



Push to Communicate for Public Safety Architecture

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1. Scope

(Informative)

The scope of the Push to Communicate for Public Safety (PCPS) V1.0 architecture document is to define the architecture for the PCPS V1.0 Enabler. This architecture is the same as the architecture for the OMA Push to Talk over Cellular V2.1 Enabler with the removal of the unrealized Condition Based URIs Selection (CBUS) enabler. The architecture is based on the system requirements as described in the PCPS requirements document [OMA PCPS RD].

The architecture of the SIP/IP Core and the underlying access network for PCPS is out of scope of this document. When SIP/IP Core corresponds to the IMS, the architecture and the 3GPP enablers for OMA PCPS services are specified in [3GPP TR 23.979], and the 3GPP2 enablers for OMA PCPS services are specified in [3GPP2 S.R0100-0].

System concepts and high-level procedures are described in [OMA PCPS SD].

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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-DICTOMA-DICT], [OMA Presence V2.0 AD], [OMA XDM AD] and the following terms and definitions apply.

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.
1-to-1 PoC Session	A feature enabling a PoC User to establish a PoC Session with another PoC User.
Access Control	PoC User specified rules that restrict the set of other PoC Users that may establish PoC Sessions to the PoC User.
Ad-hoc PoC Group Session	A PoC Group Session involving an Ad-hoc PoC Group (a temporary PoC Group whose initial set of Participants is selected by the PoC User during the PoC Session set-up).
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.
Broadcast Multicast Service Centre	A function in the MBMS providing the functionality for interacting with a Multicast Access Network for MBMS user service provisioning and delivery as defined in [3GPP TS 23.246].
Chat PoC Group	A persistent (pre-configured) PoC Group in which each PoC User individually joins the PoC Session, i.e., the establishment of a PoC Session to a Chat PoC Group does not result in other PoC Users being invited.
Chat PoC Group Session	A PoC Group 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., 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 PCPS Doc Mgmt] to indicate who is the Distinguished Participant.
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 a media content from an External Media Content Server to Participants of a PoC Session.
External Media Content Server Retrieval Function	A functional Entity contained within the PoC Server performing the Controlling Function that supports the conveying of 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 Group Advertisement is a feature that provides the capability to inform other PoC Users of the existence of a PoC Group.
Home PoC Network	The Home PoC Network is a PoC Network operated by the user's PoC Service Provider. The Home PoC Network is the same as the Home Network defined in IMS and MMD specifications.
Home PoC Server	The Home PoC Server is the PoC Server owned by 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	Incoming Instant Personal Alert Barring is a PoC Service Setting for the PoC Client that conveys the PoC User's desire for the PoC Service to block all incoming Instant Personal Alerts.
Incoming 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 message to a PoC User requesting a 1-to-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.

Limited XQuery over HTTP	The subset of XQuery functions that are used in OMA XDM Search requests.
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.
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	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 PCPS 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 are either real-time or non-real-time, like: <ul style="list-style-type: none"> - audio (e.g., speech, music) - video - still image - text (formatted and non-formatted) - 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 shared between one or more PoC Session to transport one or more Media Streams per PoC Session using the underlying Multicast Access Networks capability to distribute Media Streams on a multicast/broadcast bearer, e.g. MBMS specified by 3GPP and BCMCS specified by 3GPP2. The Multicast PoC Channel is uniquely identified by TMGI in the case of MBMS.
Multimedia	Multimedia is the simultaneous existence of multiple Media Types like <ul style="list-style-type: none"> - audiovisual - video plus subtitles Multimedia from a single source that involves real-time Media Types are assumed to be synchronized.

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 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.
PCPS Service Enabler	The functionality as defined in the OMA Push-to-Communicate for Public Safety (PCPS) V1.0 Requirements, Architecture and Technical Specification Documents.
PoC Address	A PoC Address identifies a PoC User. The PoC Address can be used by one PoC User to request communication with other PoC Users.
PoC Box	The functionality to store Media Bursts and related information (e.g., date & time, Sender Identity, Participant Information) on behalf of a PoC User.
PoC Client	A PoC Client is a PoC 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. NOTE: The PoC Crisis Event Handling Entity complements the emergency service.
PoC Dispatcher	PoC Dispatcher is a Participant in a 1-many-1 PoC Group Session that sends Media to all PoC Fleet Members and that receives Media from any PoC Fleet Member.
PoC Fleet Member	A Participant in a 1-many-1 PoC Group 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.
PoC Group	A PoC Group is a predefined set of PoC Users together with its attributes. A PoC Group is identified by a SIP URI.
PoC Group Identity	The PoC Group Identity is a SIP URI of the Pre-arranged PoC Group or Chat PoC Group.
PoC Group Session	A PoC Session involving a Pre-arranged PoC Group, Ad-hoc PoC Group or Chat PoC Group.
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	The PoC Server implements the 3GPP IMS and 3GPP2 MMD application level network functionality for the PoC Service.
PoC Service Setting	The PoC Service Settings are, 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, Ad-hoc PoC Group, Pre-arranged PoC Group, and Chat PoC Group Session.
PoC Session Control Data	Information about PoC Session Data e.g., time & date, PoC Session initiator, etc.
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 Session Search	A method for providing identities of ongoing PoC Sessions.
PoC Speech	Communication of speech as defined by PoC version 1.0.
PoC Subscriber	A PoC Subscriber is one whose service subscription includes the PoC Service.
PoC User	A PoC User is a user of the PoC Service.
Pre-arranged PoC Group	A persistent PoC Group whose membership is determined by a predefined Group List. The establishment of a PoC Session to a Pre-arranged PoC Group results in all members being invited.
Pre-arranged PoC Group Session	A PoC Group Session established to a Pre-arranged PoC Group.
Pre-established Session	The Pre-established Session is a SIP Session established between the PoC Client and the Home PoC Server. 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.
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.
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.
Sender Identification	Sender Identification is the procedure by which the current Media sender's PoC Address is determined and made known to the receiving Participants 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. The 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	When a PoC User is a Participant in more than one PoC Session simultaneously using the same PoC Client.
SIP Session	A SIP Session is a SIP dialog. From RFC 3261 [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.
SIP URI	From [RFC3261]: "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 procedure making it possible for the PoC Client to indicate to the PoC Server during an ongoing PoC Session or for a Pre-established Session that the PoC Client is still running. The Still-alive mechanism can be used to e.g. ensure accurate charging.
Talk Burst	Flow of Voice Media from a PoC Client that has the permission to send Voice Media to the receiving PoC Client(s).
Talk Burst Control	Talk Burst Control is a control mechanism that arbitrates requests from the PoC Clients, for the right to send Voice Media. Informational Note: "Floor Control" is synonymous with Talk Burst Control
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	User Equipment is a hardware device that supports a PoC Client e.g., a wireless phone.
User Plane	The User Plane includes the Media and Media control 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:

1-1	1-to-1
1-many	1-to-many
1-many-1	1-to-many-to-1
BCMCS	Broadcast Multicast Service
BM-SC	Broadcast Multicast Service Centre
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
PCPS	Push-to-Communicate for Public Safety
PDN	Packet Data Network
PoC	Push to talk over Cellular
QoE	Quality of Experience
RRC	Radio Resource Control, see [3GPP TS 25.331], [3GPP TS 36.331]
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
TMGI	Temporary Mobile Group Identifier, see [3GPP TS 26.346].
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)

The PCPS Enabler is intended to deliver a complete set of Push to Communicate for Public Safety application and service layer standards (for voice and data), hence the PCPS acronym. This enabler is an update from the PoC V2.1 Enabler

PCPS can provide rapid communications for business and consumer customers of mobile networks. The PCPS service 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.

