PoC see [TS26.235]. Further, 3GPP mandates support of the AMR wideband speech codec, if the terminal on which the PoC Client is implemented uses 16 kHz sampling frequency of the speech, see [TS26.235].

3GPP2 mandates the EVRC speech codec as the default speech codec for PoC, see [3GPP2 S.R0100-0].

8.14 Signalling compression

The SIP/IP Core SHALL support signalling compression (SigComp) according to rules and procedures of [RFC 3320], [RFC 3485] and [RFC 3486] to reduce the transmission delays.

The PoC Client SHOULD compress the SIP signalling according to rules and procedures of [RFC 3320], [RFC 3485] and [RFC 3486] to reduce the transmission delays.

If the PoC Client initiate the signalling compression according to rules and procedures of [RFC 3320], [RFC 3485] and [RFC 3486], then the SIP/IP Core SHALL compress the SIP signalling according to [RFC 3320], [RFC 3485] and [RFC 3486].

It is RECOMMENDED that the PoC Client and the SIP/IP Core supports dynamic compression or other SigComp extended operations to improve the compression efficiency and to further reduce transmission delays (for a definition of dynamic compression and a description of other SigComp extended operations see [RFC 3321]).

> NOTE: Dynamic compression can be implemented without using the extended operations mechanisms of [RFC 3321] which is referenced here in the interest of thoroughness.

When the SIP/IP Core corresponds with 3GPP IMS or 3GPP2 MMD, then the signalling compression procedures in [TS 24.229] / [3GPP2 X.S0013.4] SHALL be used.

8.15 Charging

PoC Charging architecture supports both subscription based charging and traffic based charging as specified in [3GPP TS 32.272].

For the subscription based charging, subscription events like service activation time and subscriber PoC service profile are provided to the charging infrastructure. For subscription based charging, the identification of a PoC User includes the assigned IMSI and/or MSISDN or equivalents thereof, allowing the reuse of existing charging infrastructure.

For the traffic based charging, data is provided to the charging infrastructure in time to support both online and off-line billing models. Correlation between the PoC service charging data and the packet data services used is realized by adding to the PoC service CDR the appropriate identification of the packet service as generated by the underlying network. Correlation between PoC service charging data for sessions spanning multiple operator domains is realized by storing the network identification of the involved networks and charging identifiers in the generated PoC service CDRs.

8.15.1 Charging of PoC Sessions

In a PoC Session there can be number of Participants being PoC Subscribers of several different PoC operators. PoC operators shall be able to charge their contracted online and off-line Participants independently of any other PoC operator's charging policy. The settlement between the involved PoC operators is not within the scope of the current document.

The charging of the Participant can be based on the following:

- PoC Session type: 1-1 PoC Session or PoC Group Session (Chat, Pre-arranged, Ad-hoc)

- Flat fee: Per PoC Session time or per time period independent of usage.

- Sent Talk Bursts: Amount of Talk Bursts sent by the Participant. Amount of Talk Bursts shall be measured as a number of Talk Bursts and/or as a duration or volume of Talk Bursts.

- Received Talk Bursts: Amount of Talk Bursts received by the Participant. Amount of Talk Bursts shall be measured as a number of Talk Bursts and/or as a duration or volume of Talk Bursts.

- Actions initiated by the Participant in a PoC Session. Following actions shall be able to charge
    - Inviting a new Participant into the session including identity of the invited User, outcome of the invitation (successful or failed session setup) and time stamp.

    - Inviting, joining or accepting more than one PoC session

    - Subscription to the Participant information in a PoC Session

    - Amount of participant information sent to the Participant

- For PoC Sessions using different bearer streams the QoS parameters negotiated by each Participant will be captured in the PoC service CDR, to allow for QoS based charging.

In the PoC architecture the Participating PoC Function measures and sends charging reports to the charging system for the charging of the Participant.

In a PoC Session there needs to be a PoC Session owner. The PoC Session owner in the case of 1-1 PoC Session and Ad-hoc PoC Group Session is the initiator of the PoC Session. In the case of a Chat PoC Group and a Pre-arranged PoC Group Session, the PoC Session owner is the owner of the PoC Group.

The charging of the PoC Session owner can be based on the following:

- PoC Session type: 1-1 PoC Session or PoC Group Session (Chat, Pre-arranged, Ad-hoc)

- Per PoC Session time: The time that there is at least one Participant in a PoC Session or a period of time independent of PoC Session usage.

- Number of PoC Participants as a function of time: This charging information should include identities of the Participants and a timestamp of the joining or leaving event.

- Talk-Bursts distributed to the Participants: When one of the Participants sends Talk Burst in a session, then this Talk Burst needs to be distributed to all Participants in a PoC Session. The volume and duration of distributed Talk Bursts shall be measured. Each Talk Burst information should be time stamped to capture the 'Sent Time'/'Receive Time' and contain the address of the source PoC Server and the list of reached Participants.

- Number of Participant information subscriptions.

- Number of Participant information sent to the Participants.

In the PoC architecture the Controlling PoC Function measures and sends charging reports to the charging enabler for the charging of the PoC Session owner.

8.15.2 Charging of other PoC services

A PoC operator shall be able to charge its PoC Subscriber for the following other actions:

- Number of sent PoC alerts, including the identities of the alerted PoC Users

- Activation/deactivation of PoC Service Settings

8.15.3 Charging architecture

A simplified diagram showing the online charging system, charging collection functions and the PoC related interfaces, is shown in Figure 9 *"Architecture for PoC specific charging"*. Charging information, relating to PoC usage, may also be gathered from other access network entities using existing interfaces.
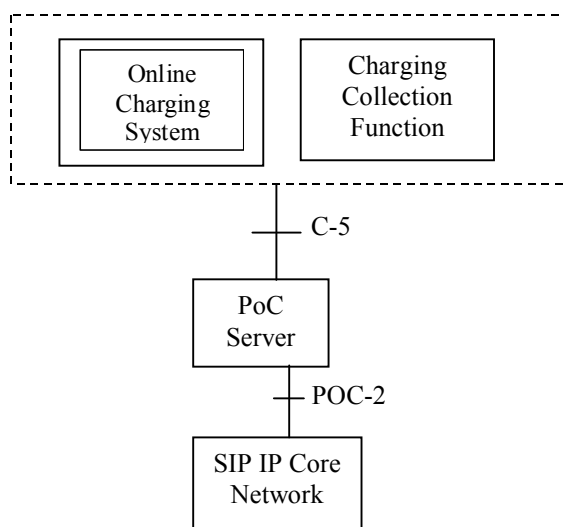
Figure 9: Architecture for PoC specific charging.

The charging collection function (CCF) is used for offline charging. It SHALL be possible for the PoC Server to send offline accounting information about PoC service events to the CCF using the C-5 interface. For 3GPP/3GPP2 IMS/MMD compliant core networks the C-5 interface SHALL conform to the Rf interface as specified in [3GPP TS 32.260]. Possible additional accounting information to cover PoC charging requirements shall be fulfilled by extending the C5 interface, if needed.

SIP/IP Core entities, may also use the C-5 interface to send offline accounting information pertaining to individual PoC Sessions. The address of the CCF to be used for one side of the PoC Session (either originating or terminating) is distributed in IMS/MMD based systems via SIP signalling, for IMS / MMD core networks this is as described in [3GPP TS 24.229].

The Online Charging Function (OCF) consists of two distinct modules, the Session Based Charging Function (SBCF) and the Event Based Charging Function (EBCF). The SBCF and the EBCF defined in [3GPP TS 32.240] is used for online charging PoC service related events. It SHALL be possible for the PoC Server to perform credit control interactions using the C-5 interface to the online charging system. For 3GPP/3GPP2 IMS/MMD compliant core networks the C-5 interface SHALL conform to the Ro interface as specified in [3GPP TS 32.260]. The address of the EBCF to be used for one side of the PoC Session (either originating or terminating) is distributed in IMS/MMD based systems via SIP signalling.

8.16 Roaming

The PoC Client SHALL be able to use the home PoC service when roaming.

When roaming, interconnection between operator's networks and communication between the PoC Server and the PoC Client MAY be achieved either

   a) through interconnection of the IP access networks; or

   b) when a SIP/IP Core exists in the visited network through interconnection of the visited and home SIP/IP Core networks.

The exact mechanisms for interconnection in the roaming scenario are outside the scope of this document. For 3GPP IMS the roaming scenarios are specified in [3GPP TS 23.228] and for 3GPP2 MMD in [3GPP2 S.P0013.2].

8.17 Presence

The Watcher associated with the PoC Client MAY utilize presence service enabler(s) to determine the PoC presence status of other PoC Clients.

The Presence Source MAY publish presence information to the Presence Server.

The Presence Source supplied presence information is routed to the Presence Server via the PRS-1 and PRS-3 reference points.

The PoC Server MAY publish presence information to the Presence Server based on the state of the PoC Client within the PoC Session.

The PoC Server MAY obtain any presence information it requires on PoC Clients by subscribing to their Presence Status using the functionalities of the Presence Service enabler. The signalling between the Presence Server and the PoC Server SHALL be routed via the SIP/IP Core and the PRS-3 Reference Point.

   NOTE: The architecture and functions of the Presence Service enabler are specified in [Presence AD].

8.18 Access Control

8.18.1 Access Control management

Access Control management includes operations that allow the XDMC to reliably manipulate the PoC User access policy and PoC Group authorization rules located in the PoC XDMS. The documents describing PoC User access policy and Group authorization rules MAY include references to Contact Lists or Group Lists stored in the Shared XDMS as URI lists.

A PoC Subscriber SHALL be able to manipulate the PoC User access policy and PoC Group authorization rules when queried.

Access Control list management uses the XML Document Management operations specified in the [XDM AD].

8.18.2 PoC User access policy

PoC User access policy MAY be used by the PoC User as a means of controlling the incoming PoC Session requests from other PoC Users or PoC Groups.

The PoC User access policy SHALL support the following actions:

- Allow/block PoC User and PoC Groups incoming PoC Session request
- Allow PoC Users to be treated in Automatic Answer Mode

The PoC User access policy MAY support the following actions:

- Allow PoC Users to override Answer Mode settings (MAO)

The Access Control MAY be applied also on the delivery of the Instant Personal Alerts.

PoC User access policies are superseded by the Incoming PoC Session Barring state.

8.18.3 Group authorization rules

The PoC Group owner MAY use authorization rules to control permissions to access a Pre-defined PoC Group. The PoC Group authorization rules SHALL support the following actions:

- Allow/block PoC User initiating the conference
- Allow/block PoC User joining the conference
- Allow/block subscription to the conference state
- Allow/forbid the anonymity of certain Participants

8.19 Incoming PoC Session Barring

If the PoC User has set Incoming PoC Session Barring active, then a Participating PoC Function of the invited PoC Client SHALL NOT send the received incoming PoC Session request to the PoC Client and SHALL send a 'busy' response towards the inviting PoC Client.

8.20 Incoming Instant Personal Alert Barring

If the PoC User has set the Incoming Instant Personal Alert Barring active, then the Participating PoC Function of the recipient PoC Client SHALL NOT send the received Instant Personal Alert and SHALL send a 'busy' response towards the sending PoC Client.

8.21 Deactivate/reactivate incoming Talk Bursts

When a PoC Client wants temporarily to deactivate incoming Talk Bursts it SHALL send a request to the PoC Server to place the media on hold. The PoC Server performing the Controlling PoC Function SHALL stop transmitting Talk Bursts to the PoC Client until the media is activated again. Deactivation and reactivation are session specific and SHALL be made via signalling path through reference points POC-1, POC-2 and IP-1.

8.22 Talk Burst request priority levels

A PoC Server or PoC Client that supports pre-emption and/or queuing of Talk Burst requests MAY additionally support prioritisation of Talk Burst requests.

The following priority levels are defined:

- Pre-emptive priority: A request to talk from a Participant with pre-emptive priority SHALL cause the current Talk Burst holder's permission to talk to be revoked immediately it is received, unless the current Talk Burst holder was also confirm response the Talk Burst with pre-emptive priority. When the Talk Burst is released or revoked, Participants with pre-emptive priority who have requested to talk SHALL be granted the Talk Burst in preference to Participants with high or normal priority.

- High priority: When the Talk Burst is released or revoked, Participants with high priority who have requested to talk SHALL be granted the Talk Burst in preference to Participants with normal priority.

- Normal priority: When the Talk Burst is released or revoked, Participants with normal priority who have requested to talk SHALL be granted the Talk Burst if and only if there are no outstanding requests from Participants with higher priority.

- Listen-only. A Participant with this priority is only allowed to listen. A request to talk from a Participant with listen-only priority SHALL be rejected.

A PoC Server or PoC Client which supports prioritisation SHALL support normal priority and at least one other priority level.

The PoC Server SHALL determine the highest priority level which can be granted to a PoC Client at the time the PoC Client is invited to join the PoC Session. Requests to talk from PoC Clients at the same priority level SHALL be granted in the order received.

The PoC Client MAY request to talk at a priority level that is the same as or lower than the highest priority permitted to the Participant. A PoC Client authorized for pre-emptive priority SHOULD request to talk at a priority level that is lower than pre-emptive priority unless the Participant explicitly requests to pre-empt the current speaker.

8.23 PoC communication methods

PoC allows a PoC User to communicate with a single Participant in a 1-1 PoC Session, communicate with a PoC Group in a 1-many Session or communicate in a 1-many-1 Session.

Hence, three different methods of communication are supported.

8.23.1 One-to-one topology

When communicating in a 1-1 PoC Session, RTP Media is transferred between two individual Participants in a half-duplex fashion.

8.23.2 Communication in a 1-many Session

When communication in a 1-manySession, RTP Media is transferred between several Participants in a half-duplex fashion. Each Participant receives all RTP Media that is transmitted by any other Participant in the PoC Session. This is default method of communication for all typed of PoC Group Sessions.

8.23.3   Communication in a 1-many-1 Session

When communicating in a 1-many-1 Session, RTP Media is transferred between several Participants in a half-duplex fashion. The 1-many-1 Session consists of one Distinguished Participant, who acts as a central node, and a set of Ordinary Participants. All Ordinary Participants receive RTP Media from the Distinguished Participant. Only the Distinguished Participant receives RTP Media from any Ordinary Participant. All Participants receive Talk Burst Control signalling.

The "one-to-many-to-one configuration" is an optional configuration, which may be used by a Pre-arranged PoC Group.

Pre-arranged PoC Groups capable of utilizing 1-many-1 Sessions SHALL maintain a PoC-specific attribute that indicates whether the Pre-arranged PoC Group is capable of supporting the use of a 1-many-1 Session.

If a Pre-arranged PoC Group is capable of utilizing a 1-many-1 Session, each member of the Group SHALL be identified as capable of acting as a Distinguished Participant or as an Ordinary Participant.

A Pre-arranged PoC Group Member capable of acting as a Distinguished Participant MAY be the initiator of a 1-may-1 Session. If this PoC Session type is selected, the Pre-arranged PoC Group Member that initiated the PoC Session SHALL act as the Distinguished Participant in the PoC Session.

A Pre-arranged PoC Group Member only capable of acting as an Ordinary Participant SHALL NOT be able to initiate a 1-many-1 Session.

8.24   PoC service provisioning

The PoC service provider sets up PoC service feature configurations remotely in the terminal device by using the device management mechanism specified in [Provisioning Architecture]. And the PoC Service provider updates PoC service feature configurations remotely in the terminal device by using [OMA DM].

The PoC Client, compliant with [Provisioning UA] SHALL be able to receive the contents sent by service provider. The exact syntax and definition of parameters needed for PoC service are specified in [Provisioning Content]. The bootstrap mechanism defined in [Provisioning Bootstrap] and [OMA-DM] SHALL be used to enhance the security of the provisioning.

Continuous Provisioning as specified in [OMA-DM] is used to update the provisioned parameters.

How any PoC Subscriber specific service attributes are provisioned to the PoC Server is out of scope of this specification.

8.25   Quality of Service traffic classes

The selection of QoS traffic classes for the PoC Control and User Plane is dependent on the QoS traffic classes supported by a PoC network.

For the case when different PDP contexts [3GPP TS 23.060] or Service Instances are used for PoC signalling and User Plane, it is recommended that the PoC Clients SHOULD separately utilize the traffic class that is best suitable for signalling (e.g., Interactive traffic class) and the traffic class that is best suitable for the User Plane (e.g. Streaming or Conversational traffic classes). If the requested level of QoS or traffic classes for the Control Plane and/or User Plane are not available, the system should attempt to use the negotiated QoS or request an alternative QoS traffic class. Additionally, the Talk Burst Control may be routed over the same PDP context or Service Instance intended for the PoC Signalling. The details of the QoS used are described in [3GPP TS 23.107].

For the case when one single PDP context or Service Instance is used for both PoC signalling and media the PoC Client SHOULD utilize the QoS traffic class that is determined to be the best available considering the overall balance between PoC Session media bearer establishment latency and media QoS (e.g. interactive traffic class).

8.26   PoC Feature Interaction with Circuit Switched services

The User Equipment supporting the PoC Client MAY support circuit switched (CS) voice communications. In this case, the PoC service and CS voice service modes are co-located in the terminal. Supporting notification of incoming CS call during an ongoing PoC Session as well as a notification of an incoming PoC Session set up during an ongoing CS call depends on the capabilities of the UE. Inter-working between CS and PoC services is not supported.

Note: The specification of the network notification is out of scope of this specification.

8.27 PoC Service Settings

The PoC Client MAY control the following PoC Service settings via the POC-1 reference point:

- Answer Mode;

- Incoming Session Barring; and,

- Incoming Instant Personal Alert Barring.

The following subclause describes the PoC Service setting in more detail.

8.27.1   Answer mode

The PoC Server in the Home PoC Network SHALL store the Answer Mode setting provided by the PoC Client for the Served PoC User

The PoC Client SHALL allow the PoC User to change the Answer Mode setting.

The possible Answer Mode settings are:

- Automatic answer; and
- Manual answer.

The PoC Server in the Home PoC Network SHALL include the value of the Answer Mode in all invitations to the Served PoC User.

8.27.2   Incoming Session Barring (ISB)

The PoC Server in the Home PoC Network SHALL store the ISB setting provided by the PoC Client for the Served PoC User.

The PoC Client SHALL allow the PoC User to change the ISB setting in the Home PoC Network.

The possible values are:

- ISB active; or,

- ISB not active.

If the value is "ISB active" the PoC Server SHALL reject all incoming invitations for the Served PoC User.

8.27.3   Incoming Instant Personal Alert Barring (IAB)

If the Home PoC Network supports Incoming Instant Personal Alert Barring, the PoC Server in the Home PoC Network SHALL store the IAB setting provided by the PoC Client for the Served PoC User.

If the PoC Client supports Incoming Instant Personal Alert Barring, the PoC Client SHALL allow the PoC User to change the IIPAB setting in the Home PoC Network.

The possible values are:

- IAB active; or,

- IAB not active.

If the value is "IAB active" the PoC Server SHALL reject all incoming Instant Personal Alerts for the Served PoC User.

9. High level procedures

The flow charts in the following subclauses describe the logical flow of information between the PoC architectural functional elements but do not necessarily fully conform to all the details of the protocols that will be used.

The interworking between the PoC Server and the PoC XDMS is not described in the high level procedure but can be assumed to take place depending on implementation either prior to the flow takes place or when the flow takes place.

Information stored in the XDM Server is needed when:

- Inviting PoC Users to a pre-arranged PoC Group.

- Adding PoC Users to an ongoing Pre-arranged PoC Group or a Chat PoC Group.

- When a user is joining a Pre-arranged PoC Group or a Chat PoC Group for Access Control.

- When performing Access Control on terminating side before inviting a PoC User to a PoC Session.

9.1 Pre-established Session

9.1.1 Introduction

The Pre-established Session provides a mechanism to negotiate Media Parameters such as IP address, ports and codecs, which are used for sending the media and Talk Burst Control messages between the PoC Client and the home PoC Server. The mechanism allows the PoC Client to invite other PoC Clients or receive PoC Sessions without negotiating again the Media Parameters.

The Pre-established Session can be established after the initial registration. The Figure 10 *"Pre-established Session"* presents the high level description of the Pre-established Session procedure.
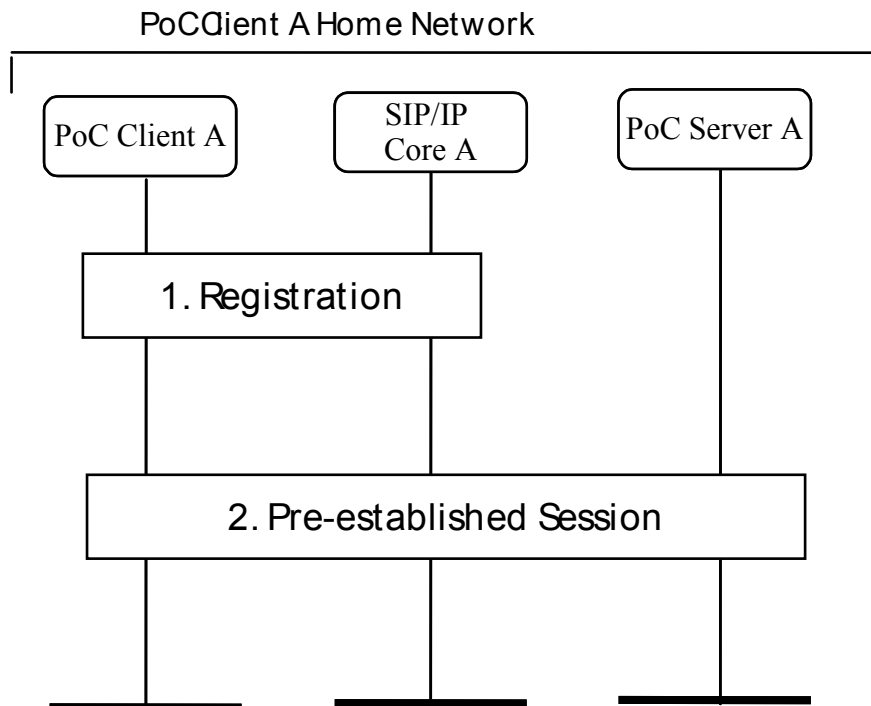
Figure 10: Pre-established Session

1. The PoC Client registers to the SIP/IP Core. The registration is described in the subclause 8.5 *"Registration"*.

2. The Pre-established Session is a session establishment procedure between the PoC Client and the PoC Server to exchange necessary Media Parameters needed for setting up the media bearer. After the Pre-established Session is established the PoC Client is able to activate media bearer whenever needed:

- immediately after the Pre-established Session procedure or;

- when the actual SIP signalling for the PoC Session is initiated.

9.1.2 Pre-established Session flow

The Pre-established Session is a session between the PoC Client and the PoC Server in the Home PoC Network. The Figure 11 *"Pre-established Session"* presents the Pre-established Session establishment flow.
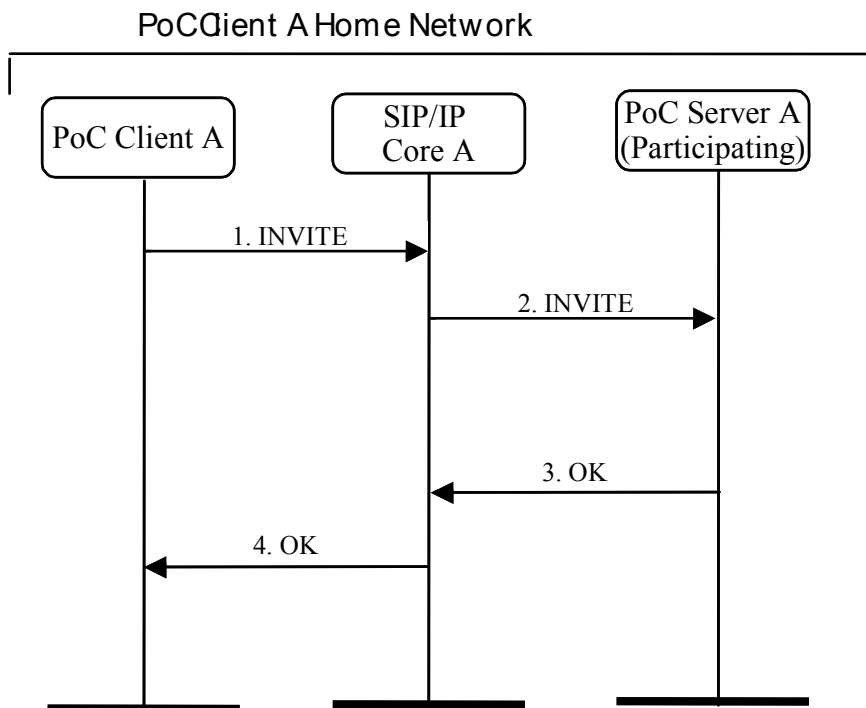
Figure 11: Pre-established Session

1. The PoC Client sends an INVITE request to the SIP/IP Core containing a PoC indication.

   Information elements contained in INVITE request:

   a. Participating function URI

   b. Media Parameters of PoC Client A for inactive media stream(s)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

   e. Talk Burst Control Protocol proposal.

2. The SIP/IP Core forwards the request to the PoC Server based on the PoC service indication and the Participating Function URI in the request.

   Information elements contained in INVITE request:

   a. Participating function URI

b. Media Parameters of PoC Client A with inactive media stream(s)

c. PoC Service indication

d. PoC Address of the PoC User at the PoC Client A

e. Talk Burst Control protocol proposal.

3. The PoC Server performs necessary service control and sends OK to the SIP/IP Core.

   Information elements contained in OK response:

   a. Media Parameters of PoC Server A

   b. A conference URI that identifies the Pre-established Session

   c. Selected Talk Burst Control Protocol.

4. The SIP/IP Core forwards the OK the PoC Client.

   Information elements contained in OK response:

   a. Media Parameters of PoC Server A

   b. A conference URI that identifies the Pre-established Session

   c. Selected Talk Burst Control Protocol.

The procedure for establishing a PoC Session with other users within the Pre-established Session is described in the subclause 9.2 *"Ad-hoc PoC Group Session and 1-1 PoC Session setup"*.

9.2 Ad-hoc PoC Group Session and 1-1 PoC Session setup

In the Ad-hoc PoC Group Session setup one PoC User selects several other PoC Users to be invited to an Ad-hoc PoC Group Session.

1-1 PoC Session setup is similar case with ad-hoc PoC Group session except only one PoC User is invited by the inviting PoC User.

9.2.1 Ad-hoc PoC Group Session invitation from PoC Client

In the following subclauses different setup scenarios are described from the inviting PoC Client point of view.

Chapter 9.2.1.1 *"Confirmed indication using On-demand Session"* describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users has accepted the invitation using On-demand Session establishment.

Chapter 9.2.1.2 *"Unconfirmed Indication using On-demand Session"* describes a case where right-to-speak indication is given to the inviting PoC User when the invited PoC User is registered and uses automatic answer.

Chapter 9.2.1.3 *"Confirmed indication using Pre-established Session"* describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users has accepted the invitation and the inviting PoC Client has Pre-established Session.

Chapter 9.2.1.4 *"Unconfirmed Indication using Pre-established Session"* describes a case where right-to-speak indication is given to the inviting PoC User when one of the Invited PoC Users is registered and uses automatic answer and the inviting PoC User has a Pre-established Session.

9.2.1.1 Confirmed Indication using On-demand Session

This subclause describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users has accepted the invitation and the final response is not sent before the first accepted indication from the terminating network is received. Figure 12 *"Confirmed indication using On-demand Session"* shows the signalling flow for this scenario.

Figure 12: Confirmed Indication using On-demand Session

1. PoC Client A initiates an ad-hoc PoC Group Session or 1-1 PoC Session by sending an INVITE request to the home PoC network.

    Information elements contained in INVITE request:

    a. A list of PoC Addresses of invited PoC Users;

    b. Media Parameters of PoC Client A

    c. PoC Service indication

    d. PoC Address of the PoC User at the PoC Client A

    e. Optionally, a Manual Answer Override request

    f. Talk Burst Control Protocol proposal.

2. SIP/IP Core A routes the INVITE request to the PoC Server A (participating & controlling) based on PoC Address of inviting PoC User and PoC service indication.

   Information elements contained in INVITE request:

   a. A list of PoC Addresses of invited PoC Users;

   b. Media Parameters of PoC Client A

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

3. Since this is an ad-hoc PoC Group Session setup or 1-1 PoC Session setup the PoC Server A (participating & controlling) takes the roles of the Controlling PoC Function and Participating PoC Function. The PoC Server A (participating & controlling) sends invitations to the PoC Clients of the invited PoC Users as described in the subclause 9.2.2 *"Ad-hoc PoC Group session invitation to the PoC Client"*. When the first ALERTING response is received the PoC Server A (participating & controlling) sends ALERTING response towards the PoC Client A, when the final response OK is not yet sent.

4. SIP/IP Core A forwards the ALERTING response to the PoC Client A.

5. When the first PoC Client accepts the PoC Session request, the PoC Server A (participating & controlling) sends OK response towards the PoC Client A. The OK response includes the following information:

   Information elements contained in OK response:

   a. Media Parameters of PoC Server A (participating & controlling)

   b. Selected Talk Burst Control Protocol.

6. SIP/IP Core A forwards the OK response to the PoC Client A.

   Information elements contained in OK response:

   a. Media Parameters of PoC Server A (participating & controlling)

   b. Selected Talk Burst Control Protocol.

7. Since one Participant is connected, the PoC Server A (participating & controlling) sends the Talk Burst Control message Talk Burst confirm response to the PoC Client A.

8. The PoC Client A sends media to the PoC Server A (participating & controlling).

If none of the invited PoC Users accepts the invitation, the PoC Server A (participating & controlling) rejects the PoC Session.

9.2.1.2 Unconfirmed Indication using On-demand Session

This subclause describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users is registered and uses automatic answer. In this case the PoC Server sends the final response after receiving the first auto-answer response from the terminating side and adds the Unconfirmed Indication to the final response. In this case the media buffering is supported and the Talk Burst confirm is sent after the first auto answer response is received. If buffering is not supported the Talk Burst confirm is sent after the first response to the invitation is received.

Figure 13 *"Unconfirmed Indication using On-demand Session "*shows the signalling flow for this scenario.

PoC Client A Home Network & Controlling Network

Figure 13: Unconfirmed Indication using On-demand Session

1. PoC Client A initiates an ad-hoc PoC Group Session or 1-1 PoC Session by sending an INVITE request to the Home PoC Network.

   Information elements contained in INVITE request:

   a. A list of PoC Addresses of invited PoC Users;

   b. Media Parameters of PoC Client A

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

   e. Optionally, a manual answer override request

   f. Talk Burst Control Protocol proposal.

2. SIP/IP Core A routes the INVITE request to the PoC Server A (participating & controlling) based on PoC Address of inviting PoC User at the PoC Client and PoC Service indication.

   Information elements contained in INVITE request:

   a. A list of PoC Addresses of invited PoC Users;

   b. Media Parameters of PoC Client A

    c.   PoC Service indication

    d.   PoC Address of the PoC User at the PoC Client A

    e.   Manual answer override request, if selected by PoC Client A

    f.   Talk Burst Control Protocol proposal.

    g.   Since this is an ad-hoc PoC Group Session setup or 1-1 PoC Session setup the PoC Server A (participating & controlling) takes the roles of the Controlling PoC Function and Participating PoC Function. The PoC Server A (participating and controlling) sends invitations to the PoC Clients of the invited PoC Subscribers as described in the subclause 9.2.2 *"Ad-hoc PoC Group Session invitation to the PoC Client"*.

3.   When the first Auto-answer response from the terminating side is received the PoC Server A (participating & controlling) sends UNCONFIRMED OK response towards the PoC Client A indicating that none of the invited PoC Users are yet connected in the PoC Session.

    Information elements contained in UNCONFIRMED OK response:

    a.   Media Parameters of PoC Server A (participating & controlling)

    b.   Selected Talk Burst Control Protocol.

4.   SIP/IP Core A forwards the UNCONFIRMED OK response to the PoC Client A.

    Information elements contained in UNCONFIRMED OK response:

    a.   Media Parameters of PoC Server A (participating & controlling)

    b.   Selected Talk Burst Control Protocol.

5.   The PoC Server A (participating & controlling) sends the Talk Burst Control message Talk Burst confirm response to the PoC Client A.

6.   The PoC Client A sends media to the PoC Server A (participating & controlling). The PoC Server A (participating & controlling) buffers the media to be sent to the invited PoC Clients when they are connected.

If none of the invited PoC Users accepts the invitation, the PoC Server A (participating & controlling) rejects the PoC Session.

9.2.1.3 Confirmed Indication using Pre-established Session

This subclause describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users has accepted the invitation and the Inviting PoC Client has Pre-established Session. Figure 14 *"Confirmed indication using Pre-established Session"* shows the signalling flow for this scenario.

PoC Client A Home Network & Controlling Network
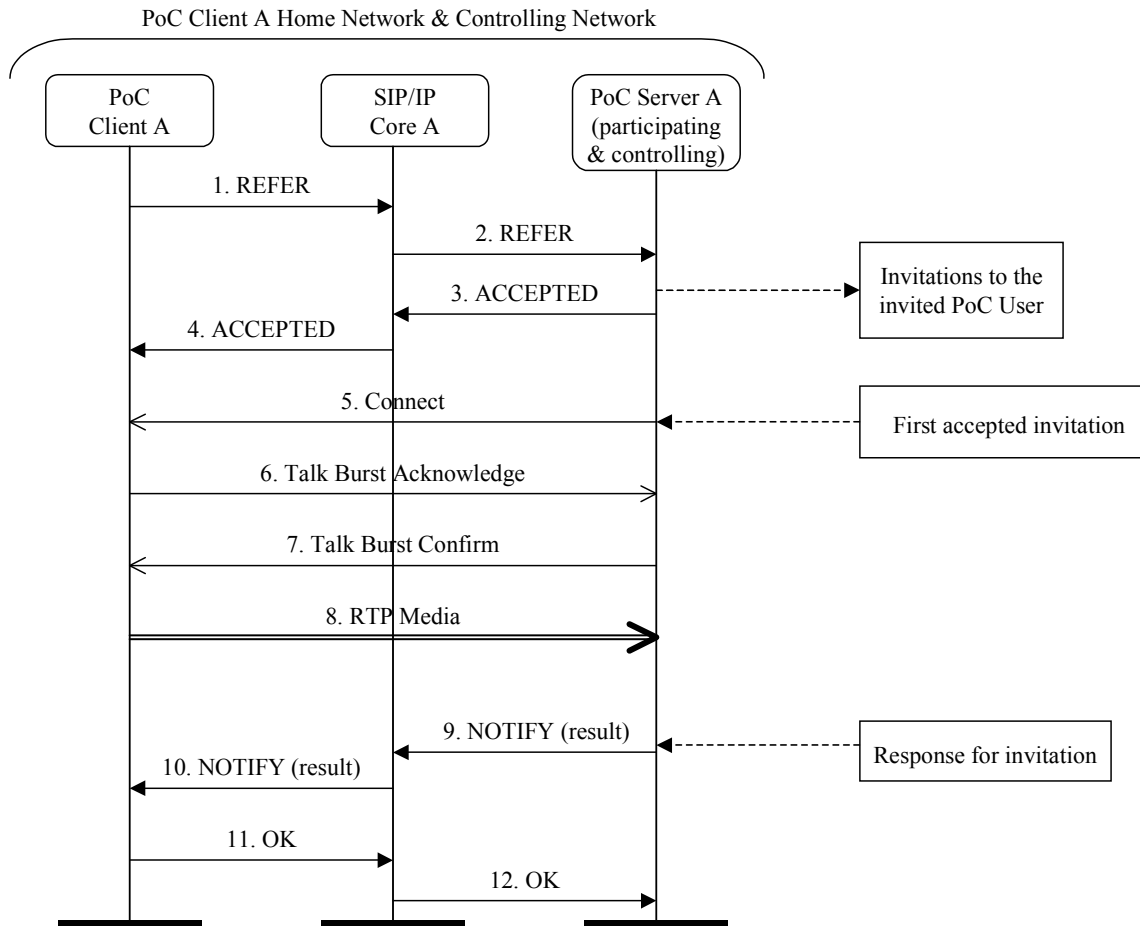
Figure 14: Confirmed Indication using Pre-established Session

1. In this case PoC Client A has a Pre-established Session with the PoC Server A (participating & controlling). PoC Client A initiates an ad-hoc PoC Group Session or 1-1 PoC Session by sending REFER request to the Home PoC Network.

    Information elements contained in REFER request:

    a. A list of PoC Addresses of PoC Users to be invited

    b. PoC service indication

    c. PoC Address of the PoC User at the PoC Client A

    d. Optionally, a manual answer override request

    e. PoC Session Identity of the Pre-established Session to which the REFER applies.

2. SIP/IP Core A forwards the REFER request to the PoC Server A (participating & controlling).

    Information elements contained in REFER request:

    a. A list of PoC Addresses of PoC Users to be invited

    b. PoC service indication

    c. PoC Address of the PoC User at the PoC Client A

     d.   Manual answer override request, if selected by PoC Client A

     e.   PoC Session Identity of the Pre-established Session to which the REFER applies.

3. Since this is an Ad-hoc PoC Group Session setup or 1-1 PoC Session setup the PoC Server A (participating & controlling) takes the roles of the Controlling PoC Function and Participating PoC Function. The PoC Server A (participating & controlling) sends invitations to the PoC Clients of the invited PoC Users as described in the subclause 9.2.2 *"Ad-hoc PoC Group Session invitation to the PoC Client"*. The PoC Server A (participating & controlling) sends ACCEPTED response towards the PoC Client A.

4. SIP/IP Core A forwards the ACCEPTED response to the PoC Client A.

5. When the first invited PoC User has accepted the invitation the PoC Server A (participating & controlling) sends the connect message to the PoC Client A.

6. The PoC Client A acknowledges the connect with a Talk Burst acknowledge message to guarantee reliable delivery of the connect message

7. The PoC Server A sends a Talk Burst confirm response to the PoC Client A to indicate that PoC Client A is allowed to send media.

8. The PoC Client A sends media to the PoC Server A (participating & controlling).

For each Invited PoC User the following signalling is repeated:

9. When final response is received from an invited PoC User, the PoC Server A (participating & controlling) sends NOTIFY request to the PoC Client A with information about the final result. A final result can be:

     a.   The invited PoC User accepted the invitation;

     b.   The invited PoC User rejected the invitation;

     c.   The invited PoC User is not reachable;

     d.   The invited PoC User is busy or

     e.   The invited PoC User did not answer.

10. The SIP/IP Core A forwards NOTIFY to the PoC Client A.

11. When the PoC User A accepts the notification, the PoC Client A sends OK response for the NOTIFY.

12. SIP/IP Core A forwards the OK response to the PoC Server A.

If none of the invited PoC Users accepts the invitation, the PoC Server A (participating & controlling) rejects the PoC Session.

