



Push to talk over Cellular (PoC) Architecture

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1. Scope

(Informative)

The scope of the Push to talk over Cellular (PoC) V2.1 architecture document is to define the architecture for the PoC Enabler V2.1. This architecture is backward compatible with the [OMA PoC V1.0 AD] and [OMA PoC V2.0 AD]. The architecture is based on the requirements listed for the system in the PoC requirements document [OMA PoC V1.0 RD], [OMA PoC V2.0 RD] and [OMA PoC V2.1 RD].

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 IMS, the architecture and the 3GPP enablers for OMA PoC services are described in [3GPP TR 23.979] and the 3GPP2 enablers for OMA PoC services are described in [3GPP2 S.R0100-0].

System concepts and high-level procedures are described in [OMA PoC V2.1 SD].

2. References

2.1 Normative References

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[3GPP TS 23.228]	3GPP TS 23.228: "IP Multimedia Subsystem (IMS)", Stage 2. URL: http://www.3gpp.org/
[3GPP TS 23.246]	3GPP TS 23. 246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description (Release 7)". URL: http://www.3gpp.org/
[3GPP TS 25.331]	3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification". URL: http://www.3gpp.org/
[3GPP TS 29.061]	3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)". 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/
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[3GPP TS 33.203]	3GPP TS 33.203: "Access security for IP-based services". URL: http://www.3gpp.org/
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[OMA CBUS V1.0 AD]	"Condition Based URIs Selection Architecture", Open Mobile Alliance™, OMA-AD-CBUS-V1_0, URL: http://www.openmobilealliance.org/
[OMA Charging AD]	"Charging Architecture", Version 1.0, Open Mobile Alliance™, OMA-AD-Charging-V1_0, URL: http://www.openmobilealliance.org/
[OMA Client Provisioning]	"OMA Client Provisioning", Version 1.1, Open Mobile Alliance™, OMA-ERP-ClientProvisioning-V1_1, URL: http://www.openmobilealliance.org/
[OMA-DICT]	"Dictionary for OMA Specifications", Open Mobile Alliance™. URL: http://www.openmobilealliance.org/
[OMA DM]	"OMA Device Management Protocol", Version 1.2, Open Mobile Alliance™, OMA-TS-DM_Protocol-V1_2, URL: http://www.openmobilealliance.org/
[OMA DM Bootstrap]	"Device Management Bootstrap", Version 1.2, Open Mobile Alliance™, OMA-TS-DM_Bootstrap-V1_2, URL: http://www.openmobilealliance.org/
[OMA IM AD]	"Instant Messaging using SIMPLE Architecture", Version 1.0, Open Mobile Alliance™, OMA-AD-SIMPLE_IM-V1_0, URL: http://www.openmobilealliance.org/

[OMA PoC V1.0 AD]	"Push to Talk over Cellular (PoC) - Architecture", Version 1.0, Open Mobile Alliance™, OMA-AD-PoC-V1_0, URL: http://www.openmobilealliance.org/
[OMA PoC V1.0 RD]	"Push to Talk over Cellular Requirements", Version 1.0, Open Mobile Alliance™, OMA-RD-PoC-V1_0, URL: http://www.openmobilealliance.org/
[OMA PoC V1.0 UP]	"PoC User Plane", Version 1.0, Open Mobile Alliance™, OMA-TS-PoC_UserPlane-V1_0, URL: http://www.openmobilealliance.org/
[OMA PoC V2.0 AD]	"Push to Talk over Cellular (PoC) - Architecture", Version 2.0, Open Mobile Alliance™, OMA-AD-PoC-V2_0, URL: http://www.openmobilealliance.org/
[OMA PoC V2.0 RD]	"Push to Talk over Cellular 2 Requirements", Version 2.0, Open Mobile Alliance™, OMA-RD-PoC-V2_0, URL: http://www.openmobilealliance.org/
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[OMA PoC V2.1 Document-Mgmt]	"OMA PoC Document Management", Version 2.1, Open Mobile Alliance™, OMA-TS-PoC_Document_Management-V2_1, URL : http://www.openmobilealliance.org/
[OMA PoC V2.1 RD]	"Push to talk over Cellular 2.1 Requirements", Version 2.1, Open Mobile Alliance™, OMA-RD-PoC-V2_1, URL: http://www.openmobilealliance.org/
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[OMA Presence V2.0 AD]	"Presence SIMPLE Architecture", Version 2.0, Open Mobile Alliance™, OMA-AD-Presence_SIMPLE-V2_0, URL: http://www.openmobilealliance.org/
[OMA XDM V2.1 AD]	"XML Document Management Architecture", Version 2.1, Open Mobile Alliance™, OMA-AD-XDM-V2_1, URL: http://www.openmobilealliance.org/
[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
[RFC2326]	IETF RFC 2326: "Real Time Streaming Protocol (RTSP)", H. Schulzrinne et al, April 1998. URL: http://www.ietf.org/rfc/rfc2326.txt
[RFC2616]	IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1", R. Fielding et al, June 1999. URL: http://www.ietf.org/rfc/rfc2616.txt
[RFC2617]	IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication", J. Franks et al, June 1999. URL: http://www.ietf.org/rfc/rfc2617.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
[RFC3550]	IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications", H. Schulzrinne, July 2003. URL: http://www.ietf.org/rfc/rfc3550.txt
[RFC3926]	IETF RFC 3926: "FLUTE - File Delivery over Unidirectional Transport", T. Paila et al, October 2004. URL: http://www.ietf.org/rfc/rfc3926.txt

- [RFC4412] IETF RFC 4412: "Communications Resource Priority for the Session Initiation Protocol (SIP)", H. Schulzrinne, J. Polk, February 2006.
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- [RFC4825] IETF RFC 4825: "The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)", J. Rosenberg, May 2007.
URL: <http://www.ietf.org/rfc/rfc4825.txt>
- [RFC4975] IETF RFC 4975: "The Message Session Relay Protocol (MSRP)", September 2007,
URL: <http://www.ietf.org/rfc/rfc4975.txt>

2.2 Informative References

- [3GPP TR 23.979] 3GPP: TS 23.979: "3GPP enablers for Open Mobile Alliance (OMA) Push-to-talk over Cellular (PoC) services", Stage 2.
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/>

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 sections 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 terms and definitions given in [OMA-DICT], [OMA Presence V2.0 AD], [OMA XDM V2.1 AD] and 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 PoC Group Session	A PoC Session with many Participants and in which all Participants can communicate with each other.
1-many-1 PoC Group Session	A PoC Session established by a PoC User to a Pre-arranged PoC Group, in which one Participant is a Distinguished Participant and other Participants are Ordinary Participants.
Access Control	PoC User specified rules that define the interactions with other PoC Users, e.g. rules restricting other PoC Users that may try to establish PoC Session to the PoC User.
Ad-hoc PoC Group Session	A PoC Group Session established by a PoC User to PoC Users listed on the invitation. The list includes PoC Users or PoC Groups or both.
Advanced Revocation Alert	An alert to the PoC User that the Media transmit time will end within the time specified by the Alert Margin.
Alert Margin	The amount of time between the moment when the Advanced Revocation Alert is notified the PoC User and the moment when the granted Media Burst for the PoC User is to be revoked.
Answer Mode	A PoC Client mode of operation for the terminating PoC Session invitation handling.
Answer Mode Indication	A PoC Service Setting indicating the current Answer Mode of the PoC Client.
Audio	General communication of sound with the exception of PoC Speech.
Chat PoC Group	A persistent PoC Group in which a PoC User individually joins to have a PoC Session with other joined PoC Users, i.e., the establishment of a PoC Session to a Chat PoC Group does not result in other PoC Users being invited. NOTE: A Chat PoC Group is a persistent PoC Group where the <invite-members> element is set to "false" as specified in the [OMA PoC V2.1 Document Mgmt] "PoC Group".
Chat PoC Group Session	A PoC Session established to a Chat PoC Group.
Contact List	A list available to the PoC User that contains the PoC Addresses and/or PoC Group Identities.
Continuous Media	Media with an inherent notion of time (e.g., PoC Speech, Audio, and Video).
Control Plane	The specification of the signalling between PoC Client and PoC Server, between PoC Box and PoC Server and between PoC Servers for the Push to talk over Cellular (PoC) service.
Controlling PoC Function	A function implemented in a PoC Server, providing centralized PoC Session handling, which includes Media distribution, Talk Burst Control, Media Burst Control, policy enforcement for participation in the PoC Group Sessions, and the Participant Information.
Crisis Event	An unplanned event having potentially significant impact on the safety or well-being of the community (local, regional or national). Examples of a Crisis Event include natural or man-made disasters.
Crisis PoC Session	A PoC Session using PoC Session Control for Crisis Handling.
Deferred Messaging	Messaging where messages are stored in a repository for later delivery.

Discrete Media	Media that itself does not contain an element of time (e.g. images, text).
Dispatch PoC Group	A Pre-arranged PoC Group in which one member is assigned the role of PoC Dispatcher and the other member(s) are assigned the role of PoC Fleet Members.
Dispatch PoC Session	The PoC Session of a Dispatch PoC Group, or a subset of the Dispatch PoC Group, in which the 1-many-1 communication method is used.
Distinguished Participant	A Participant in a 1-many-1 Session that sends Media to all Ordinary Participants, and that receives Media from any Ordinary Participant. NOTE: The <is-key-participant> is set to "true" as specified in [OMA PoC V2.1 Document Mgmt] to indicate who is the Distinguished Participant.
Dynamic PoC Group	A Pre-arranged, restricted Chat or Ad-hoc PoC Group whose Participants are restricted based on the evaluation of a set of rules.
External Media Content Server	A non PoC Entity that conveys media content to Participants of a PoC Session.
External Media Content Server Retrieval	A PoC feature enabling PoC User to request the PoC Service Infrastructure to convey media content from an External Media Content Server to Participants of a PoC Session.
External Media Content Server Retrieval Function	A functional Entity which supports conveying Media from External Media Content Server to Participants of a PoC Session.
External P2T Networks	Private or public circuit switched or packet switched network that provide push-to-talk services similar to PoC services.
Full Duplex Call Follow-on Proceed	A feature which allows PoC Session Participant to request the other PoC Session Participants to set up another independent full duplex voice call (either a circuit switched voice call or voice-over-IP call, subject to Service Provider Policy and configuration). The full duplex voice call set up is out of the scope of this specification.
Group	A predefined set of Users together with its policies and attributes. A Group is identified by a SIP URI.
Group Advertisement	A feature that provides the capability to inform other PoC Users of the existence of a PoC Group.
Home PoC Network	A network comprising of a Home PoC Server and SIP/IP Core operated by the PoC User's PoC service provider. The Home PoC Network is the same as the Home Network defined in 3GPP/3GPP2 IMS specifications.
Home PoC Server	The PoC Server of the PoC Service Provider that provides PoC service to the PoC User.
Incoming Condition Based PoC Session Barring	A feature to block a particular incoming PoC Session request based on conditions defined for incoming PoC Sessions.
Incoming Instant Personal Alert Barring	A PoC Service Setting for the PoC Client that indicates the PoC User's desire for the PoC service to block all incoming Instant Personal Alerts.
Incoming Media Content Barring	A feature to block particular Media Type(s) of media content included in incoming PoC Session and Group Advertisement requests.
Incoming Media Stream Barring	A feature to block particular Media Type(s) of media streams in incoming PoC Session requests and during ongoing PoC Sessions at terminating PoC Client.
Incoming PoC Session Barring	A PoC Service Setting for the PoC Client that indicates the PoC User's desire for the PoC service to block all incoming PoC Session requests.
Instant Personal Alert	A feature in which a PoC User sends a SIP based instant message to a PoC User requesting a 1-1 PoC Session.
Law Enforcement Agency	An organization authorized by a lawful authorization based on a national law to request interception measures and to receive the results of telecommunications interceptions.
Law Enforcement Monitoring Facility	A law enforcement facility designated as the transmission destination for the results of a Lawful Interception.
Lawful Interception	The legal authorization, process, and associated technical capabilities and activities of Law Enforcement Agencies related to the timely interception of signalling and content of wire, oral, or electronic

	communications.
Limited Participant Information	A subset of Participant Information.
Limited Segment Media Buffer	A PoC Client buffer that contains a small initial segment of the total buffered Media that can be transmitted to the PoC Server before the called PoC Client answers in order to minimise the delay due to the Media transmit delay latency.
Local Granted Mode	A permission for a PoC User to start sending Media prior to receiving the MBCP Media Burst Grant message.
Location Service	A non PoC service with location capability, i.e. capable of providing location information for a device, e.g. for a mobile terminal.
Manual Answer Mode	A mode of operation in which the PoC Client requires the PoC User to manually accept the PoC Session invitation before the PoC Session is established.
Media	Forms of information that are exchanged between Participants. Media may come in different forms, which are referred to as Media Types.
Media Burst	Flow of Media from a PoC Client that has the permission to send Media to the receiving PoC Client(s).
Media Burst Control	Media Burst Control is a control mechanism that arbitrates requests from the PoC Clients, for the right to send Media and Multimedia.
Media Burst Control Protocol	Media Burst Control Protocol is a protocol for performing Media Burst Control, and is defined in [OMA PoC V2.1 UP].
Media Burst Control Schemes	Way of using Media Burst Control according to predefined rules and procedures.
Media Filtering	A procedure of the PoC Server performing the Participating PoC Function in order to determine the Media Burst retrieval priority in case of Simultaneous PoC Sessions.
Media Streaming Control	A feature allowing a PoC functional Entity to control streaming of Media of a controlled Media Stream sent by a different PoC functional Entity.
Media Time Compression	A PoC Client operation on Media data to be transmitted, which compresses the Media in time such that the compressed Media data will be played out in a shorter time duration than the original uncompressed Media data.
Media Type	Media Types share a characteristic of human perception. Media Types are either realtime or non-realtime, like: <ul style="list-style-type: none"> • PoC Speech • Audio (e.g. music) • Video • Discrete Media (e.g. still image, formatted and non-formatted text, file)
Media-floor Control	The mechanism to control separate Media streams.
Messaging Interworking Function	A function which supports converting stored PoC Session Control Data and PoC Session Data to CPM Enabler compliant messaging.
Moderated PoC Group	A PoC Group where an authorized Participant of the PoC Session acts as the Moderator of the PoC Session who has an ability to control the Media Burst Control Entity of the PoC Session.
Moderated PoC Session	A PoC Session established using a Moderated PoC Group where an authorized Participant of the PoC Session acts as the Moderator of the PoC Session who has an ability to control the Media Burst Control Entity of the PoC Session.
Moderated PoC Session Media Burst Control	The mechanism to support a Moderator controlling a Moderated PoC Session.
Moderator	An authorized Participant of a Moderated PoC Session who has an ability to control the Media Burst Control Entity of the PoC Session.
Multicast Access Network	An access network providing multicast/broadcast access to a PoC Client, e.g. MBMS, BCMCS, DVB-H, DVB-T, etc.

