Push to Communicate for Public Safety Multicast
Candidate Version 1.0 – 20 Feb 2015

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1. Scope

This document defines the procedures of a PoC Client and a PoC Server when using multicast/broadcast access technology in a Push to talk over Cellular (PoC) session to distribute Media.

Example detailed signaling flows for the reference points POC-1, POC-2, POC-3, POC-16 and POC-17 defined in [OMA-PCPS-AD] are included in Appendix C "*Examples of signalling flows*".

This Multicast specification is based on the procedures specified in [OMA-PCPS-SD].

The SIP Session handling, such as SIP Session establishment and release are described in [OMA-PCPS-CP].

Signalling procedures for Multicast PoC over the PoC-3 are partly described in this document and partly described in [OMA-PCPS-UP].

2. References

2.1 Normative References

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2.2 Informative References

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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 [OMADICT] and the following terms and definitions apply.

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].
Common Terminal Endpoint Identifier	Identifies the endpoint of a tunnel in the receiving GTP-U entity for a specific UDP/IP endpoint (see [3GPP TS 29.281]).
Continuous Media	Media with an inherent notion of time (e.g., PoC Speech, audio, and video).
Control Plane	The specification of the signalling between PoC Client and PoC Server, between PoC Box and PoC Server and between PoC Servers for the Push to talk over Cellular (PoC) service.
Core Network	An architectural term relating to the part of 3GPP/3GPP2 System which is independent of the connection technology of the terminal.
Discrete Media	Media that itself does not contain an element of time (e.g. images, text).
File Delivery Table	See, [BCAST Distribution]
Forward Error Correction	See, [BCAST Distribution]
Home PoC Network	A network comprising of a Home PoC Server and SIP/IP Core operated by the PoC User's PoC Service Provider. The Home PoC Network is the same as the Home Network defined in 3GPP/3GPP2 IMS specifications.
Home PoC Server	The PoC Server of the PoC Service Provider that provides PoC service to the PoC User.
MBMS Client	A function in the PoC Client capable of interacting with a Multicast Access Network based on the MBMS technology.
MBMS Service Area Identity	Anidentifier that identifies a group of cells within a PLMN independent of the associated Location/Routing/Service Areas and the physical location of the cell(s) [3GPP TS 23.003].
Media Burst Control	Media Burst Control is a control mechanism that arbitrates requests from the PoC Clients, for the right to send Media and Multimedia.
Media Parameters	Media Parameters are SIP/SDP based information exchanged between the PoC Server and the PoC Client specify the characteristics of the Media for a PoC Session being established or that already exists.
Media Streaming Control	A Media Type allowing Participants to control a Continuous Media stream using RTSP in a PoC Session.
Media Type	Media Types are either realtime or non-realtime, like: - PoC Speech - Audio (e.g. music) - Video - Discrete Media (e.g. still image, formatted and non-formatted text, file) - Media Streaming Control (RTSP)
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 Steams 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 • audiovisual • video plus subtitles Multimedia from a single source that involves real-time Media Types is assumed to be synchronized.
Participating PoC Function	A function implemented in a PoC Server, which provides PoC Session handling, which includes policy enforcement for incoming PoC Sessions and relays Talk Burst Control and Media Burst Control messages between the PoC Client and the PoC Server performing the Controlling PoC Function. The Participating PoC Function may also relay RTP Media between the PoC Client and the PoC Server performing the Controlling PoC Function.
PoC Client	A functional entity that resides on the User Equipment that supports the PoC service.
PoC Media Traffic Optimisation	A mechanism for reducing PoC Media traffic via the PoC-4 reference point.
PoC Server	A network element, which implements the 3GPP/3GPP2 IMS application level network functionality for the PoC service. A PoC Server can perform the role of the Controlling PoC Function or Participating PoC Function, or both at the same time.
PoC Service Provider	A PoC Service Provider provides PoC Service – on its own or in conjunction with other Value Added Services – to his PoC Subscribers.
PoC Session	A PoC Session is a SIP Session established by the procedures of this specification. This specification supports the following types of PoC Sessions: 1-1 PoC Session, Ad-hoc PoC Group Session, Pre-arranged PoC Group Session, and Chat PoC Group Session.
PoC Subscriber	Is one whose service subscription includes the PoC service. A PoC Subscriber can be the same person as a PoC User.
PoC User	A User of the PoC service. A PoC User can be the same person as a PoC Subscriber. A PoC User uses the PoC features through the User Equipment.
RRC_CONNECTED	A state that occurs when a UE establishes an RRC connection (in eUTRAN).
Sender Identification	The procedure by which the identity of the current Media sender is determined and made known to receivers on the PoC Session.
Service Provider Policy	Service Provider Policy refers to the overall policy conditions actually selected by a service provider(s) for commercial implementation of a PoC service. Service Provider Policy is established based on commercial considerations, which may concern, e.g. support/non-support of certain network or client capabilities or service features within a network. Service Provider Policy is applicable only to the network or subscribers over which the service provider has control.
System Information Block Type 1	System Information Block Type 1 (in eUTRAN) is broadcast on the BCCH and contains information related to cell access including the cell identity, a PLMN identity list and other system information.
System Information Block Type 13)	System Information Block Type 13 (in eUTRAN) is broadcast on the BCCH and contains information needed to acquire information about the MCCHs which are available.
Transport Object Identifier	See, [BCAST Distribution]
User	Any entity that uses the described features through the User Equipment.
User Equipment	A hardware device that supports a PoC Client e.g., a wireless phone

3.3   Abbreviations

3GPP	3rd Generation Partnership Project
ALC	Asynchronous Layered Coding

NOTE: Asynchronous Layered Coding is defined in [RFC3450].

AVP	Attribute-Value Pair
BCCH	Broadcast Control Channel
BCMCS	Broadcast and Multicast Service
BM-SC	Broadcast Multicast Service Centre
BSS	Base Station System
B-TID	Bootstrapping Transaction Identifier, see [3GPP TS 33.220]
CEA	Capability-Exchange-Answer, see [RFC3588].
CER	Capability-Exchange-Request, see [RFC3588].
C-TEID	Common Tunnel Endpoint Identifier, see [3GPP TS 29.281]
DVB-H	Digital Video Broadcast - Handheld
eNB	Evolved Node B
EPS	Evolved Packet System
eUTRAN	Evolved UMTS Terrestrial Radio Access Network
FDT	File Delivery Table
FEC	Forward Error Correction
FLUTE	File deLivery over Unidirectional Transport, see [RFC3926].
GGSN	Gateway GPRS Service Node
GPRS	General Packet Radio System
GSNs	SGSN/GGSN nodes
GTP	GPRS Tunneling Protocol
GTP-C	GPRS Tunneling Protocol, Control Part
GTP-U	GPRS Tunneling Protocol, User Part
GTPv1	GPRS Tunneling Protocol, version 1, see [3GPP TS 29.281]
LCT	Layered Coding Transport

NOTE: Layered Coding Transport is defined in [RFC3451].

MBCP	Media Burst Control Protocol, see [OMA-PCPS-UP].
MBMS	Multimedia Broadcast/Multicast Service
MBMS-GW	Multimedia Broadcast/Multicast Service Gateway
MCC	Mobile Country Code
MCCH	MBMS point-to-multipoint Control Channel
MICH	MBMS Indication Channel
MME	Mobility Management Entity, see [3GPP TS 23.401]
MNC	Mobile Network Code
MRB	MBMS Point to Multipoint Radio Bearer
MSCH	MBMS point-to-multipoint Scheduling Channel
OMA	Open Mobile Alliance
PCF	Packet Control Function
PDN	Packet Data Network
PDSN	Packet Data Service Node

PGW	PDN Gateway
PLMN	Public Land Mobile Network
PoC	Push to talk Over Cellular
RAA	Re-Auth-Answer, see [3GPP TS 29.061].
RAN	Radio Access Network
RANAP	Radio Access Network Application Protocol specified in [3GPP TS 25.413]
RAR	Re-Auth-Request, see [RFC3588].
RNC	Radio Network Controller
RRC	Radio Resource Control, see [3GPP TS 25.331], [3GPP TS 36.331]
RRM	Radio Resource Management
SGSN	Service GPRS Support Node
SGW	Serving Gateway
TBCP	Talk Burst Control Protocol, see [OMA-PCPS-UP].
TCP	Transmission Control Protocol
TMGI	Temporary Mobile Group Identifier, see [3GPP TS 26.346].
TOI	Transport Object Identifier
UE	User Equipment
UTRAN	Universal Terrestrial Radio Access Network

4. Introduction

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.

This specification describes how Multicast PoC applies to PoC Group Sessions. Multicast PoC is optional for the PoC Server and the PoC Client.

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 enabler supports:

- Notification of the availability of a Multicast PoC Channel during a PoC Session

- Distribution of Continuous Media over the Multicast PoC Channel

- Distribution of Discrete Media over the Multicast PoC Channel

- File repair

This specification defines procedures for both MBMS over UTRA and eMBMS over eUTRA as the underlying multicast/broadcast radio access technologies.

4.1.1 Overview

Mission critical application sometimes requires that many people are located in the same geographical area. For example: fire-fighters trying to put out a fire, or security guards at a big sports event. In those occasions it is very important that there are undisturbed communications.