9.2.1.4   Unconfirmed right-to-speak using Pre-established Session

This subclause describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users is reachable and uses automatic answer and the inviting PoC Client has a Pre-Established Session. Figure 15 *"Unconfirmed Indication using Pre-established Session"* shows the signalling flow for this scenario.

PoC Client A Home Network & Controlling Network
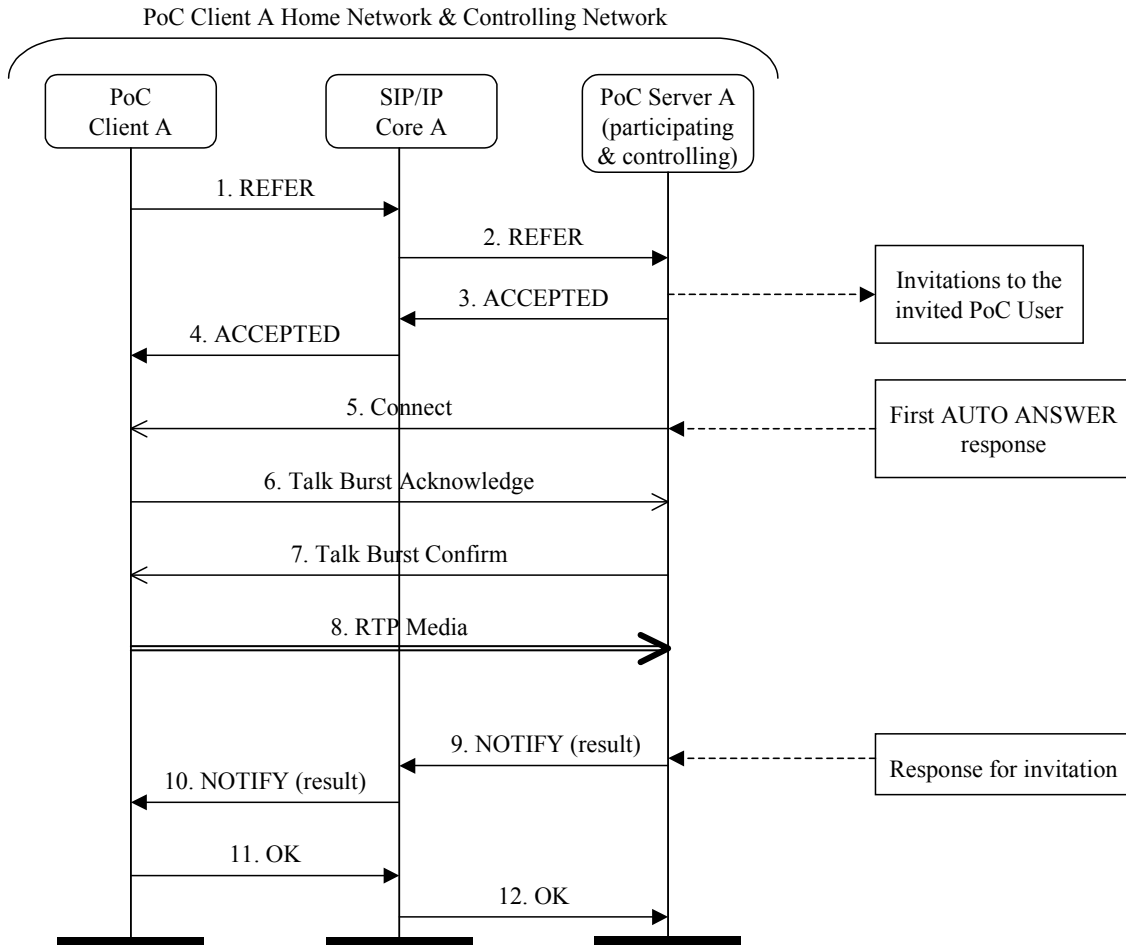
Figure 15: Unconfirmed Indication using Pre-established Session

1. In this case PoC Client A has a Pre-established Session with the PoC Server A (participating & controlling). PoC Client A initiates an ad-hoc PoC Group Session or 1-1 PoC Session by sending the REFER request to the Home PoC Network.

    Information elements contained in REFER request:

    a. A list of PoC Addresses of PoC Users to be invited

    b. PoC service indication

    c. PoC Address of the PoC User at the PoC Client A

    d. Optionally, a manual answer override request

    e. The conference URI of the Pre-established Session to which the REFER applies.

2. SIP/IP Core A forwards the REFER request to the PoC Server A (participating & controlling).

    Information elements contained in REFER request:

    a. A list of PoC Addresses of PoC Users to be invited

    b. PoC service indication

    c. PoC Address of the PoC User at the PoC Client A

    d.   Manual answer override request, if selected by PoC Client A

    e.   The conference URI of the Pre-established Session to which the REFER applies.

3.   Since this is an ad-hoc PoC Group Session setup or 1-1 PoC Session setup the PoC Server A (participating & controlling) takes the roles of the Controlling PoC Function and Participating PoC Function. The PoC Server A (participating & controlling) sends invitations to the PoC Clients of the invited PoC Users as described in the subclause 9.2.2 *"Ad-hoc PoC Group Session invitation to the PoC Client"*. The PoC Server A (controlling & participating) sends ACCEPTED response towards the PoC Client A.

4.   SIP/IP Core A forwards the ACCEPTED response to the PoC Client A.

5.   When the first AUTO-ANSWER response has been received the PoC Server A (participating & controlling) sends the connect message to PoC Client A.

6.   The PoC Client A acknowledges the connect message with a Talk Burst acknowledge message to guarantee reliable delivery of the connect message.

7.   The PoC Server A send a Talk Burst confirm message to the PoC Client A to indicate that PoC Client A is allowed to send media.

8.   The PoC Client A sends media to the PoC Server A (participating & controlling) which buffers the media stream for the late delivery upon responses by the Invited PoC Users.

For each invited PoC User the following signalling is repeated:

9.   When final response is received from an invited PoC User, the PoC Server A (controlling and participating) sends NOTIFY request towards the PoC Client A with information about the final result. A final result can be

    a.   The invited PoC User accepted the invitation;

    b.   The invited PoC User rejected the invitation;

    c.   The invited PoC User is not reachable;

    d.   The invited PoC User is busy or

    e.   The invited PoC User did not answer

10. SIP/IP Core A forwards the NOTIFY to the PoC Client A.

11. When the PoC User A accepts the notification, the PoC Client A sends OK response for the NOTIFY.

12. SIP/IP Core A forwards the OK response to the PoC Server A.

If none of the invited PoC Users accepts the invitation, the PoC Server A (participating & controlling) rejects the PoC Session.

9.2.2   Ad-hoc PoC Group Session invitation to the PoC Client

In the following subclauses different setup cases are described from the invited PoC Client point of view.

Chapter 9.2.2.1 *"Automatic answer case using On-demand Session"* describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC User is accepted automatically.

Chapter 9.2.2.2 *"Automatic answer using Pre-established Session"* describes a scenario where the invited PoC User has a Pre-established Session with the PoC Server and has defined that the PoC Session request from the inviting PoC Client is accepted automatically.

Chapter 9.2.2.3 *"Manual answer case"* describes a scenario where the invited PoC User answers manually to the PoC Session request.

Chapter 9.2.2.4 *"Manual answer override case"* describes a scenario using an On-demand Session where the inviting PoC User has requested a manual answer override and the invited User is configured to answer manually to the PoC Session request.

9.2.2.1 Automatic answer using On-demand Session

This subclause describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC User is accepted automatically and On-demand Session establishment is used. Figure 16 *"Automatic answer using On-demand Session"* shows signalling flow for this scenario.

Figure 16: Automatic answer using On-demand Session

1. PoC Server A (participating & controlling) sends INVITE request to the SIP/IP Core A.

   Information elements contained in INVITE request:

   a. PoC Address of invited PoC User

   b. Media Parameters of PoC Server A (participating & controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A.

2.   SIP/IP Core A routes the request to the PoC Client B home network.

    Information elements contained in INVITE request:

    a.   PoC Address of invited PoC User

    b.   Media Parameters of PoC Server A (participating & controlling)

    c.   PoC service indication

    d.   PoC Address of the PoC User at the PoC Client A

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A.

3.   SIP/IP Core B routes the request to the PoC Server B (participating) based on the PoC Address of invited PoC Client and PoC Service indication.

    Information elements contained in INVITE request:

    a.   PoC Address of PoC Client B

    b.   Media Parameters of PoC Server A (participating & controlling)

    c.   PoC service indication

    d.   PoC Address of PoC User at the PoC Client A

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A.

4.   Since in this case the PoC Client B is accepting the session automatically, the PoC Server B (participating) sends AUTO-ANSWER response back towards the controlling network. The AUTO-ANSWER response indicates that the automatic acceptance is used by the PoC Client B.

5.   SIP/IP Core B forwards the AUTO-ANSWER response to the controlling network.

6.   SIP/IP Core A forwards the AUTO-ANSWER response to the PoC Server A (participating & controlling)

7.   PoC Server B (participating) sends the PoC Session setup request to the SIP/IP Core B.

    Information elements contained in INVITE request:

    a.   Media Parameters of the PoC Server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

    b.   PoC service indication

    c.   Automatic acceptance indication

d. PoC Address of PoC User at the PoC Client B

e. PoC Address of PoC User at the PoC Client A

f. Talk Burst Control Protocol proposal

g. Manual answer override request, if selected by PoC Client A and if PoC Client B has authorised PoC Client A to issue a manual answer override request and PoC Server B (participating) supports manual answer override.

8. SIP/IP Core B routes the INVITE request to the PoC Client B.

Information elements contained in INVITE request:

a. Media Parameters of the PoC Server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

b. PoC service indication

c. Automatic acceptance indication

d. PoC Address of PoC User at the PoC Client B

e. PoC Address of PoC User at the PoC Client A

f. Talk Burst Control Protocol proposal

g. Manual Answer Override request, if selected by PoC Client A and included by PoC Server B.

9. When the PoC Client B receives the INVITE request, the PoC Client B sends an OK response for the INVITE.

Information elements contained in OK response:

a. Media Parameters of the PoC Client B

b. Selected Talk Burst Control Protocol.

10. SIP/IP Core B forwards the OK response to the PoC Server B (participating)

Information elements contained in OK response:

a. Media Parameters of the PoC Client B

b. Selected Talk Burst Control Protocol.

11. When PoC Server B (participating) receives OK response it will forward it to towards controlling network. The OK response includes following information:

Information elements contained in OK response:

a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

b. Selected Talk Burst Control Protocol.

12. SIP/IP Core B forwards the OK response to the controlling network

Information elements contained in OK response:

a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

b. Selected Talk Burst Control Protocol.

13. SIP/IP Core A forwards the OK response to the PoC Server A (participating & controlling)

Information elements contained in OK response:

a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

b. Selected Talk Burst Control Protocol.

14. The PoC Server A sends the receiving Talk Burst indication to the PoC Server B.

Information elements contained in receiving Talk Burst indication:

a. PoC Address of the Participant at the PoC Client sending the Talk Burst

b. Nick name of the Participant at the PoC Client sending the Talk Burst.

15. PoC Server B (participating) relays the receiving Talk Burst message to the PoC Client B.

Information elements contained in receiving Talk Burst indication:

a. PoC Address of the Participant at the PoC Client sending the Talk Burst

b. Nick name of the Participant at the PoC Client sending the Talk Burst.

Note: If the Participating PoC Server B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

9.2.2.2 Automatic answer using Pre-established Session

This subclause describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC User is accepted automatically or, in systems which support the optional manual answer override capability, that the invited PoC User has defined that the inviting PoC User is approved to override a manual answer setting and the inviting PoC User has selected to do so, and where the invited PoC Client has a Pre-established Session connection with the PoC Server. Figure 17 *"Answer using Pre-established Session"* shows signalling flow for this scenario.
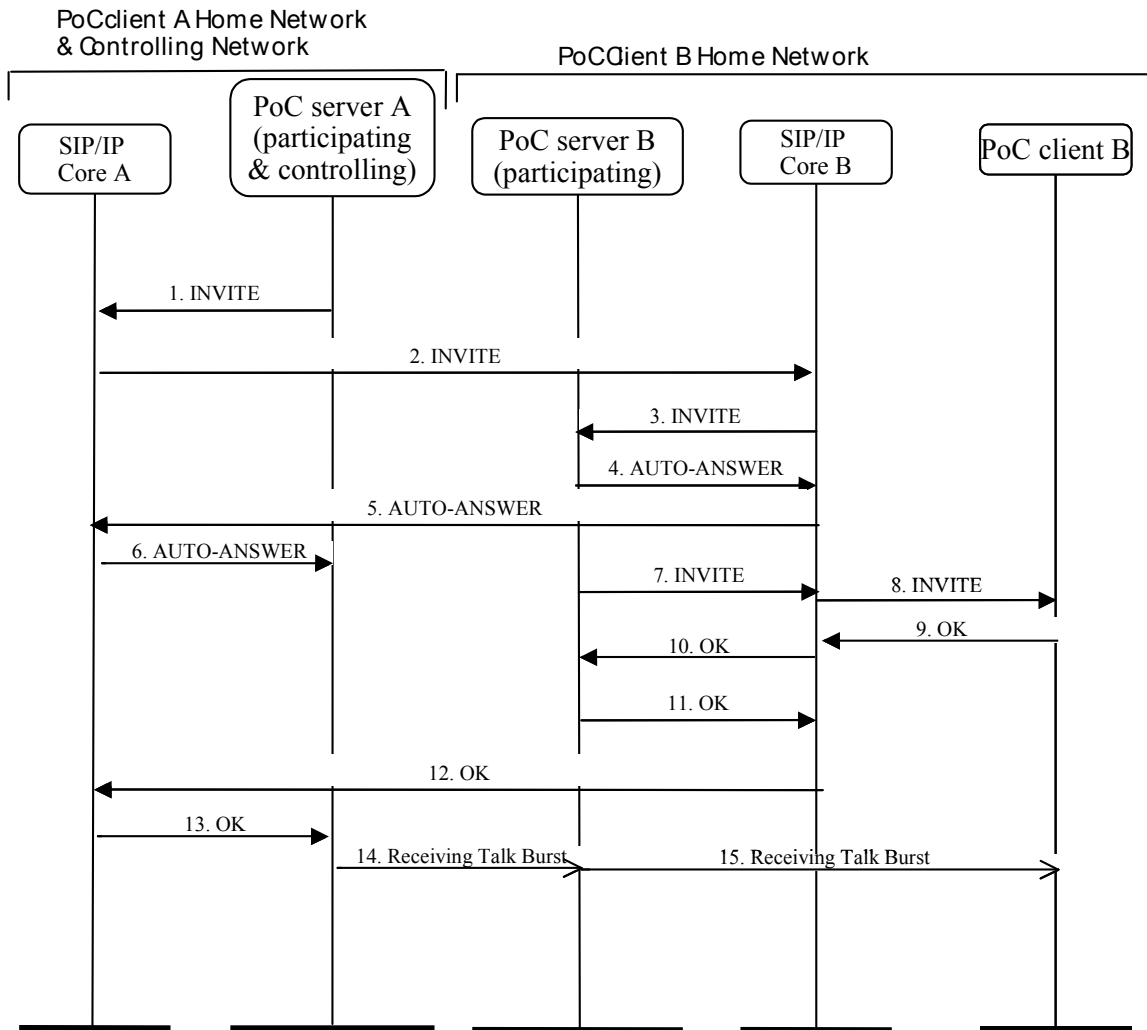
Figure 17: Answer using Pre-established Session

1. PoC Server A (participating & controlling) sends INVITE request to the SIP/IP Core A.

    Information elements contained in INVITE request:

    a. PoC Address of the PoC User at the PoC Client B

    b. Media Parameters of PoC Server A (participating & controlling)

    c. PoC service indication

    d. PoC Address of the PoC User at the PoC Client A

    e. Controlling PoC Function assigned indication

    f. Manual answer override request, if selected by PoC Client A

    g. Talk Burst Control Protocol proposal.

2. SIP/IP Core A routes the request to the PoC Client B home network.

    Information elements contained in INVITE request:

    a. PoC Address of the PoC User at the PoC Client B

    b. Media Parameters of PoC Server A (participating & controlling)

    c. PoC service indication

d. PoC Address of the PoC User at the PoC Client A

e. Controlling PoC Function assigned indication

f. Manual answer override request, if selected by PoC Client A

g. Talk Burst Control Protocol proposal.

3. SIP/IP Core B routes the request to the PoC Server B (participating) based on PoC Address of the invited PoC User and PoC service indication.

Information elements contained in INVITE request:

a. PoC Address of the PoC User at the PoC Client B

b. Media Parameters of PoC Server A (participating & controlling)

c. PoC service indication

d. PoC Address of the PoC User at the PoC Client A

e. Controlling PoC Function assigned indication

f. Manual answer override request, if selected by PoC Client

g. Talk Burst Control Protocol proposal.

4. If the PoC Client B is accepting the session automatically, or if PoC Client B has authorised PoC Client A to issue a manual answer override request and PoC Server B (participating) supports Manual Answer Override, and if the PoC Client B also has Pre-established Session with PoC Server B (participating), then the PoC Server B (participating) sends OK response back towards the controlling network

Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol.

5. SIP/IP Core B forwards the OK response to the controlling network.

Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol.

6. SIP/IP Core A forwards the OK response to the PoC Server A (participating & controlling)
Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol.

7. The PoC Server B (participating) sends the connect message to the PoC Client B.

Information elements contained in the connect message:

a. PoC Address of the Participant at the PoC Client initiating the invitation

b. Nick name of the Participant at the PoC Client initiating the invitation

c. Manual answer override request indication, if PoC Client A is authorized and PoC Server B supports manual answer override.

8. The PoC Client B acknowledges the connect message with a Talk Burst acknowledge message to guarantee reliable delivery of the connect message

9.2.2.3   Manual answer case

This subclause describes a scenario where the invited PoC User has selected the manual answer indication for responses to the PoC Session request. The scenario is valid for On-demand Session case as well as for the Pre-established Session case. Figure 18 *"Manual Answer"* shows signalling flow for this scenario.

Figure 18: Manual answer

1. PoC Server A (participating & controlling) sends INVITE request to the SIP/IP Core A.

   Information elements contained in INVITE request:

      a. PoC Address of the PoC User at the PoC Client B

      b. Media Parameters of PoC Server A (participating & controlling)

      c. PoC service indication

      d. PoC Address of the PoC User at the PoC Client A

      e. Controlling PoC Function assigned indication

     f.   Talk Burst Control Protocol proposal.

2.   SIP/IP Core A routes the request to the PoC Client B home network.

    Information elements contained in INVITE request:

       a.   PoC Address of the PoC User at the PoC Client B

       b.   Media Parameters of PoC Server A (participating & controlling)

       c.   PoC service indication

       d.   PoC Address of the PoC User at the PoC Client A

       e.   Controlling PoC Function assigned indication

       f.   Talk Burst Control Protocol proposal.

3.   SIP/IP Core B routes the request to the PoC Server B (participating) based on PoC Address of invited PoC Client and PoC service indication.

    Information elements contained in INVITE request:

       a.   PoC Address of the PoC User at the PoC Client B

       b.   Media Parameters of PoC Server A (participating & controlling)

       c.   PoC service indication

       d.   PoC Address of the PoC User at the PoC Client A

       e.   Controlling PoC Function assigned indication

       f.   Talk Burst Control Protocol proposal.

4.   In case On-demand Session is used, the PoC Server B sends an INVITE request to the SIP/IP Core B.

    In case Pre-established Session is used, the PoC Server B sends a re-INVITE request within an existing Pre-established Session to the SIP/IP Core B.

    Information elements contained in INVITE/re-INVITE request:

       a.   PoC Address of the PoC User at the PoC Client B

       b.   Media Parameters of PoC Server B (participating) if PoC Server B stays on the media and Talk Burst Control path, otherwise Media Parameters received from the controlling network are included

       c.   Manual answer request

       d.   PoC service indication

       e.   PoC Address of the PoC User at the PoC Client A

       f.   Controlling PoC Function assigned indication

       g.   Talk Burst Control Protocol proposal.

5.   SIP/IP Core B routes the INVITE/re-INVITE to the PoC Client B

    Information elements contained in INVITE/re-INVITE request:

       a.   PoC Address of the PoC User at the PoC Client B

    b.   Media Parameters of PoC Server B (participating) if PoC Server B stays on the media and Talk Burst Control path, otherwise Media Parameters received from the controlling network are included

    c.   Manual answer request

    d.   PoC service indication

    e.   PoC Address of the PoC User at the PoC Client A

    f.   Controlling PoC Function assigned indication

    g.   Talk Burst Control Protocol proposal.

6.   When the PoC Client B receives the INVITE/re-INVITE request PoC Client B prompts PoC User B about the PoC Session invitation and sends ALERTING response.

7.   SIP/IP Core B forwards the ALERTING response to the PoC Server B (participating).

8.   PoC Server B (participating) forwards ALERTING response towards controlling network.

9.   SIP/IP Core B forwards the ALERTING response to the controlling network.

10. SIP/IP Core A forwards the ALERTING response to the PoC Server A (participating & controlling).

11. When the PoC User B accepts the invitation, the PoC Client B sends OK response for the INVITE.

Information elements contained in OK response:

    a.   Media Parameters of the PoC Client B

    b.   Selected Talk Burst Control Protocol.

12. SIP/IP Core B forwards the OK response to the PoC Server B (participating)

Information elements contained in OK response:

    a.   Media Parameters of the PoC Client B

    b.   Selected Talk Burst Control Protocol.

13. When PoC Server B (participating) receives OK response it will forward it towards controlling network. Information elements contained in OK response:

    a.   Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control path, otherwise Media Parameters received from the PoC Client B are included

    b.   Selected Talk Burst Control Protocol.

14. SIP/IP Core B forwards the OK response to the controlling network

Information elements contained in OK response:

    a.   Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control path, otherwise Media Parameters received from the PoC Client B are included

    b.   Selected Talk Burst Control Protocol.

15. SIP/IP Core A forwards the OK response to the PoC Server A (participating & controlling)

Information elements contained in OK response:

    a.   Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control path, otherwise Media Parameters received from the PoC Client B are included

b. Selected Talk Burst Control Protocol.

16. When receiving OK response, the PoC Server A (participating & controlling) sends receiving Talk Burst indication the PoC Client B.

Information elements contained in receiving Talk Burst indication:

a. PoC Address of the Participant at the PoC Client sending the Talk Burst

b. Nick name of the Participant at the PoC Client sending the Talk Burst.

17. PoC Server B (participating) relays the receiving Talk Burst indication to the PoC Client B.

Information elements contained in receiving Talk Burst indication:

c. PoC Address of the Participant at the PoC Client sending the Talk Burst

d. Nick name of the Participant at the PoC Client sending the Talk Burst.

NOTE: If the Participating PoC Function B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

9.2.2.4   Manual answer override case – On-demand Session

This subclause describes a scenario where an inviting PoC User is authorized to issue manual answer override request and send INVITE message containing Manual Answer Override. Figure 19 *"Manual answer override procedure"* shows signalling flow for this scenario.
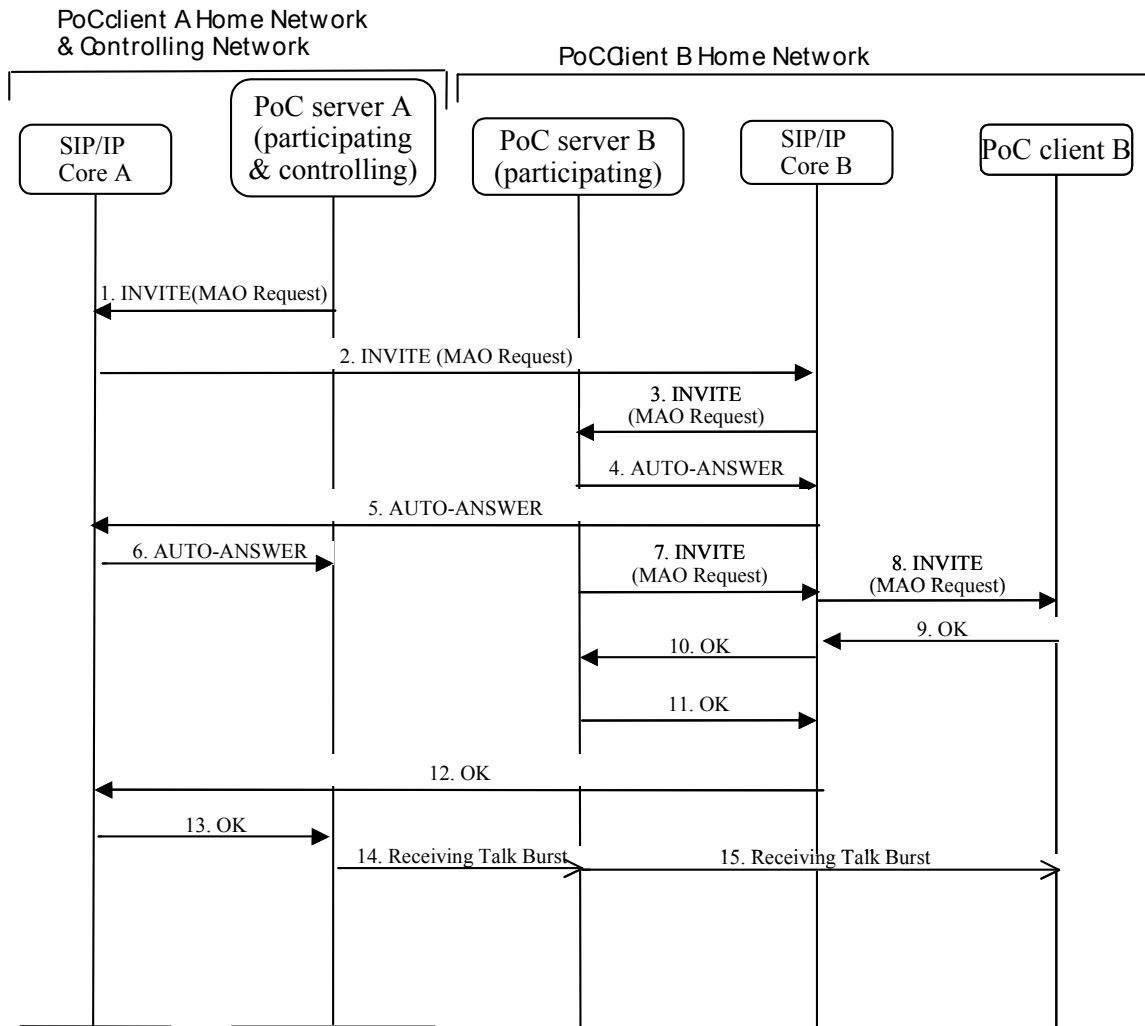
Figure 19: Manual answer override procedure
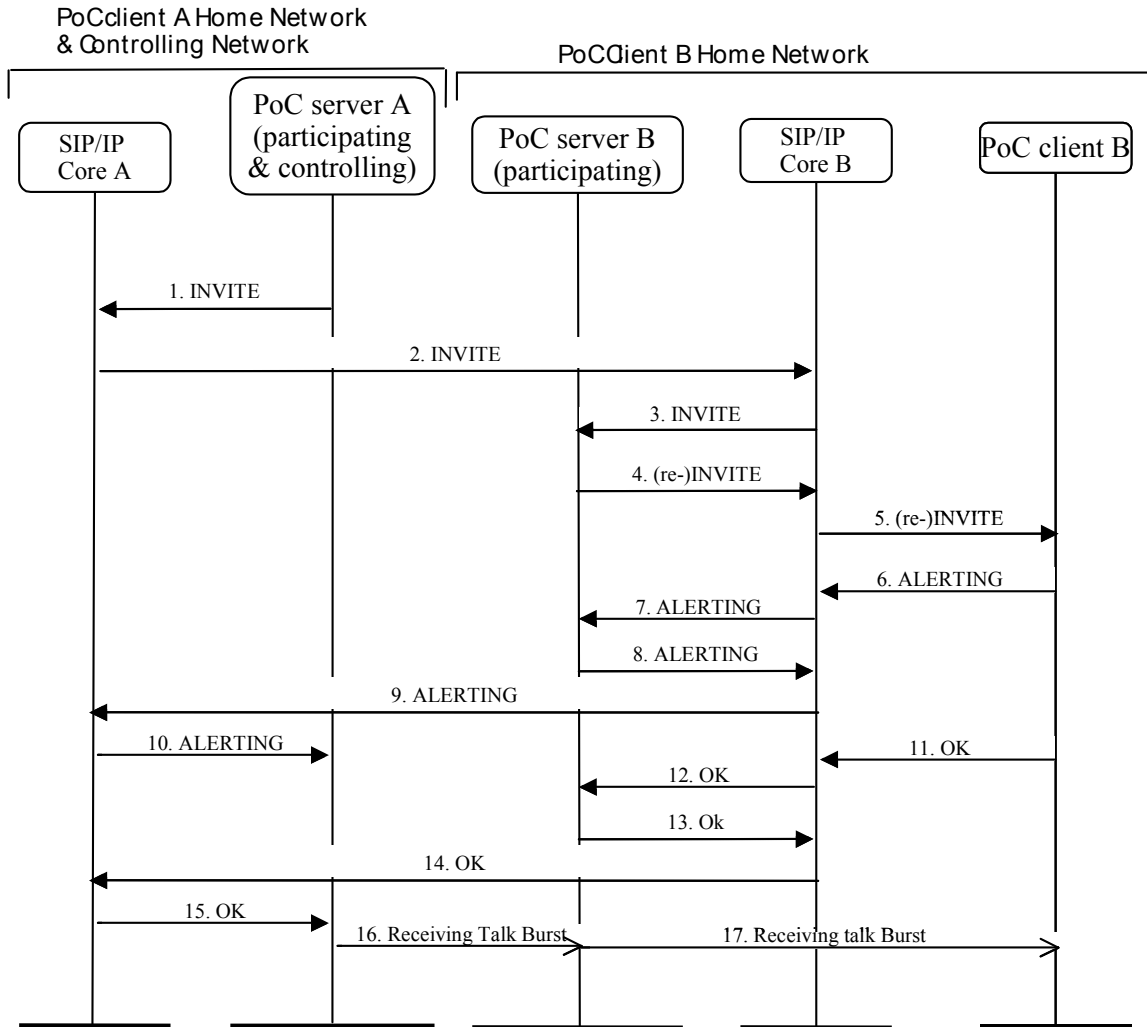
1. PoC Server A (participating & controlling) sends INVITE request to the SIP/IP Core A.

   Information elements contained in INVITE request:

   a. PoC Address of invited PoC User

   b. Media Parameters of PoC Server A (participating & controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

   e. Controlling PoC Function assigned indication

   f. Talk Burst Control Protocol proposal

   g. Manual answer override request.

2. SIP/IP Core A routes the request to the PoC Client B home network.

   Information elements contained in INVITE request:

   a. PoC Address of invited PoC User

      b.   Media Parameters of PoC Server A (participating & controlling)

      c.   PoC Service indication

      d.   PoC Address of the PoC User at the PoC Client A

      e.   Controlling PoC Function assigned indication

      f.   Talk Burst Control Protocol proposal

      g.   Manual answer override request.

3. SIP/IP Core B routes the request to the PoC Server B (participating) based on the PoC Address of invited PoC Client and PoC service indication.

    Information elements contained in INVITE request:

      a.   PoC Address of PoC Client B

      b.   Media Parameters of PoC Server A (participating & controlling)

      c.   PoC service indication

      d.   PoC Address of PoC User at the PoC Client A

      e.   Controlling PoC Function assigned indication

      f.   Talk Burst Control Protocol proposal

      g.   Manual answer override request.

4. If the inviting PoC User is authorized to issue manual answer override request, the PoC Server B (participating) sends AUTO-ANSWER response back towards the controlling network whether Answer Mode at PoC Server B (participating) is set to Automatic Answer Mode or Manual Answer Mode. The AUTO-ANSWER response triggers the controlling network to progress session in originating part.

5. SIP/IP Core B forwards the manual answer override response to the controlling network.

6. SIP/IP Core A forwards the manual answer override response to the PoC Server A (participating & controlling)

7. PoC Server B (participating) sends the PoC Session setup request to the SIP/IP Core B. Information elements contained in INVITE request:

      a.   Media Parameters of the PoC Server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

      b.   PoC service indication

      c.   PoC Address of PoC User at the PoC Client B

      d.   PoC Address of PoC User at the PoC Client A

      e.   Talk Burst Control Protocol proposal

      f.   Manual answer override request.

NOTE: In case of Pre-established Session is available the re-INVITE is sent.

8. SIP/IP Core B routes the INVITE request to the PoC Client B. Information elements contained in INVITE request:

---

    a. Media Parameters of the PoC server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

    b. PoC service indication

    c. PoC Address of PoC User at the PoC Client B

    d. PoC Address of PoC User at the PoC Client A

    e. Talk Burst Control Protocol proposal

    f. Manual answer override request.

9. When the PoC Client B receives the INVITE request, the PoC Client B sends an OK response for the INVITE. Information elements contained in the OK response:

    a. Media Parameters of the PoC Client B

    b. Selected Talk Burst Control Protocol.

10. SIP/IP Core B forwards the OK response to the PoC Server B (participating). Information elements contained in OK response:

    a. Media Parameters of the PoC Client B

    b. Selected Talk Burst Control Protocol.

11. When PoC Server B (participating) receives OK response it will forward it to towards controlling network. Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

12. SIP/IP Core B forwards the OK response to the controlling network. Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

13. SIP/IP Core A forwards the OK response to the PoC Server A (participating & controlling). Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

14. The PoC Server A sends the Talk Burst Control message informing the PoC Client B about the status in this case the receiving Talk Burst indication. Information elements contained in receiving Talk Burst indication:

    a. PoC Address of the Participant at the PoC Client sending the Talk Burst

    b. Nick name of the Participant at the PoC Client sending the Talk burst.

15. The PoC Server B (participating) relays the receiving Talk Burst message to the PoC Client B. Information elements contained in receiving Talk Burst indication:

    a. PoC Address of the Participant at the PoC Client sending the Talk Burst

      b.   Nick name of the Participant at the PoC Client sending the Talk Burst

NOTE: If the Participating PoC Function B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

9.3 Pre-arranged PoC Group Session setup

A Pre-arranged PoC Group is a Group having pre-defined Group identity and member list. A Pre-arranged PoC Group Session is initiated by one of the members. When a Pre-arranged PoC Group Session is initiated, all other Group members are invited. The Pre-arranged PoC Group Session is established by using the Group identity in the invitation message.

In case the PoC User tries to initiate a Pre-arranged PoC Group Session, when the PoC Session is already ongoing (e.g., the PoC Client did not receive an invitation at the start of the PoC Session due to being out of radio range or not being powered on) the PoC Server adds the PoC User to the existing PoC Session, and notifies the PoC User that the PoC Session was already in progress.

9.3.1 Pre-arranged PoC Session invitation from PoC Client

Chapter 9.3.1.1 *"Confirmed indication using On-demand Session"* describes a case where right-to-speak indication is given to the inviting PoC User when one of the invited PoC Users has accepted the invitation using On-demand Session establishment.

Chapter 9.3.1.2 *"Unconfirmed Indication using On-demand Session"* describes a case where right-to-speak indication is given to the inviting PoC User using On-demand Session when the invited PoC Users is registered and uses automatic answer.

Chapter 9.3.1.3 *"Unconfirmed Indication using Pre-established Session"* describes a case where right-to-speak indication is given to the inviting PoC User using Pre-established Session when the invited PoC Users is registered and uses automatic answer.

Chapter 9.3.1.4 *"Confirmed indication using Pre-established Session"* describes a case where right-to-speak indication is given to the inviting PoC Client when one of the invited PoC Clients has accepted the invitation

9.3.1.1 Confirmed Indication using On-demand Session

In this case, the originator confirms the event that at least one of the PoC Group members has been connected before he starts speaking. In the Figure 20 *"Pre-arranged Group Session setup, originating part",* the right-to-speak indication in the Talk Burst Control follows the confirmation from the PoC Server X (controlling).
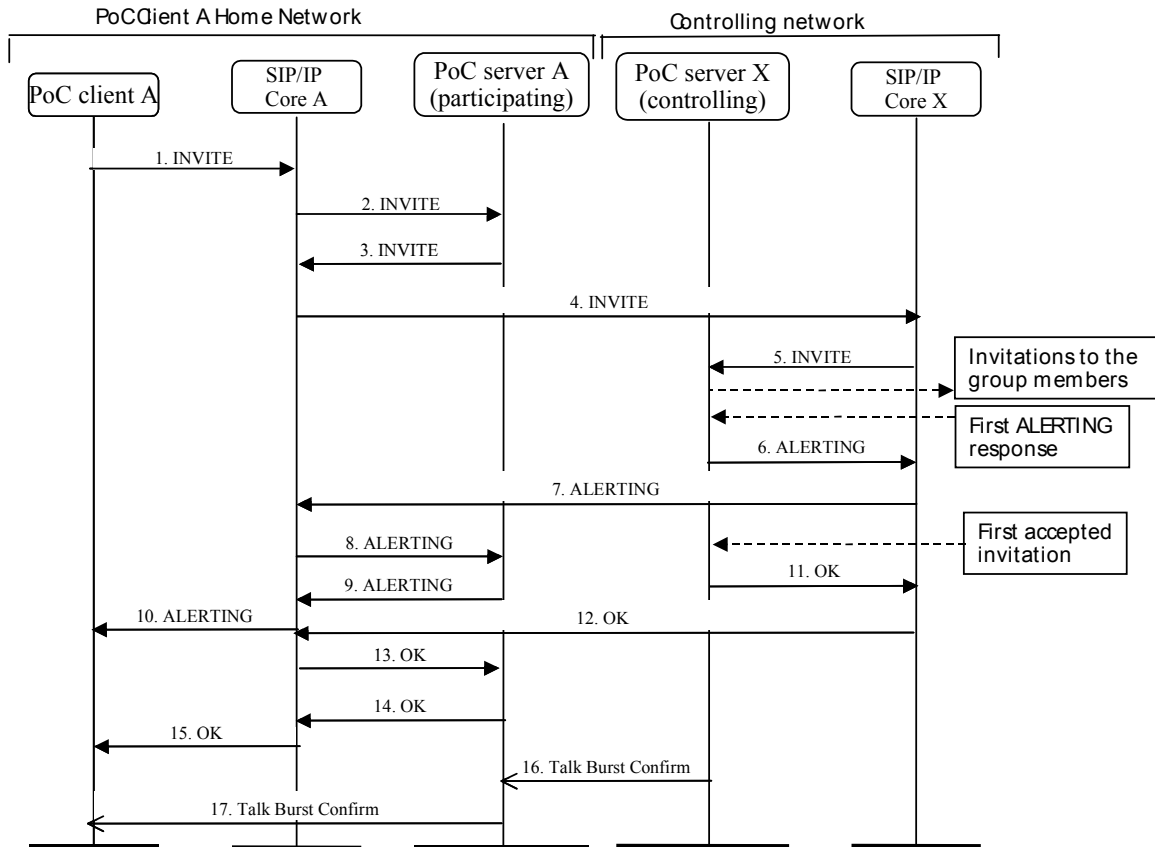
Figure 20: Pre-arranged Group Session setup, originating part

1. The PoC Client A sends an INVITE request to the address of the Pre-arranged PoC Group.

   Information elements contained in the INVITE request:

   a. Pre-arranged Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of PoC Client A

   e. Talk Burst Control Protocol proposal

   f. Optionally, manual answer override request, if selected by PoC Client A.