Multicast PoC	A feature that provides the capability to use multicast/broadcast access technology in PoC Sessions.
Multicast PoC Channel	A bearer to transport Media using the underlying Multicast Access Networks capability to distribute Media on a multicast/broadcast bearer, e.g. MBMS specified by 3GPP.
Multimedia	Multimedia is the simultaneous existence of multiple Media Types like <ul style="list-style-type: none"> • audiovisual • video plus subtitles <p>Multimedia from a single source that involves real-time Media Types are assumed to be synchronized.</p>
National Security	National security refers to the requirement to maintain the survival of the nation-state through the use of economic, military and political power and the exercise of diplomacy.
NW PoC Box	A PoC functional Entity in the PoC Network where PoC Session Data and PoC Session Control Data can be stored.
Offline Charging Entity	Network Entity that performs Offline Charging, as described in [OMA-DICT].
Online Charging Entity	Network Entity that performs Online Charging, as described in [OMA-DICT].
Ordinary Participant	A Participant in a 1-many-1 PoC Group Session that is only able to send and receive Media to and from the Distinguished Participant.
Outgoing Condition Based PoC Session Barring	A feature to block a particular outgoing PoC Session request based on conditions defined for outgoing PoC Sessions.
P2T Address	A P2T Address identifying a P2T User. The P2T Address can be used by PoC Users to communicate with P2T Users. The P2T Address used in a PoC Network points to the PoC Interworking Agent of the P2T User in the PoC Interworking service.
P2T User	A P2T User is a user of the P2T service provided by an External P2T Network.
Participant	A Participant is a PoC User in a PoC Session.
Participant Information	Information about the PoC Session and its Participants.
Participating PoC Function	A function implemented in a PoC Server, which provides PoC Session handling, which includes policy enforcement for incoming PoC Sessions and relays Talk Burst Control and Media 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	An address identifying a PoC User. The PoC Address can be used by one PoC User to request communication with other PoC Users. If SIP/IP Core is the 3GPP/3GPP2 IMS the PoC Address is a public user identity.
PoC Box	A PoC functional Entity where PoC Session Data and PoC Session Control Data can be stored. It can be a NW PoC Box or a UE PoC Box.
PoC Client	A functional Entity that resides on the User Equipment that supports the PoC service.
PoC Crisis Event Handling Entity	A functional Entity in the PoC Network authorizing PoC Users to initiate or join Crisis PoC Sessions. The PoC Crisis Event Handling Entity enforces the local policy for National Security, Public Safety and Private Safety applications within a country or a sub-division of a country. <p>NOTE: The PoC Crisis Event Handling Entity complements the emergency service.</p>
PoC Dispatcher	The Participant in a Dispatch PoC Session that sends Media to all PoC Fleet Members and that receives Media from any PoC Fleet Member. <p>NOTE: The PoC Dispatcher is an enhancement to the PoC 1 Distinguished Participant.</p>
PoC Fleet Member	A Participant in a Dispatch PoC Session that is only able to send Media to the PoC Dispatcher, and that likewise is only able to receive Media from the PoC Dispatcher. <p>NOTE: PoC Fleet Member is the same as Ordinary Participant in PoC 1.</p>
PoC Group	A Group supporting the PoC service. PoC User uses PoC Groups e.g. to establish PoC Group Sessions.

PoC Group Identity	A SIP URI identifying a Pre-arranged PoC Group or a Chat PoC Group. A PoC Group Identity is used by the PoC Client e.g. to establish PoC Group Sessions to the Pre-arranged PoC Groups and Chat PoC Groups.
PoC Group Session	A Pre-arranged PoC Group Session, Ad-hoc PoC Group Session or Chat PoC Group Session.
PoC Interworking Agent	Abstract Entity implemented in the PoC Interworking Function, acting as a PoC Client on behalf of a PoC Remote Access User or a P2T User.
PoC Interworking Function	Part of the PoC Interworking Service, it provides conversion between PoC Network based SIP signaling, Talk Burst Control and Media Burst Control Protocol, and Media packet transport, and External P2T Network based session signaling, floor control, and Media transport protocol.
PoC Interworking Service	A means to extend the PoC User experience beyond the OMA defined PoC service and PoC Network boundaries, accomplished by interworking with other networks and systems, while not PoC compliant, being able to provide a reasonably comparable capability, involving simplex Media based conferencing.
PoC Media Traffic Optimisation	A mechanism for reducing PoC Media traffic via the PoC-4 Reference Point.
PoC Remote Access	A method of providing a compliant PoC User access to a SIP/IP Core and PoC Network via an potentially non-SIP/IP based network
PoC Remote Access User	A user of the PoC service accessing the service potentially via a non IMS enabled SIP/IP based network, not necessarily using a PoC Client (e.g. a PoC User, with a valid subscription, accessing PoC services via a PSTN terminal).
PoC Server	A network element, which implements the 3GPP/3GPP2 IMS application level network functionality for the PoC service. A PoC Server can perform the role of the Controlling PoC Function or Participating PoC Function, or both at the same time.
PoC Service Setting	A set of parameters indicating the capability of the PoC Client and the willingness of the PoC User to support related PoC Client and PoC Server functionalities, e.g. Answer Mode Indication, Incoming PoC Session Barring, Incoming Instant Personal Alert Barring and Simultaneous PoC Sessions Support.
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 Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group Session, or Chat PoC Group Session.
PoC Session Control Data	Information about PoC Session Data e.g. time and date, PoC Session initiator.
PoC Session Control for Crisis Handling	A service providing the means to enforce high enough priority in the PoC Network to serve a PoC Session for end user groups with more mission critical requirements in applications such as Public Safety, Private Safety and National Security.
PoC Session Data	Media Bursts and Media Burst Control information exchanged during a PoC Session e.g. Video frames, an image or Talk Burst.
PoC Speech	Communication of speech as defined by PoC version 1.0.
PoC Subscriber	Is one whose service subscription includes the PoC service. A PoC Subscriber can be the same person as a PoC User. 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 User of the PoC service. A PoC User can be the same person as a PoC Subscriber. A PoC User uses the PoC features through the User Equipment.
Pre-arranged PoC Group	A persistent PoC Group. The establishment of a PoC Session to a Pre-arranged PoC Group results in the members being invited. NOTE: A Pre-arranged PoC Group is a persistent PoC Group, where the <invite-members> element is set to "true" as specified in the [OMA PoC V2.1 Document Mgmt]"PoC Group".
Pre-arranged PoC Group Identity	PoC Group Identity of a Pre-arranged PoC Group.
Pre-arranged PoC	A PoC Session established by a PoC User to a Pre-arranged PoC Group.

Group Session

Pre-established Session	The Pre-established Session is a SIP Session established between the PoC Client and the Home PoC Server containing at least one Media Stream bound to a Media-floor Control Entity. 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 PoC 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	A PoC Session that the PoC User selects in preference to other PoC Sessions. When the PoC User has Simultaneous PoC Sessions, the Primary PoC Session has a priority over Secondary PoC Sessions.
Private Safety	A private service providing security services aimed at protecting homes, workplaces and society including mobile patrols, access control, fire prevention, receptionist, monitoring and call-out services.
Public Safety	A public service that focuses primarily on law enforcement, fire fighting, emergency medical, and disaster recovery services for the citizens of a pre-defined political sub-division of a country.
Push To Talk Service (P2T)	Non OMA PoC "walkie-talkie" service.
QoE Profile	Set of parameters that establish, from a high level point of view, the end PoC User experience in a given PoC Session. The QoE Profile is part of the PoC User's subscription and can also be specified for PoC Groups. Each QoE Profile is associated with certain rules for underlying resource usage and potential prioritization procedures.
Remote PoC Network	Other PoC Network or inter working function to external P2T Network.
Request with Media Content	An invitation to a PoC Session or a Group Advertisement that includes embedded media e.g. Included Media Content, Referenced Media Content or Text Content.
RTP Media	Considered as an association that allows exchange of RTP Media streams and RTCP messages among a set of PoC functional Entities.
Secondary PoC Session	A PoC Session for which the PoC User receives Media when there is no Media present on the Primary PoC Session.
Sender Identification	The procedure by which the identity of the current Media sender is determined and made known to receivers on the PoC Session.
Service Provider Policy	Service Provider Policy refers to the overall policy conditions actually selected by a service provider(s) for commercial implementation of a PoC service. Service Provider Policy is established based on commercial considerations, which may concern, e.g. support/non-support of certain network or client capabilities or service features within a network. Service Provider Policy is applicable only to the network or subscribers over which the service provider has control.
Simultaneous Media Streams	A feature that provides the capability to render together multiple Media Streams of the same Media Type in a PoC Client in a PoC Session.
Simultaneous PoC Session	Functionality, where Home PoC Server discards Media for keeping conversation uninterrupted, in case a PoC User is a Participant in more than one PoC Session simultaneously using the same PoC Client.
SIP Session	A SIP dialog. From [RFC3261], 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 [RFC2543].
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.
Still-alive	A feature enabling a PoC Client to indicate to the PoC Server that the PoC Client is still in the PoC Session.
Talk Burst	A flow of PoC Speech from a PoC Client having the permission to send PoC Speech as specified in [OMA PoC V1.0 UP].
Talk Burst Control	A control mechanism that arbitrates requests from the PoC Clients for the right to send PoC Speech as specified in [OMA PoC V1.0 UP].
Talk Burst Control Protocol	A protocol for performing Talk Burst Control defined in [OMA PoC V1.0 UP].

Talker Identification	A procedure by which the current talker's identity is determined and made known to listeners on the PoC Session.
UE PoC Box	A functional Entity co-located with the PoC Client in the User Equipment where PoC Session Data and PoC Session Control Data can be stored.
User Equipment	A hardware device that supports a PoC Client e.g., a wireless phone.
User Plane	The User Plane includes the Media and Media control signaling (e.g., Talk Burst Control Protocol) between the PoC Client and PoC Server, between the PoC Box and the PoC Server as well as between PoC Servers.
Video	Communication of live-streamed pictures without any Audio component.

3.3 Abbreviations

For the purposes of the PoC specifications, the abbreviations given in [OMA-DICT] and the following abbreviations apply:

BCMCS	Broadcast Multicast Service
CBUS	Condition Based URIs Selection
CDR	Charging Data Record
CPM	Converged IP Messaging
DM	Device Management
EMCS	External Media Content Server
FLUTE	File Delivery over Unidirectional Transport NOTE: The base File Delivery over Unidirectional Transport is defined in [RFC3926]
GPRS	General Packet Radio Service
HTTP	Hypertext Transfer Protocol NOTE: The base Hypertext Transfer Protocol is defined in [RFC2616].
IM	Instant Messaging
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISC	IMS Service Control Interface
ISIM	IP Multimedia Services Identity Module
LI	Lawful Interception
MBCP	Media Burst Control Protocol
MBMS	Multimedia Broadcast/Multicast Service
MMS	Multimedia Messaging Service
MSRP	Message Session Relay Protocol NOTE: The base Message Session Relay Protocol is defined in [RFC4975].
NAT	Network Address Translators
NW	Network
OMA	Open Mobile Alliance
P2T	Push To Talk
PDN	Packet Data Network

PoC	Push to talk over Cellular
QoE	Quality of Experience
RRC	Radio Resource Control, see [3GPP TS 25.331]
RTCP	RTP Control Protocol NOTE: The base RTP Control Protocol is defined in [RFC3550].
RTP	Real-time Transport Protocol NOTE: The base Real-time Transport Protocol is defined in [RFC3550].
RTSP	Real Time Streaming Protocol NOTE: The Real Time Streaming Protocol is defined in [RFC2326].
R-UIM	Removable User Identity Module
SIP	Session Initiation Protocol NOTE: The base Session Initiation Protocol is defined in [RFC3261].
UE	User Equipment
UIM	User Identity Module
UP	User Plane
URI	Uniform Resource Identifier
USIM	User Services Identity Module
XCAP	XML Configuration Access Protocol NOTE: The base XML Configuration Access Protocol is defined in [RFC4825]
XDM	XML Document Management
XDMC	XDM Client
XDMS	XDM Server
XML	Extensible Mark-up Language

4. Introduction (Informative)

Push to talk over Cellular (PoC) is intended to provide rapid communications for business and consumer customers of mobile networks. PoC V2.1 will allow Audio (e.g. speech, music), Video (without Audio component), still image, text (formatted and non-formatted) and file 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 1-many PoC Group Session (voice transmission)" below.

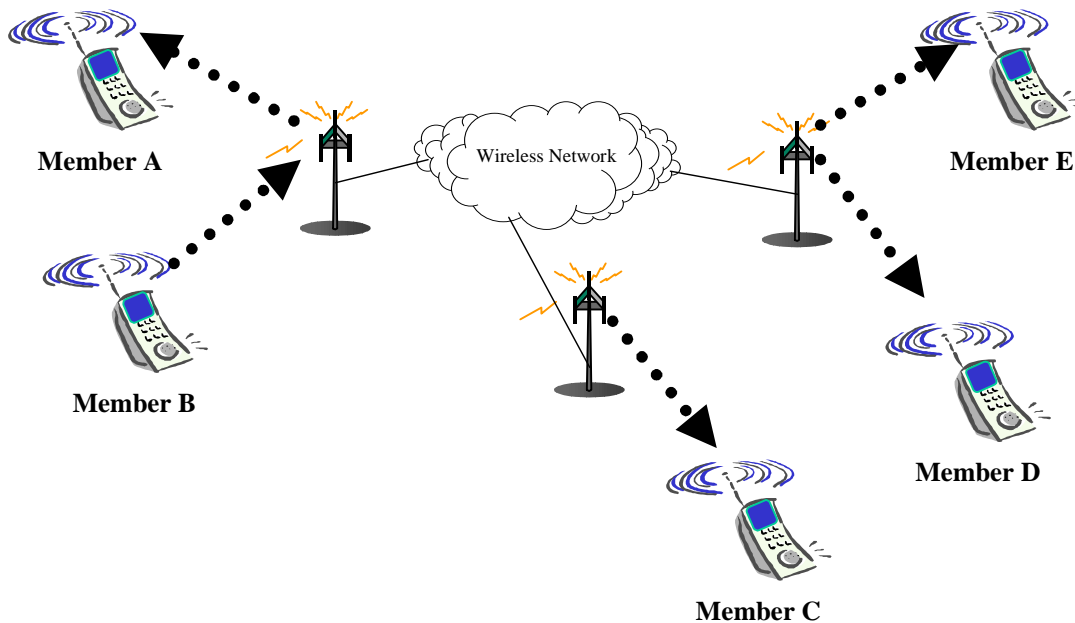


Figure 1: Example of a 1-many PoC Group Session (voice transmission)

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 session, 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.

4.1a Version 1.0

The PoC version 1.0 Enabler comprises the basic functionality for providing Push to talk over Cellular service. The PoC version 1.0 architecture addresses the requirements of PoC V1.0 Enabler Release in [OMA PoC V1.0 RD].

This subclause summarizes the architecture defined in PoC version 1.0.

4.1a.1 Functional Entities

The PoC version 1.0 architecture defines the following functional Entities, as defined in [OMA PoC V1.0 AD]:

- POC Client;
- PoC Server, i.e. the Controlling PoC Function and the Participating PoC Function; and,
- PoC XDMS.

4.1a.1.1 PoC Client

The PoC Client supports the following requirements, as defined in [OMA PoC V1.0 RD]:

- registration/de-registration to the PoC service;
- Pre-established Session;
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions, 1-to-many PoC Sessions and one-to-many-to-one PoC Sessions;
- multiple Group operation, i.e. Simultaneous PoC Sessions;
- Talk Burst Control procedures and Talk Burst Control Protocol negotiation;
- Talk Burst Control Protocols;
- Instant Personal Alert;
- PoC Service Settings;
- privacy for PoC User's PoC Address;
- Group Advertisement;
- PoC service provisioning;
- store and access to Group and User Access Policy information in PoC XDMS; and,
- access to Contact Lists in Shared XDMS.

4.1a.1.2 Controlling PoC Function

The Controlling PoC Function supports the following requirements, as defined in [OMA PoC V1.0 RD]:

- authorization of PoC Client;
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions and 1-to-many PoC Sessions and one-to-many-to-one PoC Sessions;
- multiple Group operation, i.e. Simultaneous PoC Sessions control;
- Talk Burst Control procedures and Talk Burst Control Protocol negotiation;
- Talk Burst Control Protocols;
- privacy for PoC User's PoC Address;
- Group Advertisement; and,
- access to Group information in PoC XDMS.