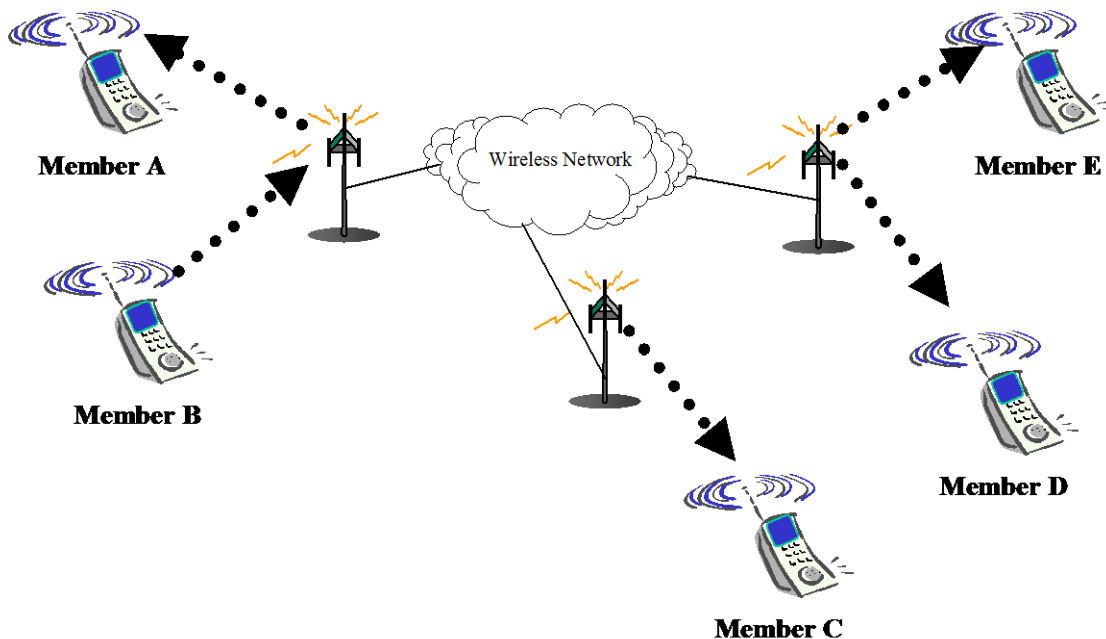


Figure 1: Example of a 1-many PoC Group Session (Voice Transmission)

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 may use proprietary messaging protocol among the various entities, such as the mobile terminal and the network.

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

4.1 Version 1.0

PCPS V1.0 has a limited scope, serving as a limited OMA PoC Enabler Update from the current version of PoC V2.1.

PCPS V1.0 updates PoC V2.1 to support 3GPP Release 12 LTE and relevant key features based upon completed 3GPP requirements up through Release 12.

PCPS V1.0 is synchronized to 3GPP Release 12, specifically excluding the following in progress Release 12 work:

- Group Communication System Enablers for LTE (GCSE_LTE)
- Proximity Services (ProSe)

PCPS V1.0 is synchronized to 3GPP Release 12, to specifically include the following:

- Adapt PoC V2.1 Multicast (currently using MBMS over UTRA) to use eMBMS over LTE
- Update PoC V2.1 SIP/IP Core operations to align with 3GPP Release 12 LTE architecture

The PCPS V1.0 architecture addresses the requirements of PCPS V1.0 enabler release as specified in [OMA-PCPS-RD].

4.1.1 Functional Entities

The PCPS V1.0 architecture includes the following functional entities:

- POC Client
- PoC Server (i.e. the Controlling PoC Function and the Participating PoC Function)
- UE PoC Box
- NW PoC Box
- PoC Interworking Function (external)
- PoC Interworking Agent (external)
- PoC Crisis Event Handling Entity
- External Media Content Server Retrieval Function

4.1.1.1 PoC Client

The PCPS V1.0 service supports the following functions for the PoC Client:

- registration/de-registration to the PCPS service
- Pre-established Session
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions, 1-many PoC Sessions and one-to-many-to-one PoC Sessions
- multiple PoC Group Sessions with multiple PoC Groups
- Media Burst Control procedures and Media Burst Control Protocol negotiation
- Media 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
- access to Contact Lists in List XDMS
- use of QoE Profiles
- PoC Session initiation including negotiation of Media other than PoC Speech
- 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
- Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, and Local Granted Mode
- operator specified warning message
- Discrete Media
- Moderated PoC Sessions
- PoC Session Control for Crisis Handling
- Limited Participant Information
- sharing of media content from External Media Content Server
- Multicast PoC
- multiple PoC Clients with the same PoC Address
- expanding duration of Media Burst transmitting
- Simultaneous Media Streams
- EMCS Retrieval function

4.1.1.2 Controlling PoC Function

The PCPS V1.0 service supports the following functions for the Controlling PoC Function:

- authorization of PoC Client
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions and 1-many PoC Sessions and one-to-many-to-one PoC Sessions
- multiple Group operation (i.e. Simultaneous PoC Sessions control)
- Media Burst Control Protocol and Media Burst Control Protocol negotiation;
- Media-floor Control procedures
- privacy for PoC User's PoC Address
- Group Advertisement
- access to Group information in PoC XDMS
- assignation and application of a QoE Profile for each PoC Session

- centralized Media distribution
- centralized Media Burst Control functionality including Sender Identification
- 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
- Media buffering capability negotiation, Limited Segment Media Buffer preload capability, Media Time Compression of buffered Media, PoC Media Traffic Optimisation and Local Granted Mode
- operator specified warning message
- Media Streaming Control
- Moderated PoC Groups
- PoC Session Control for Crisis Handling
- PoC Crisis Event handling
- Limited Participant Information
- sharing of media content from External Media Content Entity
- expanding duration of Media Burst transmitting
- search ongoing PoC Group Session

4.1.1.3 Participating PoC Function

The PCPS V1.0 service supports the following functions for the Participating PoC Function:

- authorization of PoC Client
- Pre-established Session
- PoC Session initiation, participation and termination for 1-to-1 PoC Sessions and 1-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
- supports Media Burst Control Protocol negotiation
- Media Burst Control Protocol
- privacy for PoC User's PoC Address
- Group Advertisement
- access to User Access Policy information in PoC XDMS for the purpose of access control
- supports application of a QoE Profile for each PoC Session;
- 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 Filtering of the Media streams in the case of Simultaneous PoC Sessions
- PoC Media Traffic Optimisation
- PoC Box handling
- operator specified warning message
- 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
- Incoming Media Stream Barring