In order to guarantee undisturbed communications the multicast/broadcast capabilities of radio access networks can be utilized.

The multicast/broadcast radio access network can use different access technologies than the radio access network used for unicast. Examples on multicast/broadcast radio access technologies are: MBMS, BCMCS, and DVB-H. The multicast/broadcast capability in a PoC Session is referred to as the Multicast PoC Channel in this and other PoC specifications.

The decision to use a Multicast PoC Channel in a PoC Session is taken by the PoC Server performing the Participating PoC Function based on a local policy in the PoC Server. The Multicast PoC Channel can be started during the ongoing PoC Session. One Multicast PoC Channel can be shared by several PoC Sessions.

The Multicast PoC Channel can be started in one or more radio network cells at the same time.

The Multicast PoC Channel requires support in the PoC Server performing the Participating PoC Function, in the access network and in the PoC Client. A PoC Client that does not support Multicast PoC or is out of range of the Multicast PoC Channel receives Media as a unicast Media stream.

Figure 1 "*PoC Group Session using a Multicast PoC Channel*" shows a PoC Session utilizing the multicast/broadcast capabilities of the radio network.
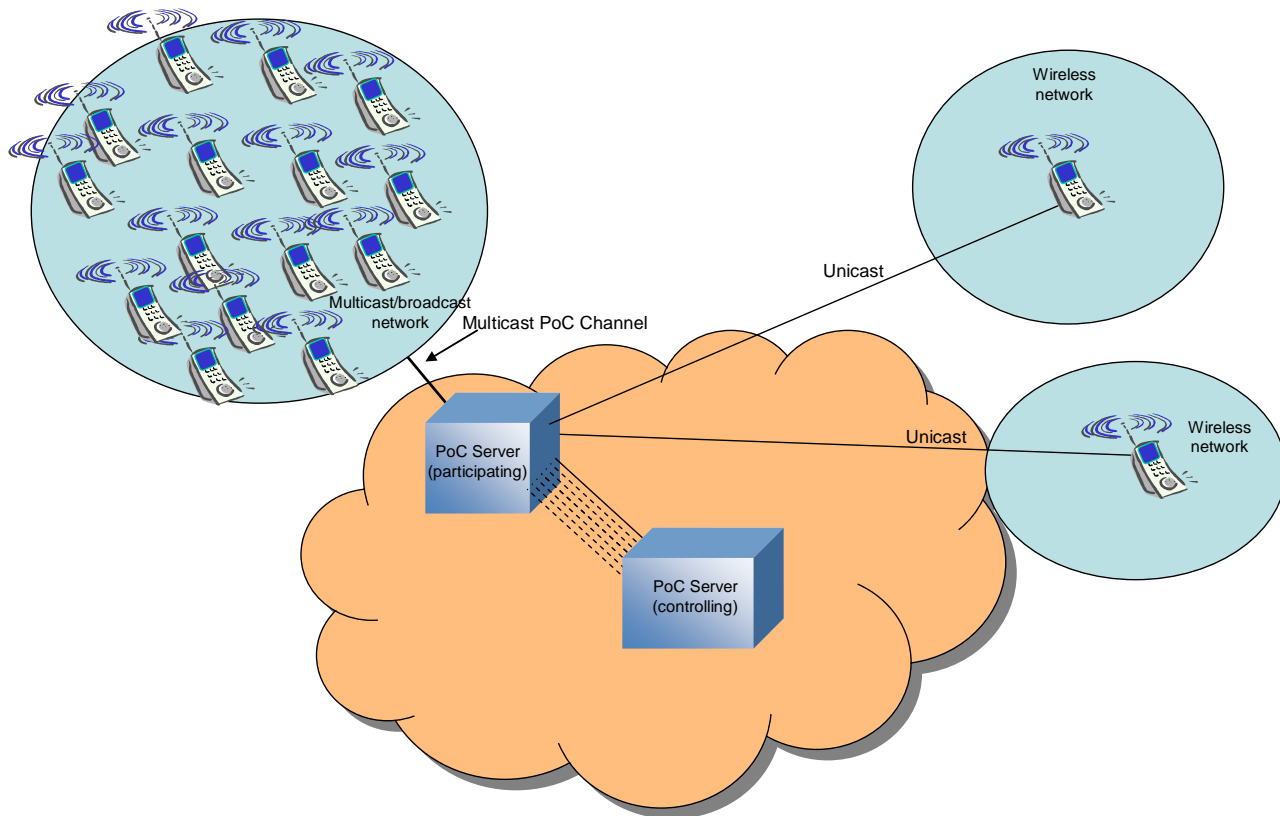
Figure 1: PoC Group Session using a Multicast PoC Channel.

In the figure the PoC Server performing the Participating PoC Function is using a Multicast PoC Channel towards a group of PoC Clients in the PoC Session while two of the PoC Clients are connected via a unicast connection. The PoC Server performing the Participating PoC Function can use the Traffic Optimisation function as described in [OMA-PCPS-CP] towards the PoC Server performing the Controlling PoC Function in order to reduce the Media Streams between the PoC Servers.

The steps to establish a Multicast PoC Channel are as follows:

1. A PoC Session is established as described in the [OMA-PCPS-CP];

2. The PoC Server performing the Participating PoC Function starts the Multicast PoC Channel as described in this document;

3. The PoC Server performing the Participating PoC Function announces the Multicast PoC Channel to the PoC Clients as described in this document;

4. The PoC Client connects to the Multicast PoC Channel when it is available in the radio network as described in this document; and,

5. The PoC Client and the PoC Server performing the Participating PoC Function negotiates the use of the Multicast PoC Channel as described [OMA-PCPS-CP] with the Media Parameters described in this document.

Once the Multicast PoC Channel is started the PoC Server performing the Participating PoC Function starts sending Media towards the Multicast Address selected for Multicast PoC Channel. Media Streams and TBCP/MBCP messages sent over the Multicast PoC Channel are encrypted. If no PoC Client has yet connected to the Multicast PoC Channel Media is buffered and is discarded by the radio access network when the buffer is full.

The Multicast PoC Channel can be stopped by the PoC Server performing the Participating PoC Function at any point in an ongoing PoC Session based on local policy or when the last PoC Session using the Multicast PoC Channel is released.

The PoC Client can disconnect from the Multicast PoC Channel at any point during the PoC Session, e.g. because the PoC Client is moving in to an area where the Multicast PoC Channel is not available or when the PoC Client leaves the PoC Session.

When the PoC Client switches from the Multicast PoC Channel to the normal unicast RTP Session or to the MSRP session the PoC Client, if possible, ensures that a minimum of disturbance occurs by staying connected to the Multicast PoC Channel until a new Media session is negotiated and the Media Stream is received over the normal unicast RTP Session or the MSRP session instead.

When the PoC Client switches from the normal unicast RTP Session or from the MSRP Session to the Multicast PoC Channel the PoC Client ensures that a minimum of disturbance occurs by staying connected to the normal unicast RTP Session or to the MSRP session until a new Media session is negotiated and the Media Stream is received over the Multicast PoC Channel instead.

5. Common functions

This subclause describes functionality common to different access technologies

Note that a legacy (i.e., backwards compatible) mode of operation with respect to the behavior defined by some RFCs referenced in this document is specified herein. The PoC functional entities will employ legacy behavior with regards to:

-references in this specification to the rules and procedures of RFC6086 that don't employ SIP INFO packages (i.e., employ "legacy INFO usage" as described in RFC6086).

5.1   PoC User plane security

PoC User Plane security provides confidentiality protection of individual Media Streams and TBCP/MBCP messages in PoC Sessions independent of access technology. The PoC Multicast protection is based on 3GPP MBMS security solution including GAA/GBA bootstrapping, data confidentiality and key distribution as defined in [3GPP TS 33.220] and [3GPP TS 33.246].

5.1.1   Providing a User Key

The PoC Client supporting Multicast PoC SHALL invoke the GBA/GAA procedure as specified in [3GPP TS 33.220] to authenticate the PoC User and to retrieve the PoC User individual user key.

As a successful result of the GBA/GAA procedure the client MAY initiate a PoC Session as defined in subclause 6.1.1 "*General*".

The PoC Server supporting Multicast PoC SHALL authenticate the PoC User and retrieve PoC User individual user key to protect the session key when distributing the session key to PoC Clients participating in a PoC Session.

5.1.2   Generation and distribution of the session key

The PoC Server performing the Participating PoC Function SHALL generate the session key using the Pseudo-random number generating function (PRF) as specified in MIKEY [RFC3830] or other pseudo-random number generators.

In order to obtain the session key generated by the PoC Server the PoC Client:

1.   SHALL include in the SIP UPDATE request an Authorization header containing the 'Digest username' with the value "(B-TID)" and 'realm' with the value in which the host name part value is "3GPP-bootstrapping" and the domain name part value is the domain name which the PoC Server belongs to, e.g., "poc-serverA.networkA.net".