4.1a.1.3 Participating PoC Function

The Participating PoC Function supports the following requirements, as defined in [OMA PoC V1.0 RD]:

- authorization of PoC Client;
- Pre-established Session;
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions and 1-to-many PoC Sessions with PoC Speech;

- multiple Group operation, i.e. Simultaneous PoC Sessions;
- PoC Service Settings;
- Instant Personal Alert Barring;
- Incoming PoC Session Barring;
- Talk Burst Control procedures and Talk Burst Control Protocol negotiation;
- Talk Burst Control Protocols;
- privacy for PoC User's PoC Address;
- Group Advertisement; and,
- access to User Access Policy information in PoC XDMS for the purpose of access control.

4.1a.1.4 PoC XDMS

The PoC XDMS supports the following requirements, as defined in [OMA PoC V1.0 RD]:

- authorization of incoming requests;
- management of PoC Groups;
- management of User Access Policy; and,
- access to Contact Lists in the Shared XDMS.

4.1a.2 Reference Points

The PoC version 1.0 architecture defines the following Reference Points, as defined in [OMA PoC V1.0 AD]:

- POC-1, POC Client – SIP/IP Core;
- POC-2, SIP/IP Core – PoC Server;
- POC-3, PoC Client – PoC Server ;
- POC-4, PoC Server – Remote PoC Network;
- POC-5, PoC Server – Shared XDMS;
- POC-6, SIP/IP Core – PoC XDMS;
- POC-7, Aggregation Proxy – PoC XDMS;
- POC-8, PoC Server – PoC XDMS; and,
- IP-1, SIP/IP Core – Remote PoC Network.

4.1b Version 2.0

The PoC version 2.0 architecture extends [OMA PoC V1.0 AD] by adding functional Entities and Reference Points, and by modifying some existing PoC version 1.0 functional Entities. These additions and modifications address the requirements identified as Enabler Release PoC V2.0 in [OMA PoC V2.0 RD].

This subclause summarises the architecture modifications included in PoC version 2.0.

4.1b.1 New Functional Entities

The new functional Entities added in PoC version 2.0 are:

- UE PoC Box; and,
- NW PoC Box.

The PoC version 2.0 architecture also defines the following new external Entities which provide additional PoC services:

- PoC Interworking Function; and,
- PoC Interworking Agent.

4.1b.2 Removed Functional Entities

The PoC version 1.0 POC XDMS Functional Entity is removed in PoC version 2.0. The Shared XDMSs, as defined in XDM 2.0 [OMA XDM V2.1 AD], includes the functionality provided by the PoC version 1.0 POC XDMS. The related POC-5 Reference Point is also removed.

4.1b.3 New Reference Points

The Reference Points added in PoC version 2.0 are the following:

- POC-9, UE PoC Box – SIP/IP Core;
- POC-10, UE PoC Box – PoC Server;
- POC 11, NW PoC Box – SIP/IP Core;
- POC 12, NW PoC Box – PoC Server ;
- POC 13, PoC Server - Shared List XDMSs;
- LI-1, Functional Entities – Law Enforcement Monitoring Facility; and,
- PB-1, Aggregation Proxy – NW PoC Box.

4.1b.4 Modified Functional Entities

The functional Entities modified to include support for new PoC version 2.0 requirements are the PoC Client, the Controlling PoC Function, and the Participating PoC Function as summarized in the following subclauses:

4.1b.4.1 PoC Client

The PoC Client is modified to add support related to the following requirements:

- use of QoE Profiles;
- PoC Session initiation including negotiation of Media other than PoC Speech;
- Media Burst Control procedures and Media Burst Control Protocol negotiation;
- Media Burst Control Protocols;
- Media-floor Control procedures;
- PoC Box capability;
- Request with Media Content;
- PoC Remote Access;

- Full Duplex Call Follow-on Proceed;
- generate and send Media Bursts containing other Media than PoC Speech;
- receive and decode Media Bursts containing Media other than PoC Speech;
- PoC Session modification for adding or removing Media in a PoC Session;
- PoC Dispatcher functionality;
- invited parties identity information functionality;
- Advanced Revocation Alert;
- browser-based PoC Client invocation functionality;
- multiple PoC Group Sessions with multiple PoC Groups;
- performance enhancements such as Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, and Local Granted Mode;
- Media Burst Control Schemes;
- operator specified warning message; and,
- Discrete Media.

4.1b.4.2 Controlling PoC Function

The Controlling PoC Function is updated to add support related to the requirements listed below:

- assignation and application of a QoE Profile for each PoC Session;
- centralized Media distribution;
- centralized Media Burst Control functionality including Sender Identification;
- Media Burst Control Protocol and Media Burst Control Protocol negotiation;
- Media-floor Control procedures;
- PoC Group Sessions with multiple Groups;
- invited parties identity information functionality;
- Discrete Media;
- PoC Box handling;
- prioritization and preemption of PoC Sessions according to the QoE Profile associated to each PoC Session;
- Request with Media Content;
- Full Duplex Call Follow-on Proceed;
- Dispatch PoC Sessions;
- PoC interworking with External P2T Networks;
- PoC Remote Access;
- Advanced Revocation Alert;

- performance enhancements such as Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, PoC Media Traffic Optimisation and Local Granted Mode;
- Media Burst Control Schemes; and,
- operator specified warning message.

4.1b.4.3 Participating PoC Function

The Participating PoC Function is updated to add support related to the requirements listed below:

- supports application of a QoE Profile for each PoC Session;
- supports Media Burst Control Protocol negotiation;
- stores the current PoC Service Settings;
- invited parties identity information functionality;
- prioritization and preemption of PoC Sessions according to the QoE Profile associated to each PoC Session;
- Request with Media Content;
- PoC interworking with External P2T Networks;
- PoC Remote Access;
- Media Burst Control Protocol;
- Media Filtering of the Media streams in the case of Simultaneous PoC Sessions;
- PoC Media Traffic Optimisation;
- PoC Box handling; and,
- operator specified warning message.

4.1c Version 2.1

The PoC version 2.1 architecture extends [OMA PoC V2.0 AD] by adding functional Entities and Reference Points, and by modifying some existing PoC version 2.0 functional Entities. These additions and modifications address the requirements identified as Enabler Release PoC V2.1 in [OMA PoC V2.1 RD].

This subclause summarises the architecture modifications included in PoC version 2.1.

4.1c.1 New Functional Entities

The new functional Entities added in PoC version 2.1 are:

- PoC Crisis Event Handling Entity; and,
- External Media Content Server Retrieval Function.

4.1c.2 Removed Functional Entities

None.

4.1c.3 New Reference Points

The Reference Points added in PoC version 2.1 are the following:

- POC-14, PoC Crisis Event Handling Entity - SIP/IP Core;
- POC-15, PoC Crisis Event Handling Entity – PoC Server;
- POC-16, PoC Server – access network;
- POC-17, PoC Client – access network;
- POC-18. External Media Content Server Retrieval Function – PoC Server;
- POC-19, PoC Server – Search Proxy;
- POC-20, External Media Content Server Retrieval Function - SIP/IP Core;
- IP-2, External Media Content Server Retrieval Function - External Media Content Server;
- IP-3, PoC Server - External Media Content Server.

4.1c.4 Modified Functional Entities

The functional Entities modified to include support for new PoC version 2.1 requirements are the PoC Client, the Controlling PoC Function, and the Participating PoC Function as summarized in the following subclauses:

4.1c.4.1 PoC Client

The PoC Client is modified to add support related to the following requirements:

- Moderated PoC Sessions;
- Alert for unavailable PoC Users;
- Dynamic PoC Groups functionality;
- PoC Session Control for Crisis Handling;
- Limited Participant Information;
- sharing of media content from External Media Content Server;
- Multicast PoC;
- performance enhancements objectives;
- multiple PoC Clients with the same PoC Address;
- expanding duration of Media Burst transmitting; and,
- retrieve list of PoC Group Identities.

4.1c.4.2 Controlling PoC Function

The Controlling PoC Function is updated to add support related to the requirements listed below:

- Media Streaming Control;
- Moderated PoC Groups;
- Dynamic PoC Groups functionality;
- PoC Session Control for Crisis Handling;
- PoC Crisis Event handling;

- Limited Participant Information;
- performance enhancements objectives;
- sharing of media content from External Media Content Entity;
- expanding duration of Media Burst transmitting; and,
- search ongoing PoC Group Session.

4.1c.4.3 Participating PoC Function

The Participating PoC Function is updated to add support related to the requirements listed below:

- Alert for unavailable PoC Users;
- Media Streaming Control;
- Multicast PoC;
- Incoming Condition Based PoC Session Barring;
- Outgoing Condition Based PoC Session Barring;
- multiple PoC Clients with the same PoC Address;
- Incoming Media Content Barring; and,
- Incoming Media Stream Barring.

4.1 Void

This subclause is replaced by subclauses 4.1a "*Version 1.0*", 4.1b "*Version 2.0*" and 4.1c "*Version 2.1*".

4.2 Security Considerations

The security mechanism provides the protection to the PoC service environment. The following aspects of security are considered: SIP signalling security, User Plane security, XDM security, and interworking function security.

4.2.1 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 PoC 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.

4.2.2 User Plane security

The PoC service User Plane communication between the PoC Client and the PoC Server using a unicast bearer, 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.

The PoC service User Plane communication between the PoC Client and the PoC Server using a Multicast PoC Channel is protected by mechanisms defined in [3GPP TS 33.246].

4.2.3 XDM security

The XDM security is specified in [OMA XDM V2.1 AD] "*Security Considerations*".

4.2.4 PoC Interworking Function security

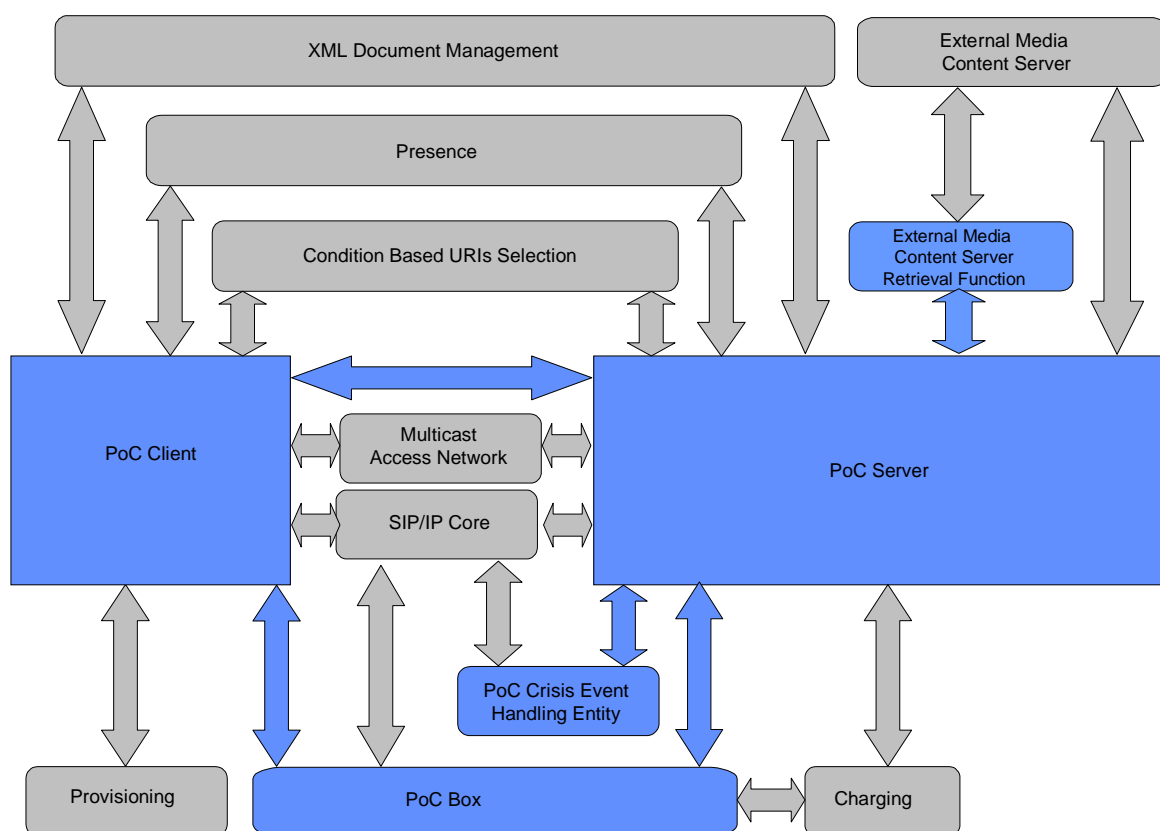
The PoC network SHALL apply the same security measures to the signalling received from non-PoC networks as it would to the signalling received from PoC networks. Subclause 4.2.1 "*SIP signalling security*", 4.2.2 "*User Plane security*" and 4.2.3 "*XDM security*" apply.

5. Architecture

5.1a Architecture Model

The PoC architecture is an evolution of the architecture described in [OMA PoC V2.0 AD].

The PoC functional Entities (PoC Client, PoC Box, PoC Crisis Event Handling Entity, External Media Content Server Retrieval Function and PoC Server), that provide the PoC service, use and interact with certain external Entities providing services to the PoC service as shown in the Figure 2 "Interaction of PoC functional Entities with external Entities."



NOTE 1: Interactions between external Entities are not shown in the figure.

NOTE 2: Architecture for PoC specific charging is described in [OMA PoC V2.1 SD] "Charging architecture".

Figure 2: Interaction of PoC functional Entities with external Entities.

The XML Document Management Enabler is described in [OMA XDM V2.1 AD]. The XDM functional Entities used by this version of the PoC Enabler are the Aggregation Proxy (as specified in subclause 6.2.3 "Aggregation Proxy"), Search Proxy (as specified in subclause 6.2.17 "Search Proxy"), Shared List XDMS (as specified in subclause 6.2.2.1 "Shared List XML Document Management Server (XDMS)"), Shared Group XDMS (as specified in subclause 6.2.2.2 "Shared Group XML Document Management Server (XDMS)") and Shared Policy XDMS (as specified in subclause 6.2.2.3 "Shared Policy XML Document Management Server (XDMS)").

Document Management Server (XDMS)). The PoC Server interacts with any of the Shared XDM Servers over the POC-2, XDM-2, and POC-13 Reference Points.

The Presence Enabler is described in [OMA Presence V2.0 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 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 [OMA PoC V2.1 SD] "*Presence*".

The Condition Based URIs Selection Enabler is described in [OMA CBUS V1.0 AD]. The CBUS functional Entities are the CBUS Server (as specified in subclause 6.2.15 "*Condition Based URIs Selection Server*") and CBUS Client (as specified in subclause 6.2.16 "*Condition Based URIs Selection Client*"). The PoC Server can assume the role of CBUS Client and interacts with the CBUS Server over the POC-2 and CBUS-2 Reference Points.

The SIP/IP Core includes a number of SIP proxies and SIP registrars. When SIP/IP Core is based on the 3GPP/3GPP2 IMS, the SIP/IP Core architecture is specified in [3GPP TS 23.228] or [3GPP2 X.S0013.2].

The Multicast Access Network contains the technology required to broadcast Continuous Media and Discrete Media in a PoC Session. The Multicast Access Network used for the Multicast PoC Channel can be based on a technology different than the access network used for PoC Sessions without Multicast PoC Channel. When the Multicast Access Network is based on the 3GPP MBMS/3GPP2 BCMCS the Multicast Access Network architecture is specified in [3GPP TS 23.246] or [3GPP2 A.S0019-A_v1.0].

The EMCS is a non PoC Entity that contains discrete or continuous media that the PoC Server may fetch and distribute over a PoC Session to PoC Clients.

Discovery/Registry, Authentication/Authorization and Security are provided in cooperation with SIP/IP Core. Registry functionality is described in [OMA PoC V2.1 SD] "*Registration*".