2. The SIP/IP Core A routes the INVITE request to the PoC Server A (participating) trigged on the PoC Service indication and the PoC Address.

   Information elements contained in the INVITE request:

   a. Pre-arranged Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of PoC Client A

    e. Talk Burst Control Protocol proposal

    f. Manual answer override request, if selected by PoC Client A.

3. The PoC Server A (participating) identifies that the Pre-arranged PoC Group is not hosted in this PoC Server therefore it sends the request to the SIP/IP Core A.

Information elements contained in the INVITE request:

    a. Pre-arranged Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. PoC Server A (participating) selected Media Parameters

    e. Talk Burst Control Protocol proposal

    f. Manual answer override request, if selected by PoC Client A.

4. The SIP/IP Core A routes the request according to the routing principles to SIP/IP Core X.

Information elements contained in the INVITE request:

    a. Pre-arranged Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. PoC Server A (participating) selected Media Parameters

    e. Talk Burst Control Protocol proposal

    f. Manual answer override request, if selected by PoC Client A.

5. The SIP/IP Core X routes the request to the PoC Server X (controlling) based on Pre-arranged PoC Group Identity. If the Pre-arranged PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC service indication to route to the PoC Server.

The PoC Server X performs the necessary terminating service control (e.g. authorizes the PoC Client A) and if the PoC Address of the PoC User initiating the PoC Session is authorized successfully, the PoC Server X invites the other members to the Pre-arranged PoC Session as described in subclause 9.3.2*"Terminating Part"*. In the case the PoC Group Session already is ongoing the PoC Client is added to the PoC Session.

Information elements contained in the INVITE request:

    a. Pre-arranged Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. PoC Server A (participating) selected Media Parameters

    e. Talk Burst Control Protocol proposal

    f. Optionally, manual answer override request, if selected by PoC Client A.

6-10. When the first ALERTING response is received the PoC Server X (controlling) sends ringing response towards the PoC Client A.

11-13. When the first PoC Client accepts the Pre-arranged PoC Session invitation, the PoC Server X sends an OK response to the PoC Server A (participating) along the same signalling path.

Information elements contained in the OK response:

   a.   PoC Server X (controlling) selected Media Parameters

   b.   Selected Talk Burst Control Protocol.

14-15. The PoC Server A sends an OK response to the PoC Client A along the same signalling path.

Information elements contained in the OK response:

   a.   PoC Server A (participating) selected Media Parameters

   b.   Selected Talk Burst Control Protocol.

16. The PoC Server X (controlling) sends the Talk Burst confirm response to the PoC Server A (participating).

17. The PoC Server A (participating) relays the Talk Burst confirm response to the PoC Client A.

NOTE: In case of PoC Client is added to an ongoing PoC Session and the Talk Burst is already given to another Participant the Talk Burst reject is sent instead of Talk Burst confirm.

9.3.1.2   Unconfirmed Indication using On-demand Session

In this case, the originator does not have to confirm that the PoC Group members have been connected before he starts speaking: he can immediately speak after he receives the Unconfirmed Indication from the PoC Server X (controlling). The Figure 21 *"Unconfirmed Indication using On-demand Session"* shows the high level flow of this scenario.

Figure 21: Unconfirmed Indication using On-demand Session.

1. The PoC Client A sends an INVITE request to the address of the Pre-arranged PoC Group. Information elements contained in the INVITE request:

    a. Pre-arranged PoC Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Client A

    e. Optionally, a manual answer override request

    f. Talk Burst Control Protocol proposal.

2. The SIP/IP Core A routes the INVITE request to the PoC Server A (participating) A trigged on the PoC service indication and PoC Address. Information elements contained in the INVITE request:

    a. Pre-arranged Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d.   Media Parameters of the PoC Client A

    e.   Manual answer override request, if selected by PoC Client A

    f.   Talk Burst Control Protocol proposal.

3.   The PoC Server A (participating) identifies that the Pre-arranged PoC Group is not hosted in this PoC Server therefore it sends the request to the SIP/IP Core A. Information elements contained in the INVITE request:

    a.   Pre-arranged PoC Group Identity

    b.   PoC Address of the PoC User at the PoC Client A

    c.   PoC service indication

    d.   PoC Server A (participating) selected Media Parameters

    e.   Manual answer override request, if selected by PoC Client A

    f.   Talk Burst Control Protocol proposal.

4.   The SIP/IP Core A routes the request according to the routing principles to SIP/IP Core X. Information elements contained in the INVITE request:

    a.   Pre-arranged Group Identity

    b.   PoC Address of the PoC User at the PoC Client A

    c.   PoC service indication

    d.   PoC Server A (participating) selected Media Parameters

    e.   Manual answer override request, if selected by PoC Client A

    f.   Talk Burst Control Protocol proposal.

5.   The SIP/IP Core X routes the request to the PoC Server X (controlling) based on Pre-arranged PoC Group Identity. If the Pre-arranged PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC service indication to route to the PoC Server. The PoC Server X performs the necessary terminating service control (e.g. authorizes the PoC Client A, and verifying authorization to override a manual answer setting, if requested) and if the PoC Address of the user initiating the PoC Session is authorized successfully, the PoC Server X invites the other members to the Pre-arranged PoC Session as described in 9.3.2*"Terminating Part"*. In the case the PoC Group Session already is ongoing the PoC Client is added to the PoC Session.

Information elements contained in the INVITE request:

    a.   Pre-arranged Group Identity

    b.   PoC Address of the PoC User at the PoC Client A

    c.   PoC service indication

    d.   PoC Server A (participating) selected Media Parameters

    e.   Manual answer override request, if selected by PoC Client A and authorisation has been verified by PoC Server X

    f.   Talk Burst Control Protocol proposal.

6-8. When the PoC Server X receives the first auto-answer indication, it sends the unconfirmed OK to the PoC Server A through the signalling path. Information elements contained in the unconfirmed OK:

     a.   PoC Server X (controlling) selected Media Parameters

     b.   Selected Talk Burst Control Protocol.

9-10. The PoC Server A sends an unconfirmed OK response to the PoC Client A along the same signalling path. Information elements contained in the unconfirmed OK response:

     a.   PoC Server A (participating) selected Media Parameters

     b.   Selected Talk Burst Control Protocol.

11. The PoC Server X (controlling) sends the Talk Burst confirm response to the PoC Server A (participating).

12. The PoC Server A (participating) relays the Talk Burst confirm response to the PoC Client A. The PoC Client is now able to start talking and the PoC Server X buffers the media for the late delivery upon the response from the terminating PoC Client indicating the acceptance of the session.

NOTE: In case of PoC Client is added to an ongoing PoC Session and the Talk Burst is already given to another Participant the Talk Burst reject is sent instead of Talk Burst confirm.

9.3.1.3   Unconfirmed Indication using Pre-Established Session

In this case, the originator does not have to confirm that the PoC Group members have been connected before he starts speaking: he can immediately speak after he receives the Unconfirmed Indication from the PoC Server X (Controlling). The Figure 22 *"Unconfirmed Indication using Pre-established Session"* shows the high level flow of this scenario.
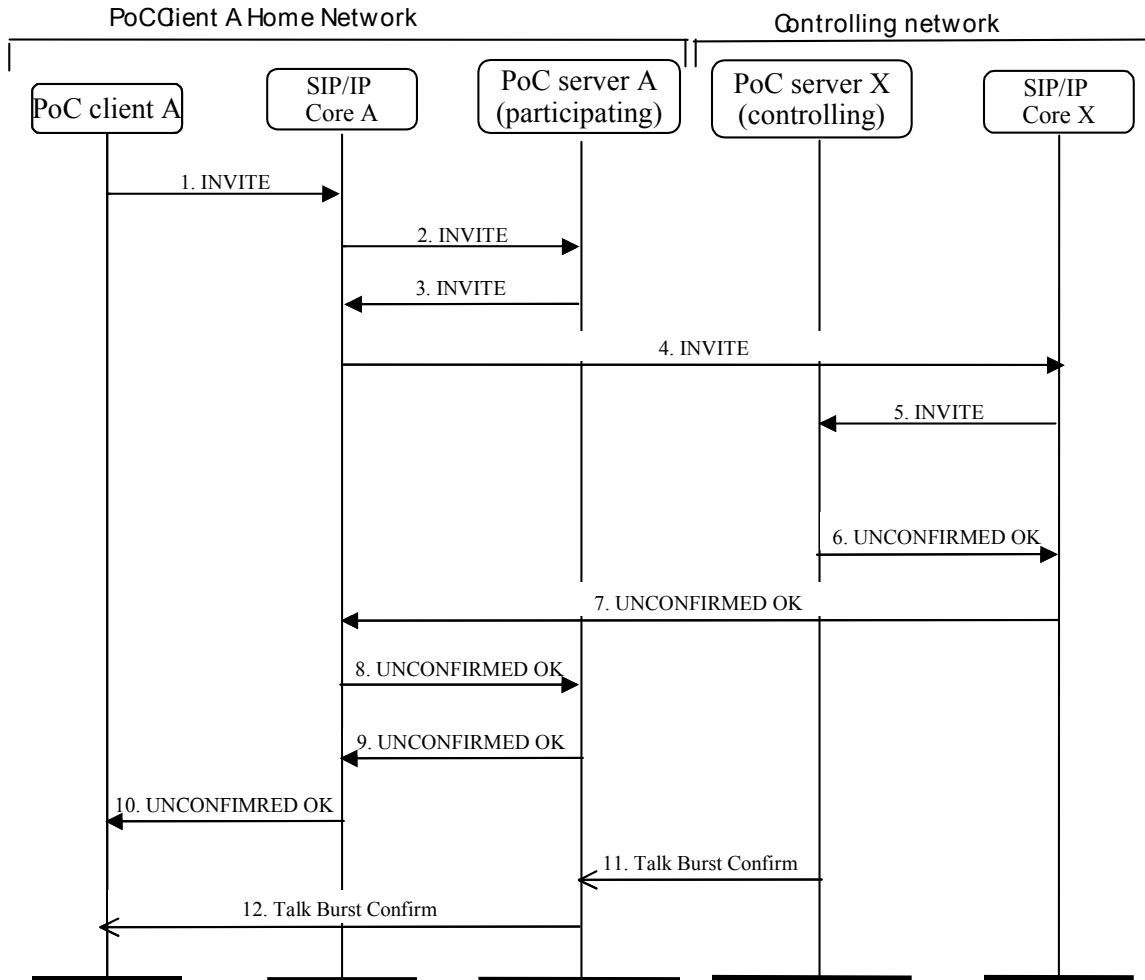

Figure 22: Unconfirmed Indication using Pre-established Session

1.   The PoC Client A sends a REFER request to the SIP/IP Core A.

Information elements contained in the REFER request:

   a. PoC Session Identity associated with the Pre-established Session to which the REFER applies

   b. Pre-arranged PoC Group Identity with an indication that it is a Pre-arranged PoC Group

   c. PoC Address of the PoC User at the PoC Client A

   d. PoC service indication

   e. Optionally, manual answer override request

2. The SIP/IP Core A routes the REFER request to the participating PoC Server A based on the PoC Service indication and conference URI of the Pre-established Session.

Information elements contained in the REFER request:

   a. PoC Session Identity associated with the Pre-established PoC Session to which the REFER applies

   b. Pre-arranged PoC Group Identity with an indication that it is a Pre-arranged PoC Group

   c. PoC Address of the PoC User at the PoC Client A

   d. PoC service indication

   e. Manual answer override request, if selected by PoC Client A

3. PoC Server A sends an ACCEPTED response to the SIP/IP Core A

4. The SIP/IP Core sends the ACCEPTED response to the PoC Client via the SIP/IP Core A

5. When the POC Server A (participating) receives a REFER request containing a URI with an indication that the URI is a Pre-arranged PoC Group not hosted by this PoC Server, the PoC Server A (participating) sends a SIP INVITE request towards the hosting PoC Server. In this scenario, PoC Server X owns the Pre-arranged PoC Group URI.

Information elements contained in the INVITE request:

   a. Pre-arranged PoC Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of the PoC Server A (participating)

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

6. The SIP/IP Core A routes the INVITE request to SIP/IP Core X.

Information elements contained in the INVITE request:

   a. Pre-arranged PoC Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of the PoC Server A (participating)

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

7. The SIP/IP Core X routes the request to the PoC Server X (controlling) based on Pre-arranged PoC Group Identity. If the Pre-arranged PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC service indication to route to the PoC Server.

    The PoC Server X performs the necessary terminating service control (e.g. authorizes the PoC Client A, and verifying authorization to override a manual answer setting, if requested) and if the PoC Address of the User initiating the PoC Session is authorized successfully, the PoC Server X invites the other members to the Pre-arranged PoC Session as described in 9.3.2. In the case the PoC Group Session already is ongoing the PoC Client is added to the PoC Session.

    Information elements contained in the INVITE request:

    a. Pre-arranged PoC Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Server A (participating)

    e. Manual answer override request, if selected by PoC Client A

    f. Talk Burst Control Protocol proposal.

8-10. When the PoC Server X receives the first auto-answer indication, it sends the unconfirmed OK to the PoC Server A through the signalling path.

    Information elements contained in the unconfirmed OK:

    a. PoC Session Identity URI of the Pre-arranged PoC Group Session

    b. PoC Server X (controlling) selected Media Parameters

    c. Selected Talk Burst Control Protocol.

11. After receiving the UNCONFIRMED OK PoC Server A sends a NOTIFY request to the SIP/IP Core A.

    Informational elements in the NOTIFY.

    a. PoC Session Identity of the Pre-arranged PoC Group Session

    b. Unconfirmed OK response received indication

12. The SIP/IP Core forwards the NOTIFY to the PoC Client A. The PoC Client is now able to start talking and the PoC Server X buffers the media for the late delivery upon the response from the terminating PoC Client indicating the acceptance of the session.

    Informational elements in the NOTIFY.

    a. PoC Session Identity of the Pre-arranged PoC Group Session

    b. Unconfirmed OK response received indication

13. PoC Client A sends an OK to the SIP/IP Core A

14. The SIP/IP Core A sends the OK to the PoC Server A

9.3.1.4 Confirmed Indication using Pre-established Session

This subclause describes a scenario when the Inviting PoC Client receives the right-to-speak indication in a Talk Burst Control message from the PoC Server X (controlling) when at least one invited PoC User accepts the invitation.

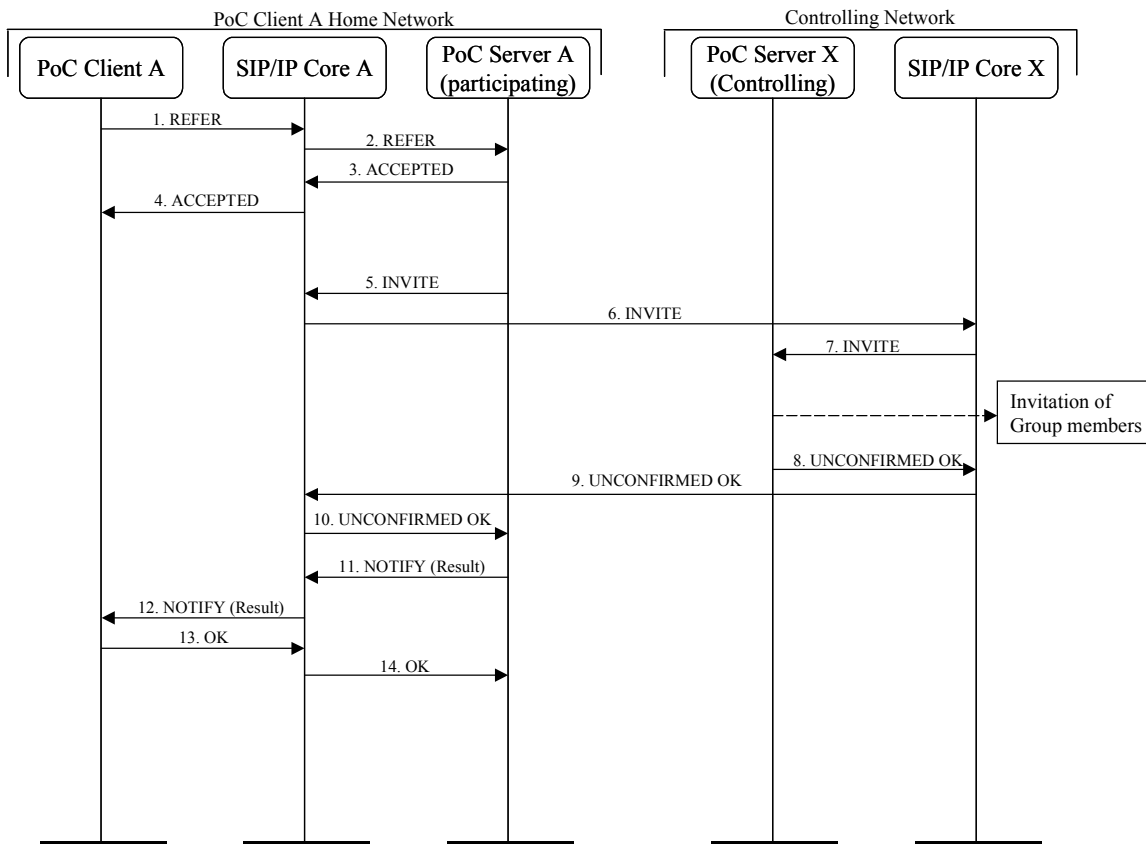Figure 23: *Confirmed Indication using Pre-established Session* shows the message flow for the scenario.
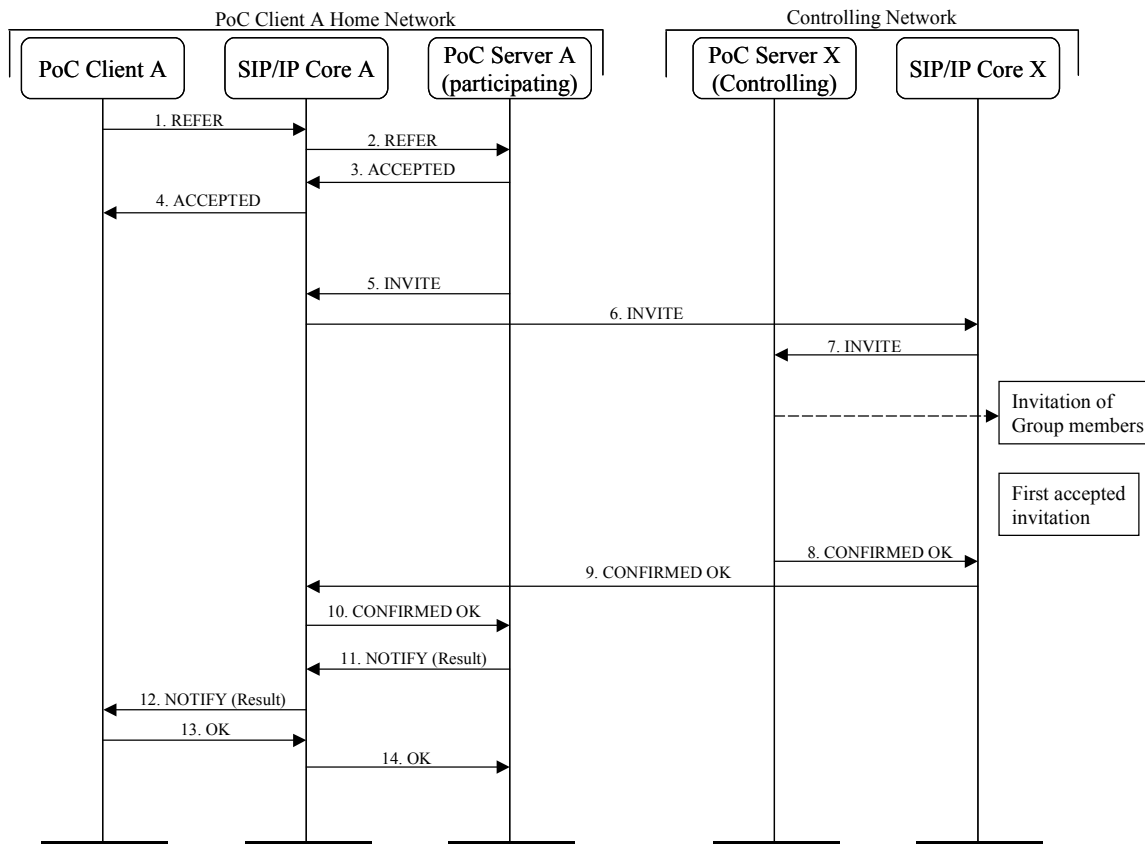
Figure 23: Confirmed Indication using Pre-established Session

1. The PoC Client A sends a REFER request to the SIP/IP Core A.

   Information elements contained in the REFER request:

   a. PoC Session Identity associated with the Pre-established Session to which the REFER applies

   b. Pre-arranged PoC Group Identity with an indication that it is a Pre-arranged PoC Group

   c. PoC Address of the PoC User at the PoC Client A

   d. PoC service indication

   e. Optionally, manual answer override request

2. The SIP/IP Core A routes the REFER request to the PoC Server A based performing the Participating PoC Function on the PoC service indication and conference URI of the Pre-established Session.

   Information elements contained in the REFER request:

   a. PoC Session Identity associated with the Pre-established Session to which the REFER applies

   b. Pre-arranged PoC Group Identity with an indication that it is a Pre-arranged PoC Group

   c. PoC Address of the PoC User at the PoC Client A

   d. PoC service indication

   e. Manual answer override request, if selected by PoC Client A

3. PoC Server A sends an ACCEPTED response to the SIP/IP Core A

4. The SIP/IP Core sends the ACCEPTED response to the PoC Client via the SIP/IP Core A

5. When the POC Server A (participating) receives a REFER request containing a URI with an indication that the URI is a Pre-arranged Group not hosted by this PoC Server, the PoC Server A (participating) sends a SIP INVITE request towards the hosting PoC Server. In this scenario, PoC Server X owns the Pre-arranged PoC Group URI.

   Information elements contained in the INVITE request:

   a. Pre-arranged PoC Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of the PoC Server A (participating)

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

6. The SIP/IP Core A routes the INVITE request to SIP/IP Core X.

   Information elements contained in the INVITE request:

   a. Pre-arranged PoC Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of the PoC Server A (participating)

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

7. The SIP/IP Core X routes the request to the PoC Server X (controlling) based on Pre-arranged PoC Group Identity. If the Pre-arranged PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC service indication to route to the PoC Server.

   The PoC Server X performs the necessary terminating service control (e.g. authorizes the PoC Client A, and verifying authorization to override a manual answer setting, if requested) and if the PoC Address of the User initiating the PoC Session is authorized successfully, the PoC Server X invites the other members to the Pre-arranged PoC Session as described in 9.3.2 *"Terminating Part".*

   Information elements contained in the INVITE request:

   a. Pre-arranged PoC Group Identity

   b. PoC Address of the PoC User at the PoC Client A

   c. PoC service indication

   d. Media Parameters of the PoC Server A (participating)

   e. Manual answer override request, if selected by PoC Client A

   f. Talk Burst Control Protocol proposal.

8-10. When the PoC Server X receives the first accept indication, it sends the CONFIRMED OK to the PoC Server A through the signalling path.

Information elements contained in the CONFIRMED OK:

    a.   PoC Session Identity of the Pre-arranged PoC Group Session

    b.   PoC Server X (controlling) selected Media Parameters

    c.   Selected Talk Burst Control Protocol.

11. After receiving the CONFIRMED OK PoC Server A sends a NOTIFY request to the SIP/IP Core A.

    Informational elements in the NOTIFY.

    a.   PoC Session Identity of the Pre-arranged PoC Group Session

    b.   Unconfirmed OK response received indication

12. The SIP/IP Core forwards the NOTIFY to the PoC Client A. The PoC Client is now able to start talking and the PoC Server X buffers the media for the late delivery upon the response from the terminating PoC Client indicating the acceptance of the session.

13. PoC Client A sends an OK to the SIP/IP Core A

14. The SIP/IP Core A sends the OK to the PoC Server A.

9.3.2   Terminating part

In the following subclauses different setup cases are described from the invited PoC Client point of view.

Subclause 9.3.2.1 *"Auto-answer case"* describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC User is accepted automatically.

Subclause 9.3.2.2 *"Manual answer case"* describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC Client is accepted manually.

9.3.2.1   Auto-answer case

9.3.2.1.1   Auto-answer with Pre-established Session

This subclause describes a scenario where the invited PoC User has defined that the PoC Session request from the inviting PoC User is accepted automatically or, in systems which support the optional manual answer override capability, that the invited PoC User has defined that the inviting PoC User is approved to override a manual answer setting and the inviting PoC User has selected to do so and where the invited PoC Client has a Pre-established Session connection with the PoC Server. Figure 24 *"Automatic answer using Pre-established Session"* shows signalling flow for this scenario.

Figure 24: Automatic answer using Pre-established Session

1. PoC Server X (controlling) sends INVITE request to the SIP/IP Core X.

    Information elements contained in INVITE request:

    a. PoC Address of the PoC User at the PoC Client A

    b. Media Parameters of PoC Server X (controlling)

    c. PoC service indication

    d. PoC Address of the PoC User at the PoC Client B

    e. Controlling PoC Function assigned indication

    f. Conference URI for the PoC Session

    g. Manual answer override request, if selected by PoC Client A

    h. Talk Burst Control Protocol proposal

    i. Pre-arranged Group Identity.

2. SIP/IP Core X routes the request to the PoC Client B home network.

    Information elements contained in INVITE request:

    a. PoC Address of the PoC User at the PoC Client A

b. Media Parameters of PoC Server X (controlling)

c. PoC service indication

d. PoC Address of the PoC User at the PoC Client B

e. Controlling PoC Function assigned indication

f. Conference URI for the PoC Session

g. Manual answer override request, if selected by PoC Client A

h. Talk Burst Control Protocol proposal

i. Pre-arranged Group Identity.

3. SIP/IP Core B routes the request to the PoC Server B (participating) based on PoC Address of PoC Client and PoC Service indication.

Information elements contained in INVITE request:

a. PoC Address of the PoC User at the PoC Client A

b. Media Parameters of PoC Server X (controlling)

c. PoC service indication

d. PoC Address of the PoC User at the PoC Client B

e. Controlling PoC Function assigned indication

f. Conference URI for the PoC Session

g. Manual answer override request, if selected by PoC Client A

h. Talk Burst Control Protocol proposal

i. Pre-arranged Group Identity.

4. Since in this case the PoC Client B is accepting the session automatically, the PoC Server B sends OK response back towards the controlling network

Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol

5. SIP/IP Core B forwards the OK response to the controlling network.

Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol

6. SIP/IP Core X forwards the OK response to the PoC Server X (controlling)

Information elements contained in OK response:

a. Media Parameters of PoC Server B

b. Selected Talk Burst Control Protocol

7. The PoC Server B (participating) sends the Connect message to the PoC Client B.

   Information elements contained in OK response:

   a. PoC Address of the Participant at the PoC Client initiating the invitation

   b. Nick name of the Participant at the PoC Client initiating the invitation

   c. Manual Answer Override request indication, if PoC Client A is authorized to issue and PoC Server B supports manual answer override.

8. The PoC Client B acknowledges the Connect message with a Talk Burst Acknowledge message to guarantee reliable delivery of the Connect message.

9.3.2.1.2 Auto-answer with On-demand Session

In this case, the terminating PoC Client automatically answers the connection request by the PoC Server and the PoC User is able to hear the voice. The Figure 25 *"Terminating part, autoanswer case"* shows the high level flow of this scenario.
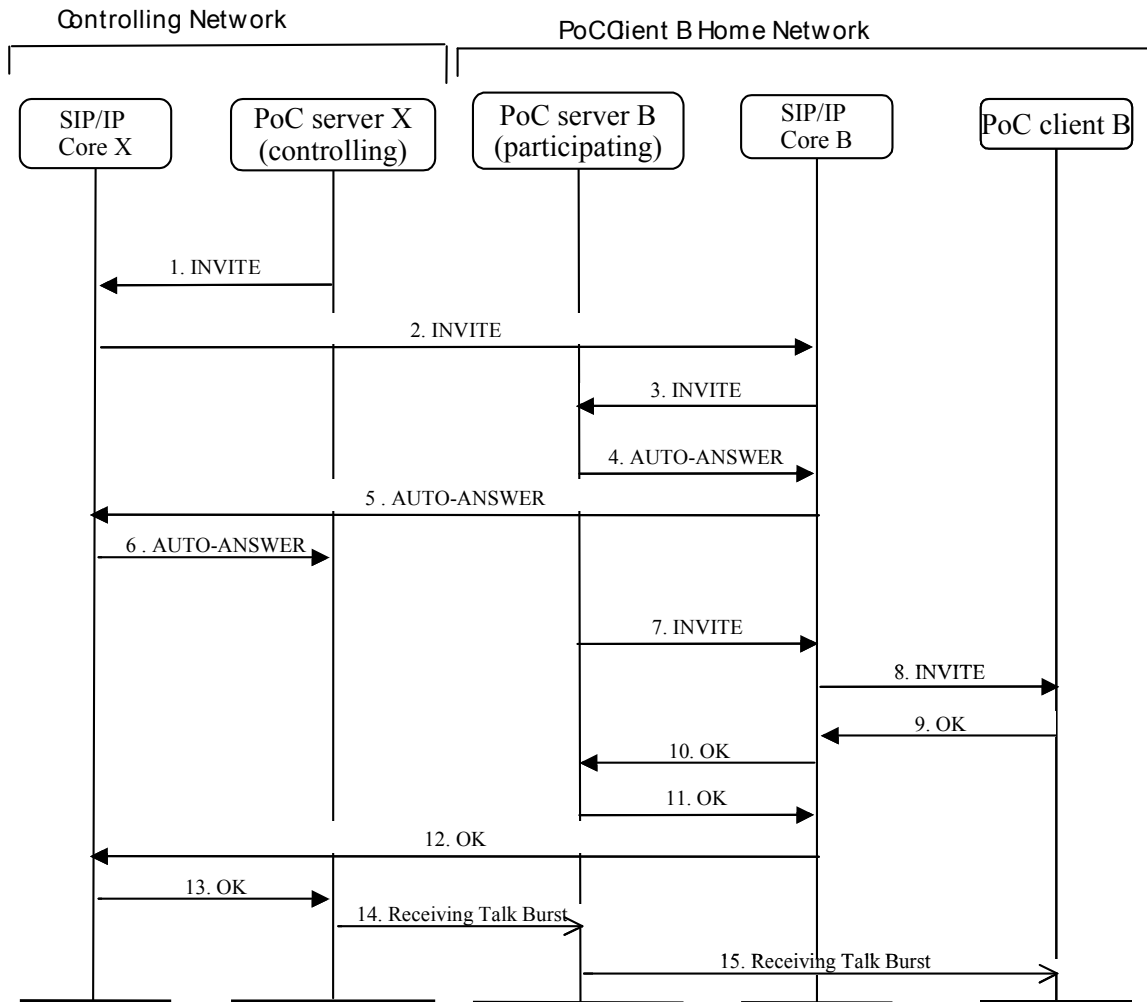
Figure 25: Terminating part, autoanswer case.

1. PoC Server X (controlling) sends an INVITE request to the SIP/IP Core X. Information elements contained in the INVITE request:

    a.   PoC Address of the PoC User at the PoC Client A

    b.   Media Parameters of PoC Server X (controlling)

    c.   PoC service indication

    d.   PoC Address of the PoC User at the PoC Client B

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A

    h.   Pre-arranged Group Identity.

2.   SIP/IP Core X routes the request to the PoC Client B home network. Information elements contained in the INVITE request:

    a.   PoC Address of the PoC User at the PoC Client A

    b.   Media Parameters of PoC Server X (controlling)

    c.   PoC service indication

    d.   PoC Address of the PoC User at the PoC Client B

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A

    h.   Pre-arranged Group Identity.

3.   SIP/IP Core B routes the request to the PoC Server B based on the PoC Address of invited PoC Client and PoC Service indication. Information elements contained in the INVITE request:

    a.   PoC Address of the PoC User at the PoC Client A

    b.   Media Parameters of PoC Server X (controlling)

    c.   PoC service indication

    d.   PoC Address of the PoC User at the PoC Client B

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request, if selected by PoC Client A

    h.   Pre-arranged Group Identity.

4. – 6. The PoC Server B sends Automatic Answer Indication to the PoC Server X through the signalling path.

7.   The PoC Server B sends an INVITE request to the SIP/IP Core B. Information elements contained in the INVITE request:

    a.   PoC service indication

    b.   Automatic acceptance indication

    c.   PoC Address of the PoC User at the PoC Client B

     d.   PoC Address of the PoC User at the PoC Client A

     e.   Media Parameters of PoC Server B (participating)

     f.   Talk Burst Control Protocol proposal

     g.   Manual answer override request, if selected by PoC Client A and if PoC Client B has authorised PoC Client A to issue a manual answer override request and PoC Server B (participating) supports manual answer override.

8.   SIP/IP Core B routes the INVITE request to the PoC Client B. Information elements contained in the INVITE request:

     a.   PoC Service indication

     b.   Automatic acceptance indication

     c.   PoC Address of the PoC User at the PoC Client B

     d.   PoC Address of the PoC User at the PoC Client A

     e.   Media Parameters of PoC Server B (participating)

     f.   Talk Burst Control Protocol proposal

     g.   Manual answer override request, if selected by PoC Client A and included by PoC Server B.

9. – 13. When the PoC Client B receives the INVITE request, the PoC Client B sends an OK response for the INVITE. The OK response is sent to the PoC Server X through the signalling connection.

Information elements contained in the OK response:

     a.   Media Parameters of the PoC Client B

     b.   Selected Talk Burst Control Protocol

14.   The PoC Server X (controlling) is sending the receiving Talk Burst indication to the PoC Server B (participating).

Information elements contained in receiving Talk Burst:

     a.   PoC Address of the Participant at the PoC Client sending the Talk Burst

     b.   Nick name of the Participant at the PoC Client sending the Talk Burst.

15. The PoC Server B (participating) is sending the receiving Talk Burst indication to the PoC Client B.

Information elements contained in receiving Talk Burst indication:

     a.   PoC Address of the Participant at the PoC Client sending the Talk Burst

     b.   Nick name of the Participant at the PoC Client sending the Talk Burst.

NOTE: If the Participating PoC Function B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

9.3.2.2   Manual answer case

In this case, the terminating PoC Client indicates the incoming PoC Session request and the user responds the request, unless the inviting client is authorized to select the optional Manual Answer Override feature and has selected that option.

9.3.2.2.1 Manual answer procedure without override

This subclause describes a scenario where the invited PoC User is using manual answer. The scenario is valid for On-demand Session case as well as for the Pre-established Session case.

The Figure 26 *"Terminating part, manual answer"* shows the high level flow of this scenario.
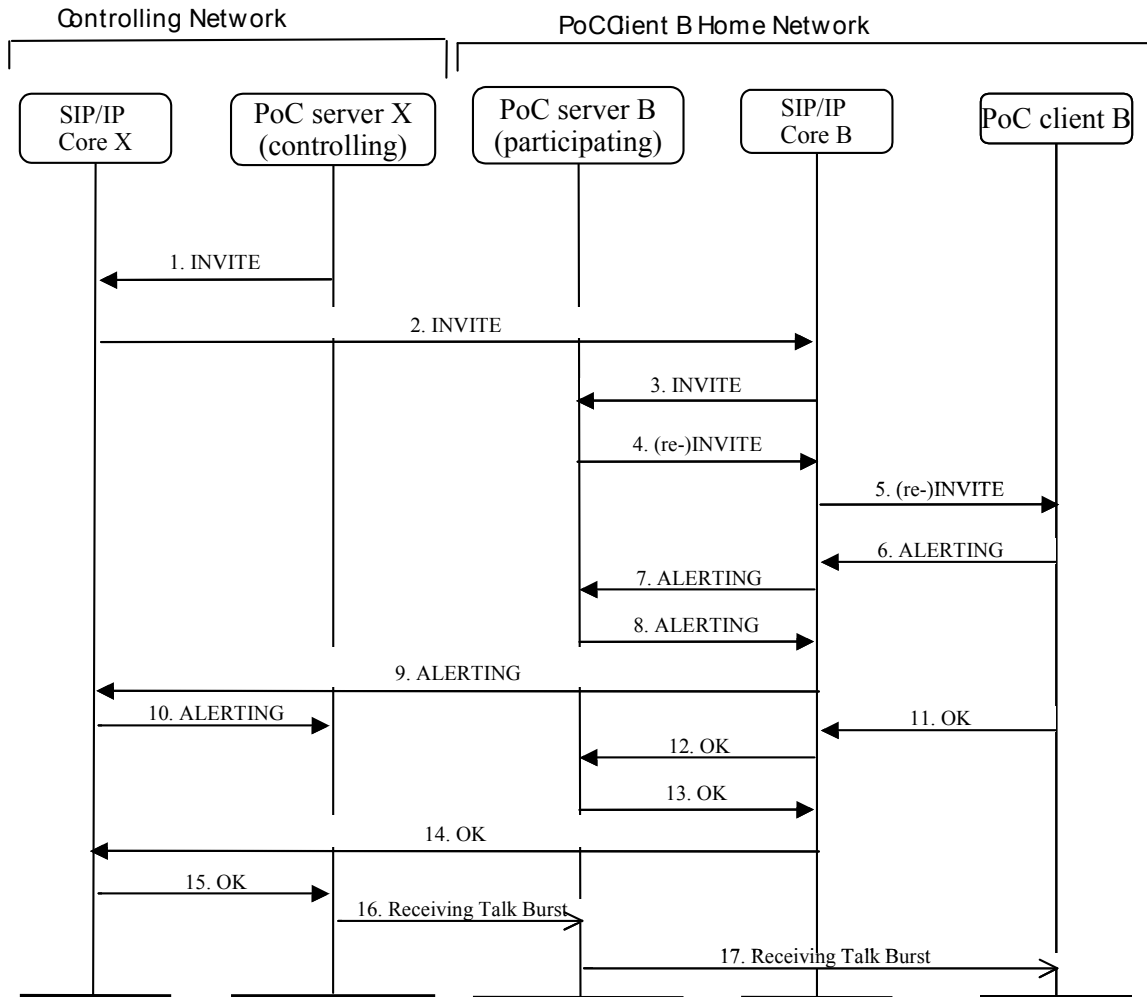
Figure 26: Terminating part, manual answer

1. PoC Server X (controlling) sends an INVITE request to the SIP/IP Core X. Information elements contained in the INVITE request:

   a. PoC Address of the PoC User at the PoC Client A

   b. Media Parameters of PoC Server X (controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client B

   e. Controlling PoC Function assigned indication

   f. Talk Burst Control Protocol proposal

g. Pre-arranged Group Identity.