At reception of a SIP UPDATE request the PoC Server performing the Participating PoC Function:

1.   SHALL, using the B-TID received as the 'Digest username' and realm contained in the Authorization header, authenticate the PoC Client and extract the user key from the BSF as specified in [3GPP TS 33.220];

2.   SHALL encrypt the generated session key with the user key as the pre-shared key as specified in [RFC 3830] and include the MIKEY message in the " a=key-mgmt:mikey" attribute as specified in [RFC4567]; and,

3.   SHALL include in the MIME SDP body of the SIP 200 "OK" response the session key protected with user key as defined in [3GPP TS 33.246].

At reception of a SIP 200 "OK" response to the SIP UPDATE request including a session key in SDP parameter the PoC Client:

1.   SHALL, using the user key, extract from the " a=key-mgmt:mikey" attribute value the session key as specified in [RFC4567]; and,

NOTE 1: The "a=key-mgmt:mikey" is defined in [RFC4567] "*Integration of MIKEY*".

2. SHALL cache the session key (any previous cached session key is overwritten).

NOTE 2: When a new session key replacing the old session key is obtained by all PoC Clients the PoC Server performing the Participating PoC Function removes the old session key from the MIKEY message.

5.1.3 Generation and distribution of the traffic key

When a RTP Media Stream is sent over the Multicast PoC Channel and PoC Clients are connected to the Multicast PoC Channel the Participating PoC Function on a regular base:

1. SHALL generate a traffic key using the Pseudo-random number generating function (PRF) as specified in MIKEY [RFC3830] or other pseudo-random number generators;

2. SHALL encrypt the traffic key with the session key as the pre-shared key as specified in [RFC 3830];

3. SHALL include the encrypted traffic key in a MIKEY message as specified in [RFC3830]; and,

4. SHALL send on regular bases the MIKEY message over the Multicast PoC Channel in UDP transport using the same port as the RTP Media Stream, which is announced in the SDP during announcement of the start of Multicast PoC Channel, see subclause 6.1.2.1 "*Announcement of the start of a Multicast PoC Channel*".

NOTE 1: When the session key is changed the PoC Server performing the Participating PoC Function encrypts the traffic key with the new session key and includes the encrypted traffic key in the MIKEY message.

At reception of the MIKEY message over the RTP Media stream the PoC Client:

1. SHALL decrypt the traffic key contained in the MIKEY message using the stored session key;

2. SHALL cache the traffic key and if the decryption is successful, do not continue with the rest of the steps. Otherwise continue with the rest of the steps;

3. SHALL perform the actions in the subclause as described in 5.1.2 "*Generation and distribution of the session key*".

NOTE 2: When a new session key replacing the old session key is obtained by all PoC Clients the PoC Server performing the Participating PoC Function starts encrypting Media using the traffic key encrypted by the new session key.

5.1.4 Media encryption and decryption

The PoC Server performing the Participating PoC Function:

- SHALL encrypt Continuous Media with SRTP, TBCP messages and MBCP messages with SRTCP as specified in [3GPP TS 33.246/6.6.2] "*Protection of streaming data*" sent over the Multicast PoC Channel using the traffic key as master key generated and distributed as specified in subclause 5.1.3 "*Generation and distribution of the traffic key*";

- SHALL continue to encrypt Continuous Media, TBCP messages and MBCP messages using an old traffic key encrypted with an old session key until all PoC Clients has obtained the new session key as specified in subclause 5.1.2 "*Generation and distribution of the session key*"; and,

- SHALL start to encrypt Continuous Media, TBCP message and MBCP message using the new traffic key encrypted by the new session key when all PoC Clients have obtained the new session key as 5.1.2 "*Generation and distribution of the session key*".

NOTE: The PoC Server can decide, using a local policy, to switch to the new traffic key encrypted by the new session key before all PoC Clients have obtained the new session key e.g. based on time.

The PoC Client

- SHALL decrypt Media encrypt Continuous Media, TBCP message and MBCP messages sent over the Multicast PoC Channel using the traffic key obtained as specified in subclause 5.1.3 "*Generation and distribution of the traffic key*"; and,

- SHALL obtain a new session key as specified in subclause 5.1.3 "*Generation and distribution of the traffic key*" when decryption fails due to a changed session key.

5.2 End-to-end Media security

This version of Multicast PoC does not include End-to-end Media security.

5.3 Transport

The transport is specified in [OMA-PCPS-UP] "*Transport*". Additional Multicast PoC specific transport procedures are described in this subclause.

5.3.1 FLUTE

A PoC Server performing the Participating PoC Function, supporting Multicast PoC, SHOULD support sending Discrete Media over the Multicast PoC Channel.

A PoC Client, supporting Multicast PoC MAY support receiving Discrete Media over the Multicast PoC Channel.

The PoC Server that supports sending of Discrete Media over the Multicast PoC Channel SHALL support FLUTE as defined in [RFC3926].

The PoC Client that supports receiving of Discrete Media over the Multicast PoC Channel SHALL support FLUTE as defined in [RFC3926].

The PoC specific procedures are specified in subclause 5.4 "*File Distribution*".

5.4 File distribution

This clause and its subclauses describe how Discrete Media is sent over the PoC Multicast PoC Channel..

5.4.1 File distribution MBMS

This subclause and its subclauses describe how Discrete Media SHALL be sent over the Multicast PoC Channel when the multicast/broadcast technology is MBMS and how lost packets, that can't be recovered by the Forward Error Correction (FEC) information provided along with the file itself, can be repaired.

5.4.1.1 General

A PoC Client that supports receiving Discrete Media over the Multicast PoC Channel SHALL use the procedures specified in the [RFC3450] with the clarifications in this subclause.

A PoC Server that supports sending Discrete Media over the Multicast PoC Channel SHALL use the procedures specified in the [RFC3450] with the clarifications in this subclause.

The PoC Server:

- SHALL NOT use congestion control for the file distribution function; and,

- SHALL use the LCT building block specified in [RFC3451] to provide in-band session management functionality.

  NOTE: The LCT building block has several specified and under-specified fields that are inherited and further specified by [RFC3450].

The PoC Client SHALL support the reception of metadata (name, URL, media type, etc.) associated with files in-band within the file delivery session, in which case the Transport Object Identifier (TOI) 0 carries the File Delivery Table (FDT), and the file delivery session is a FLUTE session as specified in [3GPP TS 26.346].

The PoC Server SHALL support the delivery of metadata (name, URL, media type, etc.) associated with files in-band within the file delivery session, in which case the Transport Object Identifier '0' carries the File Delivery Table, and the file delivery session is a FLUTE session as specified in [3GPP TS 26.346].

The whole MSRP SEND message SHALL be transported over the Multicast PoC Channel.

5.4.1.1.1   Content Encoding

The content of the Discrete Media SHALL be encoded as specified in [BCAST Distribution/5.2.1] "*Content Encoding*".

5.4.1.1.2   Forward Error Correction Building Block

The PoC Client and the PoC Server SHALL support the Forward Error Correction specified in [BCAST Distribution/5.2.2] "*Forward Error Correction Building Block*".

5.4.1.1.3   File Descriptions

Discrete Media SHALL be delivered in FLUTE sessions as described in [BCAST Distribution/5.2.3] "*File Descriptions*".

> NOTE: The use of ALC sessions is not defined for PoC.

5.4.1.1.4   File Versioning

Not applicable for Multicast PoC.

5.4.1.1.5   Signalling End of File and End of Session

5.4.1.1.5.1. Signalling End of File Delivery Session

The PoC Client SHALL considered the file delivery session as complete when one of the following events occurs:

- The PoC Client receives an end-of-session packet (ALC packet with A-flag in LCT header set to true).

- The PoC Client decides to exit the file delivery session, e.g. because the PoC Client is moving into an area where the Multicast PoC Channel is not available.

5.4.1.1.5.2. Signalling End of File Delivery

The PoC Client SHALL determine that the delivery of a file has ended when one of the following events occur:

- The PoC Client determines that the file delivery session has ended, as specified in subclause 5.4.1.1.5.1 "*Signalling End of File Delivery Session*".

- The PoC Client receives an end-of-object packet (ALC packet with B-flag in LCT header set to true).

This end of file delivery as concluded by the PoC Client SHALL be the starting point of any associated delivery procedure requested or needed for this file e.g. render and display the content to the PoC User.

5.4.1.1.6   Signalling of Parameters with FLUTE

The procedures specified in [BCAST Distribution/5.2.6] "*Signalling of Parameters with Basic ALC/FLUTE Headers*" SHALL be used with the following clarifications.

Parameters related to versioning of file delivery SHALL NOT be used.

Parameters related to expiry data for FDT instance SHALL NOT be used.

5.4.1.2 File repair

The PoC Server and the PoC Client SHOULD support the download file repair procedure as defined in subclause [BCAST Distribution/5.2.6] "*File repair"*.

The formal XML syntax of associated file delivery is defined in [BCAST XMLSchema-FD-FDT].

5.4.2 File distribution BCMCS

5.5 Media Control

The Media control is specified in [OMA-PCPS-UP] "*Media Control*". Additional Multicast PoC specific Media control procedures are described in this subclause.

5.5.1 Discrete Media Transfer Final Report

The PoC Server performing the Participating PoC Function SHALL support the Discrete Media Transfer Final Report functionality when Discrete Media is sent over the Multicast PoC Channel as specified in subclause 5.4 "*File Distribution*".