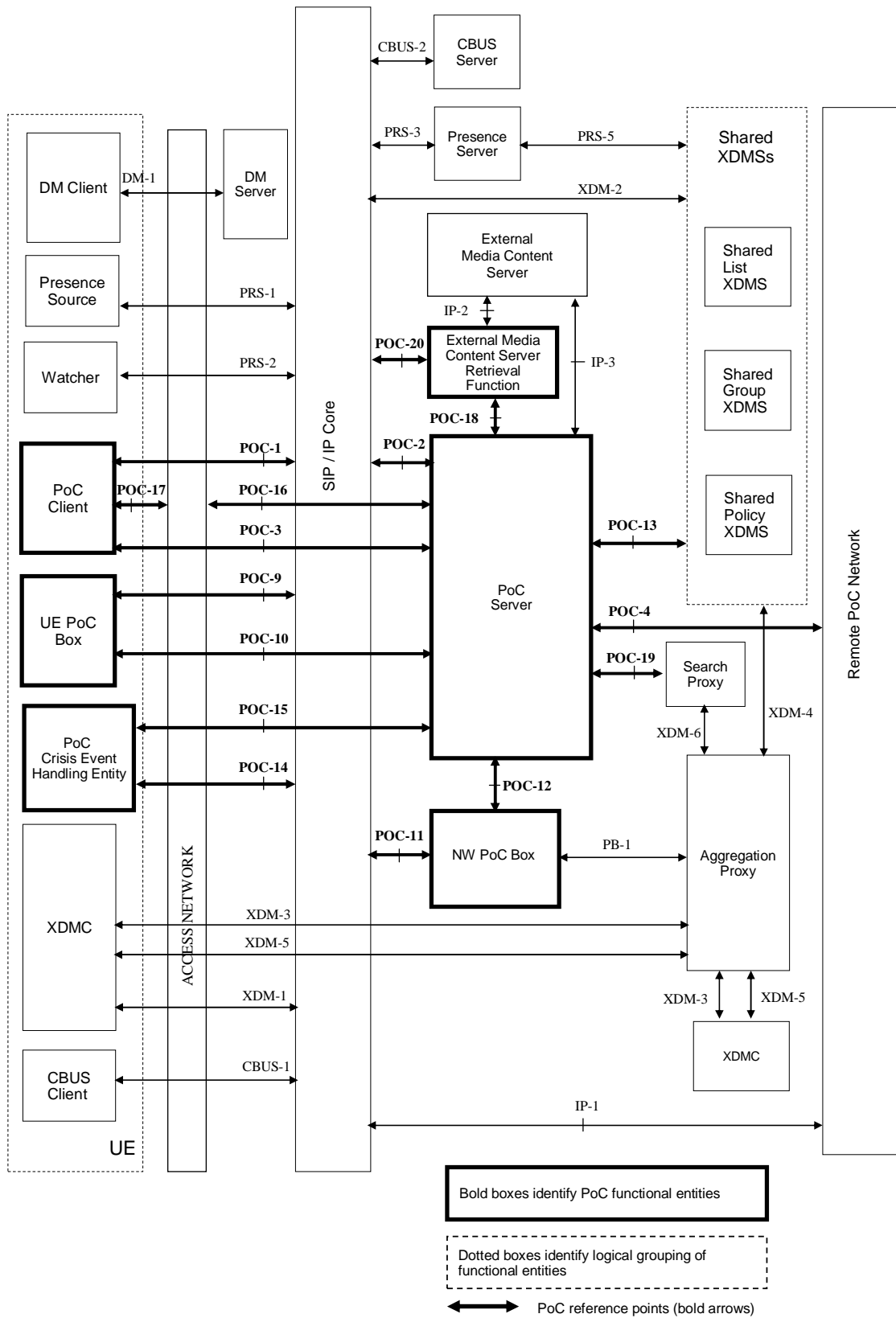
NOTE: Discovery is SIP/IP Core specific and out of scope of this specification.

The Authentication/Authorization is described in the subclause 4.2 "*Security Considerations*". Security is described in the subclause 4.2 "*Security Considerations*".

Charging functionality is described in [OMA PoC V2.1 SD] "*Charging*".

Provisioning functionality is described in [OMA PoC V2.1 SD] "*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 1: Shared XDMSs is a logical entity to map similar Shared XDM Servers together for simplification as specified in [OMA XDM V2.1 AD].

NOTE 2: There are other Reference Points described in clause 7 "*Description of the reference points*" in addition to those shown in the figure.

Figure 3: PoC architecture

5.1 Dependencies

Certain protocol(s) is/are used for each Reference Point in PoC 2.1 architecture and protocols for some Reference Points are described in other Enablers as shown in the Table 1 "*Reference Points and associated protocols*".

ReferencePoint	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, Talk Burst Control and Media Burst Control between PoC Server and PoC Client using a unicast bearer or a multicast bearer.	RTP RTCP MSRP RTSP FLUTE The Continuous Media transport utilizes RTP protocol. Talk Burst Control Protocol and Media Burst Control Protocol utilize RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD] for delivery over a unicast bearer or the FLUTE protocol for delivery over a multicast bearer. The Media Streaming Control utilizes RTSP protocol. HTTP is used for file repair of Discrete Media delivered over the multicast bearer.
POC-4	Media, Talk Burst Control and Media Burst Control between networks	RTP RTCP MSRP RTSP The Continuous Media transport utilizes RTP protocol. Talk Burst Control Protocol and Media Burst Control Protocol utilize RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD]. The Media Streaming Control utilizes RTSP protocol.
POC-9	UE PoC Box to SIP/IP Core	SIP
POC-10	Media, Media Burst Control and Talk Burst Control between PoC Server and UE PoC Box	RTP RTCP MSRP The Continuous Media transport utilizes RTP protocol. Talk Burst Control Protocol and Media Burst Control Protocol utilize RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD].
POC-11	NW PoC Box to SIP/IP Core	SIP
POC-12	Media, Media Burst Control and Talk Burst	RTP

ReferencePoint	Usage	Protocol
	Control between PoC Server and NW PoC Box	RTCP MSRP The Continuous Media transport utilizes RTP protocol. Talk Burst Control Protocol and Media Burst Control Protocol utilize RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD].
POC-13	PoC Server to Shared XDMSs (i.e., Shared List XDMS, Shared Group XDMS and Shared Policy XDMS)	XCAP
POC-14	PoC Crisis Event Handling Entity to SIP/IP Core	SIP
POC-15	Media, Talk Burst Control and Media Burst Control between PoC Crisis Event Handling Entity and PoC Server	RTP RTCP MSRP The media transport utilizes RTP protocol. Talk Burst Control protocol and Media Burst Control protocol utilize RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD].
POC-16	Signalling to start the multicast/broadcast service in the access network	DIAMETER as specified in [3GPP TS 29.061] is used in the case of MBMS.
POC-17	Signalling to connect to the multicast/broadcast service in the access network	RRC as specified in [3GPP TS 25.331] is used in the case of MBMS.
POC-18	Media, Talk Burst Control and Media Burst Control between the External Media Content Server Retrieval Function and the PoC Server	RTP RTCP MSRP RTSP The Continuous Media transport utilizes RTP protocol. Talk Burst Control Protocol and Media Burst Control Protocol utilizes RTCP APP message protocol. The Discrete Media transport utilizes the MSRP protocol as defined in [OMA IM AD]. The Media Streaming Control utilizes RTSP protocol.
POC-19	Signalling for searching ongoing PoC Sessions	XQuery, see [OMA XDM V2.1 AD]
POC-20	SIP/IP Core to External Media Content Server Retrieval Function SIP session signalling	SIP
XDM-1	XDMC to SIP/IP Core	See [OMA XDM V2.1 AD]
XDM-2	Shared Group XDMS to SIP/IP Core, Shared List XDMS to SIP/IP Core and Shared Policy XDMS to SIP/IP Core	See [OMA XDM V2.1 AD]
XDM-3	XDMC to Aggregation Proxy	See [OMA XDM V2.1 AD]
XDM-4	Aggregation Proxy to the Shared Group XDMS, Aggregation Proxy to Shared List XDMS, Aggregation Proxy to Shared Policy XDMS	See [OMA XDM V2.1 AD]
XDM-5	XDMC to Aggregation Proxy	See [OMA XDM V2.1 AD]
XDM-6	Aggregation Proxy to Search Proxy	See [OMA XDM V2.1 AD]
PRS-1	Presence Source to SIP/IP Core	See [OMA Presence V2.0 AD]
PRS-2	Watcher to SIP/IP Core	See [OMA Presence V2.0 AD]

ReferencePoint	Usage	Protocol
PRS-3	SIP/IP Core to Presence Server	See [OMA Presence V2.0 AD]
PRS-5	Shared Group XDMS to Presence Server, Shared List XDMS to Presence Server and Shared Policy XDMS to Presence Server	See [OMA Presence V2.0 AD]
IP-1	Session signalling between networks	SIP
IP-2	Media retrieval from EMCS to External Media Content Server Retrieval Function	The protocol used over this Reference Point is out of scope of PoC.
IP-3	Media retrieval from EMCS to PoC Server	The protocol used over this Reference Point is out of scope of PoC.
DM-1	DM Client to DM Server	See [OMA-DM]
PB-1	Aggregation Proxy to the NW PoC Box	XCAP
CBUS-1	CBUS Client to SIP/IP/Core	See [OMA CBUS V1.0 AD]
CBUS-2	SIP/IP Core to CBUS Server	See [OMA CBUS V1.0 AD]

Table 1: Reference Points and associated protocols

NOTE: The Reference points POC-5, POC-6, POC-7 and POC-8 are not used in the PoC 2.1 architecture, see clause 7 "*Description of the reference points*".

The access network used by the PoC architecture includes nodes required to gain IP connectivity.

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

5.2 Backward Compatibility

This subclause covers the general signaling principles to achieve backward compatibility. The feature specific backward compatibility is covered in the corresponding subclauses of [OMA PoC V2.1 SD] "*System Concepts*".

Backward compatibility means that one functional Entity compliant with the later version of the PoC Enabler Release is able to use the functionalities of other functional Entities compliant with the earlier version of the PoC Enabler Release and offer the functionality specified in the earlier version of the PoC Enabler Release.

The PoC Server SHALL support the backward compatibility with PoC Clients that are compliant with earlier versions of a PoC Enabler Release.

The PoC Client SHALL support the backward compatibility with PoC Servers that are compliant with earlier versions of a PoC Enabler Release.

The XDM Client accessing PoC documents SHALL support the backward compatibility with PoC XDMS from version 1.0 of the PoC Enabler Release.

The PoC Server SHALL support the backward compatibility with PoC Servers that are compliant with earlier versions of a PoC Enabler Release.

The PoC Server SHALL support the backward compatibility with Presence Servers that are compliant with earlier versions of a Presence Enabler Release in case presence is supported.

The backward compatibility towards XDM Enabler is described in [OMA XDM V2.1 AD].

5.3 Architectural Diagram

The architectural diagram of the PoC architecture is shown in Figure 3 "*PoC architecture*" of clause 5 "*Architecture*".

5.4 Functional Components and Interfaces/Reference Points definition

The functional components of the PoC architecture are defined in clause 6 "*Description of functional entities*".

The interfaces/Reference Points of the PoC architecture are defined in clause 7 "*Description of the reference points*".

5.5 Flows

The flows are described in [OMA PoC V2.1 SD] "*High level procedures (Informative)*".

6. Description of functional entities

6.1 PoC functional entities

6.1.1 PoC Client

The PoC Client resides on the User Equipment and is used to access the PoC service.

The PoC Client SHALL:

- 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 containing PoC Speech;
- receive and decode Talk Bursts containing PoC Speech;
- support Talk Burst Control procedures and Talk Burst Control Protocol negotiation;
- support Talk Burst Control Protocols;
- incorporate PoC configuration data provided by the DM Client;
- support the PoC Service Settings;
- support User Plane adaptation procedures if initiated by the PoC Server;
- support receiving of Instant Personal Alert; and,
- support multiple PoC Clients with the same PoC Address.

The PoC Client SHOULD use QoE Profiles.

The PoC Client MAY:

- allow PoC Session initiation including negotiation of Media other than PoC Speech;
- support sending of Instant Personal Alert;
- provide Group Advertisement;
- support Media Burst Control procedures and Media Burst Control Protocol negotiation;
- support Media Burst Control Protocols;
- support Talk Burst request and Media Burst request queuing that MAY be based on priority or timestamp or both;
- send quality feedback reports after end of Media Burst or after end of Talk Burst;
- support for Pre-established Sessions;
- support Simultaneous PoC Sessions;
- support prioritization and pre-emption of PoC Sessions, according to the applicable QoE Profile;
- support Session on-hold procedures;
- request privacy for PoC User's PoC Address;

- support of Media-floor Control procedures;
- support PoC Box capability;
- support Request with Media Content;
- support PoC Remote Access;
- support Full Duplex Call Follow-on Proceed;
- generate and send Media Bursts containing other Media than PoC Speech;
- receive and decode Media Bursts containing Media other than PoC Speech;

NOTE: A Media Burst can be generated from content received in realtime or from stored content and the content from received Media Bursts can be rendered to the PoC User in realtime or stored for rendering later.

- support PoC Session modification for adding or removing Media in a PoC Session;
- support the PoC Dispatcher functionality;
- support invited parties identity information functionality;
- support the Advanced Revocation Alert;
- support the browser-based PoC Client invocation functionality;
- support obtaining Participant Information;
- support multiple PoC Group Sessions with Multiple PoC Groups;
- support performance enhancements such as Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, Local Granted Mode and Still-alive;
- support Media Burst Control Schemes;
- support operator specified warning message;
- support Discrete Media;
- support Moderated PoC Session Media Burst Control procedures;
- support Alert for Unavailable PoC Users;
- support Dynamic PoC Groups functionality;
- support PoC Session Control for Crisis Handling;
- support obtaining Limited Participant Information;
- support initiation of sharing of media content from External Media Content Server;
- support Media Streaming Control;
- support Multicast PoC;
- support handling of Simultaneous Media Streams; and,
- support expanding duration of Media Burst transmitting.

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. URI lists used as e.g. Contact Lists in the Shared List XDMS). Management features include operations such as create, modify, retrieve, and delete.

The XDMC MAY be implemented in a UE or fixed terminal or a PoC Server.

The XDMC SHALL:

- manage XML documents.

The XDMC MAY:

- subscribe to changes made to XML documents stored in the network, such that it will receive notifications when those documents change; and;
- support configuration of various documents e.g. criteria for PoC Box invocation, conditions for Dynamic PoC Groups, etc.

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 or Participating PoC Function or both. 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.

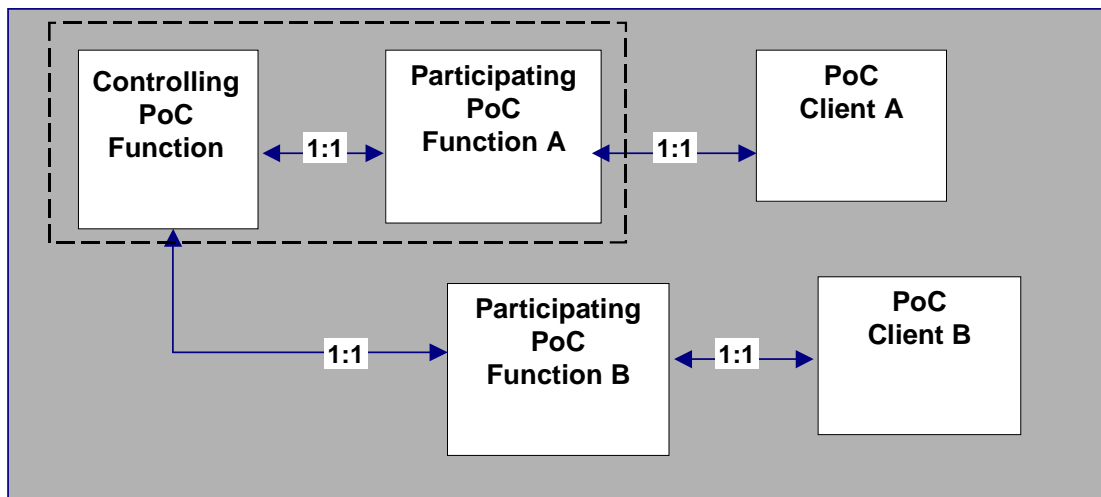


Figure 4: Relationship between Controlling PoC Function, Participating PoC Functions and the PoC Clients

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 PoC User SHALL be capable of performing the Controlling PoC Function; in addition, the PoC Server MAY instead select another PoC Server to perform the Controlling PoC Function in accordance with Service Provider Policies.