4.1.2 Shared XDMS

The PCPS V1.0 service supports the following Shared XDMS functions as defined in [OMA XDM AD]:

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

4.1.3 Reference Points

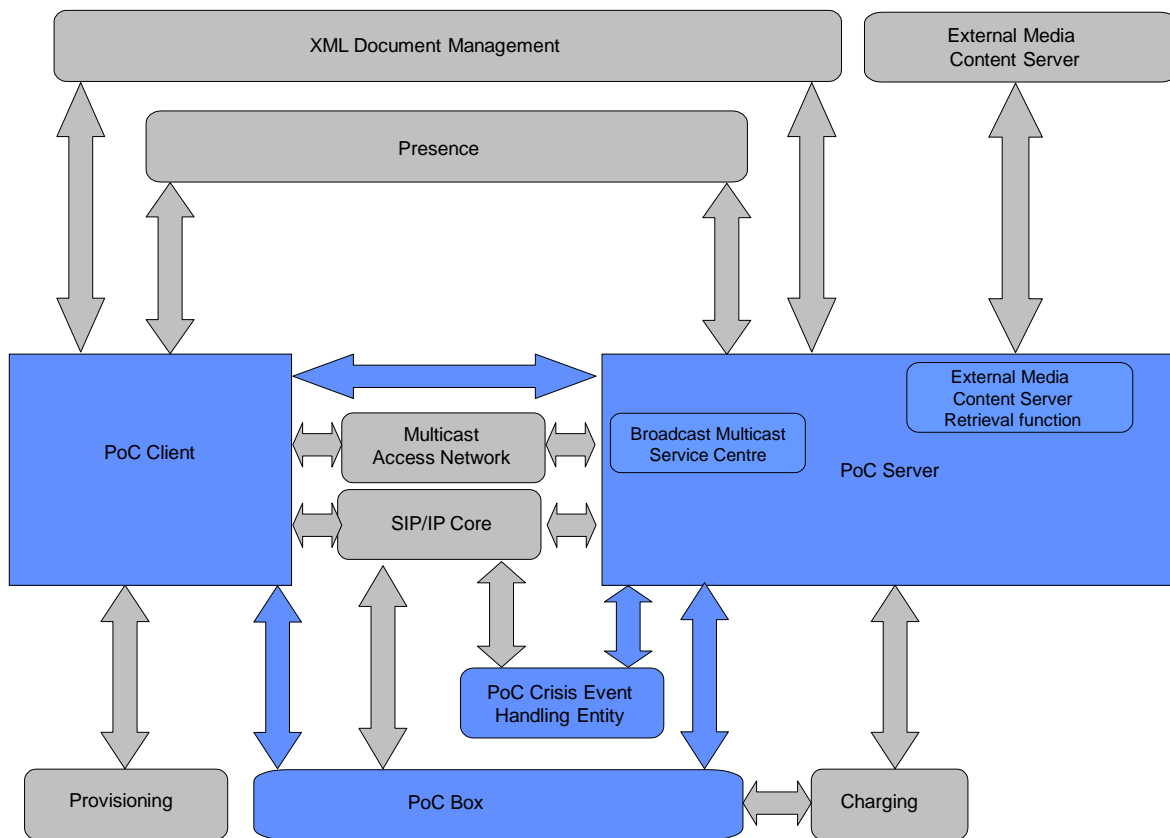
The PCPS V1.0 architecture includes the following reference points:

- POC-1, POC Client – SIP/IP Core
- POC-2, SIP/IP Core – PoC Server
- POC-3, PoC Client – PoC Server
- POC-4, PoC Server – PoC Server
- 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-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, PoC Server – Search Proxy
- XDM-1, XDM Client – SIP/IP Core
- XDM-2, XDMS – SIP/IP Core
- XDM-3, XDM Client – Aggregation Proxy
- XDM-4, Aggregation Proxy – XDMS
- XDM-5, XDM Client – Aggregation Proxy
- XDM-6, Aggregation Proxy – Search Proxy
- XDM-14, PoC Server – XDMS
- PRS-1, Presence Source – SIP/IP Core
- PRS-2, Watcher – SIP/IP Core
- PRS-3, SIP/IP Core – Presence Server
- PRS-5, Shared List XDMS – Presence Server
- PB-1, Aggregation Proxy – NW PoC Box
- IP-1, SIP/IP Core – SIP/IP Core
- IP-2, PoC Server - External Media Content Server
- DM-1, DM Client – DM Server
- CH-1, PoC Server – Offline Charging Entity
- CH-2, PoC Server – Online Charging Entity
- LI-1, Functional Entities – Law Enforcement Monitoring Facility

5. Architecture Model

The PCPS architecture is an evolution of the architecture described in [OMA PoC V2.1 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 Figure 2 "Interaction of PoC Functional Entities with External Entities."



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

Figure 2: Interaction of PoC Functional Entities with External Entities

The XML Document Management Enabler is described in [OMA XDM AD]. The XDM functional entities used by this version of the PCPS Enabler are the Aggregation Proxy (as specified in section 6.2.3 "Aggregation Proxy"), Search Proxy (as specified in section 6.2.14 "Search Proxy"), List XDMS (as specified in section 6.2.2.1 "List XML Document Management Server (XDMS)"), Group XDMS (as specified in section 6.2.2.2 "Group XML Document Management Server (XDMS)") and Policy XDMS (as specified in section 6.2.2.3 "Policy XML Document Management Server (XDMS)"). The PoC Server interacts with any of the XDM Servers over the POC-2, XDM-2, and XDM-14 reference points.

The Presence Enabler is described in [OMA Presence V2.0 AD]. The Presence functional entities are the Presence Server (as specified in section 6.2.4 "Presence Server"), Presence Source (as specified in section 6.2.5 "Presence Source"), and Watcher (as specified in section 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 PCPS SD] "*Presence*".

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]. When MBMS is used, BM-SC as defined in [3GPP TS 23.246] subclause 5.1 "Broadcast-Multicast Service Centre (BM-SC)" interacts with the Multicast Access Network for MBMS sessions management and transmission handlings and it serves as an entry point for MBMS bearer data transmissions within the PLMN. The PoC Server performing the Participating PoC Function either directly incorporates the BM-SC functionalities or makes use of the functionalities provided by a generic BM-SC in order to support Muticast PoC Channel using MBMS.

NOTE 1: The PCPS enabler does not specify the external BM-SC architecture.

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 PCPS SD] "*Registration*".

NOTE 2: Discovery is SIP/IP Core specific and out of scope of this specification.