2. SIP/IP Core X routes the request to the PoC Client B home network. Information elements contained in the INVITE request:

   a. PoC Address of the PoC User at the PoC Client A

   b. Media Parameters of PoC Server X (controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client B

   e. Controlling PoC Function assigned indication

   f. Talk Burst Control Protocol proposal

   g. Pre-arranged Group Identity.

3. SIP/IP Core B routes the request to the PoC Server B based on the PoC Address of invited PoC Client and PoC service indication. Information elements contained in the INVITE request:

   a. PoC Address of the PoC User at the PoC Client A

   b. Media Parameters of PoC Server X (controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client B

   e. Controlling PoC Function assigned indication

   f. Talk Burst Control Protocol proposal

   g. Pre-arranged Group Identity.

4. In case On-demand Session is used, the PoC Server B sends an INVITE request to the SIP/IP Core B. In case Pre-established Session is used, the PoC Server B sends a re-INVITE request within the existing Pre-established Session to the SIP/IP Core B. Information elements contained in the INVITE/re-INVITE request:

   a. PoC service indication

   b. PoC Address of the PoC User at the PoC Client B

   c. PoC Address of the PoC User at the PoC Client A

   d. Media Parameters of PoC Server B (participating)

   e. Manual answer request

   f. Talk Burst Control Protocol proposal

   g. Pre-arranged Group Identity.

5. SIP/IP Core B routes the INVITE/re-INVITE request to the PoC Client B. Information elements contained in the INVITE/re-INVITE request:

   a. PoC service indication

   b. PoC Address of the PoC User at the PoC Client B

   c. PoC Address of the PoC User at the PoC Client A

      d.   Media Parameters of PoC Server B (participating)

      e.   Manual answer request

      f.   Talk Burst Control Protocol proposal

      g.   Pre-arranged Group Identity.

6 – 10. When the PoC Client B received the INVITE/re-INVITE and the manual answer is selected, the PoC Client sends back the ALERTING indication to the PoC Server X through the signalling path.

11 – 15. When the PoC Client B receives the indication that the User accepts the PoC Session, the PoC Client B sends OK response for the INVITE/re-INVITE. The OK response is sent to the PoC Server X through the signalling connection.

    Information elements contained in OK response:

      a.   Media Parameters of the PoC Client B

      b.   Selected Talk Burst Control Protocol.

16.   The PoC Server X (controlling) sends the receiving Talk Burst indication to the PoC Server B (participating).

    Information elements contained in OK response:

      a.   PoC Address of the Participant at the PoC Client sending the Talk Burst

      b.   Nick name of the Participant at the PoC Client sending the Talk Burst.

17. The PoC Server B (participating) is sending the receiving Talk Burst indication to the PoC Client B.

    Information elements contained in Receiving Talk Burst indication:

      a.   PoC Address of the Participant at the PoC Client sending the Talk Burst

      b.   Nick name of the Participant at the PoC Client sending the Talk Burst.

NOTE: If the Participating PoC Function B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

9.3.2.2.2   Manual answer override procedure

This subclause describes a scenario where an inviting PoC User is authorized to issue manual answer override request and send INVITE message containing manual answer override, and the invited User is using manual answer. The scenario is valid for On-demand Session case.

Figure 27 *"Manual answer override procedure"* shows signalling flow for this scenario.

Controlling Network   PoC Client B Home Network

```
┌──────────┐ ┌──────────┐   ┌──────────┐ ┌──────────┐ ┌──────────┐
│  SIP/IP  │ │ PoC      │   │ PoC      │ │  SIP/IP  │ │   PoC    │
│  Core X  │ │ Server X │   │ Server B │ │  Core B  │ │ Client B │
│          │ │(control- │   │(partici- │ │          │ │          │
│          │ │ ling)    │   │ pating)  │ │          │ │          │
└──────────┘ └──────────┘   └──────────┘ └──────────┘ └──────────┘
```

1. INVITE (MAO)

2. INVITE (MAO)

3. INVITE (MAO)

4. AUTO ANSWER

5. AUTO ANSWER

6. AUTO ANSWER

7. INVITE (MAO)

8. INVITE (MAO)

9. OK

10. OK

11. OK

12. OK

13. OK

14. Receiving Talk Burst

15. Receiving Talk Burst

Figure 27: Manual answer override procedure

1. PoC Server X (controlling) sends INVITE request to the SIP/IP Core X.

   Information elements contained in INVITE request:

   a. PoC Address of invited PoC User

   b. Media Parameters of PoC Server X (controlling)

   c. PoC service indication

   d. PoC Address of the PoC User at the PoC Client A

   e. Controlling PoC Function assigned indication

   f. Talk Burst Control Protocol proposal

   g. Manual answer override request

   h. Pre-arranged Group Identity.

2. SIP/IP Core X routes the request to the PoC Client B home network.

   Information elements contained in INVITE request:

    a.   PoC Address of invited PoC User

    b.   Media Parameters of PoC Server X (controlling)

    c.   PoC service indication

    d.   PoC Address of the PoC User at the PoC Client A

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request

    h.   Pre-arranged Group Identity.

3.   SIP/IP Core B routes the request to the PoC Server B (participating) based on the PoC Address of invited PoC Client and PoC service indication.

Information elements contained in INVITE request:

    a.   PoC Address of PoC Client B

    b.   Media Parameters of PoC Server X (controlling)

    c.   PoC service indication

    d.   PoC Address of PoC User at the PoC Client A

    e.   Controlling PoC Function assigned indication

    f.   Talk Burst Control Protocol proposal

    g.   Manual answer override request

    h.   Pre-arranged Group Identity.

4.   If the inviting PoC User is authorized to issue manual answer override request, the participating PoC Server B sends AUTO-ANSWER response back towards the controlling network whether Answer Mode at participating PoC Server B is set to auto-answer or manual answer. The AUTO-ANSWER response triggers the controlling network to progress session in originating part.

5.   SIP/IP Core B forwards the manual answer override response to the controlling network.

6.   SIP/IP Core A forwards the manual answer override response to the PoC Server A (participating & controlling)

7.   PoC Server B (participating) sends the PoC Session setup request to the SIP/IP Core B. If the PoC Client B is using On-demand Session, the PoC Server B sends an INVITE request to the SIP/IP Core B. Information elements contained in the INVITE request:

    a.   Media Parameters of the PoC Server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

    b.   PoC service indication

    c.   PoC Address of PoC User at the PoC Client B

    d.   PoC Address of PoC User at the PoC Client A

    e.   Talk Burst Control Protocol proposal

    f.   Manual answer override request

g. Pre-arranged Group Identity.

8. SIP/IP Core B routes the INVITE request to the PoC Client B. Information elements contained in the INVITE request:

    a. Media Parameters of the PoC Server B (participating), if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the controlling network are included.

    b. PoC service indication

    c. PoC Address of PoC User at the PoC Client B

    d. PoC Address of PoC User at the PoC Client A

    e. Talk Burst Control Protocol proposal

    f. Manual answer override request

    g. Pre-arranged Group Identity.

9. When the PoC Client B receives the INVITE request, the PoC Client B sends an OK response for the INVITE. Information elements contained in the OK response:

    a. Media Parameters of the PoC Client B

    b. Selected Talk Burst Control Protocol.

10. SIP/IP Core B forwards the OK response to the PoC Server B (participating). Information elements contained in OK response:

    a. Media Parameters of the PoC Client B

    b. Selected Talk Burst Control Protocol.

11. When PoC Server B (participating) receives OK response it will forward it to towards controlling network. Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

12. SIP/IP Core B forwards the OK response to the controlling network. Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

13. SIP/IP Core X forwards the OK response to the PoC Server X (controlling). Information elements contained in OK response:

    a. Media Parameters of PoC Server B if PoC Server B (participating) stays on the media and Talk Burst Control message path, otherwise Media Parameters received from the PoC Client B are included

    b. Selected Talk Burst Control Protocol.

14. The PoC Server X sends the receiving Talk Burst indication to the PoC Client B. Information elements contained in receiving Talk Burst indication:

    a. PoC Address of the Participant at the PoC Client sending the Talk Burst

b. Nick name of the Participant at the PoC Client sending the Talk Burst.

15. The PoC Server B (participating) relays the receiving Talk Burst message to the PoC Client B. Information elements contained in receiving Talk Burst indication:

a. PoC Address of the Participant at the PoC Client sending the Talk Burst

b. Nick name of the Participant at the PoC Client sending the Talk Burst

NOTE 1: If the Participating PoC Function B is not on the media and Talk Burst Control message path, the PoC Server A sends the receiving Talk Burst indication directly to the PoC Client B.

NOTE 2: If PoC Client B is using Pre-established Session the signalling flow for this scenario is as shown in Figure 24: *Automatic answer using Pre-established Session* 24 in sub-clause 9.3.2.1.1 "*Auto-answer with Pre-established Session*".

9.4 Chat PoC Group Session Setup

To join a Chat PoC Group Session, a PoC Client sends a request to join the pre-defined Chat PoC Group. The Chat PoC Group is hosted either in PoC User's home PoC network or in a remote PoC network.

The PoC Server hosting the Chat PoC Group accepts any invitation request if the type of Group is an Unrestricted Group. If the type of Group is a Restricted Group then the invitation request is accepted if the inviting User is a member of the Restricted Group. In both cases the total number of Group Participants does not exceed the group Participant limit.

Figure 28 *"Joining the Chat PoC Group Session"* shows the high-level signalling procedure when a user joins a Chat PoC Group Session existing in another network.
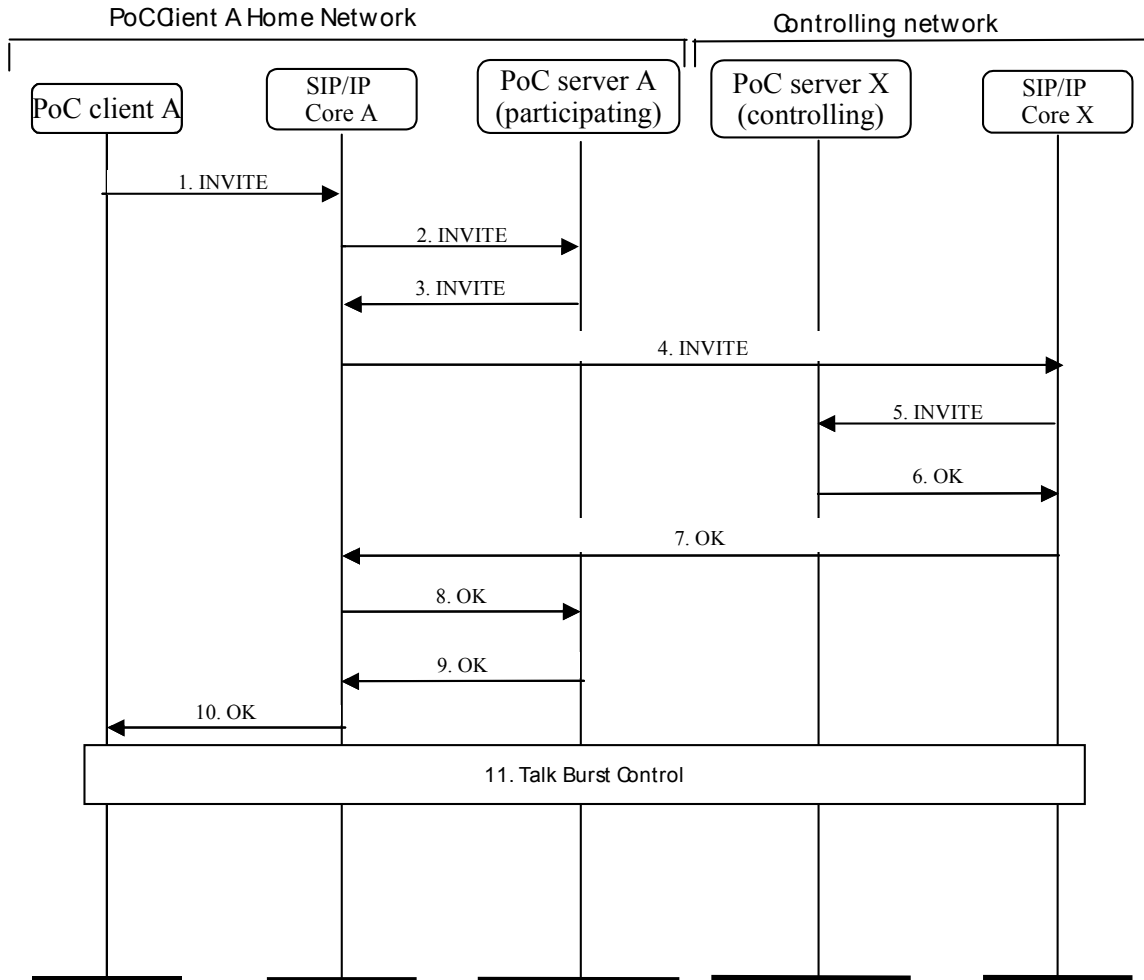
Figure 28: Joining the Chat PoC Group Session

1. The PoC Client A sends an INVITE request to the address of the Chat PoC Group.

    Information elements contained in INVITE request:

    a. Chat PoC Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of PoC Client A

    e. Talk Burst Control Protocol proposal.

2. The SIP/IP Core A routes the INVITE request to the PoC Server A (participating) trigged on the PoC Service indication and the PoC Address.

    Information elements contained in INVITE request:

    a. Chat PoC Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

      d.   Media Parameters of PoC Client A

      e.   Talk Burst Control Protocol proposal.

3.   The PoC Server A (participating) identifies that the Chat PoC Group is not hosted in this PoC Server therefore it sends the request to the SIP/IP Core A.

    Information elements contained in INVITE request:

      a.   Chat PoC Group Identity

      b.   PoC Address of the PoC User at the PoC Client A

      c.   PoC service indication

      d.   PoC Server A (participating) selected Media Parameters

      e.   Talk Burst Control Protocol proposal.

4.   The SIP/IP Core A routes the request according to the routing principles to SIP/IP Core X.

    Information elements contained in INVITE request:

      a.   Chat PoC Group Identity

      b.   PoC Address of the PoC User at the PoC Client A

      c.   PoC service indication

      d.   PoC Server A (participating) selected Media Parameters

      e.   Talk Burst Control Protocol proposal.

5.   The SIP/IP Core X routes the request to the PoC Server X (controlling) based on Chat PoC Group Identity. If the Chat PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC service indication to route to the PoC Server.

    Information elements contained in INVITE request:

      a.   Chat PoC Group Identity

      b.   PoC Address of the PoC User at the PoC Client A

      c.   PoC service indication

      d.   PoC Server A (participating) selected Media Parameters

      e.   Talk Burst Control Protocol proposal.

6-8.   The PoC Server X performs the necessary terminating service control (e.g. authorizes the PoC Client A) and if the PoC Address of the PoC User initiating the PoC Session is authorized successfully. The Chat PoC Group Session is either established or the PoC User is added to the existing Chat PoC Group Session. The PoC Server X sends an OK response to the PoC Server A (participating) along the same signalling path. Information elements contained in OK response:

      a.   PoC Server X (controlling) selected Media Parameters

      b.   Selected Talk Burst Control Protocol.

9-10.   The PoC Server A sends an OK response to the PoC Client A along the signalling path.

    Information elements contained in OK response:

      a.   PoC Server A (participating) selected Media Parameters

b. Selected Talk Burst Control Protocol.

11. Talk Burst Control is made and media transmitted as described in the subclause 9.12 *"PoC Media Flows"*.

9.5 Leaving PoC Session

9.5.1 Leaving the PoC Session in the case of On-demand Session

Any Participant in a PoC Session (1-1 or Group) can leave the PoC Session. When the PoC Session initiator leaves the PoC Session, whether the PoC Session is ended or not depends on the release policy.

Figure 29*"Leaving the PoC Group Session"* shows the high-level signalling procedure for leaving the PoC Group Session. In case the whole PoC Group Session is released the PoC Server terminates the whole PoC Session according to the subclause 9.5.3 *"PoC Server terminates the PoC Session to a PoC Client having On-demand Session"*.
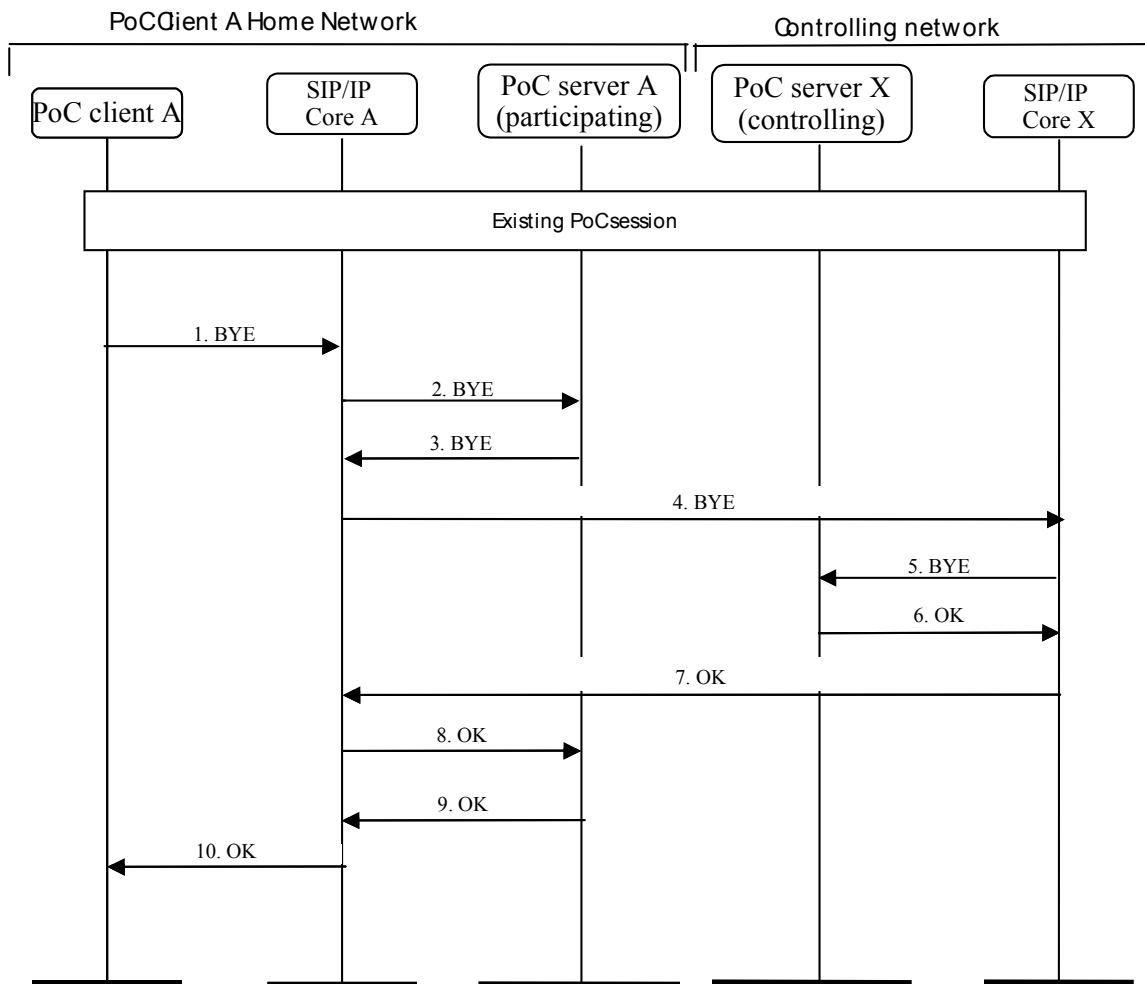
NOTE: PoC Client A can be any of the PoC Clients participating in the PoC Session.

Figure 29: Leaving the PoC Group Session

1-5. The PoC Client A stops sending Talk Burst control messages and stop sending/receiving media and sends a BYE request through the signalling path to the PoC Server X. Information elements contained in the BYE request:

a. PoC Address of the Participant leaving this PoC Session

6 – 10. Upon receiving the request, the PoC Server X (controlling) performs the necessary procedures to remove the PoC Client A. The PoC Server X (controlling) sends an OK response to the PoC Client A through the signalling path, which has routed the request. This event can be informed to other PoC Clients as described in the subclause 9.10 *"Subscription to Participant information"*

9.5.2   Leaving the PoC Session in the case of the Pre-established Session

This subclause provides scenarios as follows for PoC Clients using the Pre-established Session for a PoC Session. A PoC Client using the Pre-established Session initiates release of a Participant from a PoC Session. Other members of the PoC Session either remain on the PoC Session or depending on the release policy they are released according to the subclause 9.5.4 *"PoC Server terminates the PoC Session towards a PoC Client having a Pre-established Session"*. The PoC Session is released, but the Pre-established Session is maintained.
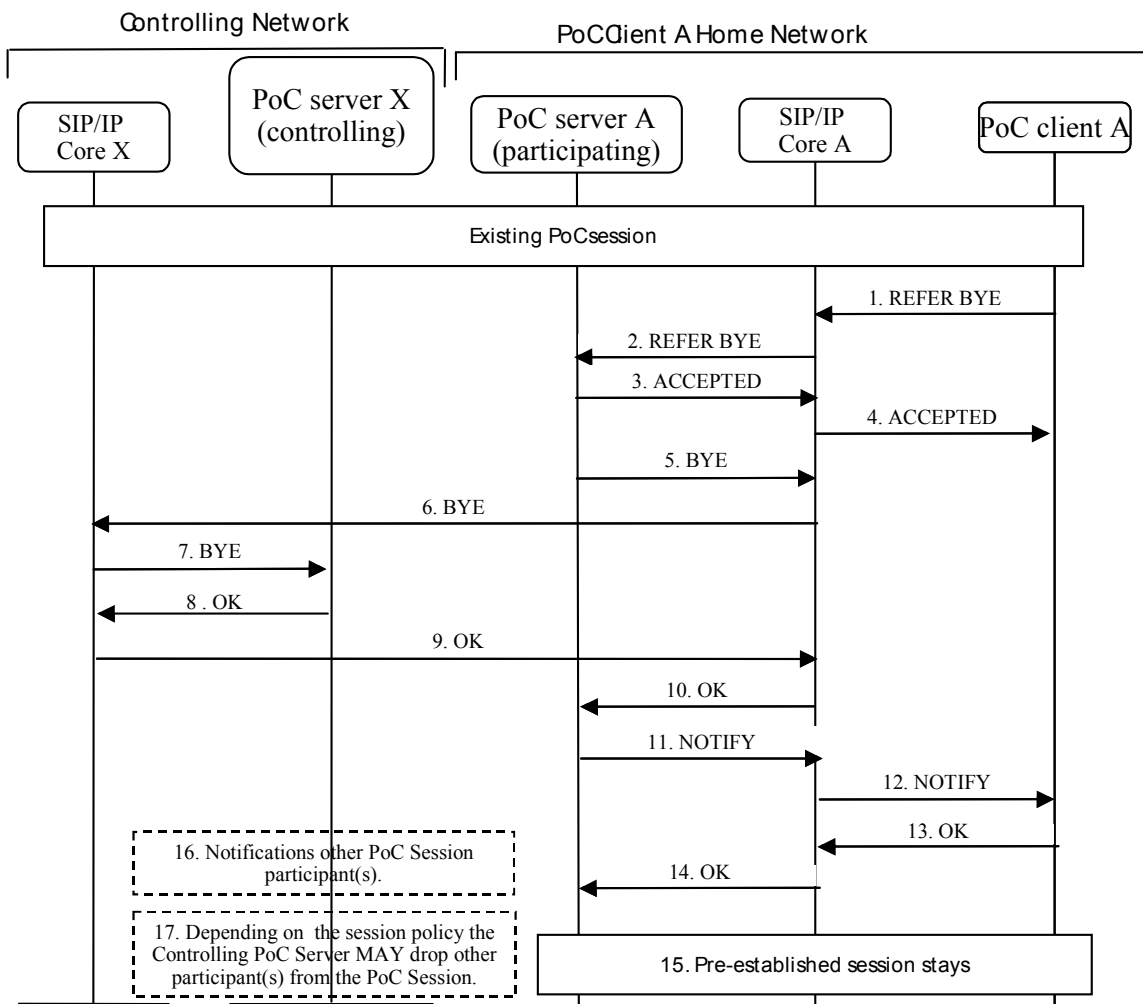

Figure 30: PoC Client releases from PoC Session (Pre-established Session)

1.   PoC Client A sends a REFER BYE message to SIP/IP Core A.

   Information elements contained in REFER BYE message:

   a.   PoC Session Identity of the Pre-established Session to which the REFER applies

   b.   PoC Session Identity of PoC Session Identity to leave.

2.   SIP/IP Core sends the REFER BYE message to the PoC Server A (participating).

3.   PoC Server A (participating) acknowledges the request by sending ACCEPTED to the SIP/IP Core.

4.   SIP/IP Core A forwards the ACCEPTED to the PoC Client A

5.-7. The PoC Server A (participating) sends a BYE message to the PoC Server X (controlling) via SIP/IP Cores.

8.-10. The PoC Server X (controlling) sends an acknowledgement to the PoC Server A (participating) via SIP/IP Cores.

11. After receiving the OK PoC Server A sends a NOTIFY request to the SIP/IP Core A. Informational elements in the NOTIFY.

   a.   PoC Session Identity of the Pre-established Session

   b.   Unconfirmed OK response received indication

12. The SIP/IP Core forwards the NOTIFY to the PoC Client A.

13. PoC Client A sends an OK to the SIP/IP Core A

14. The SIP/IP Core A sends the OK to the PoC Server A.

15. The Pre-established Session between PoC Client B and the PoC Server B is maintained.

16. The release is notified to other Participants of the PoC Group Session if subscribed.

17. According to the release policy the other Participants of the PoC Session are either released or kept in the PoC Session. If they are released the Participants, who have had a Pre-established Session are released as described in the subclause 9.5.4*"PoC Server terminates the PoC Session towards a PoC Client having a Pre-established Session* . If the Participant has not had the Pre-established Session the PoC Session is released as described in the subclause 9.5.1 *"Leaving the PoC Session in the case of On-demand Session"*.

NOTE 1: The procedure to close the Pre-established SIP Session is similar to the procedure described in the subclause 9.5.1 '*Leaving the PoC Session in the case of On-demand Session'*.

NOTE 2: NOTIFYs caused by the implicit subscription of the REFER request may also be suppressed by request of PoC Client A.

9.5.3   PoC Server terminates the PoC Session to a PoC Client having On-demand Session

The PoC Session can be released also by the PoC Server e.g. when PoC Session length time-out occurs.
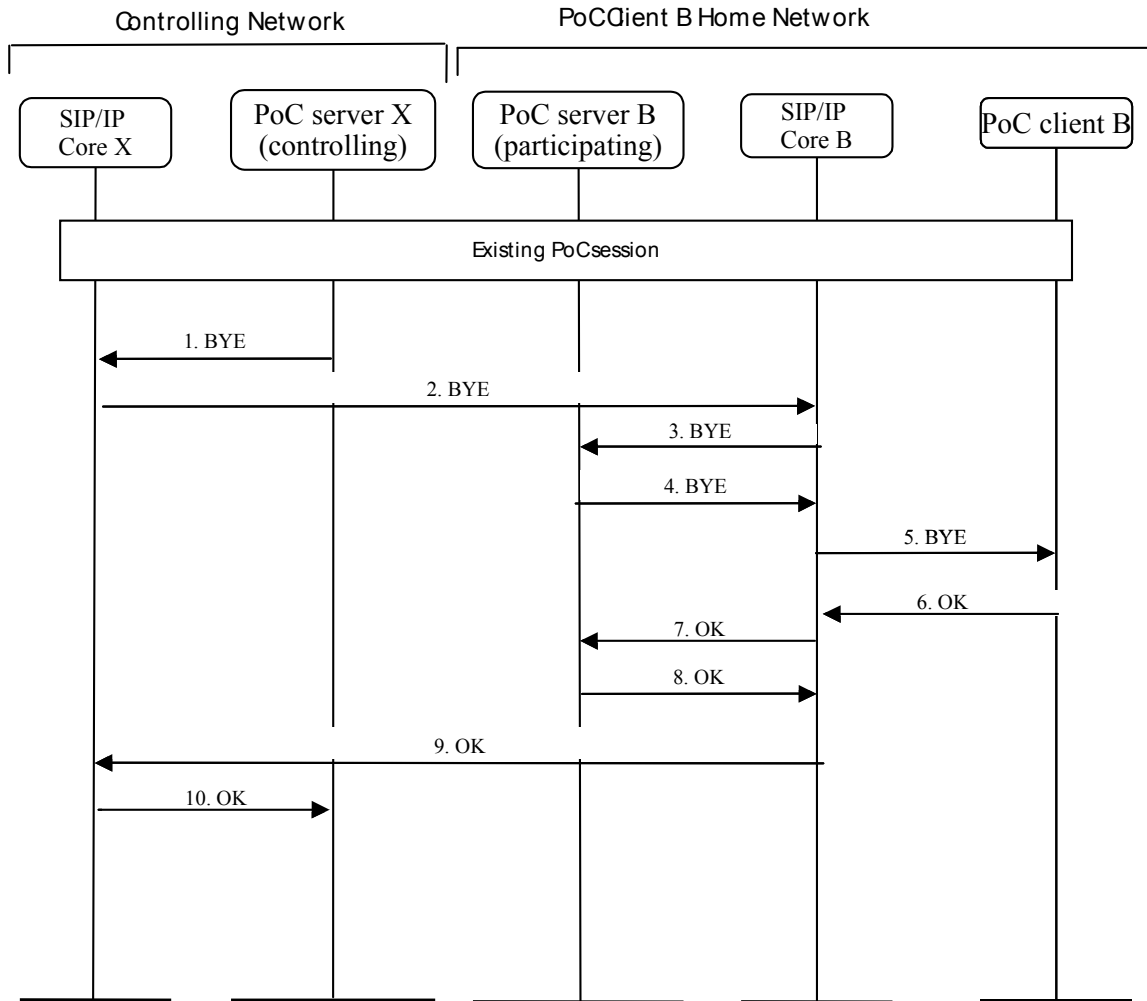
Figure 31: The release of the PoC Session.

1-5. The PoC Server X (controlling) sends a BYE request through the signalling path to the PoC Client B. Information elements contained in the BYE request:

    a.   PoC Address of the Participant leaving the PoC Session

6 – 10. Upon receiving the request, the PoC Client B can indicate the release to the PoC User and sends an OK response to the PoC Server X (controlling) through the signalling path that has routed the request.

9.5.4 PoC Server terminates the PoC Session towards a PoC Client having a Pre-established Session

The PoC Session using the Pre-established Session can be released also by the PoC Server e.g. when PoC Session length time-out occurs.
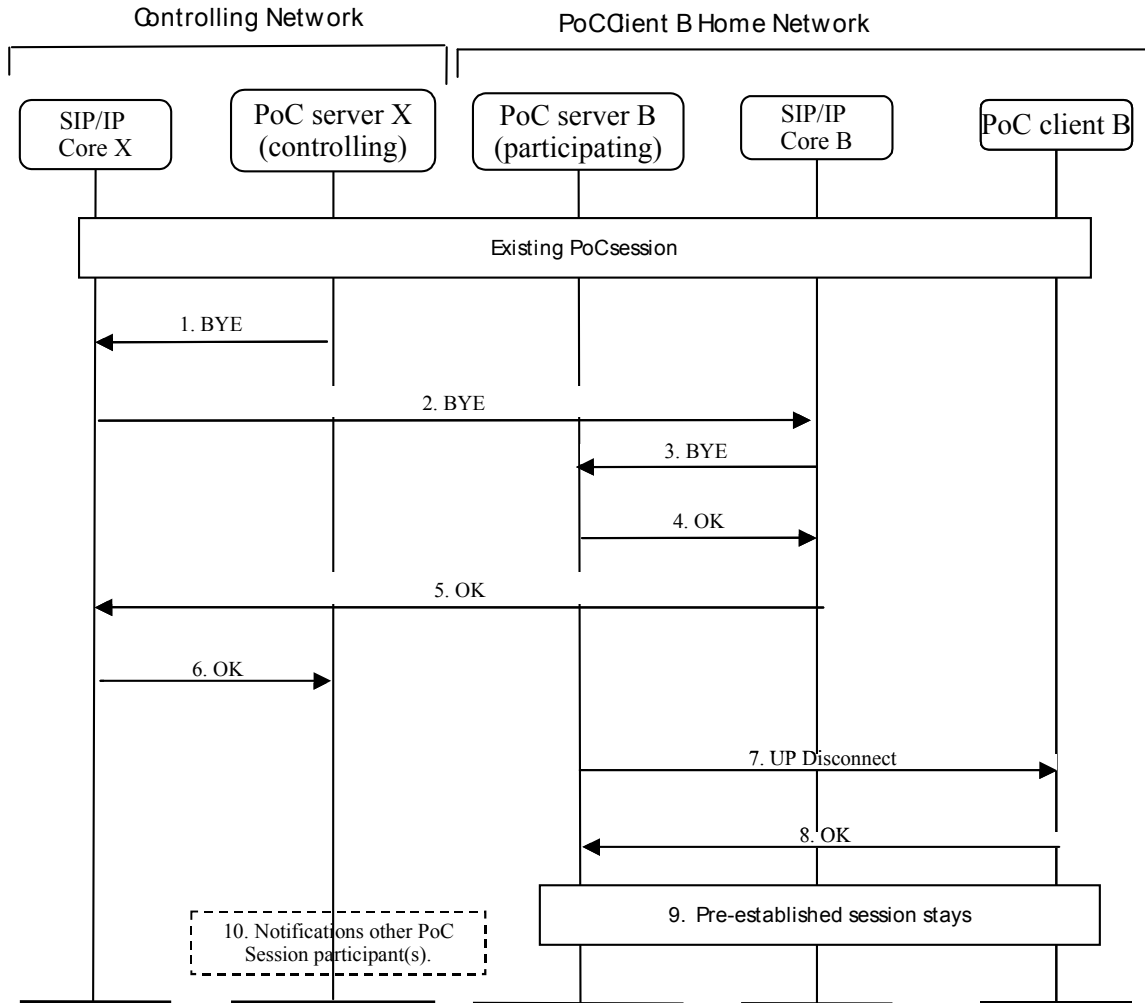
Figure 32: The release of the PoC Session with maintaining the Pre-established Session.

1-3.   The PoC Server X (controlling) sends a BYE request through the signalling path to the PoC Server B (participating). Information elements contained in the BYE request:

  a.   PoC Address of the Participant leaving the PoC Session

4-6. Upon receiving the request, the PoC Server B sends an OK response to the PoC Server X (controlling) through the signalling path, which has routed the request.

7.   PoC Server B (participating) sends the "UP Disconnect" message to the PoC Client B.

8.   PoC Client B sends the OK to the PoC Server B (participating).

9.   Pre-established Session stays for further use.

10.   The PoC Session release is notified to other Participants of the PoC Group Session if subscribed.

9.6   Re-joining PoC Group Session

9.6.1   Re-joining PoC Group in the case of On-demand Session

When the User wishes to rejoin the PoC Group Session, he issues INVITE request to the PoC Server. The PoC Server adds the User to the PoC Group Session if it is still ongoing, otherwise it is rejected.

Figure 33 *"Rejoining the PoC Group Session"* shows the high-level signalling procedure of re-joining the PoC Group Session.
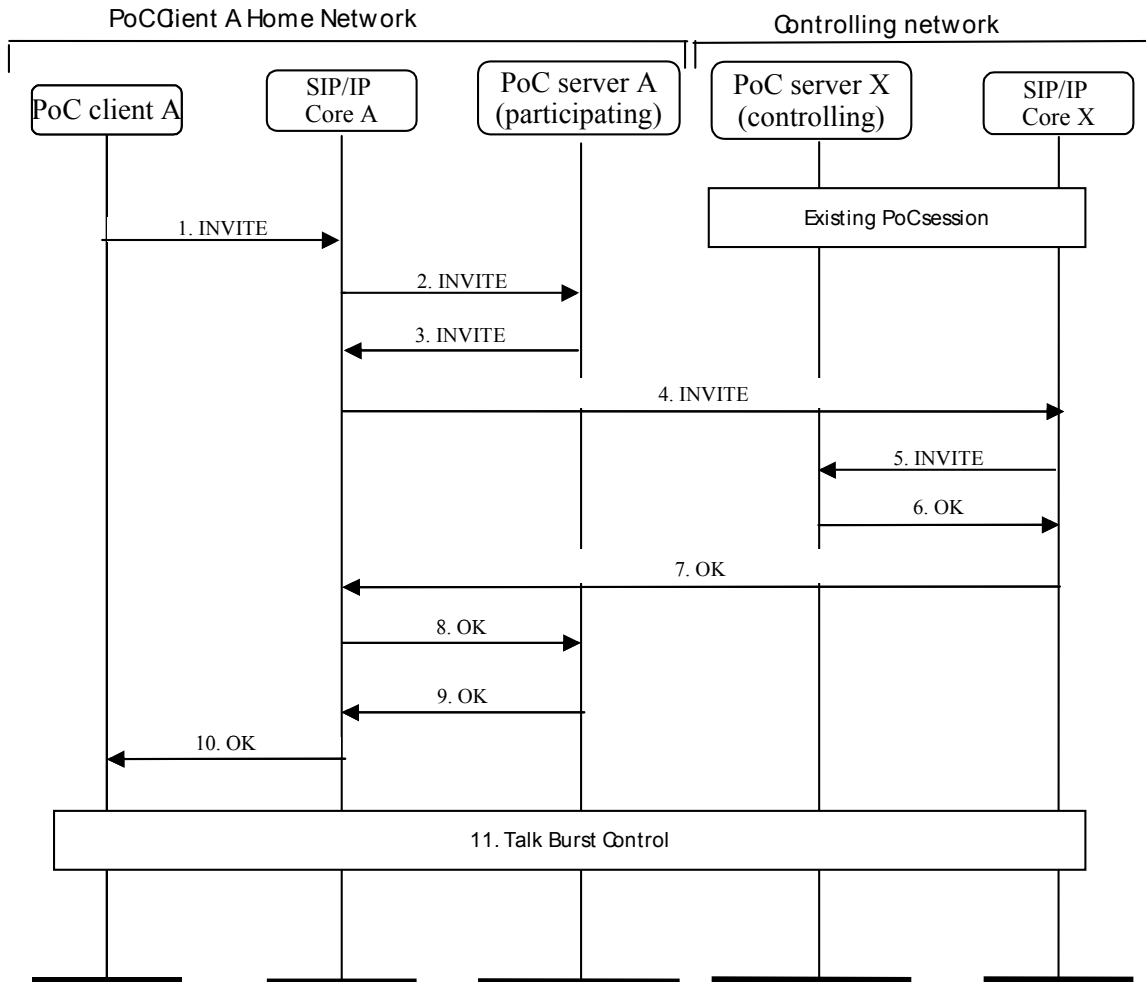
Figure 33: Rejoining the PoC Group Session

1. The PoC Client A sends an INVITE request to the PoC Group Session Identity. Information elements contained in the INVITE request:

   a. PoC Group Session Identity

   b. PoC service indication

2. The SIP/IP Core A routes the INVITE request to the PoC Server A (participating) trigged on the PoC Service indication and the PoC Address. Information elements contained in the INVITE request:

   a. PoC Group Session Identity

   b. PoC service indication

3. The PoC Server A (participating) identifies that the PoC Group is not hosted in this PoC Server therefore it sends the request to the SIP/IP Core A. Information elements contained in the INVITE request:

   a. PoC Group Session Identity

   b. PoC service indication

4. The SIP/IP Core A routes the request to SIP/IP Core X according to the routing principles of the SIP/IP Core. Information elements contained in the INVITE request:

a. PoC Group Session Identity

b. PoC service indication

5. The SIP/IP Core X routes the request to the PoC Server X (controlling) based on the PoC Group Session Identity. If the Pre-arranged PoC Group Identity is used for other services (e.g. messaging) that are hosted on other Application Servers then the SIP/IP Core needs to use PoC Service indication to route to the PoC Server. Information elements contained in the INVITE request:

a. PoC Group Session Identity

b. PoC service indication

6 – 10. Upon receiving the request, the PoC Server X (controlling) performs the necessary procedures to add the PoC Client A to the session. The PoC Server X (controlling) sends an OK response to the PoC Client A through the signalling path, which has routed the request. The PoC Client A stores the contact address of the PoC Server X (controlling).