In case of the Chat PoC Group and Pre-arranged PoC Group Session the PoC Server hosting the PoC Group SHALL be capable of performing the Controlling PoC Function; in addition, the PoC Server MAY instead select another PoC Server to perform the Controlling PoC Function in accordance with Service Provider Policies, e.g.:

- PoC Servers with a lower traffic load can be selected as the PoC Server performing the Controlling PoC Function.
- A PoC Server that serves the greatest number of PoC Users of a PoC Group can be selected as the PoC Server performing the Controlling PoC Function.

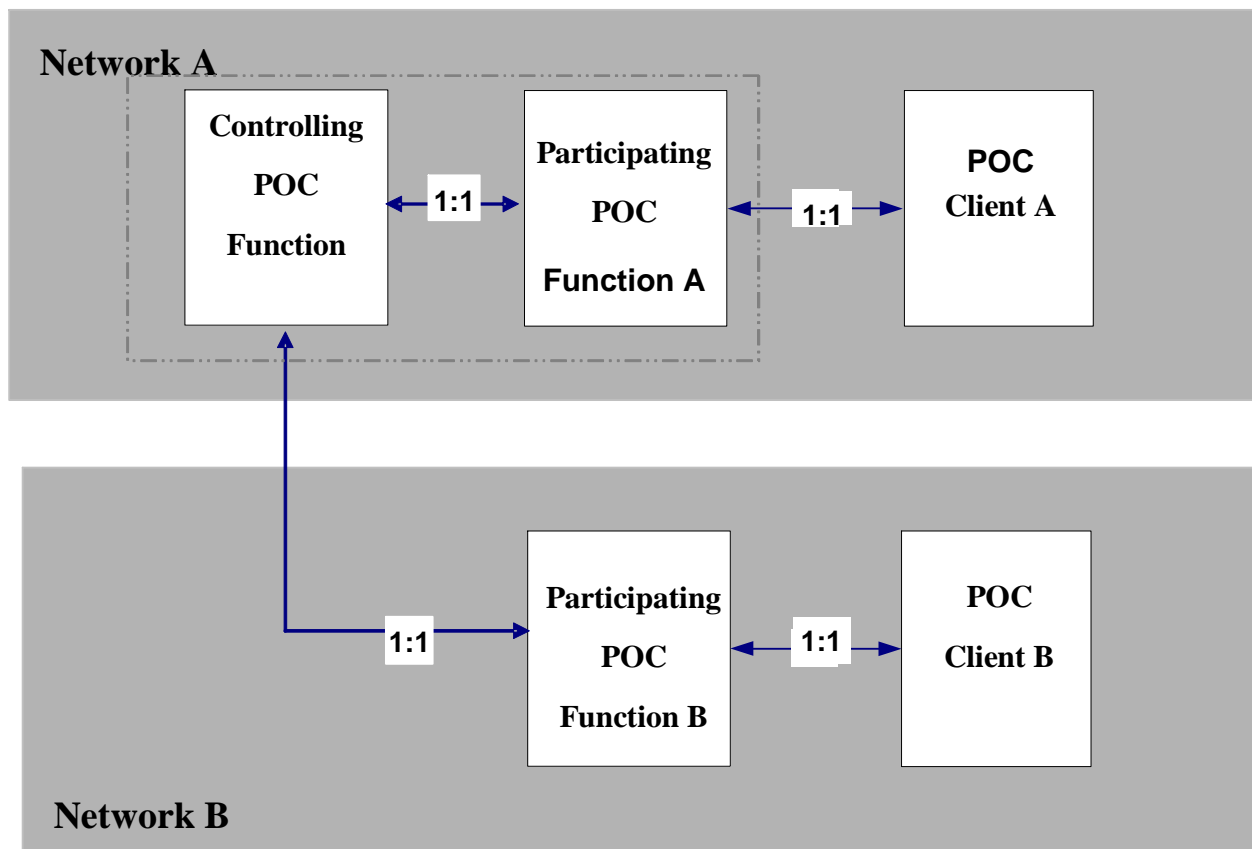


Figure 5: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for 1-1 PoC Session

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 PoC Session*" 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, Talk Burst Control and Media Burst Control communication paths in one PoC Session, where N is number of Participants in the PoC Session. The PoC Server performing the Controlling PoC 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 Function for the PoC Client.

The PoC Server performing the Controlling PoC Function will normally also route Media and Media-related signalling such as Media 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.

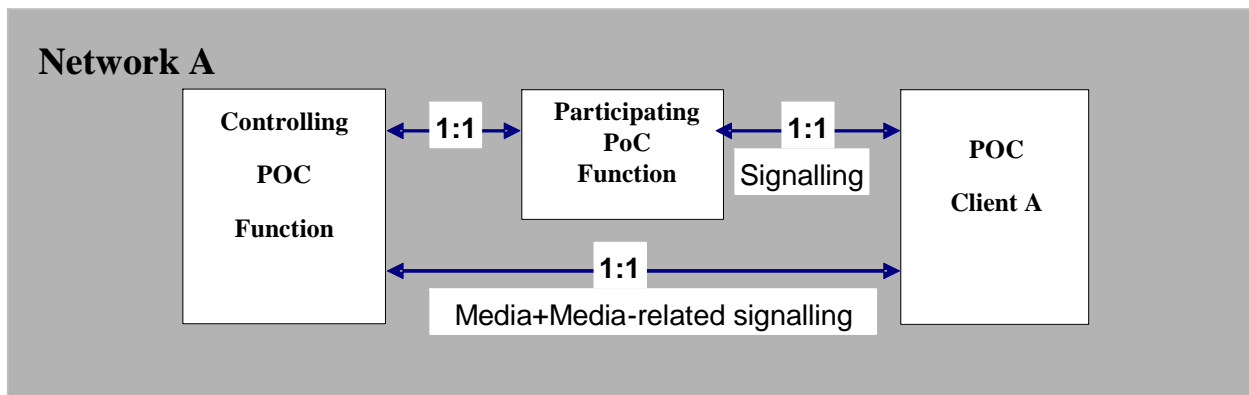


Figure 6: Direct Media flow between Controlling PoC Function and PoC Client

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 environments for a PoC Group Session.

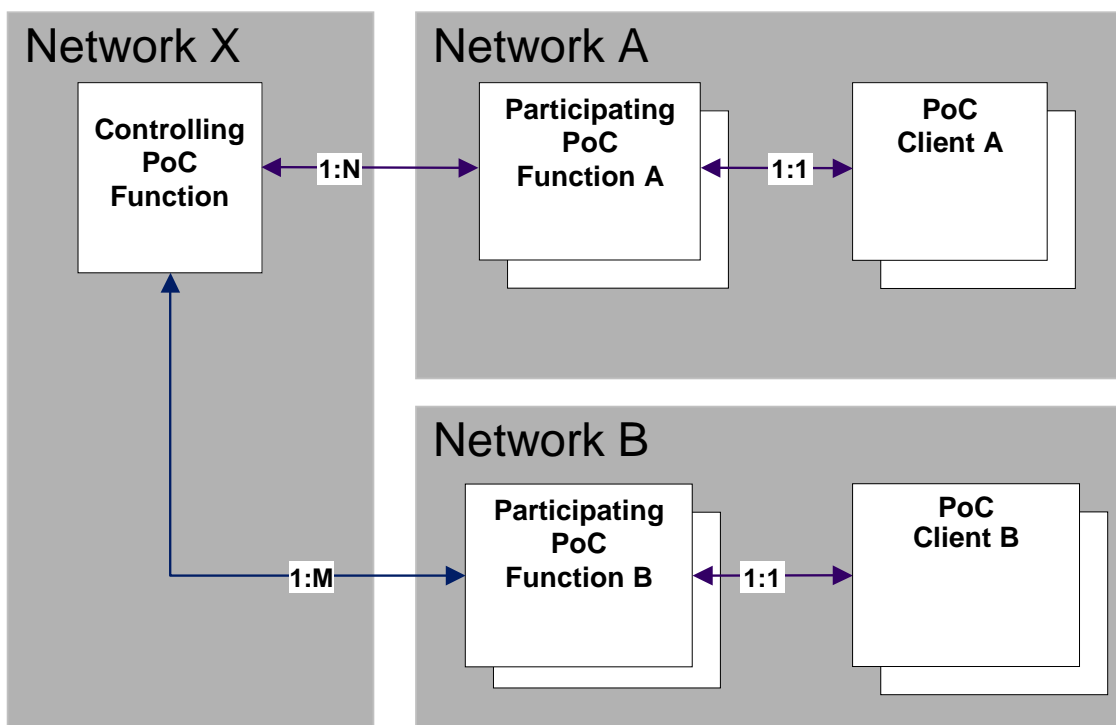


Figure 7: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for the PoC Group Session

NOTE: In Figure 7 "N" indicates the number of Participants in network A, and "M" indicates the number of Participants in network B.

In case a PoC network interworks with an External P2T Network, any of the networks (network A, network B or network X) in the Figure 7 "Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for the PoC Group Session" MAY be replaced by an External P2T Network. An External P2T Network MAY act as originating or terminating Participating PoC Function or as a Controlling PoC Function. Figure 8 "Relationship between the Controlling PoC Function,

"Participating PoC Function and an External P2T Network" describes the case where network B is replaced by an External P2T Network.

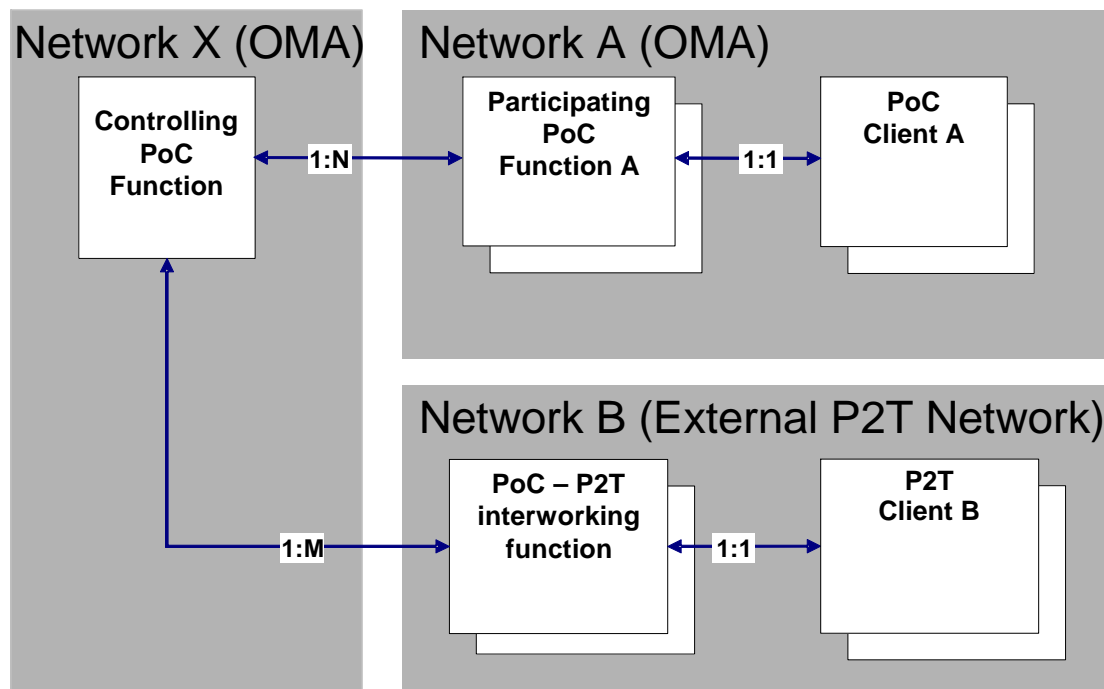


Figure 8: Relationship between the Controlling PoC Function, Participating PoC Function and an External P2T Network

6.1.3.1 Controlling PoC Function

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

- Provides centralized PoC Session handling.
- Supports assignation and application of a QoE Profile for each PoC Session.
- Provides the centralized Media distribution.
- Provides the centralized Talk Burst Control functionality including Talker Identification.
- Provides the centralized Media Burst Control functionality including Sender Identification.
- Supports Talk Burst Control Protocol and Talk Burst Control Protocol negotiation.
- Supports Media Burst Control Protocol and Media Burst Control Protocol negotiation.
- Provides SIP Session handling, such as SIP Session origination, release, etc.
- Provides policy enforcement for participation in PoC Group Sessions.
- Provides the Participant Information.
- Provides for privacy of the PoC Addresses of Participants.
- Collects and provides centralized Media quality feedback information.
- Provides centralized charging reports.

- Supports of Media-floor Control procedures.
- Supports PoC Group Sessions with multiple Groups.
- Supports invited parties identity information functionality.
- Supports Discrete Media.
- Relays Media Streaming Control messages between the PoC Server performing the Participating PoC Function and the External Media Content Server Retrieval Function, when an External Media Content Server Retrieval Function is utilized.
- Fetches content from the External Media Content Server directly, when an External Media Content Server Retrieval Function is not utilized.
- Act as a Media Streaming Control protocol peer with each PoC Client that has negotiated media streaming control, when an External Media Content Server Retrieval Function is not utilized

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

- Supports Talk Burst request and Media Burst request queuing that may be based on priority or timestamp or both.
- Provides transcoding between different codecs.
- Supports PoC Box handling.
- Prioritization and pre-emption of PoC Sessions according to the QoE Profile associated to each PoC Session.
- Supports Request with Media Content, including support for adding/changing media content to a request.
- Supports Full Duplex Call Follow-on Proceed.
- Supports Dispatch PoC Sessions.
- Supports PoC interworking with External P2T Networks.
- Supports PoC Remote Access.
- Supports Advanced Revocation Alert.
- Supports PoC Media Traffic Optimisation.
- Supports Media Burst Control Schemes.
- Supports the initiation of the User Plane adaptation.
- Support operator specified warning message.
- Supports performance enhancements such as Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, Local Granted Mode, and PoC Media Traffic Optimisation.
- Supports Moderated PoC Session Media Burst Control procedures.
- Supports Dynamic PoC Groups functionality.
- Supports PoC Session Control for Crisis Handling.
- Support providing Limited Participant Information.
- Support handling of Simultaneous Media Streams.
- Supports expanding duration of Media Burst transmitting.

- Supports search ongoing PoC Group Session.

6.1.3.2 Participating PoC Function

When the PoC Server performs the Participating PoC Function the PoC Server SHALL:

- provide PoC Session handling;
- support application of a QoE Profile for each PoC Session;
- provide SIP Session handling, such as SIP Session origination, release, etc, on behalf of the represented PoC Client;
- provide policy enforcement for incoming PoC Session (e.g. Access Control, Incoming PoC Session Barring, availability status, etc);
- provide the Participant charging reports;
- support Talk Burst Control Protocol negotiation;
- support Media Burst Control Protocol negotiation;
- store the current PoC Service Settings;
- provide for privacy of the PoC Address of the inviting PoC User on the PoC Session setup in the terminating PoC network;
- support invited parties identity information functionality;
- support handling of multiple PoC Addresses on one PoC Client;
- identify an EMCS Retrieval Function, and signal the identity of the EMCS Retrieval Function to the PoC Server performing the Controlling PoC Function, when an EMCS Retrieval Function is being utilized, and if the PoC Server performing the Participating PoC Function is configured to identify an EMCS Retrieval Function"; and,
- support multiple PoC Clients with the same PoC Addresses.