NOTE 1: The components of a Discrete Media Final Report are described in [OMA-PCPS-UP] "*Discrete Media Transfer Final Report*".

Upon receiving a MSRP SEND request and if a MSRP REPORT have been requested when Discrete Media is sent over the Multicast PoC Channel as specified in subclause 5.4 "*File Distribution*", the PoC Server performing the Participating PoC Function based on local policy either SHALL send the MSRP SEND request towards the PoC Client over the Multicast PoC Channel or the PoC Server:

1. SHALL remove the request for Discrete Media Final Report from the SEND request;

2. SHALL send the MSRP SEND request towards the PoC Client over the Multicast PoC Channel;

3. SHALL generate an MSRP REPORT requests according to rules and procedures of [RFC4975];

4. SHALL include in the leg element specified in [OMA-PCPS-UP] the attribute status="202" for each PoC User that receives the Discrete Media over the Multicast PoC Channel; and,

5. SHALL send the MSRP REPORT requests according to rules and procedures of [RFC4975].:

NOTE 2: The PoC Server performing the Participating PoC Function can respond with a MSRP 413 response if the PoC Server wishes the PoC Server performing the Controlling PoC Function to stop sending the particular message for any reason.

5.5.2 Discrete Media Transfer Progress Report

The PoC Server SHALL support the Discrete Media Transfer Progress Report functionality when Discrete Media is sent over the Multicast PoC Channel as specified in subclause 5.4 "*File Distribution*".

NOTE 1: The components of a Discrete Media Transfer Progress Report are described in [OMA-PCPS-UP] "*Discrete Media Transfer Progress Report*".

Upon receiving the MSRP SEND request and if a MSRP REPORT have been requested when Discrete Media is sent over the Multicast PoC Channel as specified in the subclause 5.4 "*File distribution* the PoC Server performing the Participating PoC Function based on local policy either SHALL send the MSRP SEND request towards the PoC Client over the Multicast PoC Channel or the PoC Server,

1. SHALL remove the request for Discrete Media Transfer Progress Report from the SEND request;

2. SHALL send the MSRP SEND request towards the PoC Client over the Multicast PoC Channel;

3.   SHALL generate an MSRP REPORT requests according to rules and procedures of [RFC4975];

4.   SHALL include in the leg element the attribute specified in [OMA-PCPS-UP] status="202" for each PoC User that receives the Discrete Media over the Multicast PoC Channel; and,

5.   SHALL send the MSRP REPORT requests according to rules and procedures of [RFC4975].

NOTE 2: The PoC Server performing the Participating PoC Function can respond with a MSRP 413 response if the PoC Server wishes the PoC Server performing the Controlling PoC Function to stop sending the particular message for any reason.

5.6   Sending and receiving Media over the Multicast PoC Channel

During a PoC Session TBCP messages, MBCP messages, Continuous Media and Discrete Media can be sent over the Multicast PoC Channel.

The Multicast PoC Channel MAY be shared by several PoC Sessions according to the Service provider's local policy.

NOTE 1: One example of a local policy can be that all PoC Sessions where the PoC Group Identity is part of the same sub-domain shares one Multicast PoC Channel. Another local policy could be that the PoC Server is configured with the PoC Group Identities of the PoC Groups sharing the same Multicast PoC Channel.

In this section and sections 5.6a and 5.6b below, a description of the multicast path through the access network is provided. In subsequent sections, only the interfaces between the BM-SC and the entry point of the Multicast Access Network, the GGSN node (UTRAN) or MBMS GW (for eUTRAN), are described. The detailed interfaces description for the User Plane data transport using a Multicast Access Network is transparent towards the PoC server and is out of the scope of this TS. For detailed information, please refer to [3GPP TS 29.061] and [3GPP TS 23.246].

In the Multicast Access Network system when MBMS is used, the Media and TBCP/MBCP messages are delivered from the PoC Server along the path of downstream nodes,i.e.GGSN, SGSN, RNC for UTRAN, MBMS-GW, eNB for eUTRAN and finally down to the PoC client,,in MBMS bearer context which is created during Multicast PoC Channel bearer initiation as specified in section 7.2.1 *"Starting a Multicast Bearer"*.

NOTE 2: The exact protocols and interfaces used for MBMS bearer service are specified in [3GPP TS 29.061] *"Interface to Packet Domain Bearer Services"*.

The path for the Media and TBCP/MBCP messages is different depending upon whether the access network is UTRAN or eUTRAN as is described below.

5.6a Multicast PoC Channel Path (UTRAN)

1.   The User Plan data is first transported towards GGSN from BM-SC in the Participating PoC Server as specified in 5.6.4 *"Multicast PoC Channel user data transport mode"* via Gi reference point ;

2.   User Plan data is further tunneled from GGSN to RNC using GTP, more specifically the transport of User Plane data along the MBMS bearer path is realized by the GTP-U protocol, while GTP-C protocol is used for the MBMS control plane between GGSN and SGSN. MBMS control plane signaling between the SGSN and the RNC is carried out via RANAP. GTP-U supports the transport of data packets from a variety of different User Plane protocols such as IPv4, IPv6 or PPP.

3.   When GGSN receives the IP data packets from the BM-SC, it duplicates the User Plane data packet, encapsulates the data into GTP for each SGSN.

NOTE 1: Besides the unicast delivery of User Plane data within GSNs, IP multicast procedures similar to those used for multicast between BM-SC and GGSN can also be used within the IP infrastructure of GSNs backbone depending on the realization.

4. When SGSN receives an incoming MBMS User Plane data packet, it delivers it to the respective RNCs as in the list of downstream nodes for GGSN, via the corresponding GTP-U tunnels.

5. RAN finally delivers the Multicast PoC User Plan data over MBMS radio bearer towards the PoC client in the air interface.

5.6b Multicast PoC Channel Path (eUTRAN)

1. The User Plane data is first transported towards MBMS-GW from the BM-SC in the Participating PoC Server as specified in 5.6.4 "Multicast PoC Channel user data transport mode" via the SGi-mb reference point.

2. User Plane data is further tunneled from the MBMS-GW to the eNBs via the M1 reference point using GTPv1-U, identified by a C-TEID. GTPv2-C is used for the MBMS control plane between the MBMS-GW and the MME. MBMS control plane signaling between the MME and eNBs communicates the C-TEID to the multicast listeners to allow them to identify the User Plane data. See [3GPP TS 29.281] for more information.

3. The MBMS-GW performs multicast distribution of the User Plane data to the eNBs.

4. The eNBs deliver the Multicast PoC User Plane data over MBMS radio bearers towards the PoC client via the air interface.

5.6.1   Sending and receiving of MBCP Messages

During a PoC Session PoC Server performing the Controlling PoC Functions sends MBCP messages according to rules and procedures of [OMA-PCPS-UP] towards all PoC Clients in the PoC Session.

On receipt of a MBCP Media Burst Taken message, a TBCP Talk Burst Taken message, a MBCP Media Burst Idle message or a TBCP Talk Burst Idle message from the Controlling PoC Server towards a PoC Client in a PoC Session where a Multicast PoC Channel, controlled by the PoC Server, is used, the PoC Server performing the Participating function:

NOTE: Other MBCP/TBCP messages are sent as specified by [OMA-PCPS-UP] independent on if a Multicast PoC Channel is used or not.

1. SHALL check the value of MBCP-sequence-number field if it is included in the received MBCP/TBCP message. If the value is bigger than the cached value, then SHALL cache it and SHALL send the MBCP/TBCP message over the Multicast PoC Channel with the content encrypted as specified in the subclause 5.1.4 "*Media encryption and decryption*" with the multicast IP address and the same port number for Media-floor Control Entity to which corresponding Multicast Media Streams are bound. The MBCP/TBCP message SHALL NOT include a request for a MBCP Acknowledgment message.

2. SHALL send the MBCP/TBCP message unencrypted toward the PoC Client if the PoC Client is not listening to the Multicast PoC Channel according to rules and procedures of [OMA-PCPS-UP] subclause 6.3 "*Procedures at the PoC Server performing the Participating PoC Function*".

On receipt of the MBCP Media Burst Taken, the TBCP Talk Burst Taken, the MBCP Media Burst Idle or the TBCP Talk Burst Idle message from the PoC Server Performing the Participating PoC Function over the Multicast PoC Function the PoC Client:

1. SHALL check that the TBCP/MBCP message is intended for this PoC Session by means of the port number in the destination address and if that is not the case do not continue with the rest of the steps; and,

2. SHALL act according to rules and procedures of [OMA-PCPS-UP] subclause 6.2 "*Procedures at the PoC Client*" as if the MBCP/TBCP message was received over the normal unicast MBCP session.

5.6.2   Sending and receiving Continuous Media

The PoC Server performing the Controlling PoC Functions sends Continuous Media in the form of RTP Media packets according to rules and procedures of the [OMA-PCPS-UP] towards all PoC Clients that has negotiated Continuous Media in the PoC Session unless the PoC Server Participating PoC Function are using PoC Media Traffic Optimisation as specified in [OMA-PCPS-UP] "*PoC Media Traffic Optimisation*".