9.6.2   Re-joining PoC Group in the case of Pre-established Session

When the PoC User desires to rejoin the PoC Group Session in the case of Pre-established Session, he issues a REFER request to the participating PoC Server of his home network. The PoC Server in the controlling network adds the User to the requested PoC Group Session if it is still on-going, otherwise the PoC Server rejects the request.

Figure 34 *"Rejoining a PoC Session in the case of Pre-established Session "* shows the high-level signalling procedure of re-joining the PoC Group Session in the case of Pre-established Session when the PoC Session is still on-going.
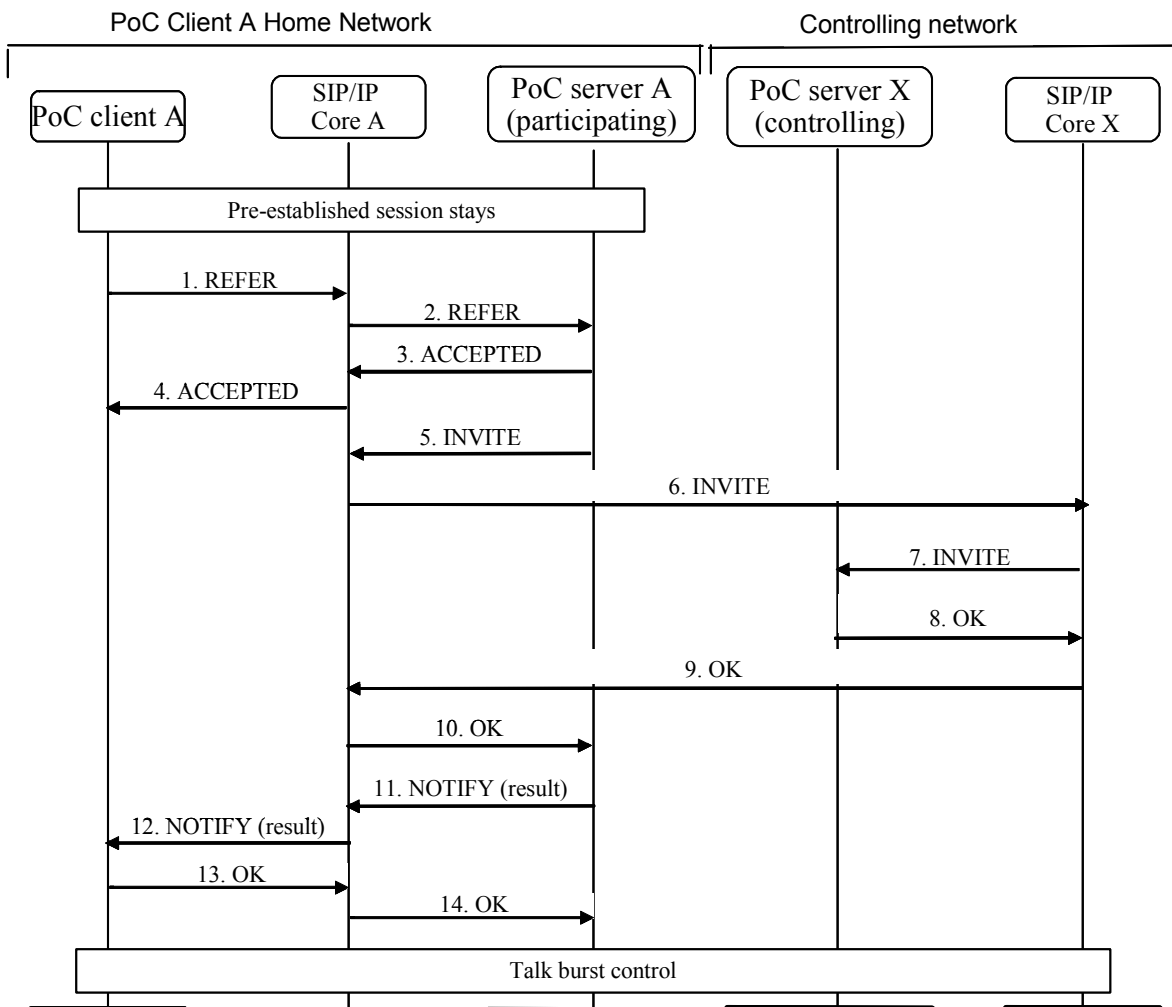
Figure 34: Rejoining a PoC Session in the case of Pre-established Session.

1. The PoC Client A sends a REFER request to SIP/IP Core A. Information elements contained in the REFER request:

    a. PoC Session Identity of the PoC Session to re-join

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. PoC Session Identity of the Pre-established Session to which the REFER applies.

2. The SIP/IP Core A routes the REFER request to the PoC Server A (participating) trigged on the PoC service indication and the PoC Address. Information elements contained in the REFER request:

    a. PoC Session Identity of the PoC Session to re-join

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. PoC Session Identity associated of the Pre-established Session to which the REFER applies.

3. PoC Server A sends an ACCEPTED response to the SIP/IP Core A.

4. The SIP/IP Core A routes the ACCEPTED response back to the PoC Client A.

5. When the PoC Server A (participating) receives a REFER request containing a URI with an indication that the URI is a PoC Session not hosted by this PoC Server, the PoC Server A (participating) sends a SIP INVITE request towards the SIP/IP Core A. Information elements contained in the INVITE request:

    a. PoC Session Identity of the PoC Session to re-join

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Server A (participating)

    e. Talk Burst Control Protocol proposal.

6. The SIP/IP Core A routes the request to SIP/IP Core X according to the routing principles of the SIP/IP Core. Information elements contained in the INVITE request:

    a. PoC Session Identity of the PoC Session to re-join

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Server A (participating)

    e. Talk Burst Control Protocol proposal.

7. The SIP/IP Core X routes the request to the PoC Server X (controlling) based on the PoC Group Session Identity. Information elements contained in the INVITE request:

    a. PoC Session Identity of the PoC Session to re-join

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Server A (participating)

    e. Talk Burst Control Protocol proposal.

8 – 10. Upon receiving the request, the PoC Server X (controlling) performs the necessary procedures to add the PoC Client A to the session. The PoC Server X (controlling) sends an OK response to the PoC Server A (participating)

through the signalling path, which has routed the INVITE request. Information elements contained in the INVITE request:

    a. PoC Session Identity of the PoC Session

    b. PoC Server X selected Media Parameters

    c. Selected Talk Burst Control Protocol.

11 – 12. After receiving the OK response, then the PoC Server A (participating) sends a NOTIFY request to the PoC Client A through the signalling path. Information elements contained in the NOTIFY request:

    a. PoC Session Identity of the PoC Session that the PoC Client A rejoined.

13 – 14. Upon receiving the NOTIFY request, the PoC Client A sends an OK response to the PoC Server A through the signalling path.

9.7 Adding a PoC User to a PoC Session

Any Participant can add any other PoC User to ongoing PoC Session, as long as the maximum number of Participants is not exceeded and if allowed by the PoC Group policy.

9.7.1 Procedure at inviting PoC User

Figure 35 *"Adding a PoC User (procedure at inviting PoC User)"* shows the high-level signalling procedure of adding a PoC User to the PoC Group Session from the inviting PoC User's point of view. The scenario is valid for On-demand Session case as well as for the Pre-established Session case.
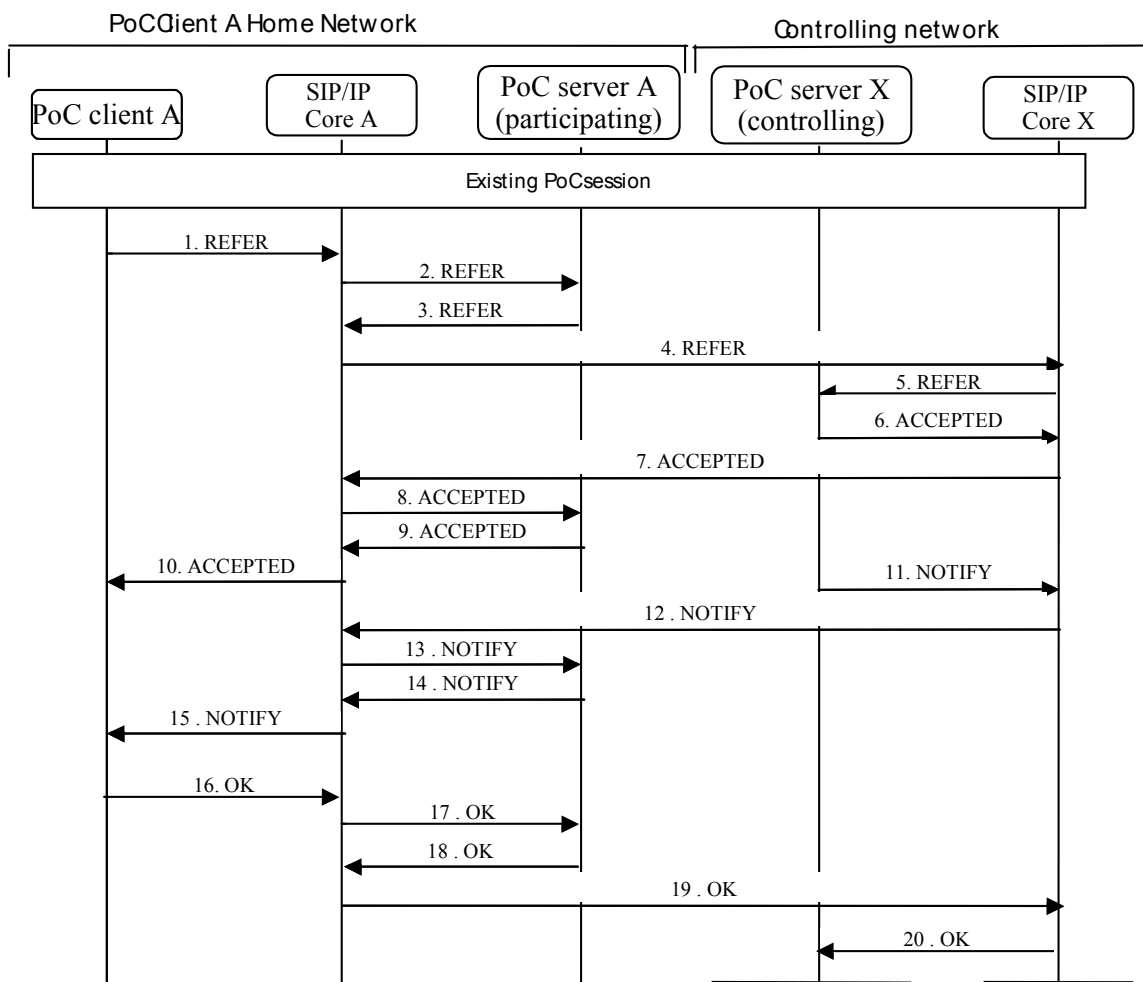
Figure 35: Adding a PoC User (procedure at inviting PoC User)

When the PoC User (referred to as the "inviting PoC User") wishes to add a user to the PoC Group Session, the PoC Client issues a REFER request to the PoC Server X (controlling). The REFER method is handled to add the PoC User (referred to as the "invited PoC User") to the PoC Group Session by the PoC Server X (controlling).

The PoC Server can apply PoC Group policies to the adding Users to an ongoing PoC Group Session.

The PoC Server X (controlling) issues a NOTIFY method according to the rules and procedures of [RFC3515] to the inviting PoC User upon receiving the accepted-response from the invited PoC User.

1. – 5. The PoC Client A sends a REFER request with the intended invited PoC User's address (PoC Client B) through the signalling path to the PoC Server X (controlling). Information elements contained in the REFER request:

   a. PoC Address of the invited PoC User

   b. PoC Session Identity of the PoC Session to add

   c. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

6 – 10. Upon receiving the REFER request, the PoC Server X (controlling) initiates the inviting procedure to the PoC Client B side and sends an ACCEPTED response to the PoC Client A through the signalling path which has routed the original request.

11 – 15. When the PoC Server X (controlling) receives the indication from the PoC Client B that it has accepted the invitation, the PoC Server X (controlling) sends a NOTIFY request to the PoC Client A.

16 – 20. Upon receiving the NOTIFY, the PoC Client A sends an OK response to the PoC Server X (controlling).

9.7.2   Procedure at invited PoC User

When an invited PoC User is indicated with incoming INVITE method by the PoC Server, depending on the answering mode on the terminal, the invited PoC User manually answers or automatically accepts which issues the final response back to the PoC Server.

9.7.2.1   Invited PoC User is in Manual Answer Mode

In this case, the terminating PoC Client indicates the incoming invitation request and the user responds the request. The scenario is valid for On-demand Session case as well as for the Pre-established Session case.

This subclause describes the scenario where the inviting PoC User did not issue manual answer override request. For the procedure of the manual answer override if the inviting PoC User has been authorized to issue this request and selected to do so, refer to the subclause 9.7.2.3 *"Invited PoC User is in Automatic Answer Mode using Pre-established Session"*.

The Figure 36 *"Adding a PoC User (procedure at invited PoC User)"* shows the high level flow of this scenario.

Figure 36: Adding a PoC User (procedure at invited PoC User)

1. Upon receiving the request to invite a PoC Client B, the PoC Server X (controlling) sends an INVITE request to the PoC Client B. To reach the PoC Client B, the PoC Server X (controlling) sends INVITE request to the SIP/IP Core X. Information elements contained in the INVITE request:

    a. PoC Group Identity (optional)

    b. PoC Address of the PoC User at the PoC Client B,

    c. PoC service indication,

    d. PoC Address of the PoC User at the PoC Client A,

    e. Controlling PoC Function assigned indication,

    f. Media Parameters of the PoC Server X (controlling)

    g. Talk Burst Control Protocol proposal.

2. SIP/IP Core routes the request to the PoC Client B's home network. Information elements contained in the INVITE request:

    a. PoC Group Identity (optional)

    b. PoC Address of the PoC User at the PoC Client B,

    c. PoC service indication,

    d.   PoC Address of the PoC User at the PoC Client A,

    e.   Controlling PoC Function assigned indication,

    f.   Media Parameters of the PoC Server X (controlling)

    g.   Talk Burst Control Protocol proposal.

3.   SIP/IP Core B routes the request to the PoC Server B based on the PoC Address of the invited PoC User and PoC service indication. Information elements contained in the INVITE request:

    a.   PoC Group Identity (optional)

    b.   PoC Address of the PoC User at the PoC Client B,

    c.   PoC service indication,

    d.   PoC Address of the PoC User at the PoC Client A,

    e.   Controlling PoC Function assigned indication,

    f.   Media Parameters of the PoC Server X (controlling)

    g.   Talk Burst Control Protocol proposal.

4.   The PoC Server B (participating) sends the PoC Session setup request to the SIP/IP Core B. If the PoC Client B is using On-demand Session, the PoC Server B sends an INVITE request. If the PoC Client B is using Pre-established Session, the PoC Server B sends a re-INVITE request. Information elements contained in the INVITE/re-INVITE request:

    a.   PoC Group Identity (optional)

    b.   PoC Address of the PoC User at the PoC Client B,

    c.   PoC service indication,

    d.   PoC Address of the PoC User at the PoC Client A,

    e.   Media Parameters of the PoC Server B (participating)

    f.   Manual answer request

    g.   Talk Burst Control Protocol proposal.

5.   The SIP/IP Core forwards the INVITE/re-INVITE request to the PoC Client B. Information elements contained in the INVITE/re-INVITE request:

    a.   PoC Group Identity (optional)

    b.   PoC Address of the PoC User at the PoC Client B,

    c.   PoC service indication,

    d.   PoC Address of the PoC User at the PoC Client A,

    e.   Media Parameters of the PoC Server B (participating)

    f.   Manual answer request

    g.   Talk Burst Control Protocol proposal.

6 – 10.   The PoC Client B indicates the invitation and waits for the accept indication by the PoC User. Upon receiving the invitation accept indication by the PoC User, the PoC Client B responds with an OK to the PoC Server X (controlling) through the signalling path which has routed the request. The PoC Server X (controlling) notifies the inviting PoC User that the invited user has accepted the invitation.

    Information elements contained in OK response:

    a.   Media Parameters of the PoC Client B

    b.   Selected Talk Burst Control Protocol.

9.7.2.2 Invited PoC User is in Automatic Answer Mode using On-demand Session

In this case, the terminating PoC Client automatically answers the invitation request by the PoC Server and the PoC User is able to hear the voice. The Figure 37 *"Adding a PoC User (procedure at invited PoC User)"* shows the high level flow of this scenario.
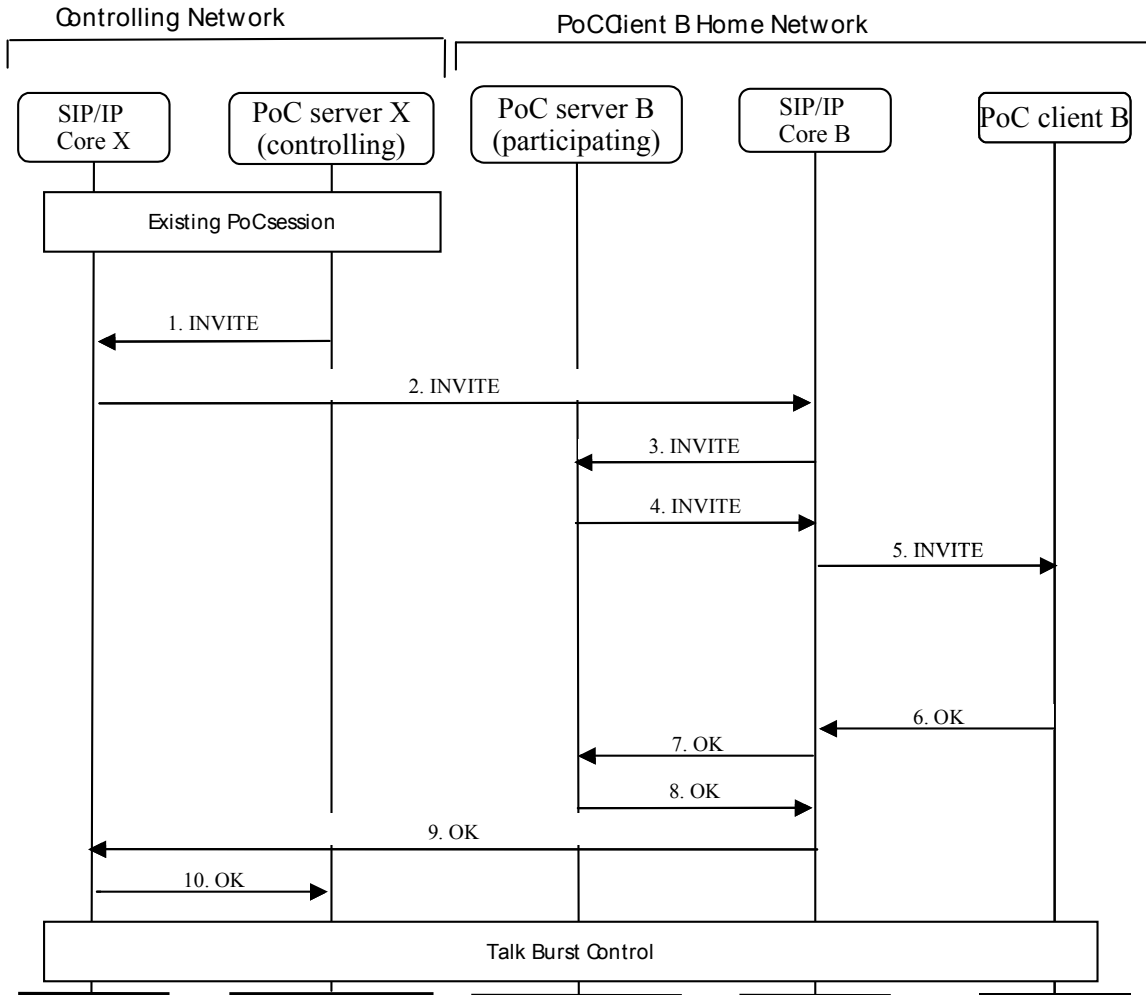

Figure 37: Adding a PoC User (procedure at invited PoC User)

1. Upon receiving the request to invite a PoC Client B, the PoC Server X sends INVITE request to the PoC Client B. To reach the PoC Client B, the PoC Server X sends INVITE request to the SIP/IP Core X. Information elements contained in the INVITE request:

    a. PoC Group Identity (optional)

    b. PoC Address of the PoC User at the PoC Client B,

    c. PoC service indication,

    d. PoC Address of the PoC User at the PoC Client A,

    e. Controlling PoC Function assigned indication,

    f. Media Parameters of the PoC Server X (controlling),

    g. Talk Burst Control Protocol proposal,

h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

2. SIP/IP Core routes the request to the PoC Client B's home network. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Controlling PoC Function assigned indication,

   f. Media Parameters of the PoC Server X (controlling),

   g. Talk Burst Control Protocol proposal,

   h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

3. SIP/IP Core B routes the request to the PoC Server B based on the PoC Address of the invited PoC Client and PoC service indication. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Controlling PoC Function assigned indication,

   f. Media Parameters of the PoC Server X (controlling),

   g. Talk Burst Control Protocol proposal,

   h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

4. – 6. When the PoC Server B (participating) receives the request, it sends automatic answer request to the PoC Server X (controlling) through the signalling path.

7. The PoC Server B (participating) sends the PoC Session setup request to the SIP/IP Core B. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Automatic answer request.

   f. Media Parameters of the PoC Server B (participating)

   g. Talk Burst Control Protocol proposal.

8. The SIP/IP Core B forwards the INVITE request to the PoC Client B. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

    d.   PoC Address of the PoC User at the PoC Client A,

    e.   Automatic answer request.

    f.   Media Parameters of the PoC Server B (participating)

    g.   Talk Burst Control Protocol proposal.

9 – 13. The PoC Client B responds with an OK to the PoC Server X (controlling) through the signalling path, which has routed the request. The PoC Server X (controlling) notifies the inviting user that the invited user has accepted the invitation.

    Information elements contained in OK response:

    a.   Media Parameters of the PoC Client B

    b.   Selected Talk Burst Control Protocol.

9.7.2.3 Invited PoC User is in Automatic Answer Mode using Pre-established Session

In this case, the terminating PoC Client automatically answers the invitation request by the PoC Server and the User is able to hear the voice. The Figure 37 *"Adding a PoC User (procedure at invited PoC User)"* shows the high level flow of this scenario.
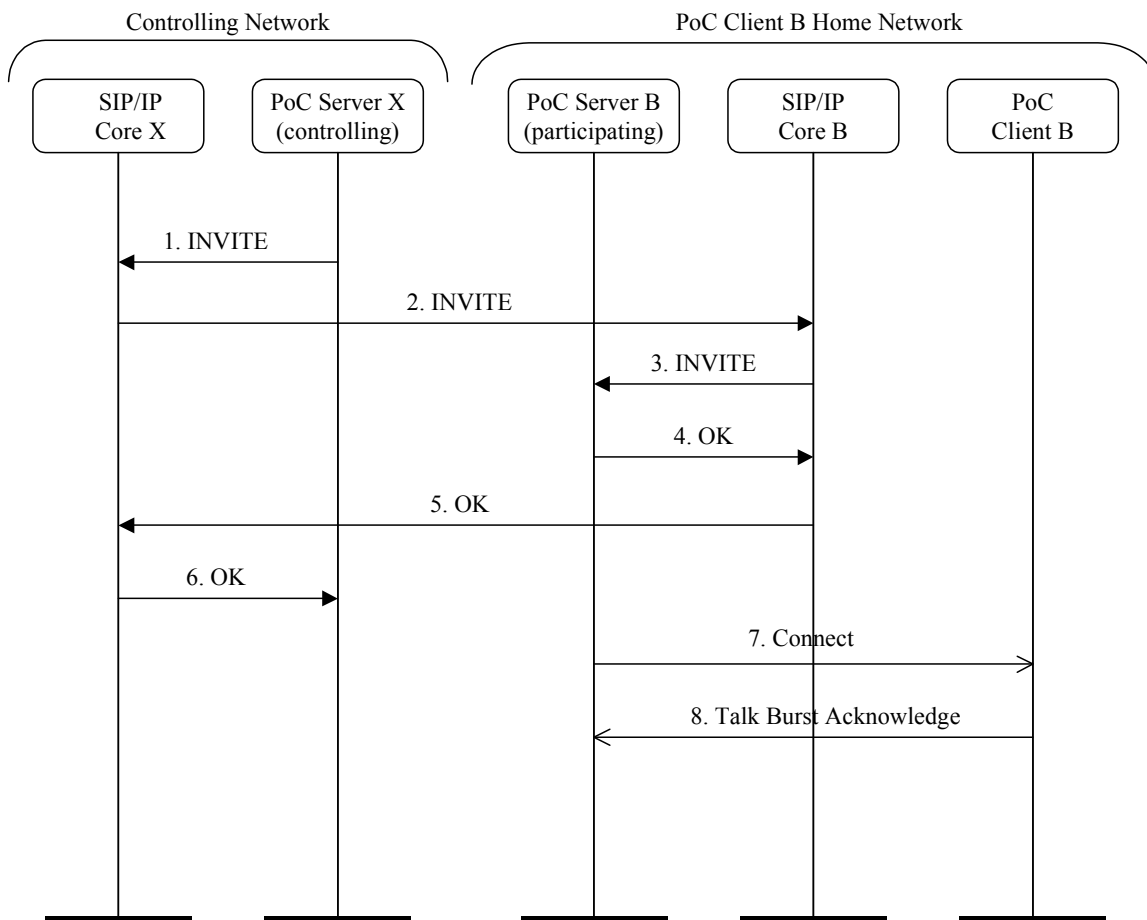

Figure 38: Adding a PoC User (procedure at invited PoC User)

1. Upon receiving the request to invite a PoC Client B, the PoC Server X sends INVITE request to the PoC Client B. To reach the PoC Client B, the PoC Server X (controlling) sends INVITE request to the SIP/IP Core X (controlling). Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Controlling PoC Function assigned indication,

   f. Media Parameters of the PoC Server X (controlling),

   g. Talk Burst Control Protocol proposal,

   h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

2. SIP/IP Core routes the request to the PoC Client B's home network. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Controlling PoC Function assigned indication,

   f. Media Parameters of the PoC Server X (controlling),

   g. Talk Burst Control Protocol proposal,

   h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

3. SIP/IP Core B routes the request to the PoC Server B based on the PoC Address of the invited PoC Client and PoC service indication. Information elements contained in the INVITE request:

   a. PoC Group Identity (optional)

   b. PoC Address of the PoC User at the PoC Client B,

   c. PoC service indication,

   d. PoC Address of the PoC User at the PoC Client A,

   e. Controlling PoC Function assigned indication,

   f. Media Parameters of the PoC Server X (controlling),

   g. Talk Burst Control Protocol proposal,

   h. Manual answer override request if the inviting PoC User has been authorized to issue this request and selected to do so.

4. – 6. If the PoC Client B is accepting the session automatically, or if PoC Client B has authorised PoC Client A to issue a manual answer override request and PoC Server B (participating) supports manual answer override, and if the PoC client B also has Pre-established Session with PoC Server B (participating), then the PoC Server B (participating) sends an OK response back towards the controlling network. . Information elements contained in OK response:

   a. Media Parameters of PoC Server B

   b. Selected Talk Burst Control Protocol.

7. The PoC Server B (participating) sends the connect message to the PoC Client B. Information elements contained in the Connect message:

   a. PoC Address of the Participant at the PoC Client initiating the invitation

   b. Nick name of the Participant at the PoC Client initiating the invitation

   c. Manual Answer Override request indication, if PoC Client A is authorized and PoC Server B supports Manual Answer Override.

8. The PoC Client B acknowledges the connect message with a Talk Burst Acknowledge message to guarantee reliable delivery of the connect message.

9.8 Handling of Simultaneous PoC Sessions

9.8.1 Simultaneous PoC session setup and control

This subclause describes the case when the PoC Client, which is capable of handling Simultaneous PoC Sessions, selects the PoC Session priority of two priority levels (primary and secondary).

The setting is made on the session setup as described in the Figure 39 *"Simultaneous session setup"* or on the session update as described in the Figure 40 *"Setting the session priority and/or locking during the session"*. The priority information is received and processed by the Home PoC Server (performing the Participating PoC Function). The lock/unlock information is sent by the PoC Client to the PoC Server performing the Participating PoC Function similar way. When PoC Client is locked to one PoC Session, then the PoC Server performing the Participating PoC Function does not send Talk Bursts of any other PoC Session to the PoC Client until unlocked or when PoC Session is ended.
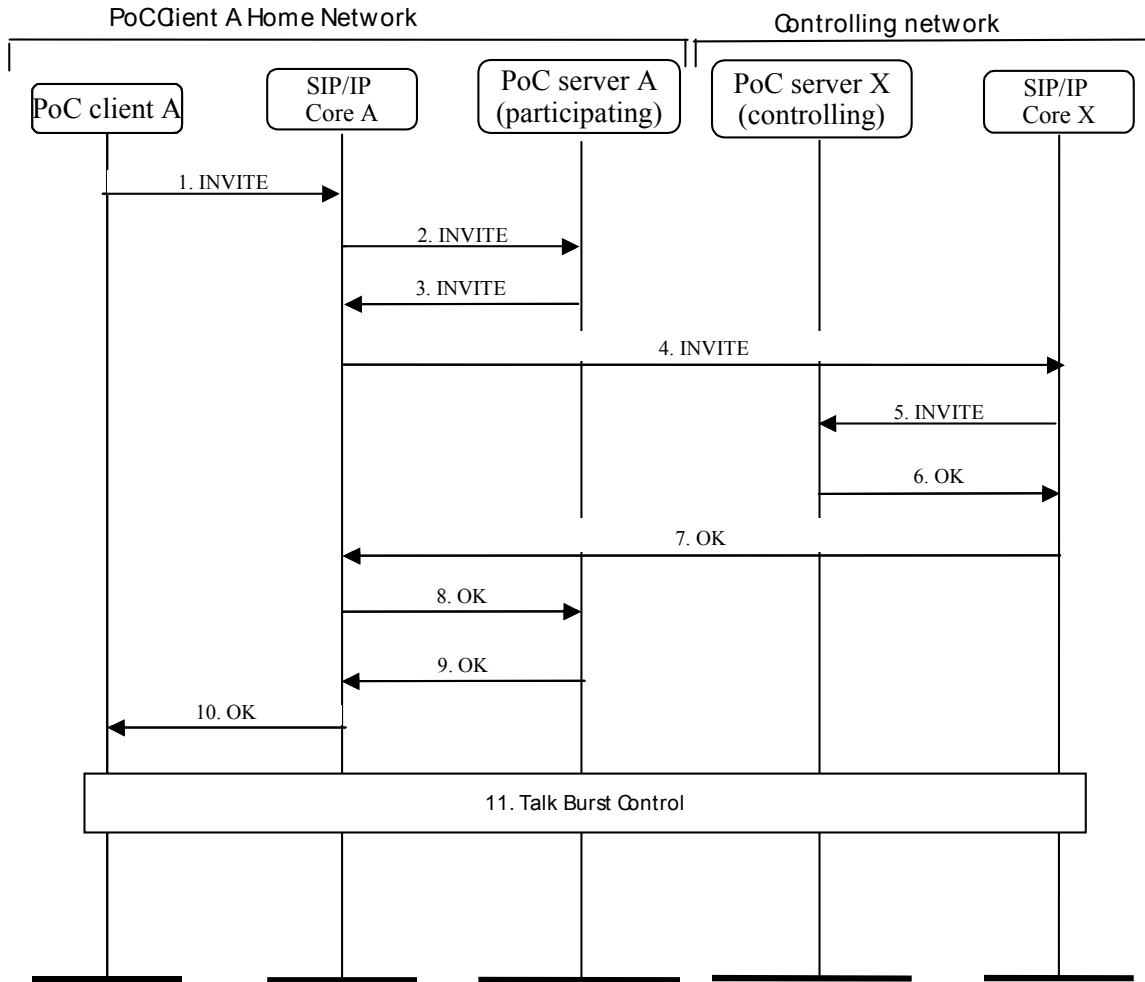
Figure 39: Simultaneous session setup.

1. In order to establish a Simultaneous PoC Session the PoC Client A sends an initial INVITE request.

    Information elements contained in INVITE request:

    a. PoC Group Identity

    b. PoC Address of the PoC User at the PoC Client A

    c. PoC service indication

    d. Media Parameters of the PoC Client A

    e. Optionally the session priority and/or locking request

    f. Talk Burst Control Protocol proposal,

    g. Optionally, a manual answer override request.

2. The SIP/IP Core A routes the INVITE request to the PoC Server A (participating) trigged on the PoC service indication and PoC Address.

    Information elements contained in INVITE request:

    a. PoC Group Identity

       b.   PoC Address of the PoC User at the PoC Client A

       c.   PoC service indication

       d.   Media Parameters of the PoC Client A

       e.   Optionally the session priority and/or locking request

       f.   Talk Burst Control Protocol proposal,

       g.   Optionally, a manual answer override request.

3.   The PoC Server A (participating) identifies that the Simultaneous PoC Sessions capability is requested and the session priority and/or locking is requested. The PoC Server A updates the session priority according to the request. If locking is requested the PoC Server A locks the RTP Media filtering the way that this session is by-passed to the PoC Client A until the session ends or it is unlocked. The PoC Server A performing the Participating PoC Function sends the INVITE to the PoC Server X (controlling), but without Simultaneous PoC Session specific information elements.

    Information elements contained in INVITE request:

       a.   PoC Group Identity

       b.   PoC Address of the PoC User at the PoC Client A

       c.   PoC service indication

       d.   PoC Server A (participating) selected Media Parameters

       e.   Talk Burst Control Protocol proposal,

       f.   Optionally, a manual answer override request.

4.   The SIP/IP Core A routes the request to SIP/IP Core X.

    Information elements contained in INVITE request:

       a.   PoC Group Identity

       b.   PoC Address of the PoC User at the PoC Client A

       c.   PoC service indication

       d.   PoC Server A (participating) selected Media Parameters

       e.   Talk Burst Control Protocol proposal,

       f.   Optionally, a manual answer override request.

5.   The SIP/IP Core X routes the request to the PoC Server X (controlling) based on PoC Group Identity.

    Information elements contained in INVITE request:

       a.   PoC Group Identity

       b.   PoC Address of the PoC User at the PoC Client A

       c.   PoC service indication

       d.   PoC Server A (participating) selected Media Parameters

       e.   Talk Burst Control Protocol proposal,

    f.   Optionally, a manual answer override request.

6-8. The PoC Server X (controlling) performs the necessary terminating service control. The PoC Server X sends an OK response to the PoC Server A (participating) along the same signalling path. Information elements contained in OK response:

    a.   PoC Server X (controlling) selected Media Parameters

    b.   Selected Talk Burst Control Protocol.

9-10. The PoC Server A sends an OK response to the PoC Client A along the same signalling path.

Information elements contained in OK response:

    a.   PoC Server A (participating) selected Media Parameters

    b.   Selected Talk Burst Control Protocol.

    c.   Optionally the session priority and/or locking response.

The session priority may be set also during the pre-established session set-up. Locking to the Pre-established Session, when there is no PoC Session, is not relevant.