When the PoC Server performs the Participating PoC Function the PoC Server SHOULD:

- support Incoming Condition Based PoC Session Barring;
- support Outgoing Condition Based PoC Session Barring;
- support Incoming Media Content Barring; and,
- support Incoming Media Stream Barring.

When the PoC Server performs the Participating PoC Function the PoC Server MAY:

- prioritize and pre-empt PoC Sessions according to the QoE Profile associated to each PoC Session;
- support Request with Media Content, including support for adding/changing media content to a request;
- support PoC interworking with External P2T Networks;
- support PoC Remote Access;
- support the initiation of the User Plane adaptation;
- support PoC Box handling;
- support operator specified warning message;
- support Alert for unavailable PoC Users;

- support Multicast PoC; and,
- support PoC Session Control for Crisis Handling.

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

- relay Media packets between the PoC Client and the PoC Server performing the Controlling PoC Function;
- provide the Talk Burst Control message transfer function between PoC Client and PoC Server performing the Controlling PoC Function;
- support Talk Burst Control Protocol and Media Burst Control Protocol;
- provide the Media Burst Control message transfer function between PoC Client and PoC Server performing the Controlling PoC Function;
- collect and provide Media quality feedback information; and,
- relay Media Streaming Control messages between the PoC Client and the PoC Server performing the Controlling PoC Function.

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

- provide Media Filtering of the Media streams in the case of Simultaneous PoC Sessions;
- provide transcoding between different codecs;
- Prioritization of the Media according to the QoE Profile associated to each PoC Session; and,
- provide PoC Media Traffic Optimisation functionality.

In a PoC Session there is one Participating PoC Function per PoC Client.

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

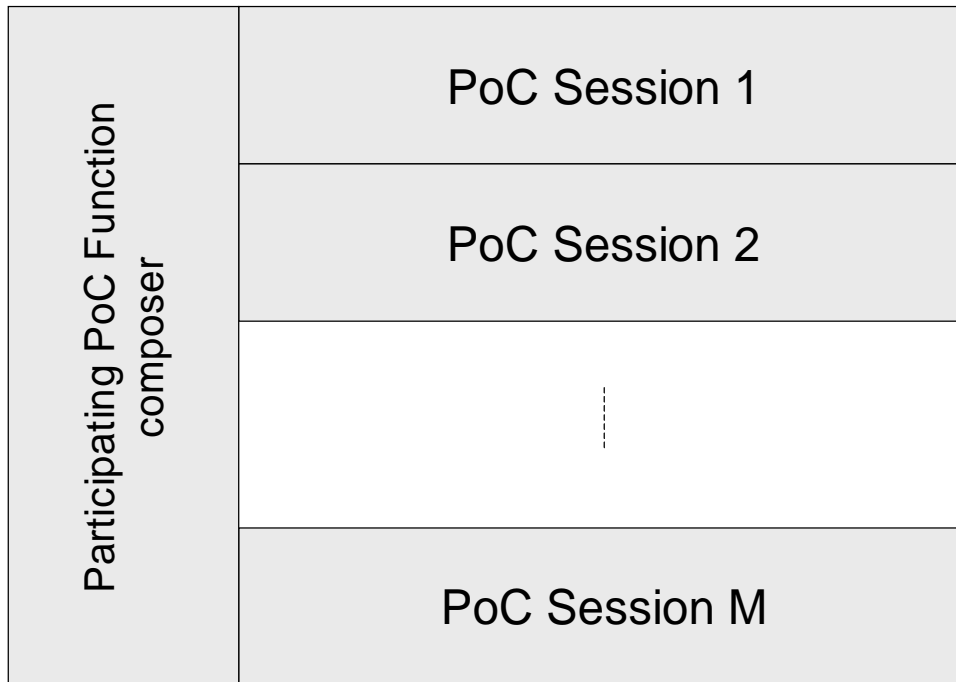


Figure 9: Participating PoC Function with Simultaneous PoC Session support (informative)

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

- policy enforcement for PoC Sessions (e.g. Access Control, availability status, ...);
- dynamic PoC Session status information for PoC Sessions the PoC User is currently involved in (e.g. listening, speaking, Talk Burst requesting); and,
- support for Simultaneous PoC Sessions (e.g. storage of multiple-session settings, priority status of all active PoC Sessions, Media flow control based on priorities (optionally)).

The Participating PoC Function MAY support Multicast PoC.

Figure 10 "*Multicast PoC Agent structure (informative)*" shows how the Participating PoC Function could be modeled to handle Multicast PoC.

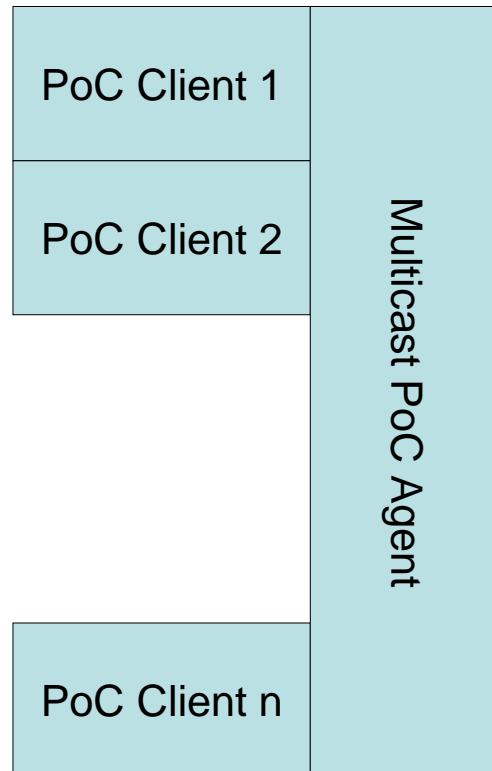


Figure 10: Multicast PoC Agent structure (informative)

When the Participating PoC Function supports Multicast PoC and when Participating PoC Function is modeled as shown in Figure 10 "*Multicast PoC Agent structure (informative)*" the Multicast PoC Agent:

- SHALL interact with the underlying Multicast PoC Network, i.e.:
 - SHALL start a Multicast PoC Channel in a PoC Session based on a local policy in the PoC Server;
 - SHALL stop distributing Media over the Multicast PoC Channel and stop the multicast/broadcast service in the Multicast Access Network;
- SHALL support sending Continuous Media over the Multicast PoC Channel;
- SHOULD support sending Discrete Media over a Multicast PoC Channel;
- SHALL perform the following tasks:
 - generate the keys necessary for encryption and decryption of Media;
 - encrypt Media towards the Multicast PoC Network;
 - decrypt Media towards the PoC Server performing the Controlling PoC Function.
- SHALL store Discrete Media to be used for file repair when sending Discrete Media over the Multicast PoC Channel is supported; and,
- SHALL generate REPORTS on behalf of the PoC Clients receiving Discrete Media over the Multicast PoC Channel when sending of Discrete Media over the Multicast PoC Channel is supported.

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 [OMA Presence V2.0 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 PoC User to communicate via the PoC service.
- Publish PoC-related presence information to the Presence service (on behalf of PoC Client) based on the mapping function mentioned above.

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

The function of the PoC Server to perform the role of Watcher is outside scope of this specification.

6.1.3.4 XML Document Management functionality

The PoC Server SHALL support the following XDM functions:

- Retrieval of PoC User access policy documents from the Shared Policy XDMS.
- Retrieval of group definitions from the Shared Group XDMS.
- Retrieval of URI lists (e.g. used as Contact Lists) from the Shared List XDMS.
- Subscription to the modification of XML documents stored in the Shared Policy XDMS, Shared Group XDMS or Shared List XDMS.

The PoC Server MAY support the following XDM functions:

- Handling search for ongoing PoC Sessions.

The details are specified in [OMA XDM V2.1 AD].

6.1.3.5 Condition Based URIs Selection functionality

If at least one of the functions Dynamic PoC Groups, Incoming Condition Based PoC Session Barring or Outgoing Condition Based PoC Session Barring is supported the PoC Server SHALL act as a CBUS Client towards the CBUS Server. The condition based URIs selection handling is performed via the Reference Points POC-2 and CBUS-2. The communication between PoC Server and CBUS Server is accomplished using SIP and the SIP specific event notification mechanism as specified in [RFC3261] and [RFC3265]. The details are specified in [OMA CBUS V1.0 AD].

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

- Request and receive a condition based URIs selection from the CBUS Server. The request is performed as a one-time request for a selection of the URIs matching the conditions or as a subscription to changes of the URIs selection based on changes to the list of matching URIs.

6.1.4 PoC XML Document Management Server

The PoC XDMS is a PoC 1.0 Enabler XCAP Server that manages XML documents in the PoC 1.0 Enabler Release as specified in [OMA PoC V1.0 AD].

NOTE: XML document management is described in the Shared Group XDM Specifications and Shared Policy XDM Specifications.

6.1.5 UE PoC Box

The UE PoC Box is an optional function co-located with the PoC Client in the UE.

The UE PoC Box SHALL be able to:

- support PoC Session signaling;
- support Talk Burst Control Protocol;
- support Talk Burst Control procedures;
- support storage of PoC Session Data;
- support storage of PoC Session Control Data; and,
- provide a PoC Box indication when accepting an invitation to a PoC Session.

The UE PoC Box MAY:

- support Media Burst Control Protocol;
- support Media Burst Control procedures;
- support retrieval of PoC Session Data;
- support retrieval of PoC Session Control Data; and,
- support management of stored PoC Session Control Data and stored PoC Session Data.

NOTE: UE PoC Box specific charging is outside of scope of the PoC Box function.

6.1.6 NW PoC Box

The NW PoC Box is an optional Entity located in the PoC User's Home PoC Network.

The NW PoC Box SHALL be able to:

- support PoC Session signaling;
- support Talk Burst Control Protocol;
- support Talk Burst Control procedure;
- support storage of PoC Session Data;
- support retrieval of PoC Session Data;
- support storage of PoC Session Control Data;
- support retrieval of PoC Session Control Data;
- support management (e.g., deletion) of stored PoC Session Control Data and stored PoC Session Data;
- support notifications of NW PoC Box stored messages; and,
- provide a PoC Box indication when accepting an invitation to a PoC Session.

The NW PoC Box MAY:

- support Media Burst Control Protocol; and,
- support Media Burst Control procedures.

Stored PoC Session Data MAY be retrieved using one of the Deferred Messaging Enablers (e.g., MMS, email, or IM Deferred Messaging). When a Deferred Messaging Enabler is used for retrieving stored PoC Session Data, retrieval of the associated PoC Session Control Data and management of the PoC Session Control Data and PoC Session Data is achieved using the mechanisms defined for the Deferred Messaging Enabler. These mechanisms are outside the scope of this specification.

Stored PoC Session Data MAY be retrieved in real time using the PoC Session establishment and PoC Session Data transfer mechanisms defined for the PoC Enabler. When PoC Session Data is retrieved in real time, management of the PoC Session Control Data and PoC Session Data is achieved using mechanisms (e.g XDM Enabler using XCAP protocol) defined by local policy.

6.1.6.1 Messaging Interworking Function

The Messaging Interworking Function is a function of the NW PoC Box utilizing other messaging systems message storage, e.g. the message storage provided by the CPM Enabler.

The realization of the Messaging Interworking Function is out of scope of the PoC Specifications.

The Messaging Interworking Function provides the following functions:

- Converts PoC Session Data and PoC Session Control Data to the message format used by other messaging systems message storage.
- Sends converted PoC Session Data and converted PoC Session Control Data to other messaging systems message storage according to rules and procedures of the other messaging system.
- Converts other messaging formats to PoC Session Data and PoC Session Control Data and sends them to a PoC User.

The retrieval of PoC Session Data and PoC Session Control Data stored in other messaging systems message storage is out of scope of PoC.

6.1.7 PoC Crisis Event Handling Entity

The main purpose of the PoC Crisis Event Handling Entity is to authorize PoC Users initiating PoC Session Control for Crisis Handling and to provide additional information to Crisis PoC Sessions.

The PoC Crisis Event Handling Entity SHALL perform the following functions:

- Provides authorization of PoC Users.
- Provides SIP Session handling, such as SIP Session origination, release, etc.
- Invites PoC User(s) to the PoC Session based on local policy.

The PoC Crisis Event Handling Entity MAY perform the following functions:

- Provides Included Media Content.
- Provides Referenced Media Content.
- Provides Text content.
- Based on the Crisis Event information received in the request to use PoC Session Control for Crisis Handling, performs pre-defined procedures for PoC Session such as:
 - sending out PoC Session invitation to one or more Pre-arranged PoC Group(s);
 - invoking other services (e.g., location, presence) to determine Dynamic PoC Groups to be invited;

- distributing pre-recorded data (e.g., canned voice);
- distributing data received in the received request (e.g., images); and,
- invoking other services to complement Crisis Event related data to be distributed (e.g., location information).

6.1.8 External Media Content Server Retrieval Function

The External Media Content Server Retrieval Function supports conveying Media from External Media Content Server to Participants of a PoC Session. The use of the External Media Content Server Retrieval Function is optional. When not used the PoC Server accesses the External Media Content Server over the IP-3 Reference Point.

The External Media Content Server Retrieval Function SHALL:

- provide SIP Session handling, such as SIP Session origination, release, etc.;
- provide Media Burst Control procedures and Media Burst Control Protocol negotiation;
- provide initiation of sharing of media content from External Media Content Server; and,
- provide Media Streaming Control.

The External Media Content Server Retrieval Function is compliant to the PoC network open Reference Points POC-18 and POC-20. The External Media Content Server Retrieval Function is accessed over the IP-2 Reference Point.

6.2 External entities providing services to PoC system

6.2.1 SIP/IP Core

The SIP/IP Core includes a number of [RFC3261] compliant SIP proxies and SIP registrars. The SIP/IP Core performs the following functions that are needed to support the PoC Enabler:

- Routes the SIP signalling.
- Provides discovery and address resolution services, including E.164 address resolution.
- 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.
- Optionally supports the Communications Resource-Priority as specified in [RFC4412].
- Provides a NAT traversal method.
- Supports subscription of registration information and association of implicitly registered PoC Addresses to an explicitly registered PoC Address.
- Supports registration of Multiple PoC Clients with the same PoC Addresses.
- Provides the target PoC Address in invitation sent to a PoC Client.

Part of the Lawful Interception functionality can be supported by the SIP/IP Core.

When SIP/IP Core is based on the 3GPP/3GPP2 IMS, the SIP/IP Core architecture is specified in [3GPP TS 23.228] or [3GPP2 X.S0013.2].

6.2.2 Shared XML Document Management Servers (XDMSs)

Documents accessed and manipulated via XCAP are stored in logical repositories in the network, called XML Document Management Servers (XDMS). Each XML document stored in an XDMS is described as an XCAP Application Usage, which enables applications to use the document via XCAP. The XDM Enabler describes Application Usages which can be reused by multiple Enablers (e.g. PoC and IM), and are stored in logical entities called Shared XDMSs. The PoC Enabler uses three types of Shared XDMSs: Shared List XDMS, Shared Group XDMS and Shared Policy XDMS.

6.2.2.1 Shared List XML Document Management Server (XDMS)

The Shared List XDMS supports the Application Usages for the URI List and Group Usage List documents.

This Entity is described in [OMA XDM V2.1 AD].

NOTE: In the PoCv1.0 Enabler, this functional Entity is called Shared XDMS.

6.2.2.2 Shared Group XML Document Management Server (XDMS)

The Shared Group XDMS supports the Application Usage for the Group document.

This Entity is described in [OMA XDM V2.1 AD].

NOTE: In the PoCv1.0 Enabler, the Group document is called PoC Group and is stored in the PoC XDMS.

6.2.2.3 Shared Policy XML Document Management Server (XDMS)

The Shared Policy XDMS supports the Application Usage for the User Access Policy document.