NOTE 1: If the PoC Media Traffic Optimisation is used the PoC Server performing the Controlling PoC Function only sends one RTP Media packets to the PoC Server performing the Participating PoC Function instead of sending one RTP Media packet to each PoC User handled by the PoC Server performing the Participating PoC Function.

On receipt of a RTP Media packet from the Controlling PoC Server towards a PoC Client in a PoC Session where a Multicast PoC Channel, controlled by the PoC Server, is used, the PoC Server performing the Participating PoC Function:

1. SHALL, if not already sent, send the RTP Media packet over the Multicast PoC Channel with the content encrypted as specified in the subclause 5.1.4 "*Media encryption and decryption*" towards the multicast IP address and port negotiated for the Continuous Media;

NOTE 2: The PoC Server is using RTP header information to determine whether the Packet is already sent or not.

2. SHALL send the RTP Media packet unencrypted towards the PoC Client if the PoC Client is not listening to the Multicast PoC Channel according to rules and procedures of [OMA-PCPS-UP] subclause 6.3 "*Procedures at the PoC Server performing the Participating PoC Function*" if PoC Media Traffic Optimisation is not used; and,

3. SHALL send the RTP Media packet unencrypted towards all PoC Clients not listening to the Multicast PoC Channel according to rules and procedures of [OMA-PCPS-UP] "*PoC Media Traffic Optimisation*" and [OMA-PCPS-UP] subclause 6.3 "*Procedures at the PoC Server performing the Participating PoC Function*" if PoC Media Traffic Optimisation is used..

On receipt of a RTP Media packet from the PoC Server performing the Participating PoC Function over the Multicast PoC Function the PoC Client:

1. SHALL check that the RTP Media packet is intended for this PoC Session by means of the port number in the destination address and if that is not the case do not continue with the rest of the steps; and,

2. SHALL act according to rules and procedures of [OMA-PCPS-UP] subclause 6.2 "*Procedures at the PoC Client*" as if the RTP Media packet was received over the normal unicast RTP Session.

3. SHALL by itself discard Media for keeping conversation uninterrupted if a PoC Client is listening to more than one Multicast PoC Channels or unicast Media Stream.

NOTE 3: The Simultaneous PoC Session is not supported in the Multicast PoC.

5.6.3   Sending and receiving of Discrete Media

During the PoC Server performing the Controlling PoC Functions sends Discrete Media using MSRP SEND requests according to rules and procedures of the [OMA-PCPS-UP] towards each PoC Client that has negotiated Discrete Media.

On receipt of an MSRP SEND request from the PoC Server performing the Controlling PoC Function towards a PoC Client in a PoC Session where a Multicast PoC Channel controlled by the PoC Server is used, the PoC Server performing the Participating PoC Function:

1. SHALL if the target PoC Client is a PoC Client listening to the Multicast PoC Channel:

    a. generate and send a MSRP 200 "OK" response according to rules and procedures of [OMA-PCPS-IM];

    b. generate a Discrete Media Transfer Progress Report as specified in subclause 5.5.2 "*Discrete Media Transfer Progress Report*" if Discrete Media Transfer Progress Report is requested; and,

    c. generate a Discrete Media Transfer Final Report as specified in subclause 5.5.1 "*Discrete Media Transfer Final Report*" if Discrete Media Transfer Final Report is requested;

2. SHALL send the file contained in the SEND request over the Multicast PoC Channel using the procedures described in subclause 5.4 "*File distribution*".

NOTE: If the MSRP SEND request contains only a part of the final file the PoC Server collects all parts prior to sending the file over the Multicast PoC Channel. When sending the file, the PoC Server needs to control the sending rate in order not to cause congestion in the access network.

3. SHALL, if the target PoC Client is a PoC Client not listening to the Multicast PoC Channel send the MSRP SEND request according to the rules and procedures of [OMA-PCPS-UP] subclause 6.3 "*Procedures at the PoC Server performing the Participating PoC Function*".

On receipt of a file as specified in subclause 5.4 "*File distribution*" from the PoC Server performing the Participating PoC Function over the Multicast PoC Channel, the PoC Client:

1. SHALL check that the Discrete Media is intended for this PoC Session by means of the port number in the destination address and if that is not the case do not continue with the rest of the steps;

2. SHALL act as if a MSRP SEND request with a complete file is received and follow the rules and procedures of [OMA-PCPS-UP] subclause 6.2 "*Procedures at the PoC Client*";

3. SHALL NOT generate any Discrete Media Transfer Progress Report; and,

4. SHALL NOT generate any Discrete Media Transfer Final Report.

5.6.4 Multicast PoC Channel user data transport mode

During the delivering of PoC User Plane data, i.e. the Continuous Media, Discrete Media and MBCP/TBCP messages, over Multicast PoC Channel using MBMS technology, PoC Server performing the Participating PoC Function SHALL support sending MBMS User Plane data with unicast mode or multicast mode or both, and the PoC Server either:

5. SHALL send the MBMS User Plane data via the IP-in-IP tunnel towards Core Network, such as GGSN/MBMS GW node, as specified in the [RFC 1853] for encapsulation of IP multicast packet in an unicast packet if the AVP [MBMS-User-Data-Mode-Indication] in RAA(start) from the Core Network indicates 'Unicast (0) ' mode is to be used during the process of starting the Multicast PoC Channel as specified in subclause 7.2.1 "*Starting a Multicast PoC Channel*".

NOTE: for the detailed reference structure of IP-in-IP tunnel packet, see Appendix E "*IP packet structure for IP-in- IP tunnel IP data (Informative)* ".

6. SHALL send the MBMS User Plane data in IP multicast packet using the Multicast address as is offered in the RAR(start) message if the AVP [MBMS-User-Data-Mode-Indication] in RAA(start) from the Core Network indicates 'Multicast(1) ' mode is to be used during the process of starting Multicast PoC Channel as specified in subclause 7.2.1 "*Starting a Multicast PoC Channel*".

5.7 Media Burst Control

The Media Burst Control is specified in [OMA-PCPS-UP] "*Media Burst Control*".

5.8 Sender identification

The Sender Identification is specified in [OMA-PCPS-UP] "*Sender Identification*".

6. Control plane signalling

6.1 Control Plane signalling in the PoC Client

6.1.1 General

PoC Client supporting Multicast PoC:

1. SHALL, when generating the initial SIP INVITE request as specified in [OMA-PCPS-CP] "*PoC Client initiates a Pre-established Session*", include in the Contact header of the SIP INVITE request the feature tag '+g.poc.multicast';

2. SHALL, when generating the initial SIP INVITE request as specified in [OMA-PCPS-CP] "PoC *Client initiates a Pre-arranged PoC Group Session or joins a Chat PoC Group Session*" and [OMA-PCPS-CP] "*PoC Client rejoining a PoC Session*", include in the Contact header of the SIP INVITE request the feature tag '+g.poc.multicast'; and,

NOTE: 1-many-1 communication method is not supported by Multicast PoC.

3. SHALL, when generating the SIP 200 "OK" response to the SIP INVITE request as specified in [OMA-PCPS-CP] "*Auto-answer* case" and [OMA-PCPS-CP] "*Manual-answer* case", include in the Contact header of the SIP 200 "OK" response the feature tag '+g.poc.multicast'.

6.1.2 Multicast PoC Channel announcements

This subclause describes the procedures in the PoC Client for handling Multicast PoC Channel announcements.

The PoC Client can receive only one of the following Multicast PoC Channel announcements at a time in the SIP INFO request:

- The start of the Multicast PoC Channel; or,

- The stop of the Multicast PoC Channel.

Modification of individual Media Parameters, e.g. codecs or Media formats, is described in the subclause 6.1.3.2 "*Modifying Media Parameters*".

6.1.2.1 Announcement of the start of a Multicast PoC Channel

Upon receipt of a SIP INFO request including a MIME SDP body with initial Multicast PoC Channel Media Parameters the PoC Client:

1. SHALL generate a SIP 200 "OK" response to the SIP INFO request according to rules and procedures of [RFC6086];

2. SHALL send the SIP 200 "OK" response according to rules and procedures of SIP/IP Core;

3. SHALL validate that the received SDP offer includes at least one Media Stream for which the Media Parameters and at least one codec or Media format acceptable by the PoC Client and if not, the PoC Client SHALL not continue with the rest of the steps;

4. SHALL cache the Multicast PoC Channel Media Parameters;

NOTE 1: If Media Parameters are changed before the PoC Client successfully completes the step above the new Media Parameters overwrites the existing Media Parameters as described in the subclause 6.1.3.2 "*Modifying Media Parameters*".

5. SHALL connect to the Multicast PoC Channel as described in subclause 7.1.3 "*Connecting to a Multicast PoC Channel*" if MBMS is used as the radio network access technology and available to the PoC Client. When the connection to the Multicast PoC Channel is successfully completed continue with the rest of the steps;

6. SHALL generate a SIP UPDATE request according to rules and procedures of [RFC3311];

7. SHALL include a session key as specified in the subclause 5.1.2 "*Generation and distribution of the session key*";

8. SHALL include a MIME SDP body as an SDP offer as specified in subclause 6.1.5.1 *"SDP offer generation for a Multicast PoC Channel "*; and,

9. SHALL send the SIP UPDATE request to the PoC Server performing the Participating PoC Function according to rules and procedures of SIP/IP Core.