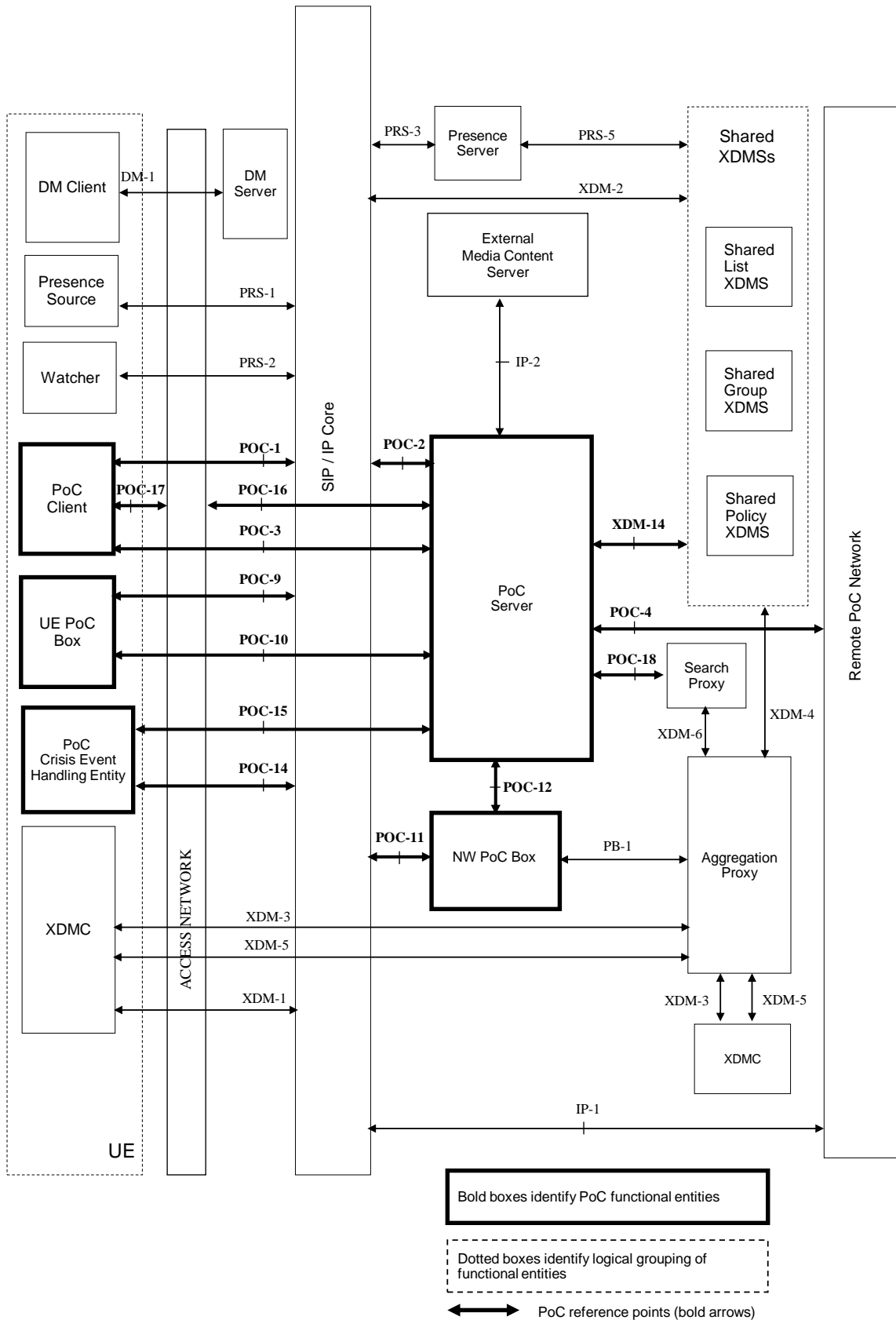
The Authentication/Authorization is described in the section 5.6 *Security Considerations*.

Security is described in the section 5.6 *Security Considerations*.

Charging functionality is described in section 5.7 *Charging Considerations*.

Provisioning functionality is described in [OMA PCPS SD] *PoC Service Provisioning*.

Figure 3 *PCPS Architecture* describes the functional entities and reference points that are involved in the support of the PCPS service.



Fig

Figure 3: PCPS Architecture

NOTE 1: XDMSs is a logical entity to map similar XDM Servers together for simplification as specified in [OMA XDM AD].

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

5.1 Dependencies

Certain protocol(s) is/are used for each reference point in PCPS V1.0 architecture, and protocols for some reference points are described in other Enablers as shown in 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

ReferencePoint	Usage	Protocol
POC-12	Media, Media Burst Control and Talk Burst Control between PoC Server and NW 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].
XDM-14	PoC Server to XDMSs (i.e., List XDMS, Group XDMS and 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] for UTRAN and [3GPP TS 36.331] for eUTRAN is used in the case of MBMS.
POC-18	Signalling for searching ongoing PoC Sessions	Limited XQuery over HTTP, see [OMA XDMAD]
XDM-1	XDMC to SIP/IP Core	See [OMA XDM AD]
XDM-2	Group XDMS to SIP/IP Core, List XDMS to SIP/IP Core and Policy XDMS to SIP/IP Core	See [OMA XDM AD]
XDM-3	XDMC to Aggregation Proxy	See [OMA XDM AD]
XDM-4	Aggregation Proxy to the Group XDMS, Aggregation Proxy to List XDMS, Aggregation Proxy to Policy XDMS	See [OMA XDM AD]
XDM-5	XDMC to Aggregation Proxy	See [OMA XDM AD]
XDM-6	Aggregation Proxy to Search Proxy	See [OMA XDM 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]
PRS-3	SIP/IP Core to Presence Server	See [OMA Presence V2.0 AD]
PRS-5	Group XDMS to Presence Server, List XDMS to Presence Server and 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 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

Table 1: Reference Points and Associated Protocols

NOTE: The Reference points POC-5, POC-6, POC-7, POC-8 and POC-13 are not used in the PCPS V1.0 architecture, see section 7 "*Description of the Reference Points*".

The access network used by the PCPS 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 section covers the general signaling principles to achieve backward compatibility. The feature specific backward compatibility is covered in the corresponding sections of [OMA PCPS 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 AD].

5.3 Architectural Diagram

The architectural diagram of the PCPS architecture is shown in Figure 3 *PCPS Architecture* of section 5 *Architecture Model*.

5.4 Functional Components and Interfaces/Reference Points Definition

The functional components of the PCPS architecture are defined in section 6 "*Description of Functional Entities*".

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

5.5 Flows

The flows are described in [OMA PCPS SD] "*High Level Procedures (Informative)*".

5.6 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.

5.6.1 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.

5.6.2 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].

5.6.3 XDM Security

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

5.6.4 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. Section 5.6.1 *SIP Signalling Security*, 5.6.2 *User Plane Security*, and 5.6.3 *XDM Security* apply.

5.7 Charging Considerations

A simplified diagram showing the online charging system, charging collection functions and the PoC related interfaces, is shown in Figure 4 *Architecture for PCPS Specific Charging*. Charging information, relating to PoC usage, may also be gathered from other access network entities using existing interfaces.