The Shared Policy XDMS is described in [OMA XDM V2.1 AD].

NOTE: In the PoCv1.0 Enabler, the User Access Policy document is called PoC User Access Policy and is stored in the PoC XDMS.

6.2.3 Aggregation Proxy

The Aggregation Proxy acts as the single contact point for the XDMS. The Aggregation Proxy performs authentication of the XDMS, 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 [OMA XDM V2.1 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 can be published by the Presence Source in the UE, or by the PoC Server on behalf of the PoC Client or by a Location Service on behalf of the PoC Client. The presence information can 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 [OMA Presence V2.0 AD].

6.2.5 Presence Source

The Presence Source is an Entity that provides (publishes) presence information to a Presence Server.

This Entity is specified in [OMA Presence V2.0 AD].

6.2.6 Watcher

The Watcher is an Entity that requests presence information about a Presentity, or Watcher information about a Watcher, from the Presence Server.

This Entity is specified in [OMA Presence V2.0 AD].

6.2.7 Charging Entity

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

The Charging Entity provides the functionality of the Charging Enabler as specified in [OMA Charging AD].

6.2.8 Device Provisioning and Management Client

The device provisioning and management client is able to:

- Receive the initial parameters needed for PoC service sent by service provider by using mechanisms specified in [OMA Client Provisioning] or [OMA DM Bootstrap].
- 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 [OMA Client Provisioning] and in [OMA DM].

NOTE: In cases of networks where the provisioning systems specified in [OMA Client Provisioning] and [OMA DM] are not supported the provisioning system is out of scope of this specification.

6.2.9 Device Provisioning and Management Server

The device provisioning and management server can perform the following functions that are needed for the support of the PoC Enabler:

- Initialization and update of all the configuration parameters necessary for the PoC Client.
- Support of software update for application upgradeable handsets.

The device provisioning and management server is the Device Management Server as specified in [OMA DM] and [OMA DM Bootstrap].

NOTE: In cases of networks where the provisioning systems specified in [OMA Client Provisioning] and [OMA DM] are not supported the provisioning system is out of scope of this specification.

6.2.10 PoC Interworking Function

The PoC Interworking Function, which is part of the optional PoC Interworking Service infrastructure, is an abstract function whose realization is outside the scope of OMA specifications; for example, the PoC Interworking Function can be realized with a single physical entity or a distributed one. The interfaces of the PoC Interworking Function towards the External P2T Networks are proprietary and outside the scope of OMA. The PoC Interworking Function is compliant to the PoC network open interface provided by the PoC Interworking Service, mostly POC-4 and IP-1 Reference Points.

The PoC Interworking Function:

- provides conversion between PoC network based SIP signaling and External P2T Network based session signalling;
- provides conversion between either Talk Burst Control Protocol or Media Burst Control Protocol or both, and External P2T Network based floor control;

- provides conversion between RTP based Media packet transport, and Media transport protocol in the External P2T Network;
- provides transcoding for speech transferred between the PoC network and the External P2T Network;
- provides conversion of Instant Personal Alert to or from similar service in the External P2T Network;
- supports negotiation of
 - either Talk Burst Control Protocol or Media Burst Control Protocol or both in PoC Sessions;
 - codec and Media Parameter for PoC Sessions;
 - PoC Session modifications;
 - either Talk Burst Control Protocol or Media Burst Control Protocol options or both in PoC Sessions;
 - User Plane adaptation in PoC Sessions;
- supports charging for PoC Sessions involving P2T Users;
- supports P2T Address to or from PoC Address mapping; and,
- supports expansion of PoC Group Identities involving P2T Users.

Optionally the PoC Interworking Function:

- provides conversion of conference state event information to or from similar service in the External P2T Network;
- provides conversion of PoC related presence information to or from similar service in the External P2T Network;
- provides mapping of PoC functions to or from similar functions in the External P2T Network (e.g. polite calling); and,
- provides conversion of Group Advertisement to or from similar function in the External P2T Network.

6.2.11 PoC Interworking Agent

The PoC Interworking Agent is an abstract function whose realization is outside the scope of OMA specifications. It can be part of the PoC Interworking Function, when the PoC Interworking Function is using the POC-1 and POC-3 Reference Points to connect to the PoC network.

On behalf of the PoC Remote Access User or a P2T User, the PoC Interworking Agent:

- performs PoC Session initiation, (e.g. codec negotiation), participation (e.g., talk or listen), and release;
- performs registration with the SIP/IP Core;
- authenticates of the PoC User to the SIP/IP Core;
- generates and sends Talk Bursts containing PoC Speech;
- receives and decodes Talk Bursts containing PoC Speech;
- generates and sends Media Bursts containing Media other than PoC Speech;
- receives and decodes Media Bursts containing Media other than PoC Speech;
- supports Talk Burst Control procedures and Talk Burst Control Protocol negotiation;
- supports Media Burst Control procedures and Media Burst Control Protocol negotiation;
- supports User Plane adaptation procedures if initiated by the PoC Server;

- supports receiving of Instant Personal Alert;
- support multiple PoC Clients with the same PoC Address;
- support the PoC Service Settings; and,
- support the use of QoE Profiles.

On behalf of the PoC Remote Access User or a P2T User, the PoC Interworking Agent optionally supports the following:

- supports sending of Instant Personal Alert;
- supports sending and receiving Group Advertisement;
- supports multiple of either Talk Burst Control Protocols or Media Burst Control Protocols, or both;
- supports negotiation of either Talk Burst Control Protocol options or Media Burst Control Protocol options or both;
- support Session on-hold procedures;
- requests privacy for PoC User's PoC Address;
- supports subscribing to Participant Information including subscribing to limited Participant Information;
- supports PoC Session Control for Crisis Handling;
- support Full Duplex Call Follow-on Proceed;
- support PoC Box capability;
- support the Advanced Revocation Alert;
- support the PoC Dispatcher functionality;
- support invited parties identity information functionality;
- support performance enhancements such as Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media and Local Granted Mode;
- support operator specified warning message;
- support Discrete Media;
- support Moderated PoC Session Media Burst Control procedures;
- support Alert for unavailable PoC Users;
- support Dynamic PoC Groups functionality;
- support PoC Session Control for Crisis Handling;
- support obtaining Limited Participant Information;
- support initiation of sharing of media content from External Media Content Server;
- support Media Streaming Control;
- support Multicast PoC;
- support handling of Simultaneous Media Streams; and,
- support expanding duration of Media Burst transmitting.

6.2.12 Access network

The access network is the network connecting PoC functional Entities and external Entities providing services to PoC system.

The access network supports unicast or multicast/broadcast or both.

The technology of the unicast access networks can be different than the technology of the multicast/broadcast access network.

The unicast access network used for PoC Sessions need to:

- Support IP datagram routing.
- Support security as specified in subclause 4.2 "*Security Considerations*".

The multicast/broadcast access network need to:

- Support multicast/broadcast functionality.
- Support IP datagram routing.
- Support security as specified in subclause 4.2 "*Security Considerations*".

Part of the Lawful Interception functionality can be supported by the access network.

When SIP/IP Core is based on the 3GPP/3GPP2 IMS, the SIP/IP Core architecture is specified in [3GPP TS 23.228] or [3GPP2 X.S0013.2].

6.2.13 External Media Content Server

The External Media Content Server is an Entity whose realization is outside the scope of OMA specifications.

The media content in the External Media Content Server is accessed over the IP-3 Reference Point.

NOTE: The protocol for fetching Media from External Media Content Server is out of scope of PoC specification.

6.2.14 External Media Content Server

The EMCS is an optional Entity. The EMCS can be located within the PoC Service provider domain or outside the PoC Service provider domain.

The protocols used over the interface between the EMCS and the PoC Server are outside the scope of PoC specifications.

NOTE: The protocol, for example, can be RTSP or HTTP.

6.2.15 Condition Based URIs Selection Server

The CBUS Server is a functional Entity that on request performs a selection of URIs based on conditions defined for an input of URIs. In a request from PoC Server the input URIs and conditions can either originate from a pre-defined Dynamic PoC Group with pre-defined conditions or from a list of URIs provided ad-hoc by a PoC Client together with a set of one or more conditions. The URIs selection can be subscribed to by the CBUS Client in the UE, or by the PoC Server when acting as a CBUS Client on behalf of a served PoC User.

This Entity is specified in [OMA CBUS V1.0 AD].

6.2.16 Condition Based URIs Selection Client

The CBUS Client is able to:

- subscribe to a one-time notification of selected URIs based on how the input URIs matches the conditions; and,

- subscribe to changes of the URI selection, such that the CBUS Client will receive notifications when the list of selected URIs changes based on how the input URIs matches the conditions.

This Entity is specified in [OMA CBUS V1.0 AD].

6.2.17 Search Proxy

The Search Proxy is a server entity that forwards an XDM Client's search request to other Entities requested to perform a search. The Search Proxy receives responses from the other Entities and sends the combined results to the XDM Client.

The Search Proxy is specified in [OMA XDM V2.1 AD].

7. Description of the reference points

The Reference Point descriptions in the following subclauses describe, what have to be supported by the Reference Points. These subclauses do not indicate if the presented functionalities are optional or mandatory for the corresponding network elements.

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.

The PoC-1 Reference Point SHALL support PoC Clients compliant with the earlier versions of PoC Enabler Release.

This Reference Point SHALL support:

- PoC Session signalling between the PoC Client and the PoC Server;
- providing discovery and address resolution services;
- providing SIP compression;
- performing authentication and authorization of the PoC User at the PoC Client based on the PoC User's service profile;
- providing PoC Client registration;
- indication of capabilities for PoC;
- relaying PoC Service Settings to the PoC Server; and,
- providing the integrity protection and optionally the confidentiality protection of the PoC Session signalling.

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 POC-2 Reference Point supports the communication between the SIP/IP Core and the PoC Server. The protocol for the POC-2 Reference Point is SIP.

The PoC-2 Reference Point SHALL support PoC Servers compliant with the earlier versions of PoC Enabler Release.

The POC-2 Reference Point SHALL support:

- PoC Session signalling between the PoC Client and the PoC Server;
- PoC Session signalling between the UE PoC Box and the PoC Server;
- PoC Session signalling between the NW PoC Box and the PoC Server;
- PoC Session signalling between the PoC Crisis Event Handling Entity and the PoC Server;
- PoC Session signalling between the External Media Content Server Retrieval Function and the PoC Server;
- providing address resolution services;
- providing charging information;
- publication of Presence information from the PoC Server to the Presence Server;

- indication of capabilities for PoC;
- relaying of PoC Service Settings from the PoC Client;
- relaying of PoC Service Settings from the UE PoC Box;
- subscription to the modification of XML documents;
- notification of modifications made to XML documents;
- subscription of list of PoC Addresses that fulfil one or more conditions;
- notifications of PoC Addresses that fulfil one or more conditions;
- subscription of registration status of PoC Clients and PoC Addresses from SIP/IP Core; and,
- notifications of registration status of PoC Clients and PoC Addresses.

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 supports User Plane communication between the PoC Client and the PoC Server. The protocols for the POC-3 Reference Point are RTP/RTCP, MSRP, RTSP, HTTP and FLUTE. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport over a unicast bearer as defined in [OMA IM AD], Reference Point IM-7; FLUTE is used for Discrete Media transport over a multicast bearer; RTSP protocol is used for Media Streaming Control; HTTP is used for file repair.

The PoC-3 Reference Point SHALL support PoC Servers and PoC Clients that are compliant with the earlier versions of PoC Enabler Release.

The POC-3 Reference Point SHALL support:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- quality feedback of received Media
- Discrete Media Burst delivery including Discrete Media transfer report procedures;
- Media Streaming Control; and,
- User Plane security as specified in subclause 4.2.2 "*User Plane security*".

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 performing 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, can 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 and Gmb reference points [3GPP TS 23.002] and ii and Mb 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, RTSP, and MSRP. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport as defined in [OMA IM AD], Reference Point IM-8; RTSP protocol is used for Media Streaming Control.

The PoC-4 Reference Point SHALL support PoC Servers compliant with the earlier versions of PoC Enabler Release.

The POC-4 Reference Point SHALL support:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- quality feedback of received Media;
- Discrete Media Burst delivery including Discrete Media transfer report procedures; and,
- Media Streaming Control.

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 specified in PoC 1.0 is not used in this version of the PoC Enabler. The equivalent functionality is included in the POC-13 Reference Point.

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

The POC-6 Reference Point specified in PoC 1.0 is not used in this version of the PoC Enabler. The equivalent functionality is provided by the XDM-2 Reference Point.

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

The POC-7 Reference Point specified in PoC 1.0 is not used in this version of the PoC Enabler. The equivalent functionality is provided by the XDM-4 Reference Point.

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

The POC-8 Reference Point specified in PoC 1.0 is not used in this version of the PoC Enabler. The equivalent functionality is provided by the POC-13 Reference Point.

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

The functionality of the XDM-1 Reference Point is specified in [OMA XDM V2.1 AD].

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

The functionality of the XDM-2 Reference Point is specified in [OMA XDM V2.1 AD].

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

The functionality of the XDM-3 Reference Point is specified in [OMA XDM V2.1 AD].

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

The functionality of the XDM-4 Reference Point is specified in [OMA XDM V2.1 AD].

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

The functionality of the PRS-1 Reference Point is specified in [OMA Presence V2.0 AD].

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

The functionality of the PRS-2 Reference Point is specified in [OMA Presence V2.0 AD].

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

The functionality of the PRS-3 Reference Point is specified in [OMA Presence V2.0 AD].

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

The functionality of the PRS-5 Reference Point is specified in [OMA Presence V2.0 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 protocol for the IP-1 Reference Point is SIP.

The IP-1 Reference Point SHALL support:

- communication and forwarding of SIP signalling messaging between SIP/IP Cores; and,
- 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

For the PoC V2.0 Enabler Release and later PoC Enabler Releases, the C-5 Reference Point has been replaced by Reference Points CH-1 and CH-2 defined in [OMA Charging AD]. These interfaces are further described in following subclause 7.18.1 "Reference point CH-1: PoC Server – Offline Charging Entity" and 7.18.2 "Reference point CH-2: PoC Server – Online Charging Entity".

7.18.1 Reference point CH-1: PoC Server – Offline Charging Entity

The CH-1 Reference Point supports the communication between the PoC Server and the Offline Charging Entity to perform the PoC-related offline charging activity.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the CH-1 Reference Point SHALL include either the functionality provided over the Rf reference point as described in [3GPP TS 32.272] / [3GPP2 X.S0013-007] or the functionality of a direct CDR generation in the PoC Server as described in [3GPP TS 32.272] / [3GPP2 X.S0013-007].

7.18.2 Reference point CH-2: PoC Server – Online Charging Entity

The CH-2 Reference Point supports the communication between the PoC Server and the Online Charging Entity to perform the PoC-related online charging activity.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the CH-2 Reference Point SHALL include the functionality provided over the Ro reference point as described in [3GPP TS 32.272] / [3GPP2 X.S0013-007].

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 protocol for the DM-1 Reference Point is described in [OMA-DM].

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 for this interface as described in [OMA DM].

7.20 Reference point LI-1: Functional Entities – Law Enforcement Monitoring Facility

The LI-1 Reference Point supports the communication between functional Entities and Law Enforcement Monitoring Facilities. The LI-1 Reference Point uses protocols defined by applicable LI specifications that transport the LI information to Law Enforcement Monitoring Facilities.

The definition of the LI protocols and the administration of LI information are outside the scope of this specification.

When the SIP/IP Core corresponds with 3GPP IMS, the LI-1 Reference Point SHALL conform to the HI1, HI2 and HI3 reference point in [3GPP TS 33.107].

7.21 Reference point PB-1: Aggregation Proxy – NW PoC Box

The PB-1 Reference Point is an optional Reference Point that supports communication between the Aggregation Proxy and the NW PoC Box for exchange of XML documents for the operation of the NW PoC Box using XDM Enabler (e.g., retrieve PoC Session Control Data, delete PoC Session Control Data and PoC Session Data). The protocol for the PB-1 Reference Point is XCAP.