On receipt of the SIP 200 "OK" response to the SIP UPDATE request the PoC Client:

1. SHALL obtain the traffic key as specified in subclause 5.1.3 "*Generating and distributing the traffic key*";

2. SHALL interact with the User Plane as specified in [OMA-PCPS-UP] "*Media on and off hold*" for those Media Streams that are received on the Multicast PoC Channel and now put on hold for unicast; and,

NOTE 2: The Media Streams for the unicast Media session, that are now received on the Multicast PoC Channel instead, is put on hold by the SIP "200" OK response to the SIP UPDATE request.

3. SHALL start decrypting and rendering the Media Streams received over the Multicast PoC Channel using the traffic key as described in subclause 5.1.4 "*Media encryption and decryption*".

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.1.2.2 Announcement of the stop of a Multicast PoC Channel

Upon receipt of a SIP INFO request including MIME SDP body where all multicast Media Streams are rejected according to rules and procedures for [RFC3264] the PoC Client:

1. SHALL generate a SIP 200 "OK" response to the SIP INFO request according to rules and procedures of [RFC6086];

2. SHALL send the SIP 200 "OK" response according to rules and procedures of SIP/IP Core;

3. SHALL stop trying to connect to the Multicast PoC Channel if the PoC Client has not yet connected to the Multicast PoC Channel;

4. if already decrypting and rendering the Media Stream being received over the Multicast PoC Channel:

    a. SHALL generate a SIP UPDATE request according to rules and procedures of [RFC3311];
    b. SHALL include a MIME SDP body as an SDP offer as specified in subclause 6.1.5.1 *"SDP offer generation"*; and,

    c. SHALL send the SIP UPDATE request to the PoC Server performing the Participating PoC Function according to rules and procedures of SIP/IP Core.

On receipt of the SIP 200 "OK" response to the SIP UPDATE request the PoC Client:

1. SHALL stop decrypting and rendering the Media Stream being received over the Multicast PoC Channel if the PoC Client is decrypting and rendering the Media Stream over the Multicast PoC Channel; and,

2. SHALL interact with the User Plane as specified in [OMA-PCPS-UP] *"Media on and off hold"* for those Media Streams that were previously received on the Multicast PoC Channel and now put off hold for unicast.

6.1.3   PoC Client PoC Session modification

6.1.3.1   Handoff

When the PoC Client detects that the PoC Client moves from Multicast service area to non Multicast service area or vice versa, the PoC Client:

1.   SHALL generate a SIP UPDATE request according to rules and procedures of [RFC3311] as specified in [OMA-PCPS-CP] subclause 6.1.4.1 *"General"*.

2.   SHALL include in the SIP request a MIME SDP body as an SDP offer as specified in subclause 6.1.5.1 "*SDP offer generation*";

3.   SHALL interact with the User Plane as specified [OMA-PCPS-UP] "*PoC Client procedures when disconnecting from a Media Type*" if removing a Media-floor Control Entity or if changing the Media-floor Control Entity bindings or if disconnecting from an existing Media Type; and,

4.   SHALL send the SIP request towards the PoC Server according to rules and procedures of the SIP/IP Core.

On receipt of the SIP 200 "OK" response, the PoC Client either in addition to procedures specified in [OMA-PCPS-CP]:

1.   SHALL disconnect to the Multicast PoC Channel locally without any signalling to access network, and render Media data received over a unicast RTP Session if the PoC Client moves from Multicast service area to non Multicast service area; or,

2.   SHALL render Media data received over the Multicast PoC Channel if the PoC Client moves from non Multicast service area to Multicast service area,

When the SIP/IP Core corresponds to 3GPP/3GPP2 IMS, the PoC Client SHALL use 3GPP/3GPP2 IMS session mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.1.3.2   Modifying Media Parameters

Upon receipt of a SIP INFO request including a MIME SDP body with changed Media Parameters compared to cached Multicast PoC Channel the PoC Client:

NOTE 1:   The PoC Server sends a SIP INFO request and a SIP UPDATE request to PoC Clients not yet listening to the Multicast PoC Channel. The procedure for the SIP UPDATE request is described in the [OMA-PCPS-CP] the procedure for the SIP INFO request is described in this subclause.

1.   SHALL generate a SIP 200 "OK" response to the SIP INFO request according to rules and procedures of [RFC6086];

2.   SHALL send the SIP 200 "OK" response according to rules and procedures of SIP/IP Core;

3.   SHALL validate that the received SDP offer includes at least one Media Stream for which the Media Parameters and at least one codec or Media format is acceptable by the PoC Client and if not, the PoC Client:

     a.   SHALL stop trying to connect to the Multicast PoC Channel if the PoC Client has not yet connected to the Multicast PoC Channel; and,

     b.   SHALL not continue with the rest of the steps;

4.   SHALL overwrite the existing cached Media Parameters and continue trying to connect to the Multicast PoC Channel, if the PoC Client has not yet connected to the Multicast PoC Channel.

Upon receipt of an SIP UPDATE request or a SIP re-INVITE request to add a new Media Stream to the existing PoC Session, to remove currently used Media Stream from the PoC Session, to change the Media-floor Control Entity binding of a used Media in the PoC Session or a combination of these the PoC Client SHALL perform the actions specified in [OMA-PCPS-CP] "*PoC Client receiving a request to add and disconnect Media Streams*" with the clarifications below regarding the Multicast PoC specific Media Parameters, codecs and Media formats.

NOTE 2: The PoC Server sends only the SIP UPDATE/re-INVITE request to PoC Clients already listening to the Multicast PoC Channel.

The PoC Client:

1. SHALL validate that the received SDP offer includes at least one Media Stream for the Multicast PoC Channel for which the Parameters and at least one codec or Media format is acceptable by the PoC Client and if not, the PoC Client:

   a. SHALL reject the Media Stream in the SDP offer according to rules and procedure of [RFC3264]; and,

   b. SHALL not continue with the rest of the steps.

2. SHALL overwrite the existing cached Media Parameters;

3. SHALL connect to the Multicast PoC Channel as described in subclause 7.1.3 "*Connecting to a Multicast PoC Channel*" if MBMS is used as the radio network access technology and available to the PoC Client. When the connection to the Multicast PoC Channel is successfully completed continue with the rest of the steps;

4. SHALL obtain the traffic key as specified in subclause 5.1.3 "*Generating and distributing the traffic key;*

5. SHALL stop decrypting and rendering the Media Stream being received over the Multicast PoC Channel using the old Media Parameters; and,

6. SHALL start decrypting and rendering the Media Stream being received over the Multicast PoC Channel with using the traffic key as described in subclause 5.1.4 "*Media Encryption decryption*".

6.1.3.3 Updating Multicast PoC Channel parameters

When the PoC Client needs to update Multicast PoC Channel parameters, e.g. retrieve a new session key, the PoC Client:

1. SHALL generate a SIP UPDATE request according to rules and procedures of [RFC3311];

2. SHALL include session key as specified in the subclause 5.1.2 "*Generation and distribution of the session key*";

3. SHALL include a MIME SDP body as an SDP offer as specified in subclause 6.1.5.1 *"SDP offer generation for a Multicast PoC Channel "*; and,

4. SHALL send the SIP UPDATE request to the PoC Server performing the Participating PoC Function according to rules and procedures of SIP/IP Core.

On receipt of the SIP 200 "OK" response to the SIP UPDATE request the PoC Client:

1. SHALL obtain the traffic key as specified in subclause 5.1.3 "*Generating and distributing the traffic key"*;

2. SHALL interact with the User Plane as specified in [OMA-PCPS-UP] *"Media on and off hold"* for those Media Streams that are received on the Multicast PoC Channel; and,

3. SHALL start decrypting and rendering the Media Streams received over the Multicast PoC Channel using the traffic key as described in subclause 5.1 "*PoC User plane security*".

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.1.4 Leaving a Multicast PoC Channel

When the PoC Client participating in the PoC Session wants to leave the PoC Session that has been established using the Multicast PoC Channel as specified in subclause "6.1.2.1 "*Announcement of the start of a Multicast PoC Channel*", the PoC Client:

1. SHALL send a SIP BYE request as specified in [OMA-PCPS-CP] "*Leaving a PoC Session - On-demand Session*".

2. SHALL disconnect from the Multicast PoC Channel within UE locally without signalling to access network.

NOTE: The SIP 200 OK response is handled as specified in [OMA-PCPS-CP] "*Leaving a PoC Session - On-demand Session*".

When the SIP/IP Core corresponds to 3GPP/3GPP2 IMS, the PoC Client SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.1.5   Handling of SDP in the PoC Client

6.1.5.1   SDP offer generation for a Multicast PoC Channel

The SDP offer SHALL be composed according to rules and procedures of [RFC3264] and [RFC4566].