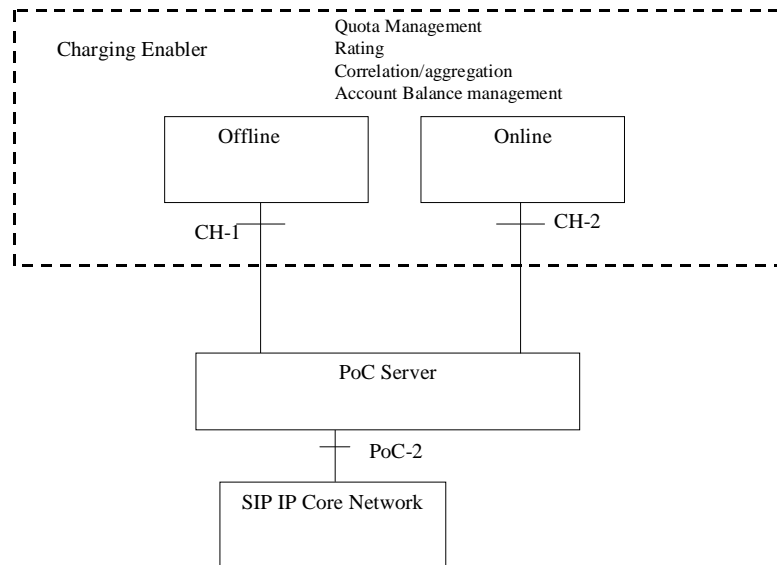


Figure 4: Architecture for PCPS Specific Charging

NOTE: The interfaces for NW PoC Box are out of scope of this specification.

The Charging Enabler supports both online and offline charging methods. For either method, any of the charging functions listed may be applied by the Charging Enabler, and also provides a method for determining whether online or offline charging should be used in a given situation.

PoC Server SHALL have the capability to send offline accounting information about PCPS service events to the charging enabler using CH-1 interface. For 3GPP/3GPP2 IMS compliant core networks the CH-1 interface SHALL conform to the Rf interface as specified in [3GPP TS 32.272]. SIP/IP Core entities, may also use the CH-1 interface to send offline accounting information pertaining to individual PoC Sessions. The address of the Charging Data Function to be used for one side of the PoC Session (either originating or terminating) is distributed in IMS based systems via SIP signalling as described in [3GPP TS 24.229].

PoC Server SHALL have the capability to send online accounting information about PCPS service events to the charging enabler using CH-2 interface. It SHALL be possible for the PoC Server to perform credit control interactions using the CH-2 interface to the online charging system. For 3GPP/3GPP2 IMS compliant core networks the CH-2 interface SHALL conform to the Ro interface as specified in [3GPP TS 32.272]. The address of the Online Charging Function to be used for one side of the PoC Session (either originating or terminating) is distributed in IMS based systems via SIP signalling as described in [3GPP TS 24.229].

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, Still-alive and fast PoC Session establishment;
- 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 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 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;
- support configuration of various documents e.g. criteria for PoC Box invocation, etc; and,
- support PoC Session search.

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 section 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 5 "Relationship between Controlling PoC Function, Participating PoC Functions and the PoC Clients" shows the distribution of the functionality during a 1-to-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.

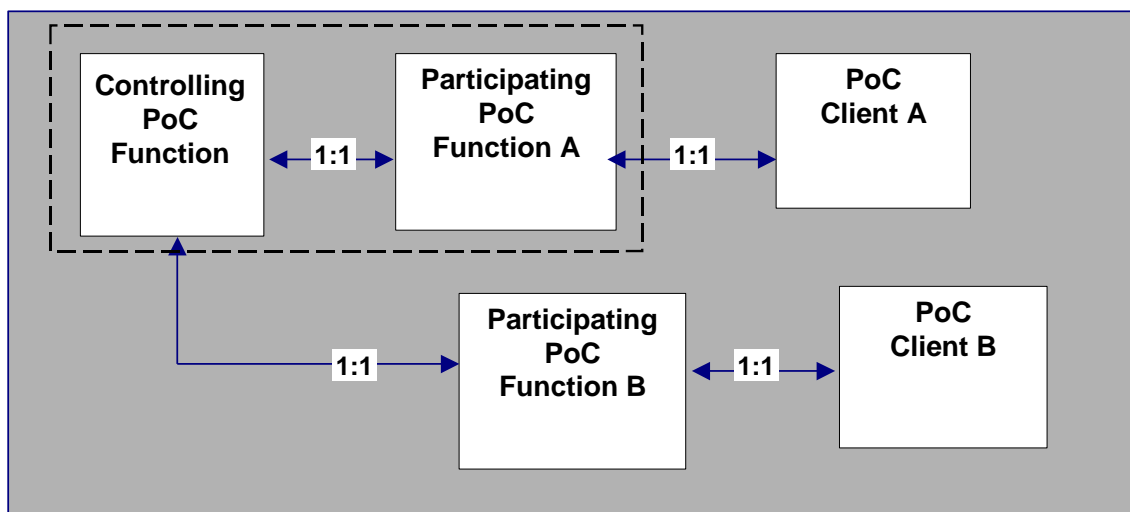


Figure 5: Relationship between Controlling PoC Function, Participating PoC Functions and the PoC Clients

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-to-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 in its own domain 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.