9.8.2   Setting session priority/lock-in during a session

This subclause describes the case when the session priority is changed during a PoC Session. In this case the UPDATE is sent to the PoC Server A (participating) without forwarding it to the PoC Server X (controlling) as described in the Figure 40 *"Setting the session priority and/or locking during the session",* where Pre-arranged or Chat PoC Group Session priority and/or locking is changed. The priority and locking request information element can be added to the 1-to-1 and Ad hoc Group PoC Session update, too.
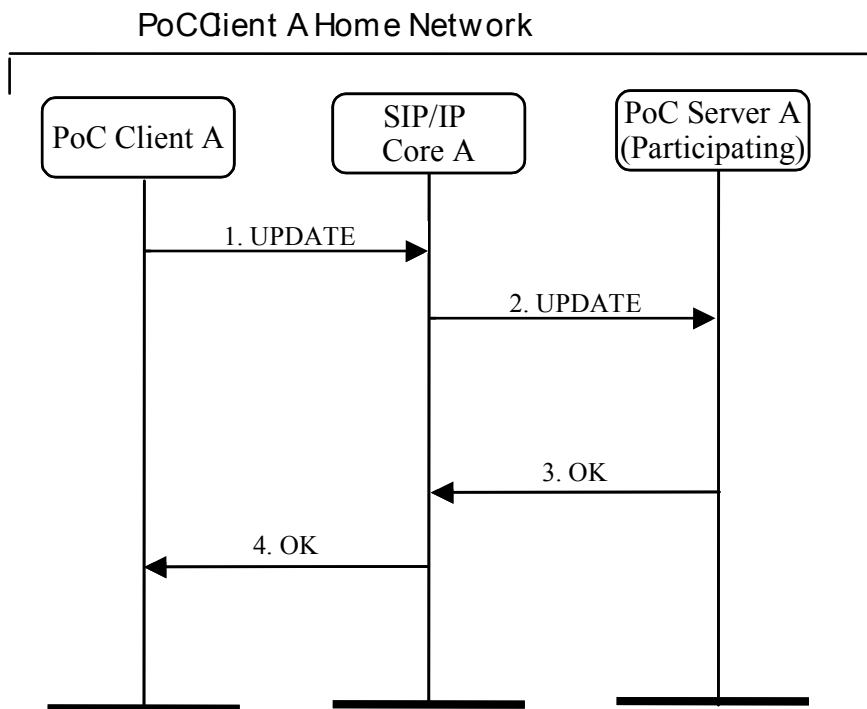

Figure 40: Setting the session priority and/or locking during the session

1.   The PoC Client A sends an UPDATE request to the address of the PoC Group.

Information elements contained in UPDATE request:

a. PoC Group Identity

b. PoC Address of the Participant initiating the session priority setting

c. PoC service indication

d. The session priority and/or locking request.

2. The SIP/IP Core A routes the UPDATE request to the PoC Server A (participating) trigged on the PoC service indication and PoC Address.

Information elements contained in UPDATE request:

a. PoC Group Identity

b. PoC Address of the Participant initiating the session priority setting

c. PoC service indication

d. The session priority and/or locking request.

3. The PoC Server A (participating) changes the session priority and/or locking, if not permanently pre-configured and sends OK response to the SIP/IP Core A with the response to the request.

Information elements contained in OK response:

a. The session priority and/or locking response.

4. The SIP/IP Core A forwards the response to the PoC Client A with the response to the request.
Information elements contained in OK response:

a. The session priority and/or locking response.

NOTE 1: The UPDATE in this subclause is realized in the protocol specification either as SIP UPDATE or SIP re-INVITE request.

NOTE 2: If the invited PoC Client wants to change the session priority and/or locking, it shall execute the procedure described in this subclause.

9.9 Instant Personal Alert

The Instant Personal Alert provides the capability for one PoC User to alert another PoC User, i.e. request the other PoC User to establish a 1-1 PoC Session when convenient for the alerted PoC User.

9.9.1 Originating side

This subclause describes the procedures in the home network of the PoC User sending the Instant Personal Alert. Figure 41 *"Sending an Instant Personal Alert, originating side"* shows the high-level signalling flow for this scenario.

Figure 41: Sending an Instant Personal Alert, originating side.

1. The PoC Client A sends a PoC ALERT to the SIP/IP Core A. Information elements contained in PoC ALERT request:

     a.   The PoC Address of the PoC User at the PoC Client A;

     b.   The PoC Address of the PoC User at the PoC Client B;

     c.   PoC service indication;

     d.   PoC alert indication.

2. The SIP/IP Core sends the PoC ALERT request to the PoC Server A based on the PoC Address of PoC User A PoC service indication.

Information elements contained in PoC ALERT request:

     a.   The PoC Address of the PoC User at the PoC Client A;

     b.   The PoC Address of the PoC User at the PoC Client B;

     c.   PoC service indication;

     d.   PoC alert indication.

The signalling flow on the terminating side is described in the subclause 9.9.2 *"Terminating side"*.

3-4 When the PoC Client B acknowledges the reception of the PoC ALERT request an OK response is received in the PoC Server A. The PoC Server A forwards the OK response via SIP/IP Core A to the PoC Client A.

9.9.2 Terminating side

This subclause describes the procedures when the PoC User in another network receives the Instant Personal Alert. Figure 42 *"Sending an Instant Personal Alert, terminating side"* shows the high level signalling for the scenario.
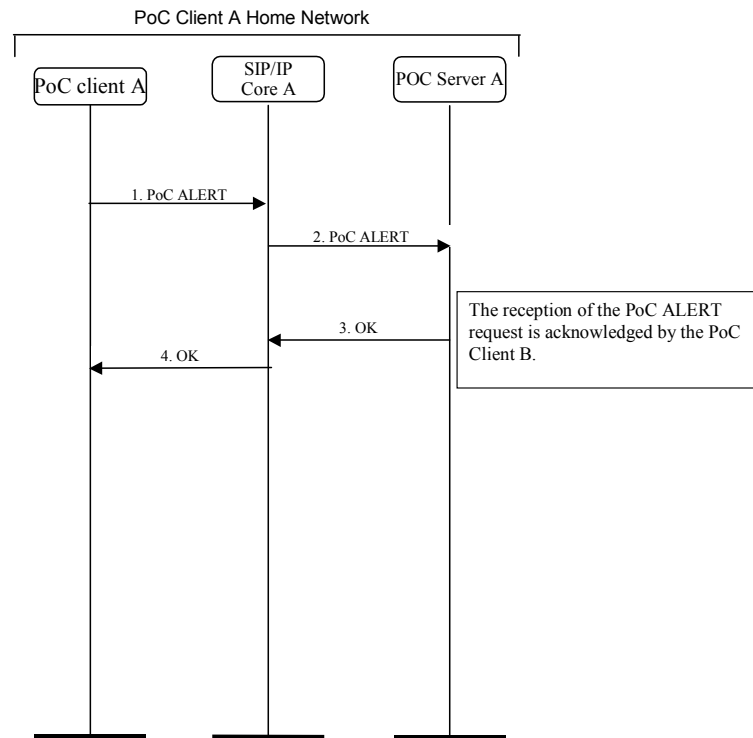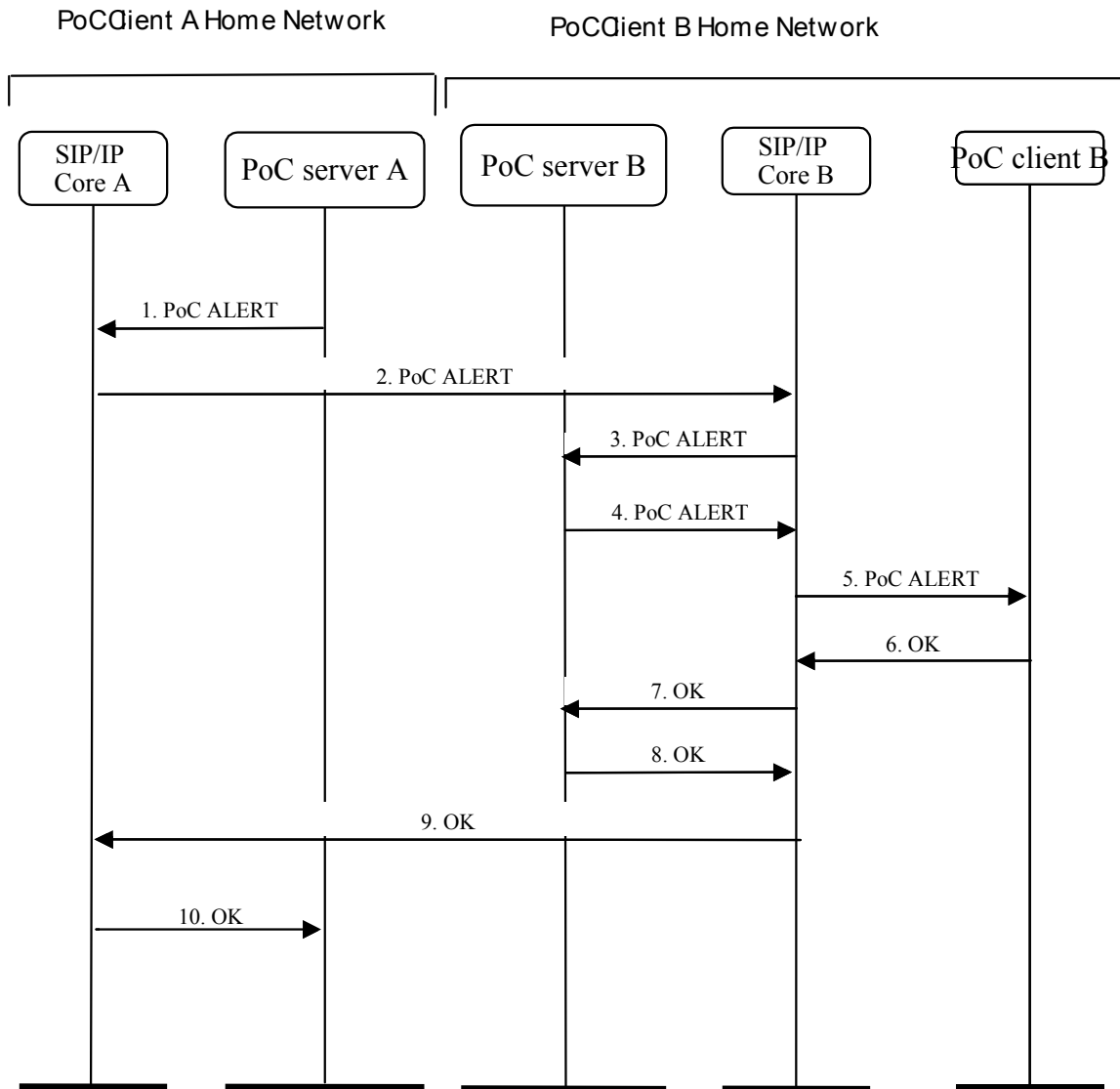

Figure 42: Sending an Instant Personal Alert, terminating side.

1. The PoC Server A sends the PoC ALERT to the SIP/IP Core A.

    Information elements contained in PoC ALERT request:

    a. The PoC Address of the PoC User at the PoC Client A;

    b. The PoC Address of the PoC User at the PoC Client B;

    c. PoC service indication;

    d. PoC alert indication.

2. The SIP/IP Core A routes the PoC ALERT request to the SIP/IP Core B based on the PoC Address of the target PoC User B.

Information elements contained in PoC ALERT request:

   a.   The PoC Address of the PoC User at the PoC Client A;

   b.   The PoC Address of the PoC User at the PoC Client B;

   c.   PoC service indication;

   d.   PoC alert indication.

3. The SIP/IP Core B sends the PoC ALERT request to the PoC Server B based on the PoC Address of the target PoC User, the PoC service indication and the PoC alert indication.

Information elements contained in PoC ALERT request:

   a.   The PoC Address of the PoC User at the PoC Client A;

   b.   The PoC Address of the PoC User at the PoC Client B;

   c.   PoC service indication; and,

   d.   PoC alert indication.

4. The PoC Server B checks if the PoC User sending the PoC ALERT request is authorized to send an instant personal alert to the target PoC User using the target PoC User's accept and reject list and if authorized the PoC Server B sends the PoC ALERT to the SIP/IP Core B.

Information elements contained in PoC ALERT request:

   a.   The PoC Address of the PoC User at the PoC Client A;

   b.   The PoC Address of the PoC User at the PoC Client B;

   c.   PoC service indication; and,

   d.   PoC alert indication.

5. The SIP/IP Core B routes the PoC ALERT request to the PoC Client B based on registration information.

Information elements contained in PoC ALERT request:

   a.   The PoC Address of the PoC User at the PoC Client A;

   b.   The PoC Address of the PoC User at the PoC Client B;

   c.   PoC service indication; and,

   d.   PoC alert indication.

6-10. The PoC Client B sends the OK response in order to acknowledge the reception of the PoC ALERT request. The OK response is along the signalling path created by the PoC ALERT request. The sending of the OK response does not imply that the user has seen the alert.

9.10 Subscription to Participant information

A user is able to request notification about the Participants of a Group in a PoC Group Session. The PoC Client subscribes to the Participant information either when participating in a PoC Group Session or when not participating in a PoC Group Session. When subscribing to the PoC Session the subscription is performed using SIP URI associated to the PoC Group Session Identity.

The PoC Server can decline the request based on policy information disallowing the requesting user to subscribe the Participant information.

The subscription to the Participant information is done according [RFC3265].

The PoC Client MAY choose to subscribe to the current status (one-off mode) of the PoC Group or for a period of time (continuous mode) of Participant information.

The signalling flow is described in the Figure 43 *"Subscribing to Participant information"*.
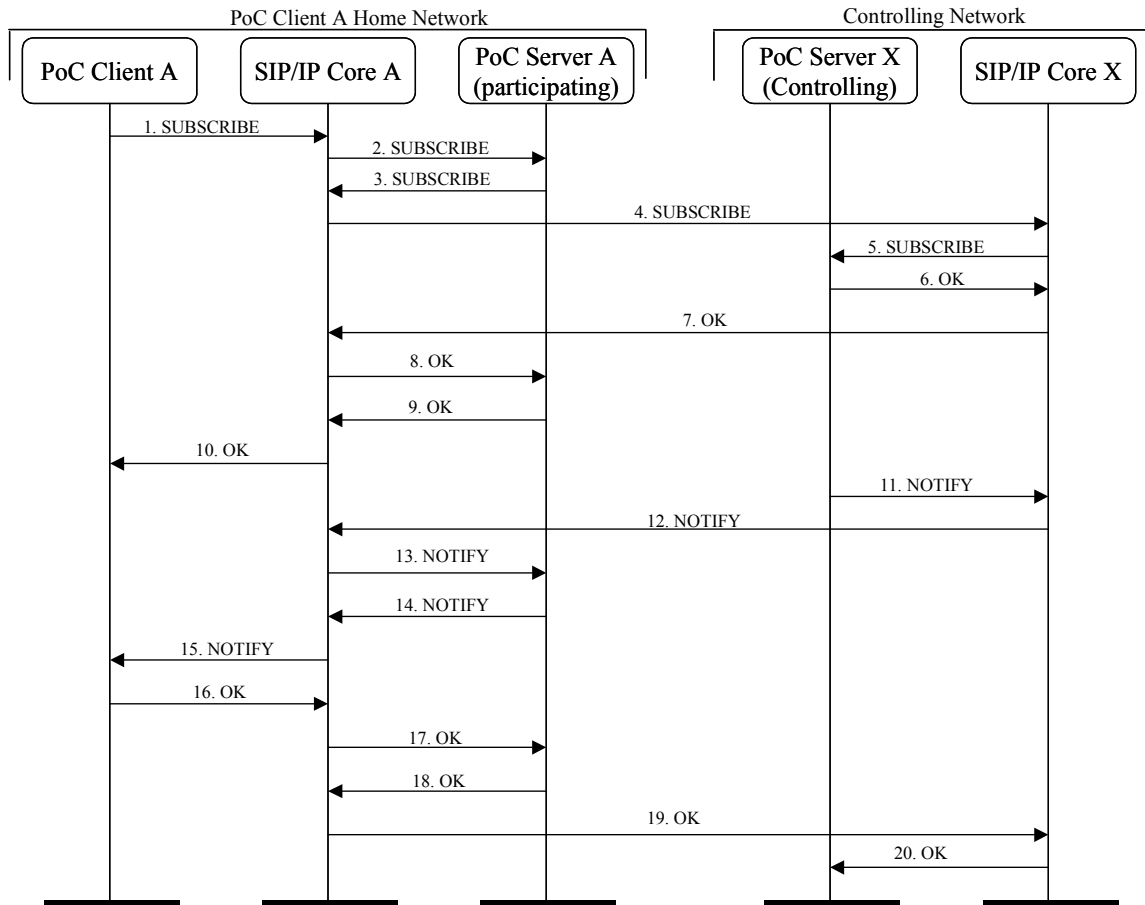
Figure 43: Subscribing to Participant information

1.   PoC Client A initiates the Participant information subscription by creating a SUBSCRIBE request and sends the SUBSCRIBE request to the SIP/IP Core A. Information elements contained in the SUBSCRIBE request includes:

   a.   PoC Address of the PoC User at the PoC Client A

   b.   PoC service indication

   c.   Group Session Identity

   d.   The length of time the subscription lasts (is zero if the one-off mode is used and higher than zero if continuous mode is used).

2.   The SIP/IP Core A forwards the SUBSCRIBE to the PoC Server A (participating) based on the PoC service indication and the PoC Address. Information elements contained in the SUBSCRIBE request:

   a.   PoC Address of the PoC User at the PoC Client A

b.   PoC service indication

c.   Group Session Identity

d.   The length of time the subscription lasts (is zero if the one-off mode is used and higher than zero if continuous mode is used).

3.   PoC Server A (participating) identifies that SUBSCRIBE request is destined to a further PoC Server. The PoC Server A (participating) forwards the message to the SIP/IP Core. The Information elements contained in the SUBSCRIBE request:

a.   PoC Address of the PoC User at the PoC Client A

b.   PoC service indication

c.   Group Session Identity

d.   The length of time the subscription lasts (is zero if the one-off mode is used and higher than zero if continuous mode is used).

4.   SIP/IP Core forwards the SUBSCRIBE to the hosting network of the subscribed Group. Information elements contained in the SUBSCRIBE request:

a.   PoC Address of the PoC User at the PoC Client A

b.   PoC service indication

c.   Group Session Identity

d.   The length of time the subscription lasts (is zero if the one-off mode is used and higher than zero if continuous mode is used).

5.   The SIP/IP Core X forwards the SUBSCRIBE request to the PoC Server X (controlling) based on the Group identity. The PoC Server X (Controlling) receives the SUBSCRIBE request and checks whether the PoC Group Session exists and whether the originator is allowed subscription to it. Information elements contained in the SUBSCRIBE request:

a.   PoC Address of the PoC User at the PoC Client A

b.   PoC service indication

c.   Group Session Identity

d.   The length of time the subscription lasts (is zero if the one-off mode is used and higher than zero if continuous mode is used).

6-10.   If the Group exists and the originator is allowed to subscribe to it, the PoC Server X (controlling) sends OK to the PoC Client A along the signalling path.

11-15.   The PoC Server X (controlling) generates and sends a NOTIFY including information of all the members of the subscribed Group, to which the originating user is allowed subscription. The NOTIFY message is sent to the SIP/IP Core X and it follows the signalling path to the PoC Client A. Information elements contained in the NOTIFY:

a.   Subscribed information

b.   If the one-off mode is used an indication that the subscription is terminated.

16-20.   The PoC Client A answers the NOTIFY with OK. The OK is sent following the signalling path to the PoC Server X (Controlling) hosting the subscribed Group.

The PoC Client can choose to subscribe to the current status of the PoC Group or for a period of time of Participant information. In the first case, the procedure of above is run once. In the second case, the steps 11-20 are additionally run when the status of the group changes. The rate can be limited to assure the PoC Client A is not overwhelmed by the NOTIFY requests.

The PoC Client can refresh the subscription to extend the subscription the length of time chosen in step 1. In addition, the PoC Client can choose to end the subscription before the ending of that time. Both refreshing the subscription or deletion of one is done by running the same procedure as the original subscribing (steps 1-20) indicating the desire.

9.11 Group Advertisement

Group Advertisement is used to inform PoC Group members about the existence and the membership of the Group. Group Advertisement is a feature, which extends the basic PoC service functionality with an additional communication mode for providing operational Group-related information. When supported, Group Advertisement reuses PoC addressing.

PoC Clients and PoC Servers supporting Group Advertisement indicate this operational capability as an additional communication mode when required, to indicate that the request is different from the basic PoC capability.

A PoC Client can be able to send Group Advertisement information to a single PoC User or to all members of the Group using the Group Identity.

PoC Server performing the Controlling PoC Function can support delivery of Group Advertisement messages to all PoC Group members and applies authorization rules for who are allowed to send Group Advertisement information to all Group members. The possible authorization rules are:
- only the Group owner is allowed to send Group Advertisement information to all Group members

- all the Group members are allowed to send Group Advertisement information to all Group members.

PoC Server performing the Participating PoC Function provides Access Control for the Group Advertisement information sent to a PoC User.

The subclause 9.11.1 *"Individual Group Advertisement"* specifies a case where PoC Client sends Group Advertisement information to a single PoC User

The subclause 9.11.2 *"Advertising information to Group members"* specifies a case where PoC Client sends Group Advertisement information to all members.

9.11.1   Individual Group Advertisement

This subclause describes a case where PoC Client advertises the PoC Group information by sending a Group Advertisement message to a PoC Client.

The subclause 9.11.1.1"*Originating side"* describes the originating signalling flows in the case that the terminating party is in another network.

The subclause 9.11.1.2"*Terminating side"* described the terminating part of the signalling flow.

9.11.1.1   Originating side

The Figure 44 "Group Advertisement; originating part" describes the originating signalling flows in the case that the terminating party is in another network.
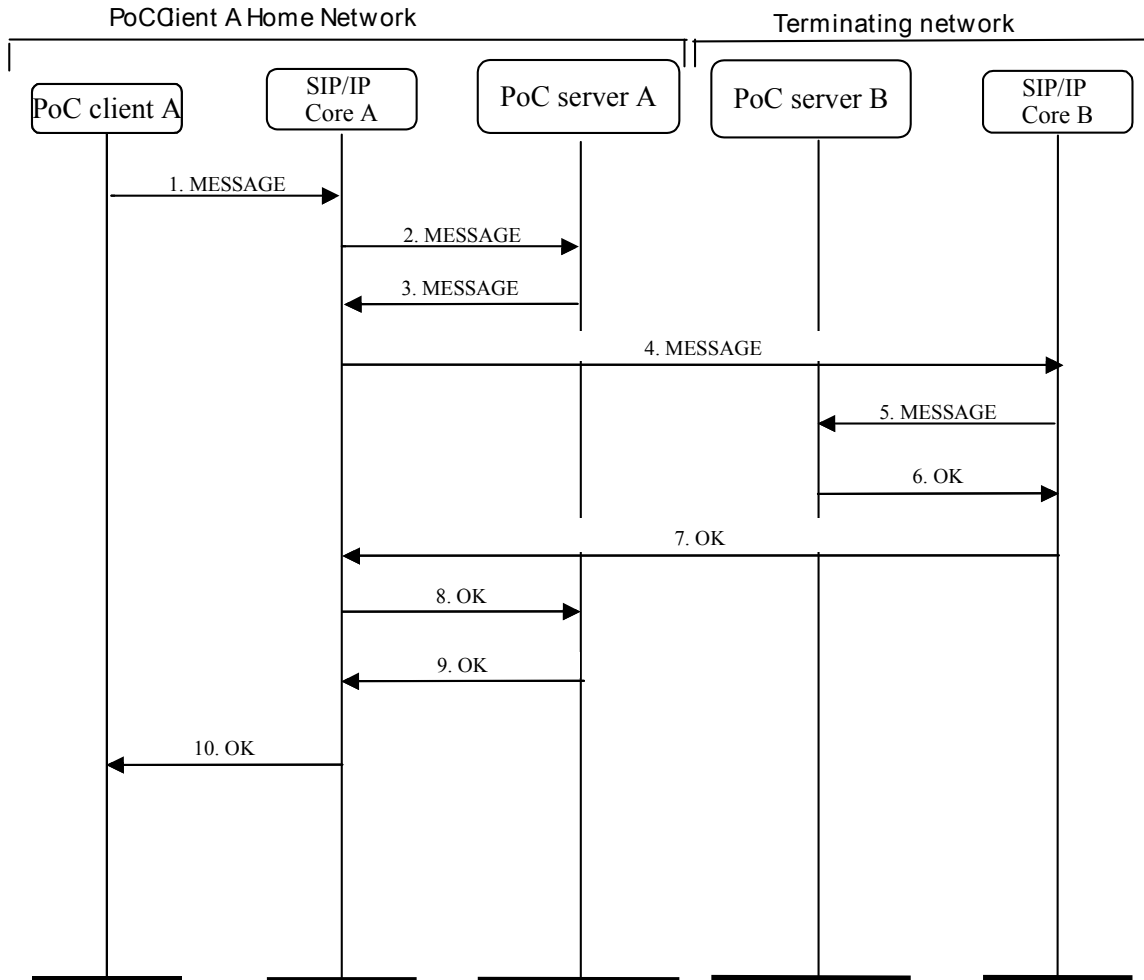
Figure 44: Group Advertisement; originating part.

1. PoC Client sends the MESSAGE request to SIP/IP Core A. Information elements contained in the MESSAGE request:

    a. PoC Address of the PoC User sending the Group Advertisement

    b. PoC Address of the PoC User receiving the Group Advertisement

    c. PoC service indication

    d. Group characteristics: Group Identity, nick name, description

2. SIP/IP Core A forwards the received MESSAGE request and reroute (according to PoC service indication and originating party PoC Address) to the PoC Server A. Information elements in the MESSAGE request:

    a. PoC Address of the PoC User sending the Group Advertisement

    b. PoC Address of the PoC User receiving the Group Advertisement

    c. PoC service indication

    d. Group characteristics: Group Identity, nick name, description

3. PoC Server A sends the MESSAGE request to the SIP/IP Core A.

4. SIP/IP Core A routes the MESSAGE request to the terminating network B.

5. SIP/IP Core B sends the MESSAGE request to the PoC Server B. PoC Server B sends the MESSAGE to the terminating party as seen in the subclause 9.11.1.2"*Terminating side"*.

6.-10. PoC Server B sends the OK back to the originating PoC Client along the same signalling path.

9.11.1.2 Terminating side

The *Figure 45: Group Advertisement, terminating part"* describes the terminating part of the signalling flow.
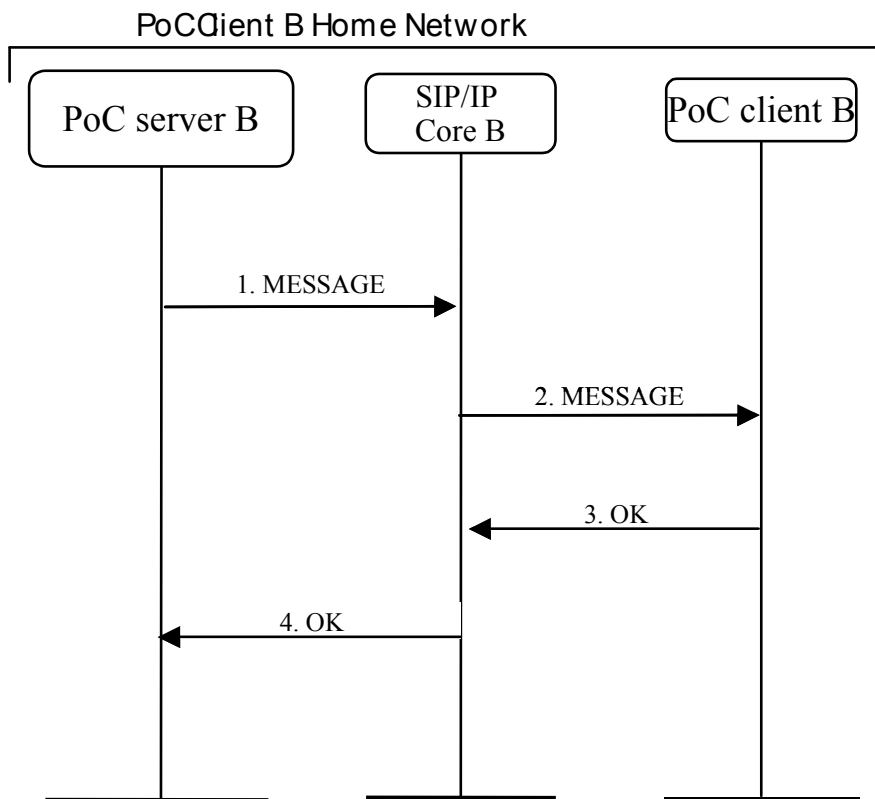
Figure 45: Group Advertisement, terminating part

1. When PoC Server B has received the MESSAGE request as described in the subclause 9.11.1.1*"Originating side"* the PoC Server B sends the MESSAGE request to SIP/IP Core B if allowed by the Access Control policies of PoC User B as described in the subclause 8.18 *"Access Control"*. Information elements contained in the MESSAGE request:

   a. PoC Address of the PoC User sending the Group Advertisement

   b. PoC Address of the PoC User receiving the Group Advertisement

   c. PoC service indication

   d. Group characteristics: Group Identity, nick name, description

2. SIP/IP Core B sends the MESSAGE request to the PoC Client B. Information elements contained in the MESSAGE request:

   a. PoC Address of the PoC User sending the Group Advertisement

b.   PoC Address of the PoC User receiving the Group Advertisement

c.   PoC service indication

d.   Group characteristics: Group Identity, nick name, description

3.&4. PoC Client B sends the OK to the PoC Server B along the same signalling path.

9.11.2 Group Advertisement to Group Members

This subclause describes sending of the Group Advertisement to all Group members. The sending of the Group Advertisement can be initiated by the PoC Client or by the PoC Server.

The subclause 9.11.2.1"*side" shows* the originating part of the flow when PoC Client initiates the sending of Group Advertisement. The terminating flow is described in the subclause 9.11.2.2 "*Terminating side"*. The flow described in subclause 9.11.2.2 "*side" is* also used when PoC Server initiates the sending of the Group Advertisement to group members.
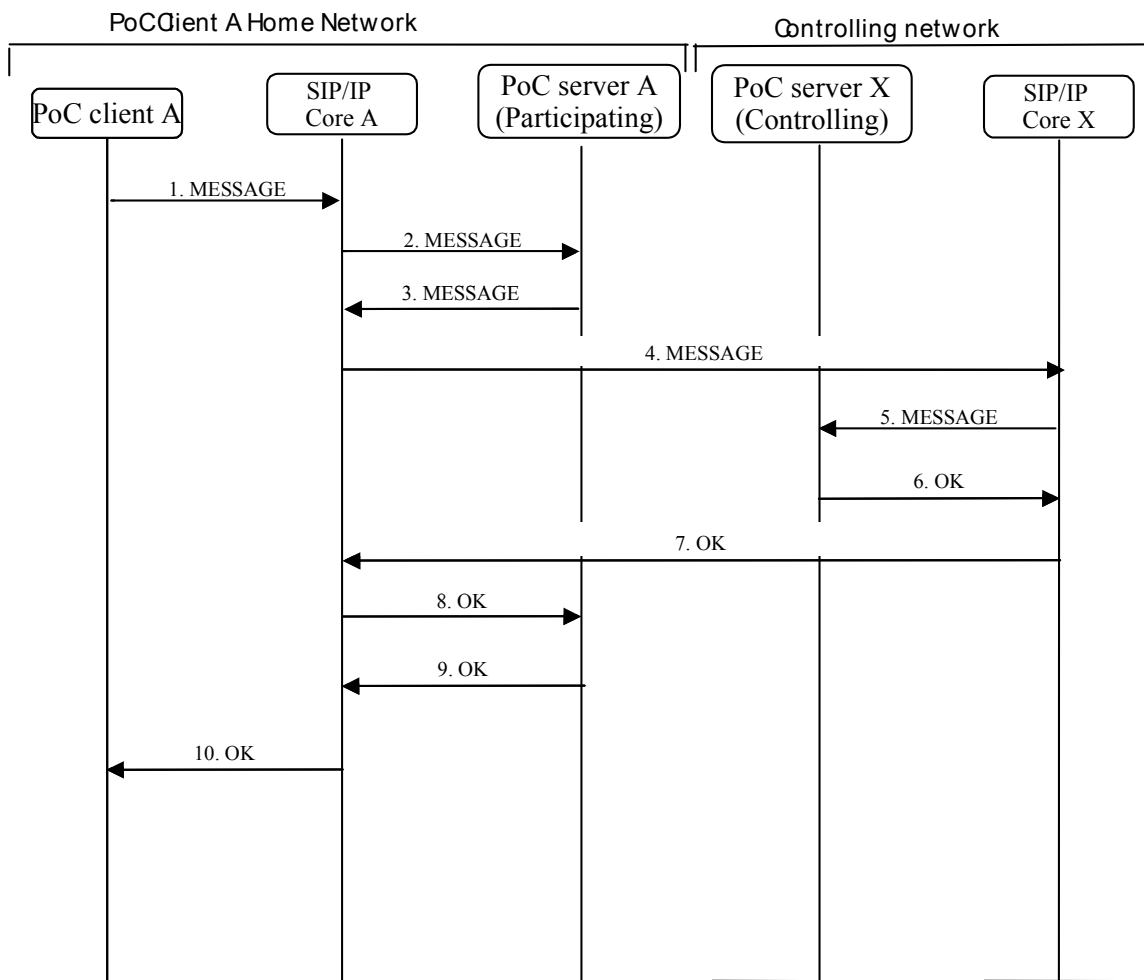
9.11.2.1   Originating side

Figure 46: Group Advertisement; originating part.

1.   PoC Client A sends the MESSAGE request to SIP/IP Core A. Information elements contained in the MESSAGE request:

a.   PoC Address of the PoC User sending the Group Advertisement

b. PoC Address(es) of the PoC Group Members receiving the Group Advertisement

c. PoC service indication

d. Group characteristics: Group Identity, nick name, description

2. SIP/IP Core A forwards the received MESSAGE request and reroute (according to PoC service indication and the PoC Address of the originating PoC User) to the PoC Server A. Information elements contained in the MESSAGE request:

a. PoC Address of the PoC User sending the Group Advertisement

b. PoC Address(es) of the PoC Group members receiving the Group Advertisement

c. PoC service indication

d. Group characteristics: Group Identity, nick name, description

3. PoC Server A sends the MESSAGE request to the SIP/IP Core A. The information elements contained in the MESSAGE request:

a. PoC Address of the PoC User sending the Group Advertisement

b. PoC Address(es) of the PoC Group Members receiving the Group Advertisement

c. PoC service indication

d. Group characteristics: Group Identity, nick name, description

4. SIP/IP Core A routes the MESSAGE request to the terminating network X. Information elements contained in the MESSAGE request:

a. PoC Address of the PoC User sending the Group Advertisement

b. PoC Address(es) of the PoC Group Members receiving the Group Advertisement

c. PoC service indication

d. Group characteristics: Group Identity, nick name, description

5. SIP/IP Core X sends the MESSAGE request to the PoC Server X. The PoC Server X authorises the advertising client (PoC Client A) if the authorisation is provisioned. PoC Server X sends the MESSAGE to the terminating party as seen in the subclause 9.11.2.2 "*Terminating side*". Information elements contained in the MESSAGE request:

a. PoC Address of the PoC User sending the Group Advertisement

b. PoC Address(es) of the PoC Group members receiving the Group Advertisement

c. PoC service indication

d. Group characteristics: Group Identity, nick name, description

6.-10. PoC Server X sends the OK back to the originating PoC Client along the same signalling path.

9.11.2.2 Terminating side

The terminating flow of the sending Group Advertisement to the PoC Group is described in the *Figure 47: The PoC Server (controlling) sends Group Advertisement to one of the Group members*. The flow is also used when PoC Server initiates the sending of the Group Advertisement to Group Members. The procedures for a service provider to send Group Advertisements are out of scope of this specification.
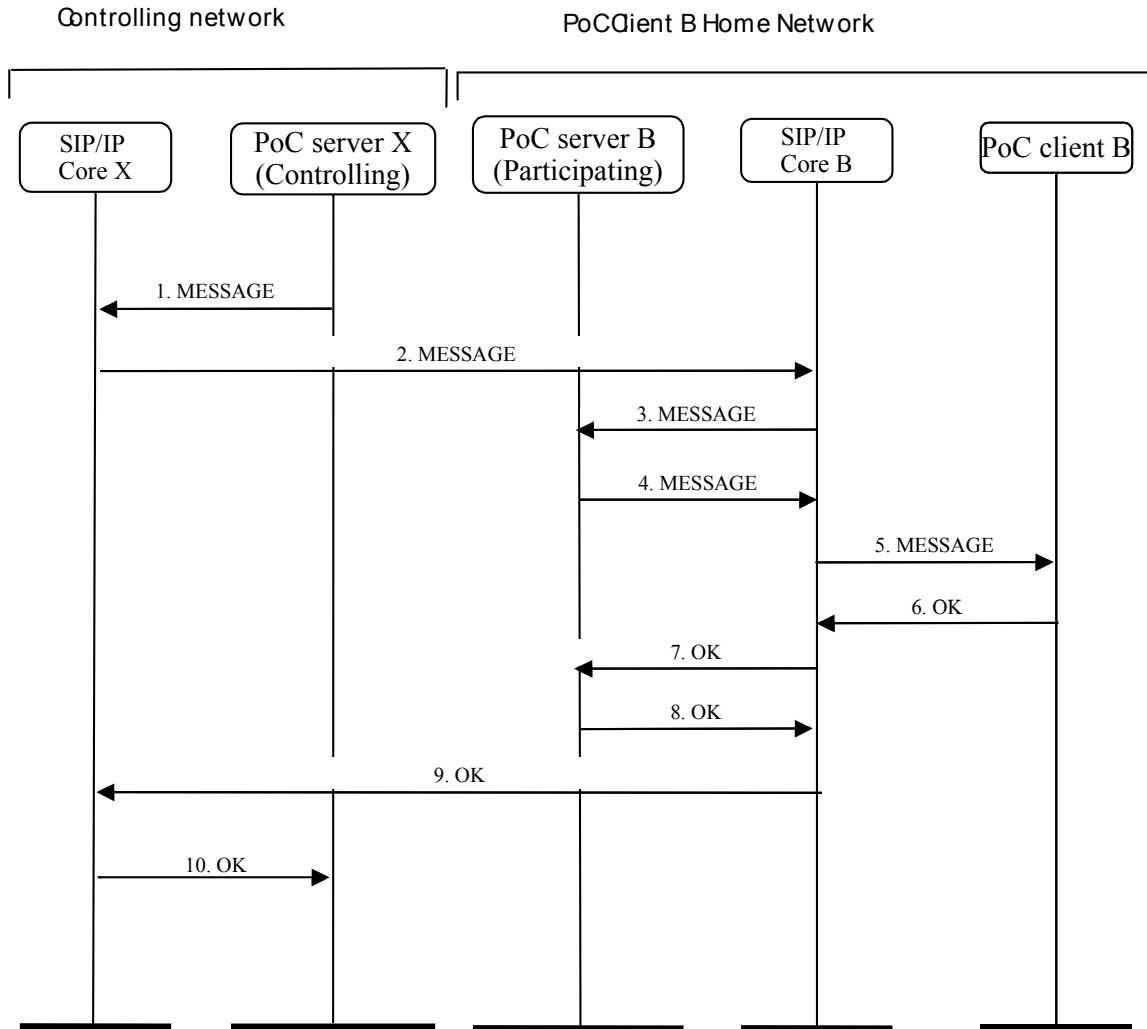

Figure 47: The PoC Server (controlling) sends Group Advertisement to one of the Group members.