When composing an SDP offer the PoC Client:

1. SHALL include a MIME SDP body as an SDP offer for the unicast Media Streams and Media-Floor Control Entities as specified in [OMA-PCPS-CP] subclause 6.1.3.1a "*SDP offer generation*" with the clarification in the following steps:

2. SHALL include in the media-level section for each offered unicast Media-level description where the Media Stream is received over the Multicast PoC Channel and sent as unicast the "a=sendonly";

3. SHALL include in the media-level section for each offered multicast Continuous Media Stream:

    a) the port number for the multicast Continuous Media Stream as received in the MIME SDP body of the SIP INFO request;

    b) the codec(s) and Media Parameters as received in the MIME SDP body of the SIP INFO request;

NOTE 1:   The offer can only contain one codec or Media format for each multicast Media Stream.

    c) the "a=label" attribute with a unique value as specified in [RFC4574];

    d) the "a=recvonly" attribute; and,

    e) if the MBMS multicast/broadcast access technology is used

       -   i) the "a= mbms-mode" attribute as received in the MIME SDP body of the SIP INFO request.

NOTE 2:   Only the Media-level sections for Media Streams encrypted with a new session keys are included in the case the announcement in the SIP INFO request contained duplicated Media-level sections.

4. SHALL include in the media-level section for each offered multicast Discrete Media Stream FLUTE media section descriptor as specifed in [3GPP TS26.346] "*SDP Parameters for MBMS download session*";:

    a) the port number for the multicast Discrete Media Stream as received in the MIME SDP body of the SIP INFO request;

    b) Transport Session Identifier attribute "a=flute-tsi";

    c) the "a=label" attribute with a unique value as specified in [RFC4574];

    d) the "a= mbms-mode" attribute as received in the MIME SDP body of the SIP INFO request;.

    e) the other applicable MBMS FLUTE media level parameters depending on the actual needs..

5. SHALL include offered multicast Media Stream bindings to corresponding offered Media-floor Control Entities as received in the MIME SDP body of the SIP INFO request.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS Session establishment mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.1.5.2   SDP answer generation for a Multicast PoC Channel

Not applicable because it is always the PoC Client that offers the use of the Multicast PoC Channel.

6.1.5.3 PoC Client PoC Session modification

The PoC Client SHALL modify the PoC Session as specified in [OMA-PCPS-CP] subclause 6.1.4"*PoC Client PoC Session modification*". The PoC Client SHALL NOT modify the media-level section for each multicast Media Stream received in the SIP INFO request for the Multicast PoC Channel announcements.

6.2 Control Plane signalling in the Participating PoC Function

6.2.1 Establishing a Multicast PoC Channel

Initially a Multicast PoC Channel is created by the PoC Server based on a local policy. The Multicast PoC Channel is announced as described in the subclause 6.1.2 "Multicast PoC Channel announcement".

6.2.1.1 Announcement of the start of a Multicast PoC Channel

When the PoC Server wants to initiate the use of a Multicast PoC Channel in an ongoing PoC Session the PoC Server:

1. SHALL start the Multicast PoC Channel as described in subclause 7.2.1 "*Starting a Multicast PoC Channel"*;

2. SHALL generate a SIP INFO request according to rules and procedures of [RFC6086];

3. SHALL include in the SIP INFO request a MIME SDP body as described in subclause 6.2.4.1.2 "*SDP for a permanent multicast Media Streams announcement*"; and,

4. SHALL send the SIP INFO request according to rules and procedures of SIP/IP Core to all PoC Clients participating in the PoC Session that included a feature tag '+g.poc.multicast' in the Contact header headers of the initial SIP INVITE requests or in the SIP 200 "OK" response to a initial SIP INVITE requests.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.2.1.2 Receiving a SIP UPDATE request

Upon receipt of an SIP UPDATE request from a PoC Client, as the result of the procedure described in subclause 6.2.1.1 "*Announcement of the start of a Multicast PoC Channel*" the PoC Server:

1. SHALL validate that the received SDP offer includes at least one Media Stream for which the Media Parameters and at least one codec or Media format is acceptable by the PoC Server and if not reject the request with a SIP 488 "Not Acceptable Here" response generated as specified in the [OMA-PCPS-CP] 7.3.1.1c "*SDP answer generation*". Otherwise, continue with the rest of the steps;

2. SHALL authenticate the user key as specified in the subclause 5.1.2 "*Generation and distribution of the session key*" and if the authentication is not successful the PoC Server SHALL return a SIP 403 "Forbidden" response. Otherwise, continue with the rest of the steps;;

3. SHALL generate a SIP 200 "OK" response to the SIP UPDATE request according to rules and procedures of [RFC3311];

4. SHALL include in the SIP 200 "OK" response a MIME SDP body as an SDP answer to the SDP offer in the incoming SIP UPDATE request as specified in the subclause 6.2.4.2 *"SDP answer generation"*;

5. SHALL include the session key as specified in subclause 5.1.2 "*Generation and distribution of the session key*"; and,

6. SHALL send the SIP 200 "OK" response to the PoC Client according to rules and procedures of the SIP/IP Core.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.2.2   Announcement of the stop of a Multicast PoC Channel

This subclause describes how the PoC Server performing the Participating PoC Function announces the stop of a Multicast PoC Channel.

When the PoC Server does not want to use a Multicast PoC Channel in an ongoing PoC Session any longer the PoC Server:

1. SHALL generate a SIP INFO request according to rules and procedures of [RFC6086];

2. SHALL include in the SIP INFO request a MIME SDP as described in subclause 6.2.3.1.1 "*SDP for stopping a Multicast PoC Channel*"; and,

3. SHALL send the SIP INFO request to all PoC Clients that has indicated support for Multicast PoC according to rules and procedures of SIP/IP Core.

NOTE: The support of Multicast PoC is indicated by the PoC Client by means of the feature tag '+g.poc.multicast' in the Contact headers of initial SIP INVITE requests or in the SIP 200 "OK" response to a initial SIP INVITE requests.

Upon receipt of an SIP UPDATE request from a PoC Client, as the result of a Multicast PoC Channel stop announcement including Multicast PoC Media Parameters the PoC Server:

1. SHALL validate that the received SDP offer includes at least one Media Stream for which the Media Parameters and at least one codec or Media format is acceptable by the PoC Server and if not reject the request with a SIP 488 "Not Acceptable Here" response generated as specified in the [OMA PoC CP] 7.3.1.6 "*PoC Session Modifications*". Otherwise, continue with the rest of the steps;

2. SHALL generate a SIP 200 "OK" response to the SIP UPDATE request according to rules and procedures of [RFC3311];

3. SHALL include in the SIP 200 "OK" response a MIME SDP body as an SDP answer to the SDP offer in the incoming SIP UPDATE request as specified in the subclause 6.2.3.1.1 *"SDP for stopping a Multicast PoC Channel"*;

4. SHALL send the SIP 200 "OK" response to the PoC Client according to rules and procedures of the SIP/IP Core; and,

5. SHALL stop the Multicast PoC Channel when the PoC Server has received the SIP UPDATE request from all PoC Clients receiving the Media Stream over the Multicast PoC Channel as described in subclause 7.2.3 "*Stopping the Multicast PoC Channel*" when the multicast/broadcast technology is MBMS.

NOTE: PoC Server knows which PoC Clients have been receiving the Media Stream over the Multicast PoC Channel when each PoC Client established the PoC Session using the Multicast PoC Channel.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

6.2.3   PoC Server PoC Session modification

6.2.3.1   SDP in SIP INFO request

6.2.3.1.1   SDP for stopping a Multicast PoC Channel

This subclause describes the SDP that the PoC Server performing the Participating PoC Function uses when stopping an entire Multicast PoC Channel.

The SDP in the SIP INFO request SHALL be composed as an SDP answer according to rules and procedures of [RFC3264] and [RFC4566].

When composing the SDP announcement for stopping the Multicast PoC Channel PoC Server:

1. SHALL include a MIME SDP body for the unicast Media Parameters as specified in [OMA-PCPS-CP] subclause 7.3.1.1c "*SDP answer generation*" with the clarification in the following step;

2. SHALL include the "a=sendrecv" attribute for each unicast Media Stream that previously was set to "a=recvonly" due to the Multicast PoC Channel"; and,

3. SHALL mark each closed multicast Media Stream as rejected according to rules and procedures of [RFC3264].

6.2.3.1.2   SDP for removing multicast Media Streams

This subclause describes the SDP that the PoC Server performing the Participating PoC Function uses when closing an individual Media.

The SDP in the SIP INFO request SHALL be composed as an SDP answer according to rules and procedures of [RFC3264] and [RFC4566].

When composing the SDP announcement for closing individual multicast Media Streams the Multicast PoC Channel PoC Server:

1. SHALL include a MIME SDP body for the unicast Media Parameters as specified in [OMA-PCPS-CP] subclause 7.3.1.1c "*SDP answer generation*" with the clarification in the following step;

2. SHALL include the "a=sendrecv" attribute for each unicast Media Stream that previously was set to "a=recvonly" and now is closed";

3. SHALL mark each closed multicast Media Stream as rejected according to rules and procedures of [RFC3264]; and,

4. SHALL include in the media-level section for each offered multicast Media Stream consisting of:

    a) the codec(s) and Media Parameters;

NOTE 1: The announcement can only contain one codec or Media format for each multicast Continuous Media Stream.

    b) the multicast address included in the Framed-Interface-Id AVP in case of IPv6 or the Framed-IP-Address AVP in case of IPv4 of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

    c) the "a=label" attribute with a unique value as specified in [RFC4574];

    d) the "a=sendonly" attribute;

    e) if the MBMS multicast/broadcast access technology is used:

        i) the "a=mbms-mode" attribute is set to "broadcast" (GPRS) or "broadcast-mbsfn" (EPS) as specified in [RFC6064] and [3GPP TS 26.346];

        ii) include in the "a= mbms-mode" attribute the tmgi parameter as specified in [3GPP TS 26.346] set to the same value as in the TMGI AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*"; and,

        iii) if the "a=mbms-mode" attribute was set to "broadcast", include in the "a= mbms-mode" attribute the mbms-counting-information parameter as specified in [3GPP TS 26.346] to the same value as in the MBMS-Counting-Information AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*".