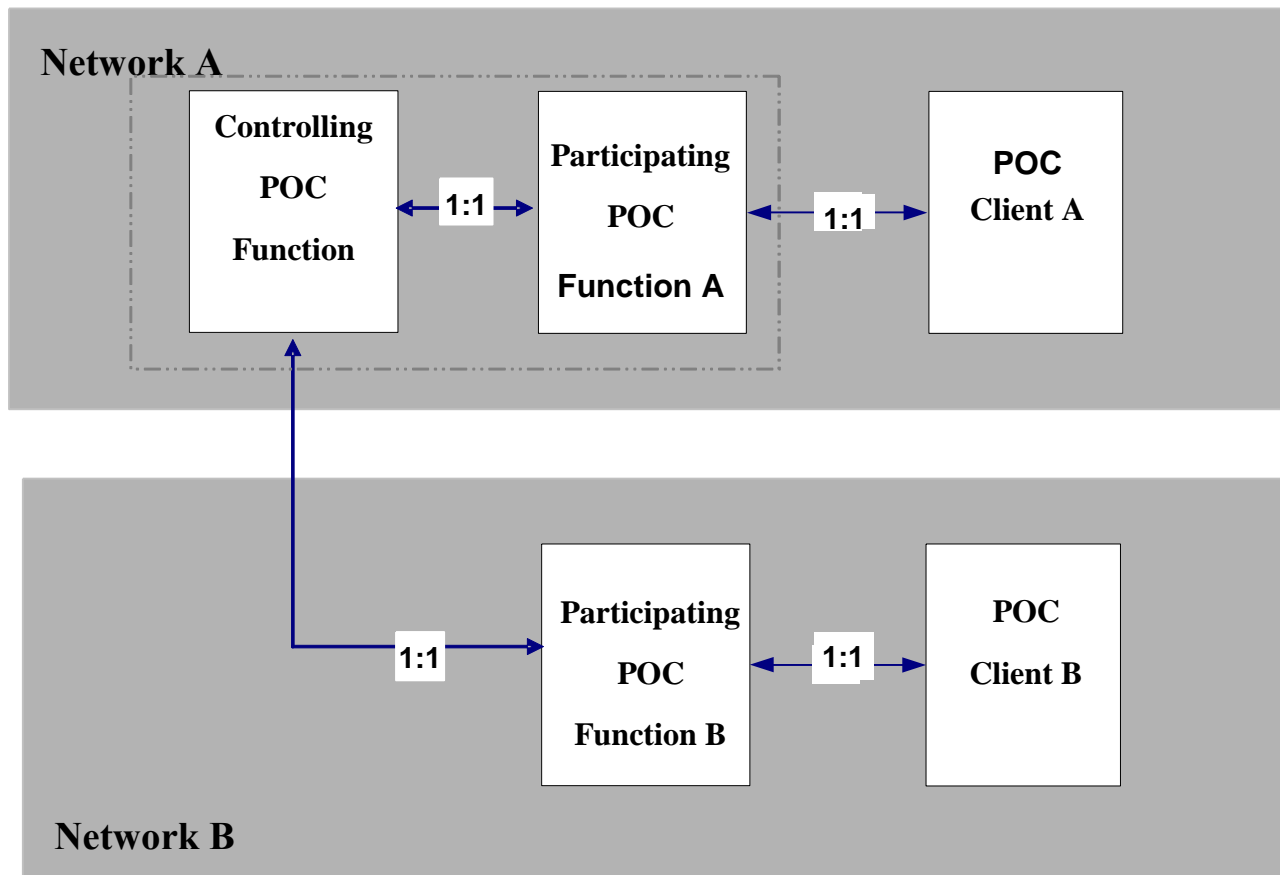


Figure 6: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for 1-to-1 PoC Session

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 6 "Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for 1-to-1 PoC Session" shows the distribution of the functionality during a 1-to-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 Function 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 7 "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.

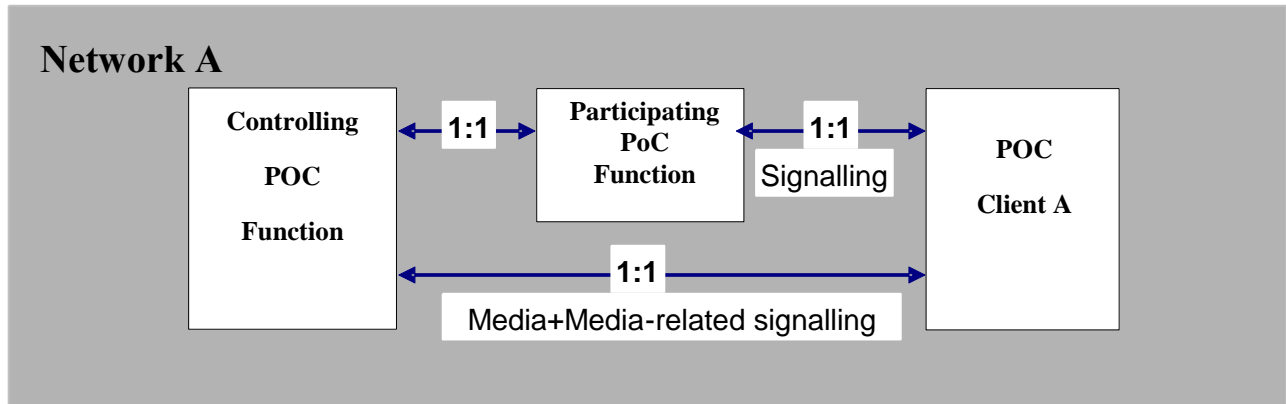


Figure 7: Direct Media flow between Controlling PoC Function and PoC Client

Figure 8 "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.

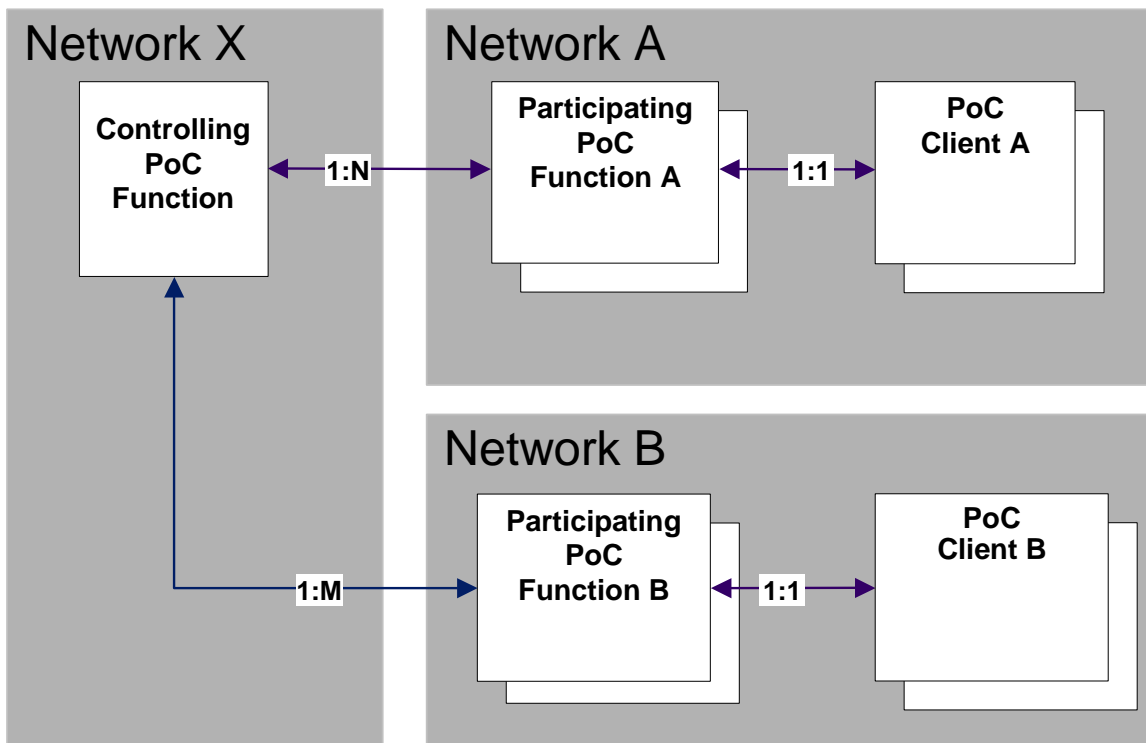


Figure 8: Relationship between the Controlling PoC Function, Participating PoC Function and PoC Clients for the PoC Group Session

NOTE: In Figure 8 "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 8 "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 9 "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.