The flow described in the Figure 47*" The PoC Server (controlling) sends Group Advertisement information to one of the Group members"* is initiated either by the PoC Client or the service provider. If it is initiated by the PoC Client the PoC Server X first checks if the PoC User A is authorized to send Group Advertisement information to the Group members.

1. PoC Server X sends the MESSAGE request to the SIP/IP Core X. Information elements contained in the MESSAGE request:

   a. PoC Address of the PoC User sending the Group Advertisement

   b. PoC Address of the PoC User receiving the Group Advertisement

   c. PoC service indication

   d. Group characteristics: Group Identity, nick name, description

2. SIP/IP Core X routes the MESSAGE request to the terminating network B. Information elements contained in the MESSAGE request:

   a. PoC Address of the PoC User sending the Group Advertisement

   b. PoC Address of the PoC User receiving the Group Advertisement

   c. PoC service indication

    d.   Group characteristics: Group Identity, nick name, description

3. SIP/IP Core B sends the MESSAGE request to the PoC Server B. Information elements contained in the MESSAGE request:

    a.   PoC Address of the PoC User sending the Group Advertisement

    b.   PoC Address of the PoC User receiving the Group Advertisement

    c.   PoC service indication

    d.   Group characteristics: Group Identity, nick name, description

4. PoC Server B sends the MESSAGE to the terminating PoC Client B if allowed by the Access Control policies of PoC User B as described in subclause 8.18 *"Access Control"*. Information elements contained in the MESSAGE request:

    a.   PoC Address of the PoC User sending the Group Advertisement

    b.   PoC Address of the PoC User receiving the Group Advertisement

    c.   PoC service indication

    d.   Group characteristics: Group Identity, nick name, description

5. SIP/IP Core sends the MESSAGE to the terminating PoC Client B. Information elements contained in the MESSAGE request:

    a.   PoC Address of the PoC User sending the Group Advertisement

    b.   PoC Address of the PoC User receiving the Groups Advertisement

    c.   PoC service indication

    d.   Group characteristics: Group Identity, nick name, description

6.-10. PoC Client B sends the OK back to the PoC Server X (controlling) along the same signalling path.

9.12 PoC media flows

9.12.1 General

RTP Media, Talk Burst Control signalling and quality feedback reports are passed across the POC-3 and POC-4 interfaces.

In all types of PoC Sessions (i.e. 1-1 PoC Sessions, 1-many Sessions, 1-many-1 Sessions), the RTP Media transfer is half-duplex. Hence, only one Participant is permitted to originate RTP Media at a time in the PoC Session.

All RTP Media to and from all PoC Clients in a PoC Session is sent through (and maybe replicated by) the Controlling PoC Function. If the Participating PoC Function is inserted in the transport path between the Controlling PoC Function and a PoC Client, all RTP Media to and from the PoC Client flows through the Participating PoC Function. Talk Burst Control and RTP Media replication are Controlling PoC Function functions. The transport path between the PoC Client and the Controlling PoC Function is established on a per PoC Session basis. When the PoC Session is established the Participating PoC Function normally includes itself into the transport path to relay the RTP Media packets between the PoC Client and the Controlling PoC Function.

9.12.2 One-to-one media

The one-to-one media flow is used in any type of PoC Session.

Figure 48: One-to-one media flow

1. PoC Client A, having been granted permission to send Talk Bursts, sends media to PoC Server A, which performs the Participating PoC Function for PoC Client A.

2. PoC Server A sends the media to PoC Server X, which performs the Controlling PoC Function for the session.

3. PoC Server X sends the media to PoC Server B, which performs the Participating PoC Function for PoC Client B.

4. PoC Server B sends the media to PoC Client B.

9.12.3 One-to-many media

The one-to-many media flow is used in PoC Sessions with Pre-arranged Groups, Ad-hoc PoC Groups or Chat PoC Groups.

The media flow is illustrated with respect to a PoC Session with three Participants and two PoC Servers performing the Participating PoC Function
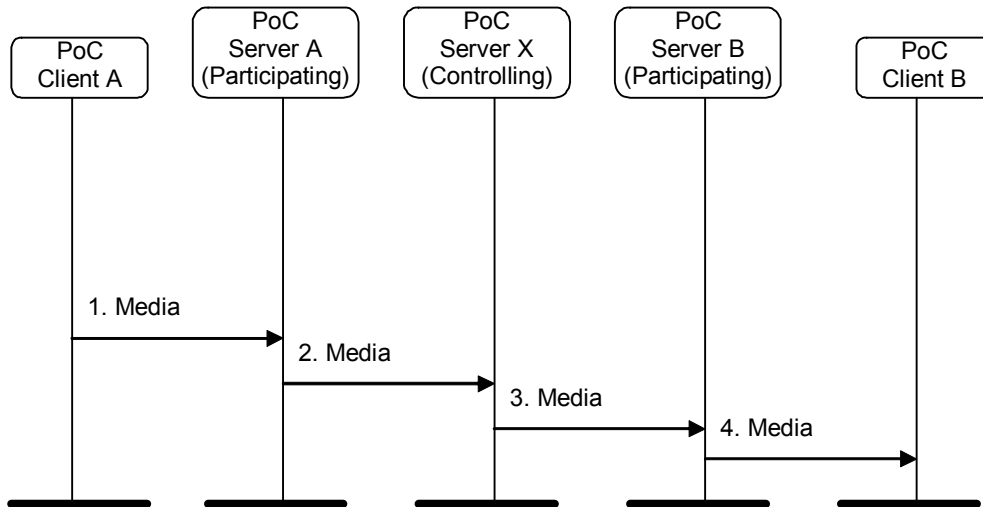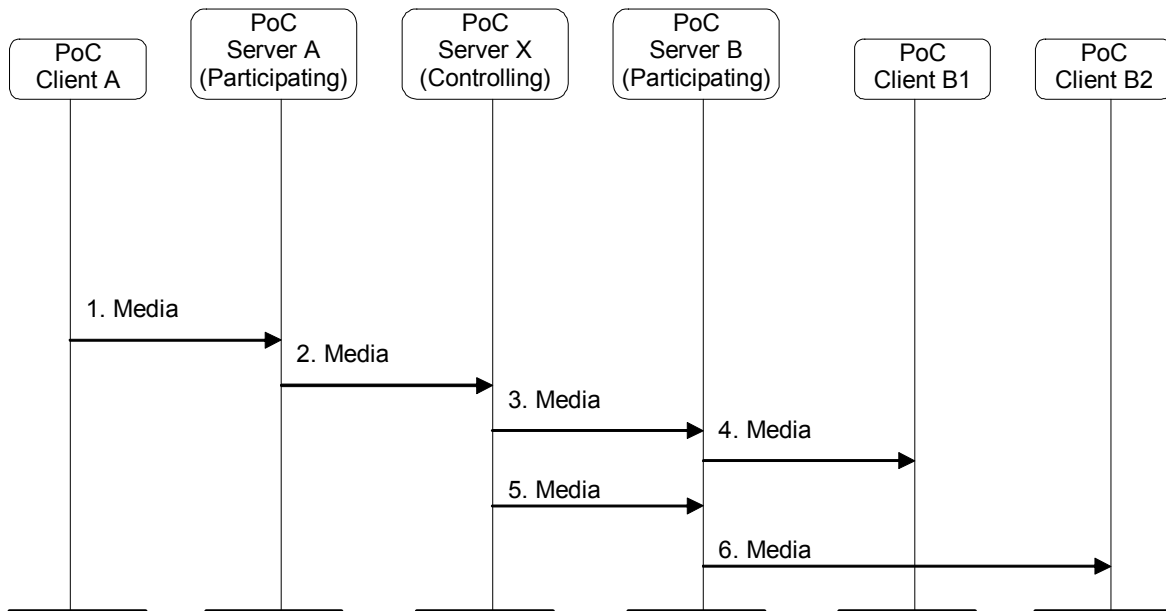

Figure 49: One-to-many media flow

1. PoC Client A, having been granted permission to send Talk Bursts, sends media to PoC Server A, which performs the Participating PoC Function for PoC Client A.

2. PoC Server A sends the media to PoC Server X, which performs the Controlling PoC Function for the PoC Session.

3. PoC Server X sends the media to PoC Server B, which performs the Participating PoC Function for PoC Client B1.

4. PoC Server B sends the media to PoC Client B1.

5. Concurrently with step 3, PoC Server X sends a second copy of the media to PoC Server B, which performs the Participating PoC Function for PoC Client B2.

6. PoC Server B sends the second copy of the media to PoC Client B2.

9.12.4   One-to-many-to-one media

The one-to-many-to-one media flow is used in PoC Sessions with Pre-arranged PoC Groups, which have been configured to support it. See subclause 8.23.3 *"One-to-many-to-one topology"* for further information on configuring Pre-arranged PoC Groups to support one-to-many-to-one media flows.

If the PoC Session is configured for one-to-many-to-one media flows, one Participant is the Distinguished Participant and all other Participants are Ordinary Participants.

The media flow for Talk Bursts transmitted by the Distinguished Participant is the same as the one-to-many media flow, shown in the subclause 9.12.3 "*One-to-many media*".

The media flow Talk Bursts transmitted by an Ordinary Participant is illustrated with respect to a PoC Session with three Participants and two Participating PoC Servers is described in the Figure 50 *"One-to-many-to-one media flow: Ordinary Participant"*.
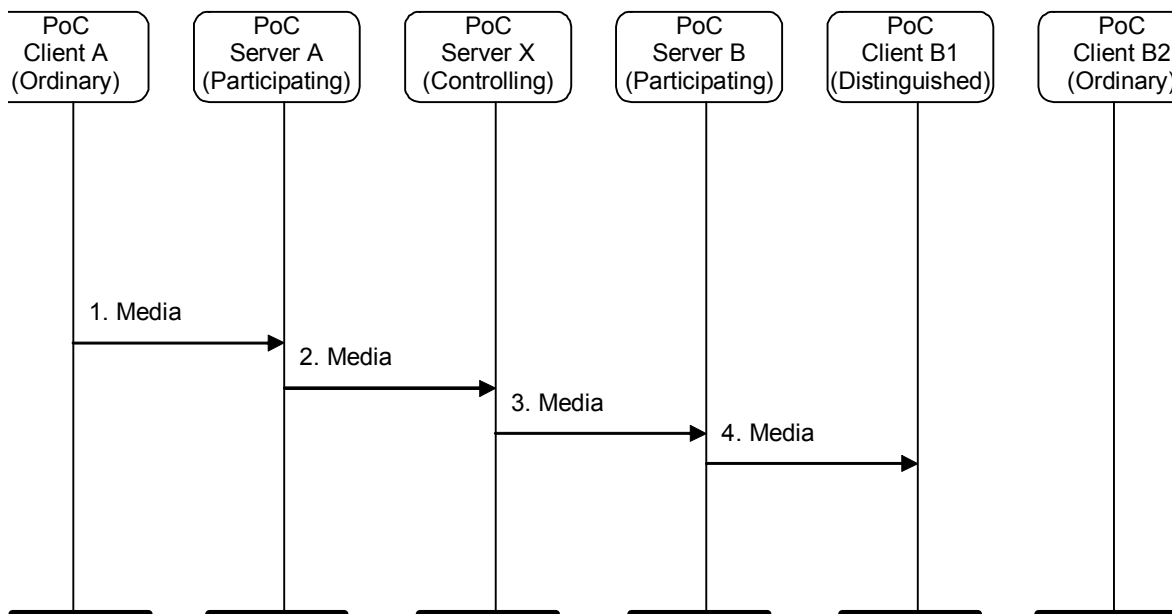
Figure 50: One-to-many-to-one media flow: Ordinary Participant

1. PoC Client A, having been granted permission to send Talk Bursts, sends media to PoC Server A, which performs the Participating PoC Function for PoC Client A.

2. PoC Server A sends the media to PoC Server X, which performs the Controlling PoC Function for the PoC Session.

3. PoC Server X sends the media to PoC Server B, which performs the Participating PoC Function for PoC Client B1, the Distinguished Participant.

4. PoC Server B sends the media to PoC Client B1, the Distinguished Participant.

PoC Server X does not distribute media to any Ordinary Participant. However, Talk Burst Control signalling is distributed to all Participants.

9.12.5   Simultaneous sessions media

The media flow in the case of Simultaneous PoC Sessions is illustrated with respect to three PoC Sessions with three Servers performing the Controlling PoC Function.

Figure 51: Media flow in the case of simultaneous sessions

1. The PoC Server X3 (controlling) sends the media stream X3 to the PoC Server B (participating).
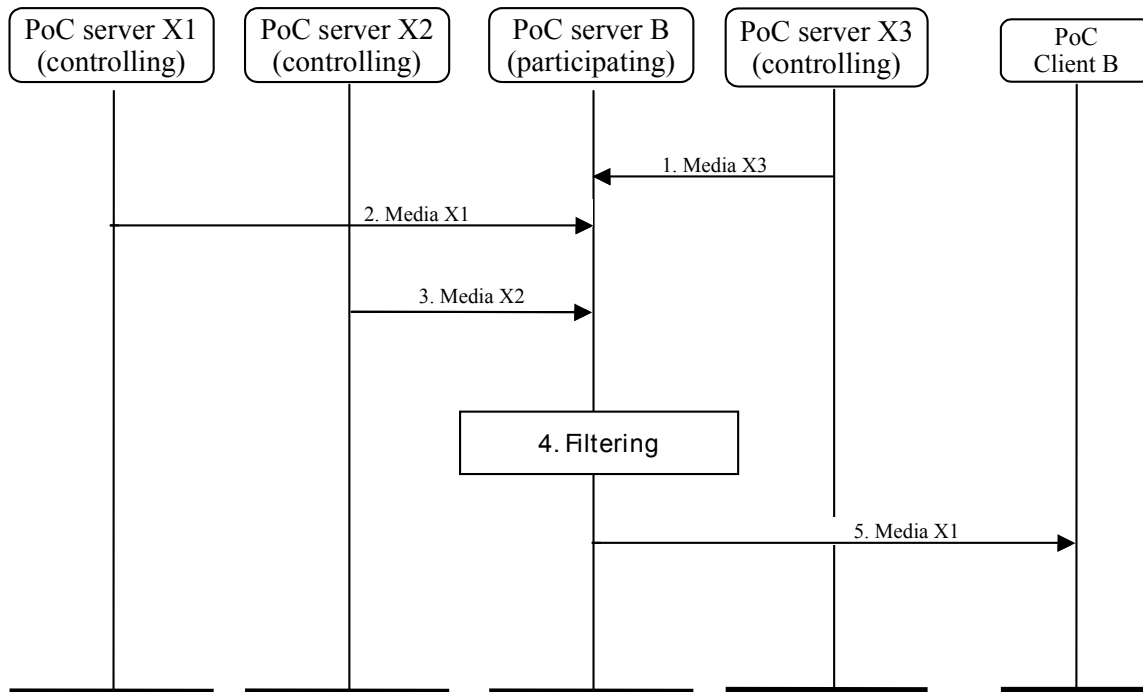
2. The PoC Server X1 (controlling) sends the media stream X1 to the PoC Server B (participating).

3. The PoC Server X2 (controlling) sends the media stream X2 to the PoC Server B (participating).

4. The PoC Server B (participating) filters the media stream as described in the Chapter 8.10.4 *"Voice stream filtering of simultaneous sessions"* selecting the stream X1.

5. The PoC Server B sends (participating) the voice stream X1 to the PoC Client B.

9.13   Talk Burst Control procedures

Talk Burst Control provides a mechanism to arbitrate the Participant requests to speak. The PoC Server and PoC Client supports arbitration of Talk Burst requests without queuing. The mechanism for Talk Burst requests without queuing allows PoC Server and PoC Client to support Talk Burst request, Talk Burst confirm response, Talk Burst reject, Talk Burst complete, no Talk Burst, receiving Talk Burst, stop Talk Burst and Talk Burst acknowledgement messages. This is described in subclause 9.13.1 *"Talk Burst Control procedures without queuing"*.

PoC Server and PoC Client can additionally support queuing of Talk Burst requests. If so, then the PoC Server and PoC Client additionally support the Talk Burst queue position request and Talk Burst queue position status messages. The additional procedures for Talk Burst control with queuing are described in subclause 9.13.2 *"Talk Burst request procedure at PoC Session initialisation"*.

Talk Burst Control is negotiated at SIP Session establishment along with the other Media Parameters.

9.13.1   Talk Burst Control procedures without queuing

In PoC there are four main Talk Burst Control procedures described in the following sub clauses:

- Talk Burst request procedure at PoC Session initialisation

- Talk Burst request procedure (both confirmed and rejected)

- Talk Burst complete procedure

- Talk Burst stop procedure

9.13.1.1   Talk Burst request procedure at PoC Session initialisation

This subclause describes the Talk Burst Control procedure when a PoC Client is connected to a PoC Session and permission to send one Talk Burst is granted to the PoC Client. Figure 52 *"Talk Burst request procedure at PoC Session initialisation"* shows the Talk Burst Control flow for this scenario.

The PoC Session establishment request message from the originating PoC Client to PoC Server performing the Controlling PoC Function through the initiation of an On-demand Session or through the setup of a PoC Session over a Pre-established Session is an implicit Talk Burst request. When the Controlling PoC Server has accepted the PoC Session establishment, it acts as if it has received a Talk Burst request. Note that initiating or joining a Chat PoC Group Session does not imply a Talk Burst request.
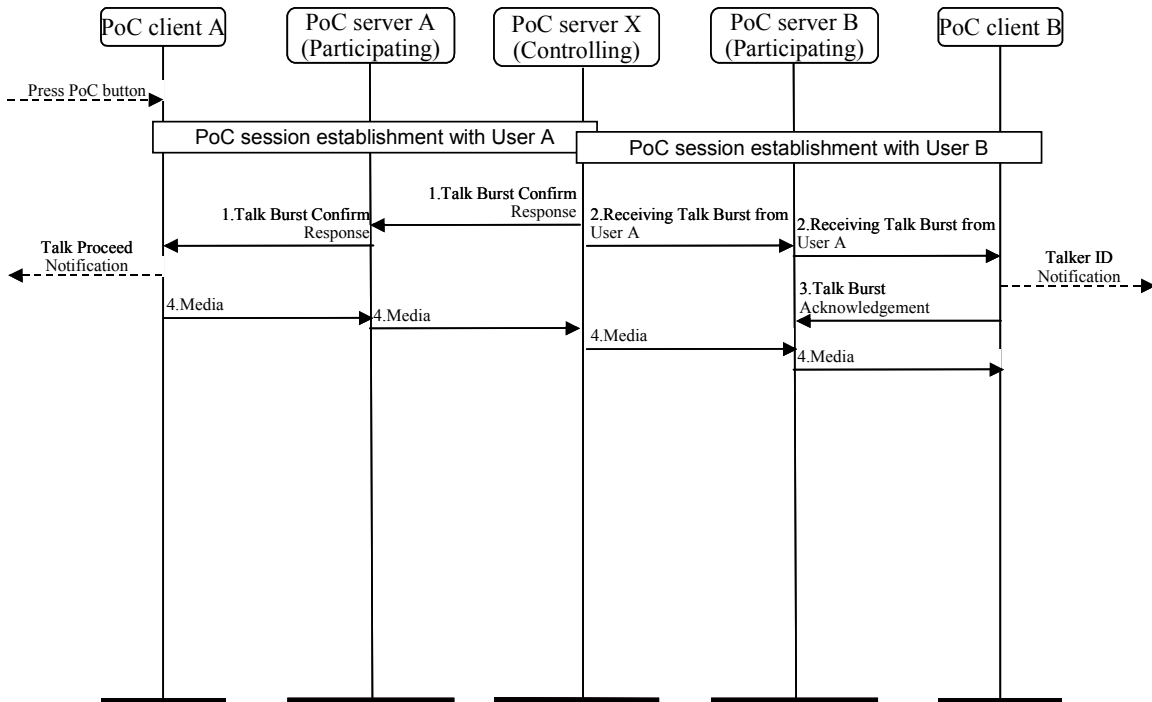
Figure 52: Talk Burst request procedure at PoC Session initialisation

1.   PoC Client A has initiated a PoC Session with PoC Server X (controlling). This creates an implicit Talk Burst request and Controlling PoC Server X sends Talk Burst confirm response message to PoC Client A. While this scenario shows the Talk Burst confirm response message being sent after the PoC Session is established with PoC User B, it can be transmitted also before or during the PoC Session establishment with PoC User B depending on whether the session indication is confirmed or unconfirmed.

2.   At the same time, PoC Server X (controlling) sends a receiving Talk Burst message to all other PoC Clients in the PoC Session (only PoC Client B is shown in Figure 52 *"Talk Burst request procedure at PoC Session initialisation"*). The

receiving Talk Burst message contains PoC User A's identity and the PoC Client B can display this identity for PoC User B.

3. In the case of acknowledgement is required by the receiving Talk Burst message PoC Client acknowledges the receiving Talk Burst message. The Talk Burst acknowledgement is received by the PoC Server B (participating) and is not sent to the PoC Server X (controlling).

4. When PoC Client A receives the Talk Burst confirm response message, it provides a talk proceed notification to PoC User A. PoC Client A then begins to send media to PoC Server X (controlling). PoC Server X (controlling) forwards this media to the other PoC Clients.

9.13.1.2   Talk Burst request confirmed procedure during a PoC Session

This subclause describes the Talk Burst Control procedure when a PoC Client, connected to a PoC Session, successfully requests permission to send a Talk Burst when no other PoC Client has permission to send. Figure 53 *"Talk Burst request confirmed procedure during a PoC Session"* shows the Talk Burst Control flow for this scenario.

Figure 53: Talk Burst request confirmed procedure during a PoC Session

1. PoC User A has pressed the PoC button when no other PoC User is known to have permission to send a Talk Burst. PoC Client A sends a Talk Burst request message to PoC Server X (controlling).

2. PoC Server X (controlling) decides to grant the Talk Burst to PoC Client A and sends a Talk Burst confirm response message to PoC Client A.

3. At the same time PoC Server X (controlling) sends a receiving Talk Burst message to the other PoC Clients on the PoC Session (only PoC Client B is shown in Figure 53 *"Talk Burst request confirmed procedure during a PoC Session")* with PoC User A's identity.

4. When PoC Client A receives the Talk Burst confirm response message, it provides a talk proceed notification to PoC User A. PoC Client A then begins to send media to PoC Server X (controlling). PoC Server X (controlling) forwards this media to the other PoC Clients.

9.13.1.3 Talk Burst request rejected procedure during a PoC Session

This subclause describes the Talk Burst Control procedure when a PoC Client, connected to a PoC Session, unsuccessfully requests permission to send a Talk Burst. Figure 54 *"Talk Burst request rejected procedure during a PoC Session"* shows the Talk Burst Control flow for this scenario.

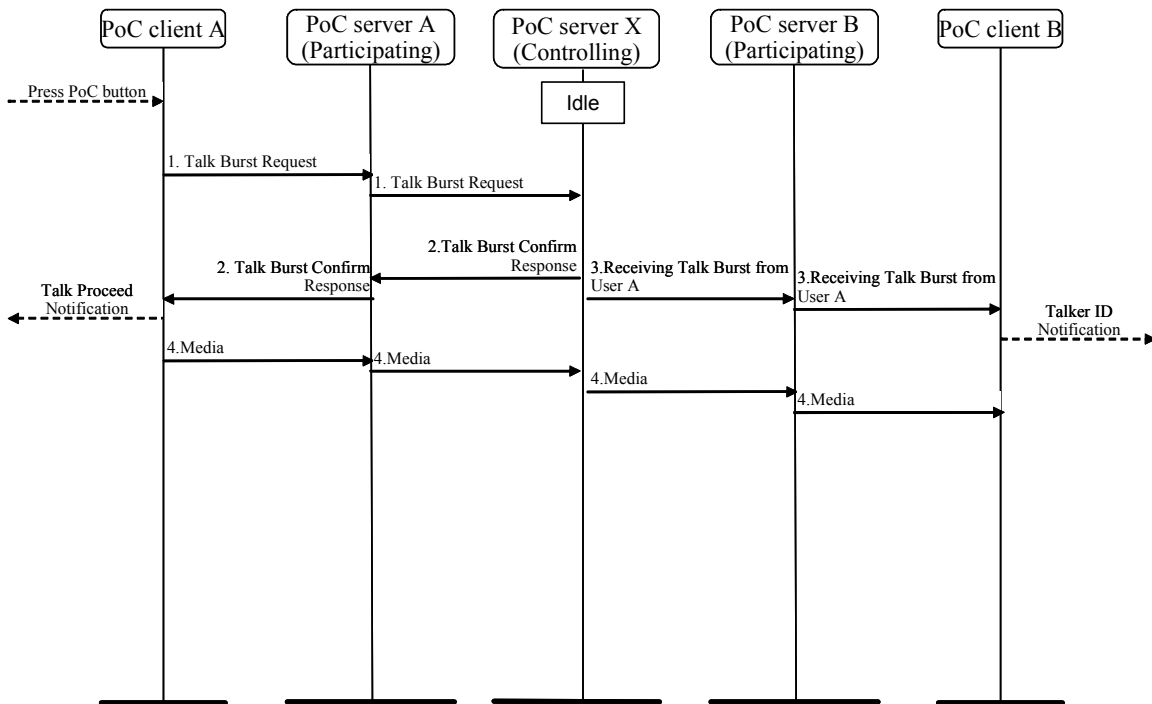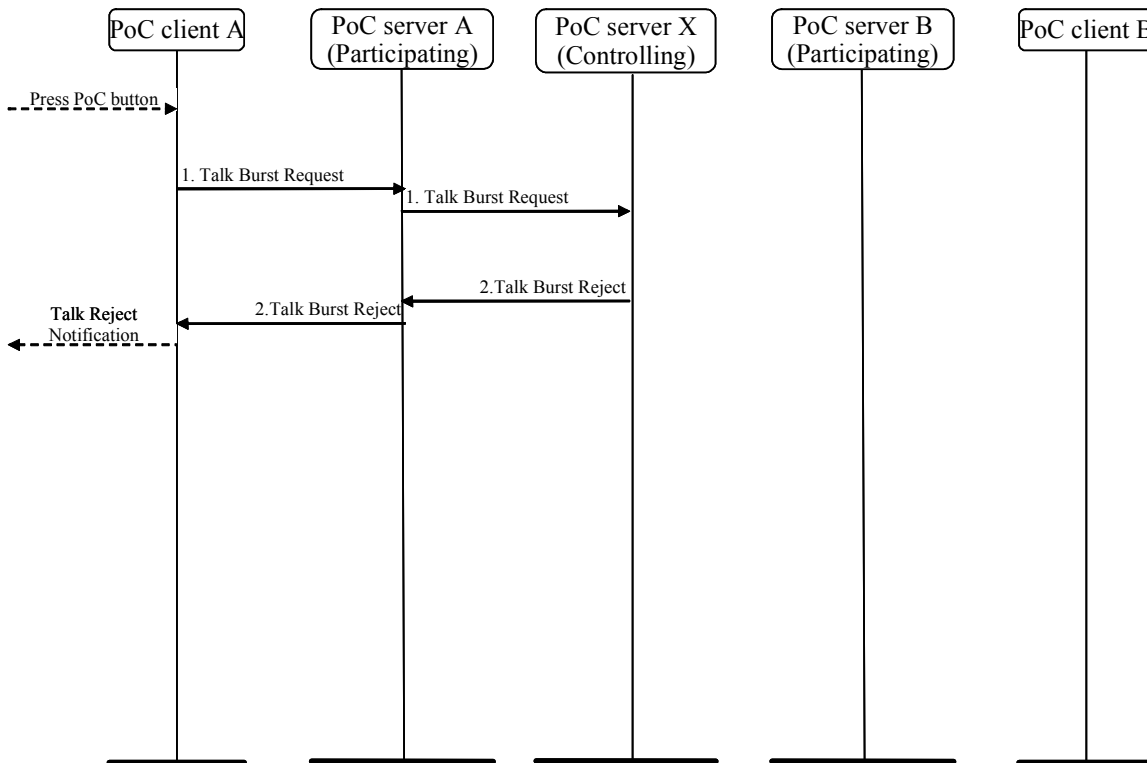**Figure 54: Talk Burst request rejected procedure during a PoC Session**

1. PoC User A has pressed the PoC button. PoC Client A sends a Talk Burst request message to PoC Server X (controlling).

2. PoC Server X (controlling) decides to reject the Talk Burst request made by PoC Client A (either because another PoC Client has permission to send a Talk Burst or because PoC Server X (controlling) has some policy that determines that PoC Client A can not be given permission to send a Talk Burst at this time) and sends a Talk Burst reject message to PoC Client A. When PoC Client A receives the Talk Burst reject message, it sends a talk reject notification to User A.

9.13.1.4 Talk Burst complete procedure

This subclause describes the Talk Burst Control procedure when a PoC Client with permission to send a Talk Burst finishes speaking and the user releases the PoC button. Figure 55 *"Talk Burst complete procedure"* shows the Talk Burst Control flow for this scenario.

Figure 55: Talk Burst complete procedure

1. PoC Client A has permission to send a Talk Burst. Media has been streaming from PoC Client A to PoC Server X (controlling) and PoC Server X (controlling) has been forwarding this media stream to the other PoC Clients in the PoC Session (only PoC Client B is shown in Figure 55 *"Talk Burst complete procedure"*).

2. PoC User A releases the PoC button and PoC Client A sends the last media packet to PoC Server X (controlling), who forwards it to the other PoC Clients.

3. PoC Client A then sends the Talk Burst complete message to PoC Server X (controlling).

4. After PoC Server X (controlling) has forwarded the last media packet, it then sends a No Talk Burst message to all Participants of the PoC Session, including PoC Client A. Each of the PoC Clients sends a Talk Burst idle notification to its PoC User.

9.13.1.5   Talk Burst stop procedure

This subclause describes the Talk Burst Control procedure when the Controlling PoC Server decides to revoke permission to send a Talk Burst from a User. Figure 56 *"Talk Burst stop procedure"* shows the Talk Burst Control flow for this scenario.
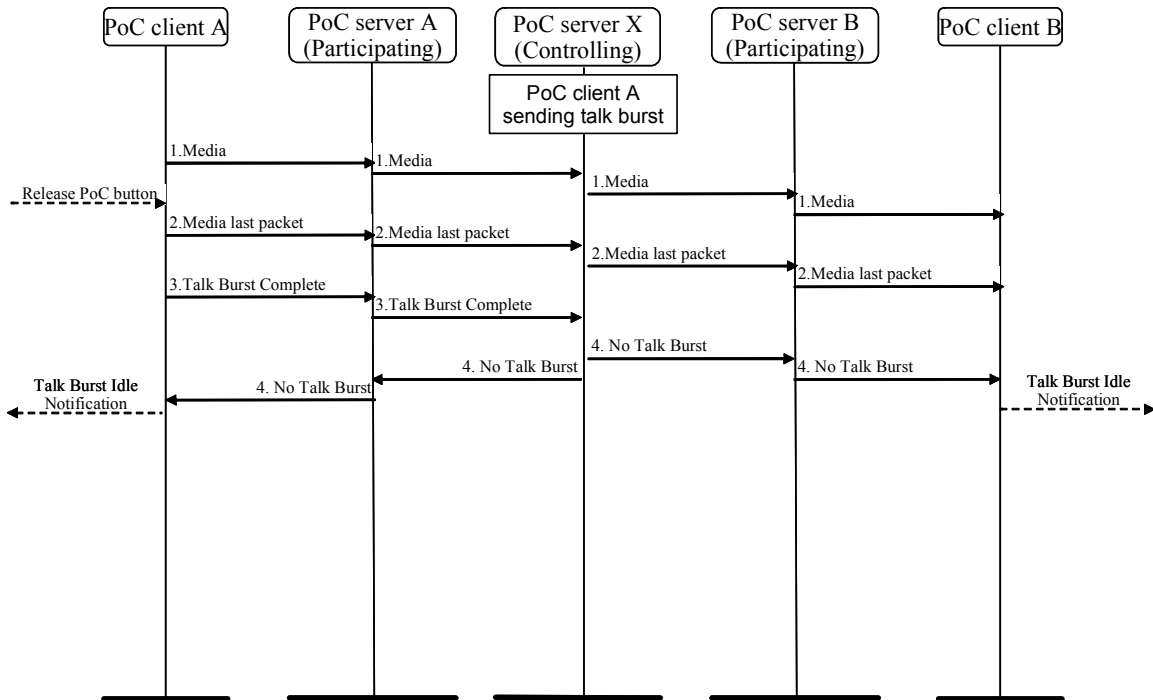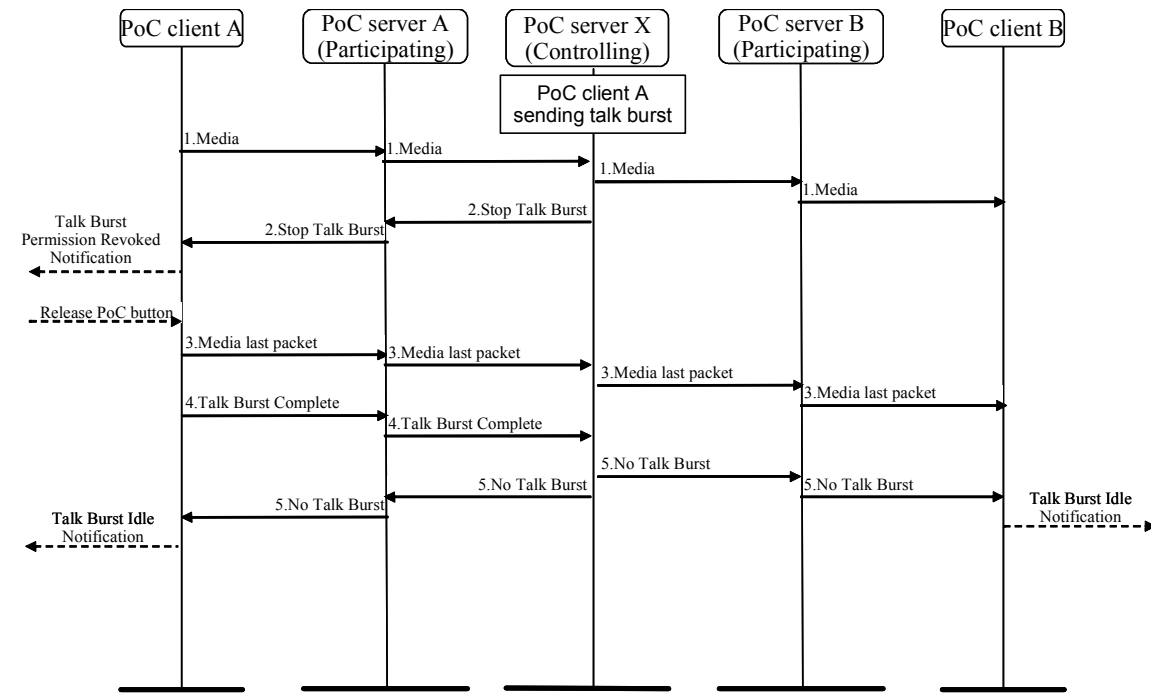
Figure 56: Talk Burst stop procedure

1. PoC Client A has permission to send a Talk Burst. Media has been streaming from PoC Client A to PoC Server X (controlling) and PoC Server X (controlling) has been forwarding this media stream to the other PoC Clients in the PoC Session (only PoC Client B is shown in Figure 56 *"Talk Burst stop procedure"*).

2. Based on some policy (e.g. the user has exceeded an allowed time limit), PoC Server X (controlling) decides to revoke permission to send a Talk Burst from PoC Client A and sends a Stop Talk Burst message to PoC Client A. In this scenario, it is possible, that PoC Server X (controlling) grants the PoC Client A a grace period before revoking the Talk Burst. If the Talk Burst complete has not been received before the grace timer expires, the PoC Server X (controlling) will stop forwarding media from User A and will send out the No Talk Burst message to all Participants of the PoC Session.

3. PoC Client A sends a Talk Burst permission revoked notification to PoC User A. User A finishes speaking and releases the PoC button. PoC Client A sends the last media packet to PoC Server X (controlling), who is still forwarding the media to all other Participants of the PoC Session.

4. PoC Client A then sends the Talk Burst complete message to PoC Server X (controlling).

5. When the Talk Burst complete message arrives at the PoC Server X (controlling), it sends a no Talk Burst message to all Participants of the PoC Session, including PoC Client A. Each of the PoC Clients sends a Talk Burst idle notification to its PoC User.

9.13.2   Talk Burst Control procedures with queuing

If the PoC Client and the PoC Server (controlling) in a PoC Session support Talk Burst Control with queuing, the following procedures apply in addition to those defined in subclause 9.13.1 *"Talk Burst Control procedures without queuing"*:

- Talk Burst request with queued response
- Talk Burst request cancellation
- Talk Burst complete with transfer to queued request
- Talk Burst stop with transfer to queued request

- Talk Burst request with pre-emptive priority

- Talk Burst queue position request

The PoC Server (controlling)provides the same level of support for queuing Talk Burst requests from a given PoC Client for all Talk Burst requests received in a given session from that PoC Client. The PoC Server (controlling)does not change the highest level of priority, which can be granted to a PoC Client, if requested by that client during the course of a session, unless the PoC Server performing the Controlling PoC Function is externally commanded to do so.

The PoC Server (controlling) supports Talk Burst Control with queuing by means of a Talk Burst request queue. When the PoC Client repeats the Talk Burst request message until the PoC Client receives Talk Burst queue position status message, the Talk Burst request message can include a timestamp value to indicate when the original Talk Burst request message was sent. If the PoC Server performing the Controlling PoC Function supports the timestamp based queuing then the PoC Client that has the earliest request time can be placed in the queue according to the timestamp and priority. The PoC Client at the head of the queue SHALL have permission to send the Talk Burst. The Talk Burst grant is indicated by the Talk Burst granted message.

NOTE: If the timestamp value of the Talk Burst request message is significantly earlier than the current time at the PoC Server the PoC Server may discard the Talk Burst request message.

When queuing a PoC request, the PoC Server (controlling) notifies the requesting client that the request is queued. In addition, the PoC Server (controlling) can support a policy of notifying a PoC Client when it is next in line for permission to send a Talk Burst, e.g. in order to allow the PoC Client the opportunity to acquire radio resources in advance of being granted permission to send a Talk Burst.