The documents exchanged using this Reference Point are a matter of local policy and not specified.

7.22 Reference point POC-9: UE PoC Box – SIP/IP Core

The POC-9 Reference Point supports the communication between the UE PoC Box and the SIP/IP Core. The protocol for the POC-9 Reference Point is SIP.

This Reference Point SHALL support:

- PoC Session signalling between the UE PoC Box and the PoC Server;
- providing discovery and address resolution services;
- providing SIP compression;
- performing authentication and authorization of the PoC User at the UE PoC Box based on the PoC User's service profile;
- providing UE PoC Box registration;

- indication of capabilities for UE PoC Box; and,
- relaying UE PoC Box PoC Service Settings to the PoC Server.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-9 Reference Point SHALL conform to the Gm reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.23 Reference point POC-10: UE PoC Box – PoC Server

The POC-10 Reference Point is between the UE PoC Box and the PoC Server. The protocols for the POC-10 Reference Point are RTP/RTCP and MSRP. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport as defined in [OMA IM AD], Reference Point IM-7.

The POC-10 Reference Point SHALL support:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- quality feedback of received Media; and,
- Discrete Media Burst delivery including Discrete Media transfer report t procedures.

The POC-10 Reference Point is between a UE PoC Box and a PoC Server accessing the SIP/IP Core serving the PoC Client or accessing different SIP/IP Cores, e.g. to allow direct Media flow between the UE PoC Box and the PoC Server performing the Controlling PoC Function.

NOTE: Provision of a POC-10 Reference Point between a UE PoC Box and a PoC Server accessing different SIP/IP Cores, when the SIP/IP Cores are controlled by different operators, can be subject to an inter-operator agreement.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-10 Reference Point SHALL use the services of the Mb reference point [3GPP TS 23.002] and ii reference point [3GPP2 X.S0013.2].

7.24 Reference point POC-11: NW PoC Box – SIP/IP Core

The POC-11 Reference Point supports the communication between the NW PoC Box and the SIP/IP Core. The protocol for the POC-11 Reference Point is SIP.

The POC-11 Reference Point SHALL support:

- PoC Session signalling between the NW PoC Box and the PoC Server;
- providing discovery and address resolution services; and,
- performing authentication and authorization of the PoC User at the NW PoC Box based on the PoC User's service profile.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-11 Reference Point SHALL conform to the Gm reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.25 Reference point POC-12: NW PoC Box – PoC Server

The POC-12 Reference Point is between the NW PoC Box and the PoC Server. The protocols for the POC-12 Reference Point are RTP/RTCP and MSRP. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be

supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport as defined in [OMA IM AD], Reference Point IM-8.

The POC-12 Reference Point SHALL support:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- quality feedback of received Media; and
- Discrete Media Burst delivery including Discrete Media transfer report procedures.

The POC-12 Reference Point is between a NW PoC Box and a PoC Server accessing the SIP/IP Core serving the NW PoC Box or accessing different SIP/IP Cores, e.g. to allow direct Media flow between the NW PoC Box and the PoC Server performing the Controlling PoC Function.

NOTE: Provision of a POC-12 Reference Point between a NW PoC Box and a PoC Server accessing different SIP/IP Cores, when the SIP/IP Cores are controlled by different operators, can be subject to an inter-operator agreement.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-12 Reference Point SHALL use the services of the Mb reference point [3GPP TS 23.002] and ii reference point [3GPP2 X.S0013.2].

7.26 Reference point POC-13: PoC Server – Shared XDMSs

The POC-13 Reference Point supports communication between the PoC Server and the Shared XDMSs (i.e., the Shared List XDMS, the Shared Group XDMS and the Shared Policy XDMS). The protocol for the POC-13 Reference Point is XCAP.

The PoC-13 Reference Point SHALL support Shared XDM Servers compliant with the earlier versions of XDM Enabler Release.

The POC-13 Reference Point SHALL provide one or more of the following functions:

- Retrieval of URI Lists from the Shared List XDMS.
- Retrieval of Group documents from the Shared Group XDMS.
- Retrieval of user access policy documents from the Shared Policy XDMS.

7.27 Reference point POC-14: PoC Crisis Event Handling Entity – SIP/IP Core

The POC-14 Reference Point supports the communication between the PoC Crisis Event Handling Entity and the SIP/IP Core. The protocol for the POC-14 Reference Point is SIP.

The POC-14 Reference Point SHALL support:

- PoC Session signalling between the PoC Crisis Event Handling Entity and the SIP/IP Core; and,
- authorization of PoC Users initiating PoC Session Control for Crisis Handling.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-14 Reference Point SHALL conform to the Gm reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.28 Reference point POC-15: PoC Crisis Event Handling Entity – PoC Server

The POC-15 Reference Point supports the User Plane communication between the PoC Crisis Event Handling Entity and the PoC Server. The protocols for the POC-15 Reference Point are RTP/RTCP and MSRP. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport as defined in [OMA IM AD], Reference Point IM-8.

The PoC-15 Reference Point SHALL support PoC Servers compliant with this and future versions of PoC Enabler Release.

The POC-15 Reference Point SHALL support:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- quality feedback of received Media;
- Discrete Media Burst delivery including Discrete Media transfer report procedures; and,
- Media Streaming Control.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-15 Reference Point SHALL use the services of the Mb reference point [3GPP TS 23.002], [3GPP2 X.S0013.2].

7.29 Reference Point POC-16: PoC Server – access network

The POC-16 Reference Point supports communication between the PoC Server performing the Participating PoC Function and the multicast/broadcast network for controlling the status of the Multicast PoC Channel. The protocol for the POC-16 Reference Point depends on the multicast/broadcast access network.

The POC-16 Reference Point SHALL support:

- start of the Multicast PoC Channel and Release of the Multicast PoC Channel
- setting of priority of Multicast PoC Channel; and,
- request to count the number of PoC Clients listening to the Multicast PoC Channel.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-16 Reference Point SHALL use the services of the Gi reference point [3GPP TS 23.002] and A10/A11 interface [3GPP2 A.S0019-A_v1.0].

7.30 Reference Point POC-17: PoC Client – access network

The POC-17 Reference Point supports communication between the PoC Client and the multicast/broadcast access network for the purpose of connecting to a Multicast PoC Channel.

The POC-17 Reference Point SHALL support:

- providing information about ongoing Multicast PoC Channels in the Multicast Access Network
- connecting and disconnecting to a Multicast PoC Channel; and,
- support of counting the number of PoC Clients listening to the Multicast PoC Channel.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-17 Reference Point SHALL use the services of the Iu-ps reference point [3GPP TS 23.002] and Um reference point [3GPP2 X.S0013.2].

7.31 Reference point POC-18: External Media Content Server Retrieval Function – PoC Server

The POC-18 Reference Point supports the User Plane communication between the PoC Server and an External Media Content Server Retrieval Function. The protocols for the POC-18 Reference Point are RTP/RTCP and MSRP. RTP protocol is used for Continuous Media transport, RTCP APP messages SHALL be supported for the transport of the Talk Burst Control and Media Burst Control procedures; MSRP is used for Discrete Media transport as defined in [OMA IM AD], Reference Point IM-8.

The POC-18 Reference Point SHALL support the following:

- Media transport;
- Talk Burst Control procedures;
- Media Burst Control procedures;
- Quality feedback of received Media;
- Discrete Media Burst delivery including Discrete Media transfer report procedures; and,
- Media Streaming Control.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, then the POC-18 Reference Point SHALL use the services of the Mb reference point [3GPP TS 23.002], [3GPP2 X.S0013.2].

7.32 Reference point POC-19: PoC Server – Search Proxy

The POC-19 Reference Point is between the PoC Server and the Search Proxy. The protocol for the POC-19 Reference Point is XQuery. XQuery is used for signalling search requests and related responses.

The POC-19 Reference Point SHALL support:

- ongoing PoC Session search procedures.

7.33 Reference point POC-20: External Media Content Server Retrieval Function – SIP/IP Core

The POC-20 Reference Point supports the communication between the External Media Content Server Retrieval Function and the SIP/IP Core. The protocol for the POC-20 Reference Point is SIP.

The POC-20 Reference Point SHALL support the following:

- PoC Session signalling between the External Media Content Server Retrieval Function – SIP/IP Core.

When SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the POC-20 Reference Point SHALL conform to the Gm reference point [3GPP TS 23.002, 3GPP2 X.S0013.2].

7.34 Reference point XDM-5: XDMC – Aggregation Proxy

The functionality of the XDM-5 Reference Point is specified in [OMA XDM V2.1 AD].

7.35 Reference point XDM-6: Aggregation Proxy – Search Proxy

The functionality of the XDM-6 Reference Point is specified in [OMA XDM V2.1 AD].

7.36 Reference point CBUS-1: CBUS Client – SIP/IP Core

The functionality of the CBUS-1 Reference Point is specified in [OMA CBUS V1.0 AD].

7.37 Reference point CBUS-2: SIP/IP Core – CBUS Server

The functionality of the CBUS-2 Reference Point is specified in [OMA CBUS V1.0 AD].

7.38 Reference point IP-2: External Media Content Server Retrieval Function – EMCS

The IP-2 Reference Point supports communication between the PoC Server and an External Media Content Server Retrieval Function. The protocols over this interface are outside the scope of PoC Specifications.

7.39 Reference point IP-3: PoC Server – EMCS

The IP-3 Reference Point supports communication between the PoC Server and an EMCS. The protocols over this interface are outside the scope of PoC Specifications.

8. System concepts

The System concepts are described in [OMA PoC V2.1 SD] "*System concepts*".

9. High level procedures

(Informative)

The High level procedures are described in [OMA PoC V2.1 SD] "*High level procedures (Informative)*".

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2 Draft/Candidate Version 2.1 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-AD-PoC-V2_1	06 Jun 2006	All	Baseline document. OMA-AD-PoC-V2_0-20060425-D was used as the baseline for the 2.1 AD
	29 Oct 2007	All	New baseline document. OMA-AD-PoC-V2_0-20071022-D was used as the baseline for the 2.1 AD and extended with new subclauses according to template OMA-Template-ArchDoc-20071005-1.
	23 Nov 2007	3.2, 5, 6.1.1, 6.1.3.1, 6.2.1	Updated according to agreed CRs: OMA-POC-POCV2_1-2007-0030R01, OMA-POC-POCV2_1-2007-0031R01
	18 Dec 2007	2, 3, 5, 6, 7	Updated according to agreed CRs: OMA-POC-POCV2_1-2007-0036, OMA-POC-POCV2_1-2007-0038R01, OMA-POC-POCV2_1-2007-0044R01, OMA-POC-POCV2_1-2007-0047, OMA-POC-POCV2_1-2007-0048R01, OMA-POC-POCV2_1-2007-0068R01, OMA-POC-POCV2_1-2007-0069R01, OMA-POC-POCV2_1-2007-0070R01
	15 Feb 2008	4A.1, 4A.2, 4A.3, 4.1, 4.3, 4.4, 4.4.1	Updated according to agreed CRs: OMA-POC-POCV2_1-2007-0067R02
	14 Mar 2008	3.2, 4A.1, 4A.2, 4A.3, 4.2, 5.4, 6.1.1, 6.1.3.1	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0002R02, OMA-POC-POCV2_1-2008-0012R02, OMA-POC-POCV2_1-2008-0024, OMA-POC-POCV2_1-2008-0025, OMA-POC-POCV2_1-2008-0026
	15 May 2008	2.1, 2.2, 3.2, 3.3, 4.2.2, 5.1a, 5.1, 6.1.1, 6.1.3.1, 6.1.3.2, 6.2.12, 6.2.13, 7.3, 7.4, 7.29, 7.30	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0034R01, OMA-POC-POCV2_1-2008-0037R02
	05 June 2008	3.2, 6.1.1, 6.1.3.1, 6.1.3.2, 6.2.13	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0067
	07 July 2008	3.2, 4.1c, 5.1a, 6.1.1, 6.1.3.1, 6.1.3.2, 6.2.1	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0069, OMA-POC-POCV2_1-2008-0085, OMA-POC-POCV2_1-2008-0097

Document Identifier	Date	Sections	Description
	22 July 2008	1, 2.1, 2.2, 3.2, 3.3, 4.2.2, 5.1a, 6.1.3.1, 6.1.3.2, 6.2.13, 6.2.14, 7.31, 8, 9, Appendix B	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0111R01, OMA-POC-POCV2_1-2008-0113R01, OMA-POC-POCV2_1-2008-0114, OMA-POC-POCV2_1-2008-0121, OMA-POC-POCV2_1-2008-0124, OMA-POC-POCV2_1-2008-0125
	25 Aug 2008	3.2, 5.1a, 5.1, 6.1.1, 6.1.2, 6.1.3.1, 6.1.3.2, 6.1.7, 7.27, 7.28	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0070R03, OMA-POC-POCV2_1-2008-0120R03, OMA-POC-POCV2_1-2008-0132R01, OMA-POC-POCV2_1-2008-0133R01, OMA-POC-POCV2_1-2008-0162R03, OMA-POC-POCV2_1-2008-0178R01
	29 Oct 2008	2.1, 3.2, 3.3, 5.1a, 5.1, 6.1.2, 6.1.3, 6.2, 7	Updated according to agreed CRs: OMA-POC-POCV2_1-2008-0168R03, OMA-POC-POCV2_1-2008-0223, OMA-POC-POCV2_1-2008-0224R01, OMA-POC-POCV2_1-2008-0248R01
	11 Feb 2009	All	Updated according to agreed CRs: OMA-POC-POCV2_1-2009-0009R01, OMA-POC-POCV2_1-2009-0010, OMA-POC-POCV2_1-2009-0011R02, OMA-POC-POCV2_1-2009-0012R01, OMA-POC-POCV2_1-2009-0013, OMA-POC-POCV2_1-2009-0014, OMA-POC-POCV2_1-2009-0015R01, OMA-POC-POCV2_1-2009-0019R01, OMA-POC-POCV2_1-2009-0026, OMA-POC-POCV2_1-2009-0027, OMA-POC-POCV2_1-2009-0028R01, OMA-POC-POCV2_1-2009-0029, OMA-POC-POCV2_1-2009-0030R01
	22 Feb 2009	All	Updated according to agreed CRs: OMA-POC-POCV2_1-2009-0018R01, OMA-POC-POCV2_1-2009-0024R01, OMA-POC-POCV2_1-2009-0025R01, OMA-POC-POCV2_1-2009-0031R01, OMA-POC-POCV2_1-2009-0032, OMA-POC-POCV2_1-2009-0033R01, OMA-POC-POCV2_1-2009-0035R02, OMA-POC-POCV2_1-2009-0036, OMA-POC-POCV2_1-2009-0037, OMA-POC-POCV2_1-2009-0038, OMA-POC-POCV2_1-2009-0042R01, OMA-POC-POCV2_1-2009-0043, OMA-POC-POCV2_1-2009-0050R02, OMA-POC-POCV2_1-2009-0054R02, OMA-POC-POCV2_1-2009-0057, OMA-POC-POCV2_1-2009-0058, OMA-POC-POCV2_1-2009-0082
	24 Feb 2009	6.1.3.2, 7.30	Updated according to agreed CR: OMA-POC-POCV2_1-2009-0055R01 Editorial correction in 7.30.
Candidate Version OMA-AD-PoC-V2_1	17 Mar 2009	n/a	Status changed to Candidate by TP TP ref # OMA-TP-2009-0104- INP_PoC_V2.1_AD_Package_for_Candidate_Approval

Appendix B. Guidelines for preparing flow charts (Informative)

The Appendix B Guidelines for preparing flow charts is described in [OMA PoC V2.1 SD] "*Guidelines for preparing flow charts (Informative)*".

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.