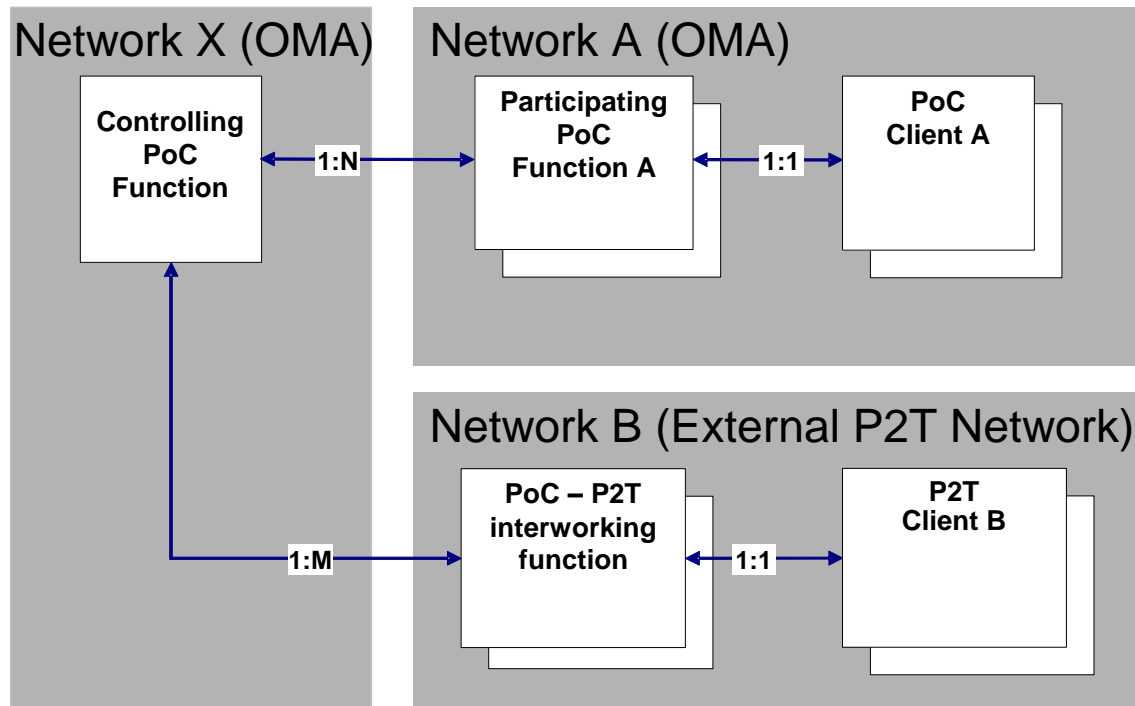


Figure 9: Relationship between the Controlling PoC Function, Participating PoC Function, and an External P2T Network

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.
- Fetches content from the EMCS, and may be able to use the address of an indirection entity to help identify the EMCS; Act as a Media Streaming Control protocol peer with each PoC Client that has negotiated media streaming control.

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 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 and signal to the PoC Server performing the Controlling PoC Function the address of an indirection entity associated with an EMCS that the PoC Server can use to identify the EMCS, if the PoC Server performing the Participating PoC Function is configured to identify such an indirection entity; 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 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;
- provide PoC Media Traffic Optimisation functionality; and,
- support performance enhancements such as Still-alive and fast PoC Session establishment.

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

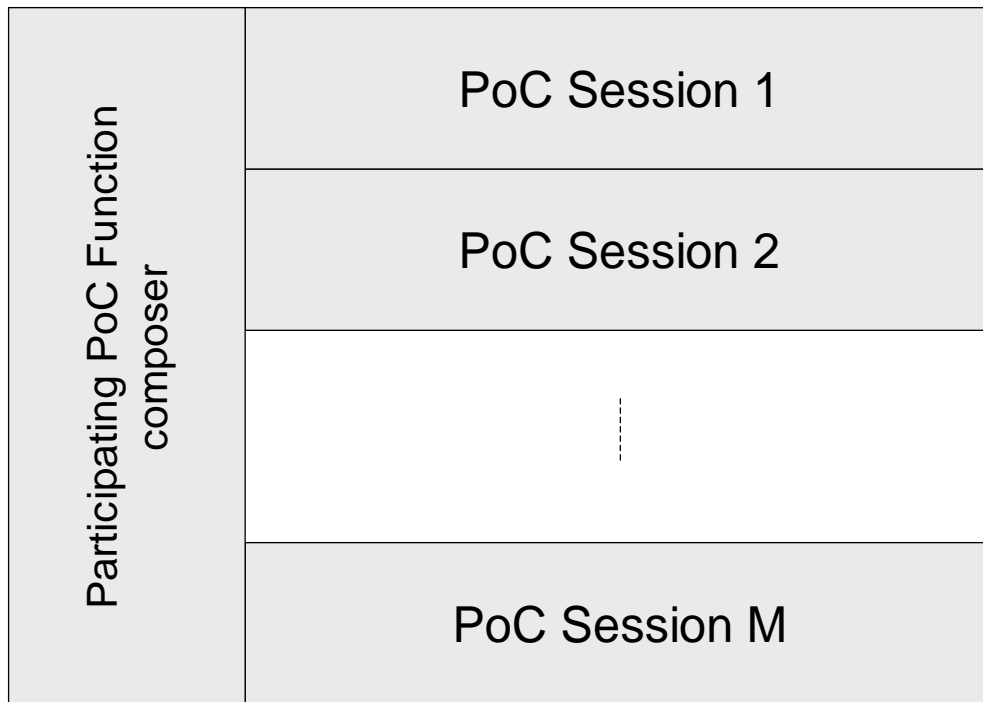


Figure 10: Participating PoC Function with Simultaneous PoC Session Support (Informative)

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

- policy enforcement for PoC Sessions (e.g. Access Control, availability status, ...);
- 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 11 "*Multicast PoC Agent Structure (Informative)*" shows how the Participating PoC Function could be modeled to handle Multicast PoC.

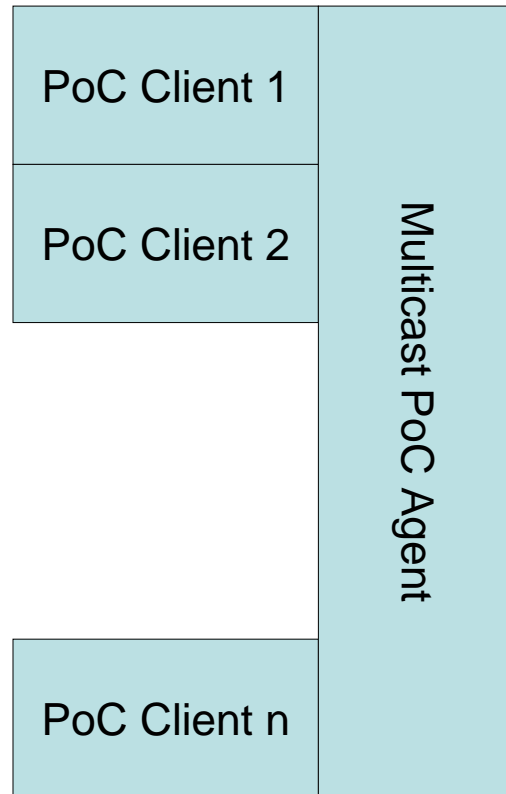


Figure 11: Multicast PoC Agent Structure (Informative)

When the Participating PoC Function supports Multicast PoC and when Participating PoC Function is modeled as shown in Figure 11 "*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 [RFC6665]. 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:

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

The PoC Server MAY support the following XDM functions:

- Handling search for ongoing PoC Sessions.

The details are specified in [OMA XDM AD].

6.1.4 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.

6.1.5 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.

6.1.5.1 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.

6.1.6 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);
 - 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).