9.13.2.1 Talk Burst request with queued response

This subclause describes the Talk Burst Control procedure when a PoC Client supporting Talk Burst Control with queuing, connected to a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, requests permission to send a Talk Burst when another PoC Client has permission to send. Figure 57 *"Procedure for Talk Burst request with queued response"* shows the Talk Burst Control flow for this scenario.
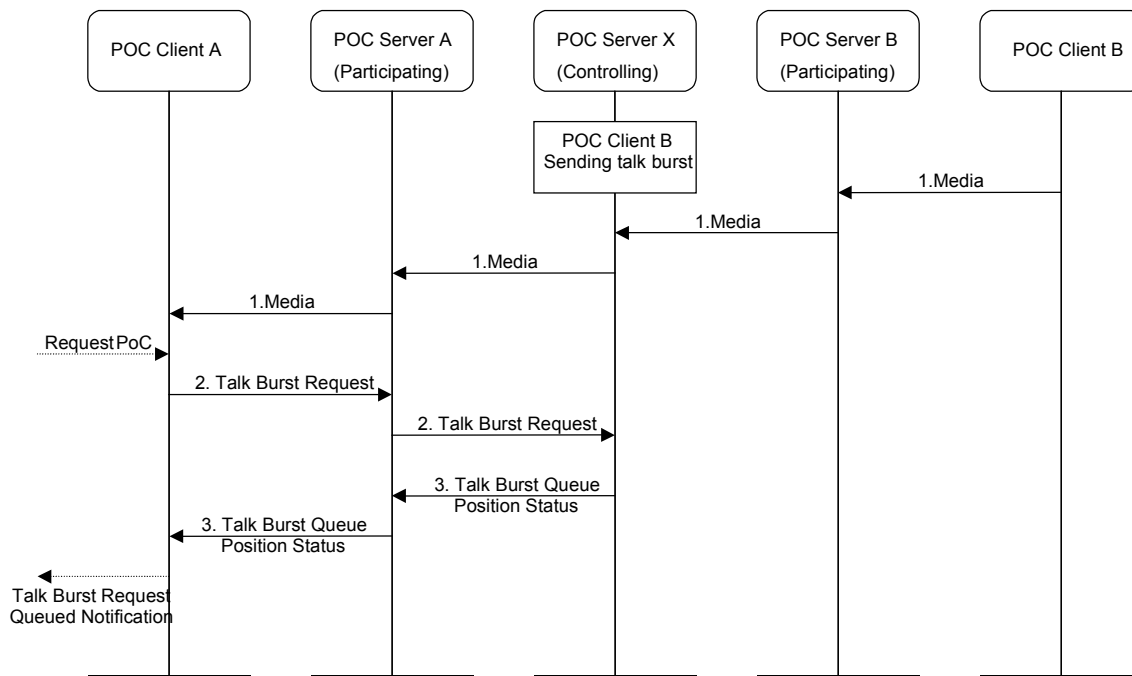

Figure 57: Procedure for Talk Burst request with queued response

1. PoC User A requests permission to send a Talk Burst, e.g. by pressing a PoC button, when another PoC User (PoC User B) has permission to send a Talk Burst.

2. PoC Client A sends a Talk Burst request message to PoC Server X (controlling). The Talk Burst request message identifies PoC Client A. If User A is permitted to request priority levels other than normal priority, as defined in subclause 8.18 *"Access Control"*, the Talk Burst request message can include a priority level that PoC User A is permitted to access.

3. PoC Server X performing the Controlling PoC Function determines that PoC User B has permission to send a Talk Burst at this time, that PoC User A does not currently have a request for permission to send a Talk Burst in the Talk Burst request queue, and either that PoC User A has not requested to pre-empt PoC User B or that PoC User B has pre-emptive priority. PoC Server X performing the Controlling PoC Function queues the request of User A in the Talk Burst request queue and send a Talk Burst queue position status message to PoC Client A. PoC Client A SHALL notify PoC User A that the Talk Burst request is queued.

4. The Talk Burst queue position Status message SHALL indicate:

   a. The position that PoC Client A currently holds in the Talk Burst request queue

   b. Optionally, the priority granted to PoC Client A's request

5. (Not shown in Figure 57 *"Procedure for Talk Burst request with queued response"*) If the request of PoC Client A has been granted a higher priority than the request of a PoC Client which was previously next in line for permission to talk (PoC Client C), then the PoC Server X (controlling) can send a Talk Burst queue position status message to PoC Client C giving the updated status of its queued request. The Talk Burst queue position status message is interleaved with the media originating from PoC User B.

9.13.2.2   Talk Burst request cancellation

This subclause describes the Talk Burst Control procedure when a PoC Client supporting Talk Burst Control with queuing, connected to a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, cancels a queued request for permission to send a Talk Burst before it is known that the request has been granted. Figure 58 *"Procedure for Talk Burst request cancellation"* shows the Talk Burst Control flow for this scenario.

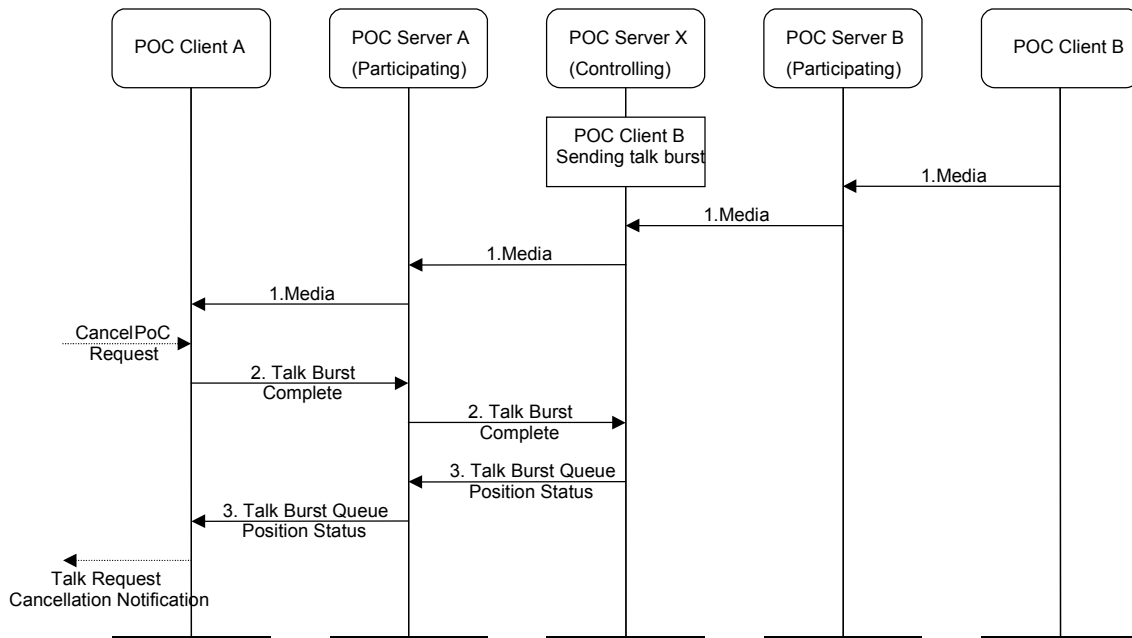

Figure 58: Procedure for Talk Burst request cancellation

1. PoC Client A has queued a request for permission to send a Talk Burst in the Talk Burst request queue. While PoC User B has permission to send a Talk Burst, PoC User A cancels the request, e.g. by releasing the PoC button.

2. PoC Client sends a Talk Burst complete message to PoC Server X performing the Controlling PoC Function.

3. PoC Server X performing the Controlling PoC Function removes the request of User A from the Talk Burst request queue and send a Talk Burst queue position status message to PoC Client A. The Talk Burst queue position status message indicates that PoC Client A is not in the Talk Burst request queue. PoC Client A SHALL notify PoC User A that the Talk Burst request is cancelled.

4. (Not shown in Figure 58). If the effect of cancelling the request from PoC Client A is to change the PoC Client which is next in line to be granted permission to talk (PoC Client C), then the PoC Server X (controlling) can send a Talk Burst queue position status message to PoC Client C giving the updated status of its queued request.

9.13.2.3   Talk Burst complete with transfer to queued request

This subclause describes the Talk Burst Control procedure when a PoC User with permission to send a Talk Burst indicates that he has finished speaking, e.g. by releasing the PoC button, in a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, and the Talk Burst request queue contains queued requests for permission to send Talk Bursts from other users. Figure 59 *"Procedure for Talk Burst complete with transfer to queued request"* shows the Talk Burst Control flow for this scenario.
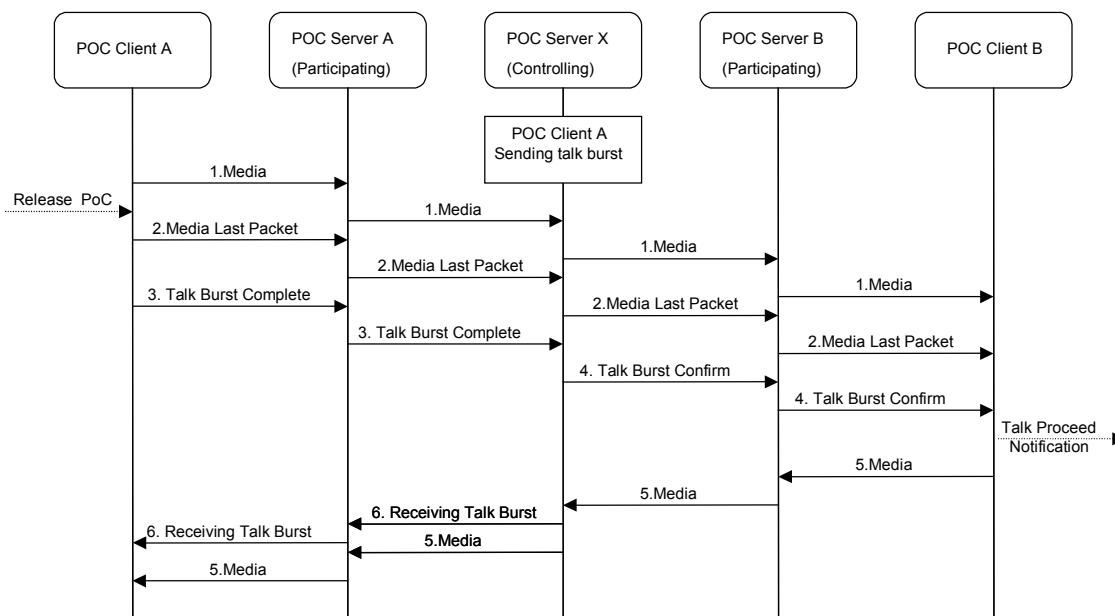

Figure 59: Procedure for Talk Burst complete with transfer to queued request

1. PoC Client A has permission to send a Talk Burst. Media has been streaming from PoC Client A to PoC Server X (controlling) and PoC Server X (controlling) has been forwarding this media stream to the other PoC Clients in the talk session (only PoC Client B is shown in Figure 59 *"Procedure for Talk Burst complete with transfer to queued request"*).

2. PoC User A indicates that he has finished speaking, e.g. by releasing the PoC button, and PoC Client A sends the last media packet to PoC Server X (controlling), who forwards it to the other PoC Clients.

3. PoC Client A then sends the Talk Burst complete message to PoC Server X (controlling). PoC Server X (controlling) removes PoC Client A from the Talk Burst request queue.

4. PoC Server X (controlling) examines the Talk Burst request queue and determines that PoC Client B has queued a request to send a Talk Burst that is at the head of the queue, after also taking into account the priority levels (if any) associated with all queued requests. After PoC Server X (controlling) has forwarded the last media packet from PoC Client A, it sends a Talk Burst confirm response message to PoC Client B.

5. When PoC Client B receives the Talk Burst confirm response message, it provides a talk proceed notification to User B. PoC Client B then begins to send media to PoC Server X (controlling). PoC Server X (controlling) forwards this media to the other PoC Clients.

6. The first media packets forwarded to the other PoC Clients are preceded by a receiving Talk Burst message.

7. (Not shown in Figure 59). If the effect of granting PoC Client B permission to send Talk Bursts is to change the PoC Client which is next in line to be granted permission to talk (PoC Client C), then the PoC Server X (controlling) can send a Talk Burst queue position status message to PoC Client C giving the updated status of its queued request.

9.13.2.4 Talk Burst stop with transfer to queued request

This subclause describes the Talk Burst Control procedure in a PoC Session when the PoC Server X (controlling) supporting Talk Burst Control with queuing decides to revoke permission to send a Talk Burst from a PoC User, and the Talk Burst request queue contains queued requests for permission to send Talk Bursts from other PoC Users. Figure 60 *"Procedure for Talk Burst stop with transfer to queued request"* shows the Talk Burst Control flow for this scenario.
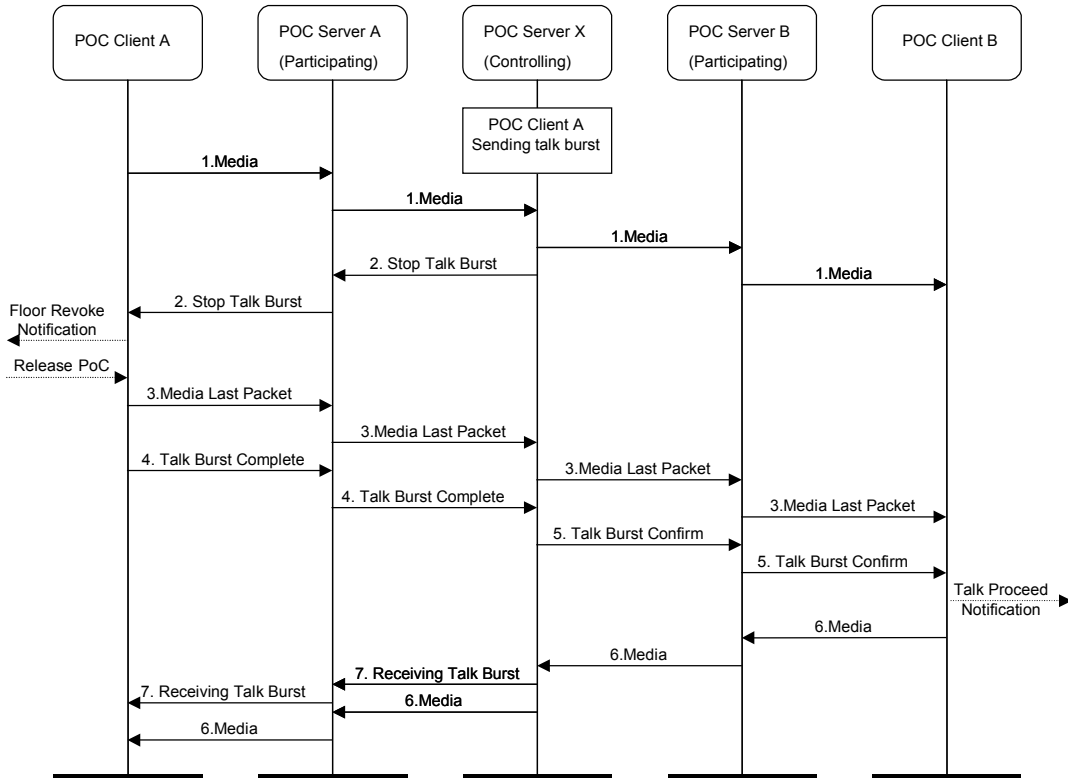

Figure 60: Procedure for Talk Burst stop with transfer to queued request

1. PoC Client A has permission to send a Talk Burst. Media has been streaming from PoC Client A to PoC Server X (controlling) and PoC Server X (controlling) has been forwarding this media stream to the other PoC Clients in the PoC session (only PoC Client B is shown in Figure 60 *"Procedure for Talk Burst stop with transfer to queued request"*).

2. Based on some policy (e.g. the user has exceeded an allowed time limit), PoC Server X (controlling) decides to revoke permission to send a Talk Burst from PoC Client A and sends a stop Talk Burst message to PoC Client A. In this scenario, PoC Server X (controlling) can grant PoC Client A a grace period before revoking permission to send a Talk Burst.

3. PoC Client A sends a Talk Burst permission revoked notification to PoC User A. PoC User A indicates that he has finished speaking, e.g. by releasing the PoC button. PoC Client A sends the last media packet to PoC Server X (controlling), who is still forwarding the media to all other members of the PoC session.

4. PoC Client A then sends the Talk Burst complete message to PoC Server X (controlling).

5. PoC Server X (controlling) examines the Talk Burst request queue and determines that PoC Client B has queued a request to send a Talk Burst that is at the head of the queue, after also taking into account the priority levels (if any)

associated with all queued requests. After PoC Server X (controlling) has forwarded the last media packet from PoC Client A, it sends a Talk Burst confirm response message to PoC Client B.

6. When PoC Client B receives the Talk Burst confirm response message, it provides a talk proceed notification to User B. PoC Client B then begins to send media to PoC Server X (controlling). PoC Server X (controlling) forwards this media to the other PoC Clients.

7. The first media packets forwarded to the other PoC Clients are preceded by a receiving Talk Burst message.

8.   (Not shown in Figure 60). If the effect of granting PoC Client B permission to send Talk Bursts is to change the PoC Client which is next in line to be granted permission to talk (PoC Client C), then the PoC Server X (controlling) can send a Talk Burst queue position status message to PoC Client C giving the updated status of its queued request.

9.13.2.5   Talk Burst request with pre-emptive priority

This subclause describes the Talk Burst Control procedure when a PoC Client supporting Talk Burst Control with queuing, connected to a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, requests permission to send a Talk Burst with pre-emptive priority when another PoC Client which does not have pre-emptive priority has permission to send. Figure 61 *"Procedure for Talk Burst request with pre-emptive priority"* shows the Talk Burst Control flow for this scenario.
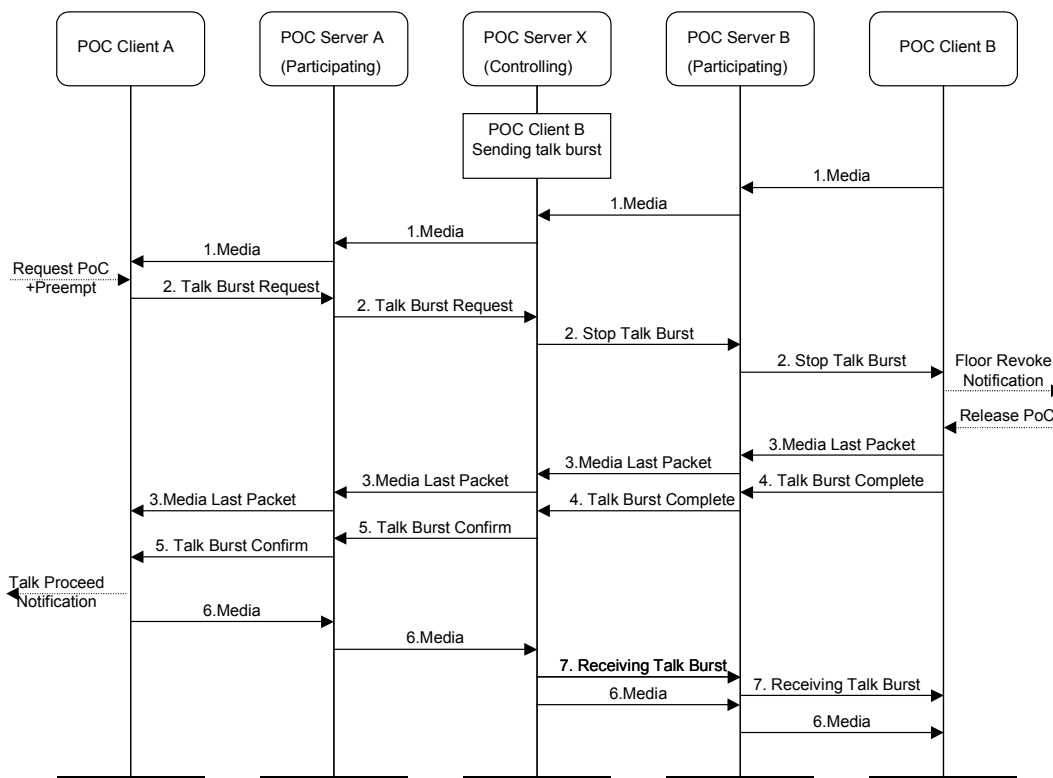
Figure 61: Procedure for Talk Burst request with pre-emptive priority

1. PoC User A, who is authorized to request permission to send a Talk Burst with pre-emptive priority, does so, e.g. by pressing a PoC button, when another PoC User (PoC User B) who does not have pre-emptive priority has permission to send a Talk Burst. PoC Client A sends a Talk Burst Request message to PoC Server X (controlling). The Talk Burst request message identifies the PoC Client A. The Talk Burst request message SHALL indicate that PoC User A is requesting access with pre-emptive priority.

2. PoC Server X (controlling) determines that PoC User B does not have pre-emptive priority and that the pre-emption request from PoC User A is authorized and does not violate policies supported by PoC Server X (controlling), such as limits on the number of times or the amount of time that a PoC User is permitted to pre-empt other PoC Users. PoC

Server X (controlling) revokes permission to send a Talk Burst from PoC Client B by sending a stop Talk Burst message to PoC Client B. The stop Talk Burst message can indicate that PoC Client B has been pre-empted by another client. In this scenario, PoC Server X (controlling) can grant the PoC Client B a grace period before revoking permission to send a Talk Burst.

3. PoC Client B sends a Talk Burst Permission Revoked Notification to PoC User B. PoC User B indicates that he has finished speaking, e.g. by releasing the PoC button. PoC Client B sends the last media packet to PoC Server X (controlling), who is still forwarding the media to all other members of the talk session.

4. PoC Client B then sends the Talk Burst complete message to PoC Server X (controlling).

5. After PoC Server X (controlling) has forwarded the last media packet from PoC Client B, it sends a Talk Burst confirm response message to PoC Client A.

6. When PoC Client A receives the Talk Burst confirm response message, it provides a talk proceed notification to PoC User A. PoC Client A then begins to send media to PoC Server X (controlling). PoC Server X (controlling) forwards this media to the other PoC Clients.

7. The first media packets forwarded to the other PoC Clients are preceded by a receiving Talk Burst message.

8. (Not shown in Figure 61). If the effect of granting PoC Client B permission to send Talk Bursts is to change the PoC Client which is next in line to be granted permission to talk (PoC Client C), then the PoC Server X (controlling) can send a Talk Burst queue position status message to PoC Client C giving the updated status of its queued request.

9.13.2.6 Talk Burst queue position request

This subclause describes the Talk Burst Control procedure when a PoC Client supporting Talk Burst Control with queuing, connected to a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, requests the PoC Server to notify the PoC Client of its position in the Talk Burst request queue. Figure 62 *"Procedure for Talk Burst queue position request"* shows the Talk Burst Control flow for this scenario.
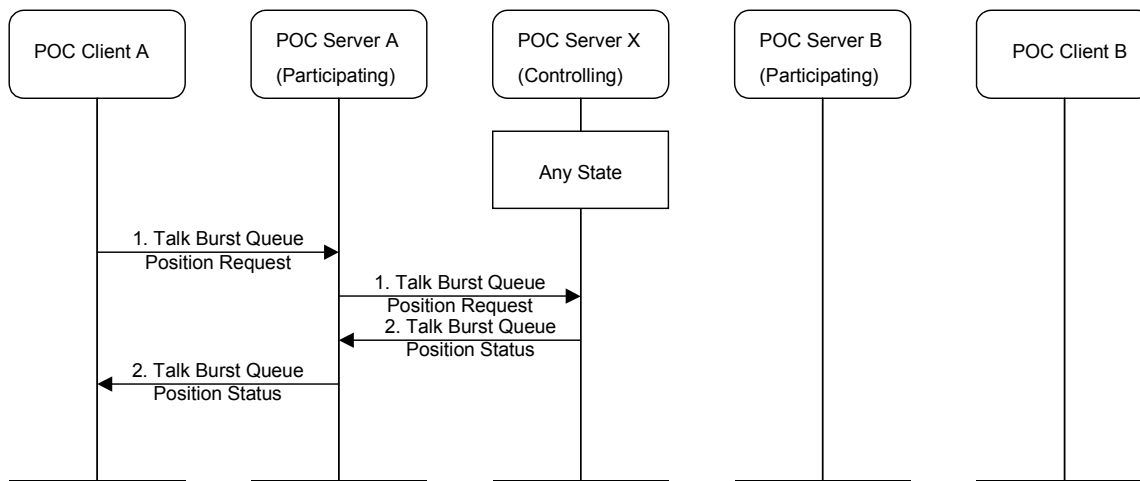
Figure 62: Procedure for Talk Burst queue position request

1. PoC Client A, which supports Talk Burst Control with queuing, and is connected to a PoC Session controlled by a PoC Server supporting Talk Burst Control with queuing, determine that it is necessary to obtain information on the PoC Client's position in the Talk Burst request queue, e.g. in response to a request by PoC User A. PoC Client A requests the PoC Server to notify the PoC Client of its position in the Talk Burst Request Queue by sending a Talk Burst Queue Position Request to the PoC Server. The Talk Burst Queue Position Request can be sent at any time in the session.

2. The PoC Server responds by sending a Talk Burst queue position status message to PoC Client A.

9.14 Changing PoC service settings

This subclause describes successful modification of a PoC User's PoC service settings, i.e. the Incoming Session Barring (ISB), Incoming Instant Personal Alert Barring and/or Answer Mode settings.

Figure 63: Changing Answer Mode setting shows the message flow for the scenario.
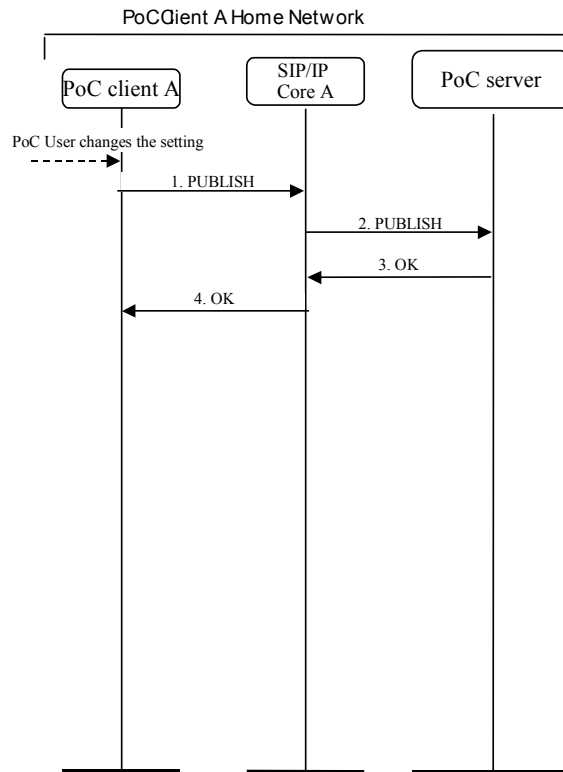
Figure 63: Changing Answer Mode setting

1. The PoC Client sends the PUBLISH request to the SIP/IP Core. Information elements contained in the PUBLISH request:

    a. PoC service indication.

    b. PoC Address of the PoC User at PoC Client A.

    c. Answer mode setting (auto-answer or manual-answer).

    d. Incoming PoC Session Barring setting (ISB active or ISB not active).

    e. Incoming Instant Personal Alert Barring setting (IAB active or IAB not active).

2. The SIP/IP Core sends the PUBLISH request to the PoC Server based on the PoC Address of the PoC User and the PoC service indication. Information elements contained in the PUBLISH request:

    a. PoC service indication.

    b. PoC Address of the PoC User at PoC Client A.

    c. Answer mode setting (auto-answer or manual-answer).

      d.   Incoming PoC Session Barring setting (ISB active or ISB not active).

      e.   Incoming Instant Personal Alert Barring setting (IAB active or IAB not active).

3.   The PoC Server authorizes the PoC Address of the PoC User and if successful stores the new values and sends the OK response to the SIP/IP Core.

4.   The SIP/IP Core forwards the OK response to the PoC Client.

Appendix A   Change History   (Informative)

A.1   Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2   Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-Architecture_PoC-V1_0	22 Sept 2003		First version, table of contents, baseline
OMA-Architecture_PoC-V1_0	02 Oct 2003		Definitions and abbreviations added.
OMA-Architecture PoC-V1_0	13 Oct .2003		In Tokyo meeting agreed architecture picture provided by RIM (Andrew Allen) added, text agreed in the meeting added into sections 4, 5, 6. References adjusted.
OMA-AD-PoC-V1_0	13 Oct 2003		Document name changed to the permanent document name.
OMA-AD-PoC-V1_0	17 Oct 2003	1, 7.1, 7.2	Text added to section 1, and sections 7.1 and 7.2 added to the document.
OMA-AD-PoC-V1_0	27 Oct 2003	7.3, 7.4, 8.1	Input contribution 0045 implemented in 7.3, and 7.4. Sections 8.1, 8.1.1, 8.1.2 added based on on-line editing.
OMA-AD-PoC-V1_0	5 Nov 2003	8.1.3, 8.2	3.11.2003 Conference call result implemented to the AD. Related references added.
OMA-AD-PoC-V1_0	18 Nov 2003	6 – 9	The version 20031105 edition trace marks approved. The London meeting 10.-12.11.2003 changes added (seen as revision marked in this version).
OMA-AD-PoC-V1_0	24 Nov .2003		The version 20031118 edition trace marks approved. The given comments are taken account (seen as revision marked in this version).
OMA-AD-PoC-V1_0	09 Jan .2004	3,4,8,9	The PoC WG meeting Phoenix 6.-9.1.2004 accepted contributions are taken account.
OMA-AD-PoC-V1_0	20 Jan 2004	9, 3	Some minor editorials are corrected.
OMA-AD-PoC-V1_0	04 Feb 2004	8.10, 9.7	The PoC WG meeting Los Angeles 2.-4.2.2004 accepted contributions are included.
0MA-AD-PoC-V1_0	13 Feb 2004	3,8,9	Small editorial and stylistic corrections made. Definition chapter is inlined with the later chapters.
OMA-AD-PoC-V1_0	01 Mar 2004	3, 8	Privacy and Deactivate incoming Talk Bursts chapters added. Some font changes made.
OMA-AD-PoC-V1_0	02 Mar 2004	9	The figure 21 corrected and the Subscription to Participant Information chapter added according to the decisions in the telco 01.03.2004.
OMA-AD-PoC-V1_0	16 Mar 2004	2,3,5,6,7,8,9	Added contributions agreed in the PoC WG Kansas meeting 8.-11.3.2004. Additionally updated the figures in the chapter 6.
OMA-AD-PoC-V1_0	17 Mar 2004	9.2 , 9.3 , 9.10	Manual answer override and group advertising corrected according to the comments.
OMA-AD-PoC-V1_0	18 Mar 2004	9.2, 9.3	Unagreed editor's notes are removed.
OMA-AD-PoC-V1_0	25 Mar 2004	8, 9	Added contributions "Security" and "Media flows" as agreed in the PoC WG conf.call on 22.03.2004. ToC and ToF are updated.
OMA-AD-PoC-V1_0	07 Apr .2004	3,9	Added contributions "Simultaneous sessions" and partly "Talk Burst Control Flows" as agreed in the PoC WG conf.call on 05.04.2004.
OMA-AD-PoC-V1-0	20 Apr 2004	3,8,9	Added an editor's note to the chapter Simultaneous sessions and added changes proposed in the contribution 111R2 and added PoC Media Topologies and the corresponding definitions as agreed in the PoC WG conf.call on 19.04.2004.
OMA-AD-PoC-V1_0	23 Apr 2004		Chapter and figure references are updated. Table of content updated. Version history updated.
OMA-AD-PoC-V1_0	30 Apr 2004	3,6,8,9	Included the contributions agreed in the Munich OMA PoC WG meeting 26. - 30.04.2004.
OMA-AD-PoC-V1_0	21 May 2004	6, 8, 9.	Some editorial errors corrected: The releases cases are moved to the correct chapter (from 9.6 to 9.5). Chapter 9.6 is returned as it was before the change. PoC – CS interworking is added as was agreed in the Munich meeting. The contribution 125R2 is adopted. The contribution 225 was not agreed in Munich and it is removed from the AD. Some editor changes made according to the decisions in the Munich meeting, when discussed the contribution 0194. The PoC WG on 10.05.2004 tel.conf. decisions are adopted.
OMA-AD-PoC-V1_0	28 May 2004	1 … 9	Included the contributions agreed in the Helsinki OMA PoC WG meeting 24. - 27.05.2004.

Document Identifier	Date	Sections	Description
OMA-AD-PoC-V1_0	08 Jun 2004	7	Adopted 208R2 as agreed in Helsinki.
OMA-AD-PoC-V1_0	24 Jun 2004	2,3,5,6,7,8,9	Included the contributions agreed in the Bangkok OMA PoC WG meeting 21. - 23.06.2004.
OMA-AD-PoC-V1_0	19 Jul 2004	3,6,7,8,9	Figure 21 corrected. Included the contribution agreed in the OMA PoC WG telco 19th July 2004.
OMA-AD-PoC-V1_0	02 Aug 2004	2,6,8,9	Included the contributions agreed in the Chicago OMA PoC WG meeting 25. - 29.07.2004.
OMA-AD-PoC-V1_0	09 Aug 2004	9	Some figure references are corrected. The chapter 8.17 corrected according to the contribution 497.
OMA-AD-PoC-V1_0	24 Aug 2004	5,6,8,9	Included the contributions agreed in the Hawaii OMA PoC WG meeting 16. – 20.08.2004.
OMA-AD-PoC-V1_0	05 Oct 2004	8, 9	Included the contributions agreed in the Orlando OMA PoC WG meetings #13 and #14 23. –29.09.2004.
OMA-AD-PoC-V1_0	07 Oct 2004	6, 8, 9	Included the contributions agreed in the Orlando OMA PoC WG meetings #13 and #14 23. –29.09.2004, which were not available for the previous version and figure in the chapter 9.5.4 and some editorial errors corrected and some wrong fonts changed.
OMA-AD-PoC-V1_0	28 Oct 2004	5,6,7,8 and Appendix D	Joint PoC-PAG architecture decisions adopted (OMA-POC-2004-569R04 adopted).
OMA-AD-PoC-V1_0	01 Nov 2004	3,6,7,8,9	Included the contributions agreed in the Sophia Antipolis OMA PoC WG meeting #15 25. –29.10.2004. The figure 26 (MAO) deleted and corresponding EN added.
OMA-AD-PoC-V1_0	11 Nov 2004	8.26, 9.2.2.3, 9.3.2.2.1, 9.14	Errors in the contribution adoption corrected and adopted contributions agreed in 08.11.2004 PoC WG telco. Figure 23 cleaned.
OMA-AD-PoC-V1_0	17 Nov 2004	2,6,8,9	Included the contributions agreed in the Barcelona OMA PoC WG meeting #16 15.-16.11.2004.
OMA-AD-PoC-V1_0	17 Nov 2004	3	Definitions updated.
OMA-AD-PoC-V1_0	05 Jan 2005	All	Editorial consistence review comments are taken account.
OMA-AD-PoC-V1_0	18 Jan 2005	3,5,6,7,8,9	Included the contributions agreed in the Vienna OMA PoC WG meeting #17 10.-12.01.2005.
OMA-AD-PoC-V1_0	28 Jan .2005	All	Editorials are corrected. Some figures are updated and corresponding ENs are removed.
OMA-AD-PoC-V1_0	02 Feb .2005	All	Included the contributions agreed in the Frankfurt OMA PoC WG meeting #18 31.01. – 02.02.2005.
OMA-AD-PoC-V1_0	10 Feb .2005	7, 8	Also OMA-POC-2005-189R01 adopted.
OMA-AD-PoC-V1_0	08 Mar 2005	All	Included the contributions agreed in the Stockholm OMA PoC WG meeting #19 28.02. – 04.03.2005.
OMA-AD-PoC-V1_0	17 Mar 2005		Status changed to Candidate by TP: OMA ref# OMA-TP-2005-0059-PoC-V1_0-for-candidate-approval

Appendix B   Guidelines for preparing flow charts   (Informative)

The protocol issues are not yet agreed in the OMA PoC work on stage 2. And although it is clear that the Session Initiation Protocol (SIP) and Session Description Protocol (SDP) are used for call set up etc. purposes, it may stay open at this moment what are the exact SIP methods and headers used in the signalling flows.

Therefore it is recommended to use a high level description in the architecture document describing only e.g. INVITE and OK for a successful session setup and leaving open what is the exact message sequence in each session setup case. In some cases when the precise protocol method still needs to be determined it may be appropriate to use an abstract signalling naming, e.g. PoC Session request and acknowledgement.

Additionally it is defined the network elements shown on the figure. It is recommended to show all network elements participating the signalling message transfer. Typically they are PoC Client A and B, PoC Server A, B and X and SIP/IP Core A, B and X. Where A is the originating party, B is the terminating party and X is the session controlling party. Additionally the network element naming shall clarify the PoC Server role: participating, controlling or both.

The originating flow (from originating PoC Client to the PoC Server X (controlling)) and terminating flow (from the PoC Server X (controlling) to the terminating PoC Client) is described separately. The flows are numbered and textually described under the figure. The textual description includes the Information elements that are necessary to be conveyed in each flow.

The flow charts are drawn in AD by using Power Point tool. The template for drawing the flow charts by Power Point is available as a permanent document.

For an example see subclause 9.4 "*Chat PoC Group"*.

Appendix C   OMA SEC Group security threats analyses (Informative)

OMA Security Group has analysed the potential PoC security threats. When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, these potential security threats are addressed. If other SIP/IP Cores are used then these potential security threats need to be addressed by the SIP/IP Core:

1. Registering misleading usernames

    Currently with the OMA PoC framework a user is required to have one private identity (which is kept internally by the SIP/IP Core service provider) and a number of public identities. Currently it is possible for users to register misleading public identities in order to fool or masquerade at the PoC User Plane as other users. For example, a users real name may be John Smith and may have a private SIP address as: SIP:John.Smith@operator.net, however, John Smith can then register public ID's such as SIP:Bob.Holmes@operator.net. Please note that all public ID's require operator provisioning before they can be used. An unknown public ID to the SIP/IP Core operator cannot be registered without prior provisioning.

2. SPAM

    There is a general SPAM problem with PoC. It is possible for advertising companies or other third parties to randomly invite users to their groups, although the user has to accept the invite before participating, this will still cause a nuisance. SPAM coupled with misleading user public identities can trick the user into participating into a group or one on one PoC Session. On the network side, SPAM will cause network clogging on the air interface, if for example a third party tries to invite users from a particular cell based on location information.

3. Eavesdropping in PoC Sessions

    Because it is possible for users to register arbitrary public user names, as suggested in point 1, it is possible for the attacker to trick the user into accepting an invite that may have been from a trusted user. For one to one communication this may be identified once the attacker starts his speech, however in Ad-hoc Group PoC Sessions it may be possible for the attacker to invite him-self on to a group session and passively eavesdrop. This could be picked up in the network at a later time as the network operator can identify the real user behind the public identity.

4. The possibility of attacks such as eavesdropping makes it possible for Pre-Pay customers that have not registered personal details with operators difficult to trace because identities are tied down to an IMSI (SIM card) and not the actual user information such as name and address.