6.1.7 EMCS Retrieval Function

The EMCS Retrieval Function supports conveying Media from an EMCS to the Participants of a PoC Session. The EMCS Retrieval function is a logical, abstract functional entity of the PoC Server performing the Controlling PoC Function. The EMCS Retrieval function is used as an aid to explain EMCS Retrieval functionalities of the PoC Server performing the Controlling PoC Function.

An EMCS Retrieval function performs the following logical tasks:

- provides SIP Session handling, such as SIP Session origination, release, etc.;
- provides Media Burst Control procedures and Media Burst Control Protocol negotiation;
- provides initiation of sharing of media content from an EMCS; and,
- provides Media Streaming Control.

The EMCS Retrieval function logically access an EMCS via the IP-2 reference point.

The EMCS Retrieval function residing external to the PoC Server performing the Controlling PoC Function is outside the scope of this specification.

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 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. PCPS and IM), and are stored in logical entities called XDMSs. The PCPS Enabler uses three types of XDMSs: List XDMS, Group XDMS and Policy XDMS.

6.2.2.1 List XML Document Management Server (XDMS)

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

This Entity is described in [OMA XDM AD].

NOTE: In the PoCv1.0 Enabler, this functional Entity is called Shared XDMS and in PoC V2.0 Enabler it is called Shared List XDMS.

6.2.2.2 Group XML Document Management Server (XDMS)

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

This Entity is described in [OMA XDM AD].

NOTE 1: In the PoCv1.0 Enabler, the Group document is called PoC Group and is stored in the PoC XDMS.

NOTE 2: In the PoCv2.0 Enabler, this functional Entity is called Shared Group XDMS.

6.2.2.3 Policy XML Document Management Server (XDMS)

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

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

NOTE 1: In the PoCv1.0 Enabler, the User Access Policy document is called PoC User Access Policy and is stored in the PoC XDMS.

NOTE 2: In PoC V2.0 Enabler, this functional Entity is called the Shared Policy 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 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.

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 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 section 5.6 *Security Considerations*.

The multicast/broadcast access network need to:

- Support multicast/broadcast functionality.
- Support IP datagram routing.
- Support security as specified in section 5.6 *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 (EMCS)

The External Media Content Server is an Entity whose realization is outside the scope of OMA specifications. The EMCS can be located within the PoC service provider domain or outside the PoC service provider domain.

The media content in the External Media Content Server is accessed over the IP-2 reference point.

NOTE 1: The protocol for fetching Media from External Media Content Server is out of scope of PoC specification.

NOTE 2: The protocol, for example, can be RTSP or HTTP.

6.2.14 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 AD].

7. Description of the Reference Points

The reference point descriptions in the following sections detail what has to be supported for each reference point. These sections do not indicate if the presented functionalities are optional or mandatory for the corresponding network elements.

The following reference points: POC-5, POC-6, POC-7, POC-8 and POC-13 were specified in the PoC V1.0 enabler, but are not used in the PCPS V1.0 architecture. As a result these references points are not described in this document.

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 section 5.6.2 *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 a 3GPP Core Network is used, the PoC-3 reference point SHALL use the services of the Gi/SGi reference points [3GPP TS 23.002] in conjunction with the Uu interface [3GPP TS 23.002] for unicast services while for broadcast services the Uu and Gi/SGi-mb [3GPP TS 23.002] reference points SHALL be used. When a 3GPP2 Core Network is used, the PoC-3

reference point SHALL use the services of the Um and Pi reference points [3GPP2 S.R0005-B] for unicast services while for broadcast/multicast services the Um and BSN-BCMCS Content Server interface [3GPP2 X.S0022-A] SHALL be used.

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 XDM-1: XDM Client – SIP/IP Core

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

7.6 Reference Point XDM-2: XDMS – SIP/IP Core

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

7.7 Reference Point XDM-3: XDM Client – Aggregation Proxy

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

7.8 Reference Point XDM-4: Aggregation Proxy – XDMSs

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

7.9 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].

7.10 Reference Point PRS-2: Watcher – SIP/IP Core

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

7.11 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].

7.12 Reference Point PRS-5: Shared List XDMS – Presence Server

The functionality of the PRS-5 reference point is specified in [OMA Presence V2.0 AD].

NOTE: The Shared List XDMS referred to in [OMA Presence V2.0 AD] is renamed to List XDMS according to [OMA XDM AD].

7.13 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].

7.14 Reference Point C-5: PoC Server – Charging Entity

For the PCPS V1.0 Enabler Release and PoC Enabler Releases V2.0 and V2.1, 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 sections 7.14.1 "*Reference Point CH-1: PoC Server – Offline Charging Entity*" and 7.14.2 "*Reference Point CH-2: PoC Server – Online Charging Entity*".

7.14.1 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].

7.14.2 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].

7.15 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].

7.16 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].

7.17 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.

7.18 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].

7.19 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 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].

7.20 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].

7.21 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].

7.22 Reference Point XDM-14: PoC Server –XDMSs

The XDM-14 reference point supports communication between the PoC Server and the XDMSs (i.e., the List XDMS, the Group XDMS and the Policy XDMS). The protocol for the XDM-14 reference point is XCAP.

The XDM-14 reference point SHALL support XDM Servers compliant with the earlier versions of XDM Enabler Release.

The XDM-14 reference point SHALL provide one or more of the following functions:

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

The functionality of the XDM-14 reference point is specified in [OMA XDM AD].

7.23 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].

7.24 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].

7.25 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 a 3GPP Core Network is used, the POC-16 reference point SHALL use the services of the Gmb/SGmb reference point [3GPP TS 23.002]. When a 3GPP2 Core Network is used, the PoC-16 reference point SHALL use the services of the A10/A11 interface [3GPP2 A.S0019-A_v1.0].

7.26 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.

The POC-17 reference point SHALL use the services of the Uu reference point [3GPP TS 23.002] and Um reference point [3GPP2 X.S0013.2].

7.27 Reference Point POC-18: PoC Server – Search Proxy

The POC-18 reference point is between the PoC Server and the Search Proxy. The protocol for the POC-18 reference point is Limited XQuery over HTTP. Limited XQuery over HTTP is used for signalling search requests and related responses.

The POC-18 reference point SHALL support:

- PoC Session Search procedures.

7.28 Reference Point XDM-5: XDMC – Aggregation Proxy

The functionality of the XDM-5 reference point is specified in [OMA XDM AD].

7.29 Reference Point XDM-6: Aggregation Proxy – Search Proxy

The functionality of the XDM-6 reference point is specified in [OMA XDM AD].

7.30 Reference Point IP-2: PoC Server – EMCS

The IP-2 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 PCPS SD] "*System Concepts*".

9. High Level Procedures (Informative)

The high level procedures are described in [OMA PCPS SD] "*High Level Procedures (Informative)*".

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-AD-PCPS-V1_0-20170124-A	24 Jan 2017	Status changed to Approved by TP TP Ref # OMA-TP-2017-0001-INP_PCPS-V1_0_ERP_for_Final_Approval

Appendix B. Guidelines for Preparing Flow Charts (Informative)

The Appendix B Guidelines for preparing flow charts is described in [OMA PCPS 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

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.