NOTE 2: MBMS counting information is not included in the "broadcast-mbsfn" format of the "a=mbms-mode" attribute as specified in [3GPP TS 26.346].

4. SHALL include in the media-level section for each offered multicast Discrete Media Stream using FLUTE media section descriptor as specifed in [3GPP TS26.346] "*SDP Parameters for MBMS download session*":

    a) the multicast address included in the Framed-Interface-Id AVP in case of IPv6 or the Framed-IP-Address AVP in case of IPv4 of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

    b) Transport Session Identifier attribute "a=flute-tsi";

c) the "a=label" attribute with a unique value as specified in [RFC4574];

d) if the MBMS multicast/broadcast access technology is used:

i) the "a=mbms-mode" attribute is set to "broadcast" (GPRS) or "broadcast-mbsfn" (EPS) as specified in [RFC6064] and [3GPPTS 26.346];

ii) include in the "a=mbms-mode" attribute the tmgi parameter as specified in [3GPP TS 26.346] set to the same value as in the TMGI AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*"; and,

iii) if the "a=mbms-mode" attribute was set to "broadcast", include in the "a=mbms-mode" attribute the mbms-counting-information
parameter as specified in [3GPP TS 26.346] set to the same value as in the MBMS-Counting-Information AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

e) the other applicable MBMS FLUTE media level parameters depending on the actual needs.

6. SHALL exclude offered multicast Media Stream bindings to corresponding offered Media-floor Control Entities.

6.2.4   Handling of SDP in the Participating PoC Function

6.2.4.1   SDP in SIP INFO request

The procedures in this subclause SHALL be used by the PoC Server when announcing the multicast Media Streams.

The multicast Media Streams are announced in the MIME SDP bodies of SIP INFO requests.

Normal SIP procedure for negotiating Media Types and Media-floor Control Entities as specified in [OMA-PCPS-CP] SHALL be used for negotiating used Media Types and Media-floor Control Entities.

The SDP in the SIP INFO request for initial or modifying announcements SHALL be composed as an SDP offer according to rules and procedures of [RFC3264] and [RFC4566].

For the unicast part of the SDP the PoC Server SHALL offer the Media Types and Media-floor Control Entities negotiated between the PoC Client and the PoC Server in the ongoing PoC Session, i.e. the SDP announcement SHALL NOT include any additional Media Types or additional Media-floor Control Entities that may be in use between the PoC Server and other PoC Clients.

For the multicast part of the SDP the PoC Server SHALL only add those Media Types and Media-floor Control Entities corresponding to the unicast part of the SDP, i.e. the SDP announcement SHALL NOT include any additional Media Streams available over the Multicast PoC Channel to other PoC Clients in the PoC Session.

When composing the SDP announcement the PoC Server:

1. SHALL include a MIME SDP body as an SDP offer for the unicast Media Parameters as specified in [OMA-PCPS-CP] subclause 7.3.1.1a "*SDP offer generation in case of On-demand session*" with the clarification in the following steps:

2. SHALL include in the media-level section for each offered unicast Media-level description where the Media Stream is sent over the Multicast PoC Channel and received as unicast the "a=recvonly";

3. SHALL include in the media-level section for each offered multicast Continuous Media Stream SDP parameters consisting of:

a) the port number for the multicast Continuous Media Stream as specified in as specified in [3GPP TS26.346] "*SDP Parameters for MBMS streaming session*";

b) the codec(s) and Media Parameters;

NOTE 1:   The announcement can only contain one codec or Media format for each multicast Continuous Media Stream.

c) the multicast address included in the Framed-Interface-Id AVP in case of IPv6 or the Framed-IP-Address AVP in case of IPv4 of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

d) the "a=label" attribute with a unique value as specified in [RFC4574];

e) the "a=sendonly" attribute;

f) if the MBMS multicast/broadcast access technology is used:

    i) the "a=mbms-mode" attribute set to "broadcast" (GPRS) or "broadcast-mbsfn" (EPS) as specified in [RFC6064] and [3GPP TS 26.346];

    ii) include in the "a=mbms-mode" attribute the tmgi parameter as specified in [3GPP TS 26.346] set to the same value as in the TMGI AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*"; and,

    iii) if the "a=mbms-mode" attribute was set to "broadcast", include in the "a=mbms-mode" attribute the mbms-counting-information

    parameter as specified in [3GPP TS 26.346] set to the same value as in the MBMS-Counting-Information AVP of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

NOTE 2: MBMS counting information is not included in the "broadcast-mbsfn" format of the "a=mbms-mode" attribute as specified in [3GPP TS 26.346].

5. SHALL include in the media-level section for each offered multicast Discrete Media Stream FLUTE media section descriptor as specifed in [3GPP TS26.346] "*SDP Parameters for MBMS download session*":

a) the port number for the multicast Discrete Media Stream as specified in as defined in [3GPP TS26.346] "*SDP Parameters for MBMS download session*";

b) the multicast address included in the Framed-Interface-Id AVP in case of IPv6 or the Framed-IP-Address AVP in case of IPv4 of the RAR message described in subclause 7.2.1 "*Starting a Multicast PoC Channel*";

c) Transport Session Identifier attribute "a=flute-tsi";

d) the "a=label" attribute with a unique value as specified in [RFC4574];

e) if the MBMS multicast/broadcast access technology is used:

    i) the "a= mbms-mode" attribute is set to "broadcast" (GPRS) or "broadcast-mbsfn" (EPS) as specified in [RFC6064] and [3GPPTS 26.346];

    ii) include in the "a=mbms-mode" attribute the tmgi parameter as specified in [3GPP TS 26.346] set to the same value as in the TMGI AVP of the RAR message described in subclause 7.2.1 "Starting a Multicast PoC Channel"; and,

    iii) if the "a=mbms-mode" attribute was set to "broadcast", include in the "a=mbms-mode" attribute the mbms-counting-information

    parameter as specified in [3GPP TS 26.346] set to the same value as in the MBMS-Counting-Information AVP of the RAR message described in subclause 7.2.1 *"Starting a Multicast PoC Channel"*;

f) the other applicable MBMS FLUTE media level parameters depending on the actual needs.

## 6.2.4.2		SDP answer generation

When composing an SDP answer according to rules and procedures of [RFC3264] and [RFC4566] the PoC Server:

1. SHALL include a MIME SDP body as an SDP answer for the unicast Media Parameters as specified in [OMA-PCPS-CP] subclause 7.3.1.1c "*SDP answer generation*" with the clarification in the following steps:

2. SHALL include in the SDP session level the "a=key-mgmt" attribute as described in the subclause 5.1.2 "Generation and distribution of the session key";

3. SHALL include in the media-level section for each accepted unicast Media-level description where the Media Stream is sent over the Multicast PoC Channel and received as unicast the "a=recvonly";

4. SHALL include in the media-level section for each accepted multicast Media Stream from the received SDP offer consisting of the parameters sent in the Multicast PoC Channel announcement as specified in subclause 6.2.4.1 "*SDP in SIP INFO request*" and received in SDP offer from the client as specified in the subclause 6.1.5.1 "*SDP Offer Generation for a Multicast PoC Channel*";

5. SHALL include offered multicast Media Stream bindings to corresponding offered Media-floor Control Entities.

6. SHALL mark the Media Stream as rejected according to rules and procedures of [RFC3264], if the Media Stream is rejected, e.g. if the content of the offer is not the same as the content of the SDP announcement sent by the PoC Server in the SIP INFO request.

When the SIP/IP Core corresponds with 3GPP/3GPP2 IMS, the PoC Server SHALL use 3GPP/3GPP2 IMS Session establishment mechanisms according to rules and procedures of [3GPP TS 24.229] / [3GPP2 X.S0013.4] with the clarifications given in this subclause.

7. MBMS bearer service control

7.1 Client procedures using MBMS

7.1.1 General

MBMS bearer service control describes how the PoC Client acting as a MBMS Client detects theTMGI, connects to the Multicast PoC Channel, and then receives the Media over the Multicast PoC Channel according to rules and procedures of [3GPP TS 25.331] for UTRAN and [3GPP TS 36.331] for eUTRAN.

NOTE 1: The TMGI is received in the MIME SDP body of the SIP INFO request announcing the Multicast PoC Channel.

NOTE 2: MBMS procedures specific to the transfer of Discrete Media over the Multicast PoC Channel are described in the subclause 5.4.1 "*File Distribution MBMS*".

The procedures for UTRAN and eUTRAN are described in following sections.

7.1.1.1 General (UTRAN)

The PoC Client acting as a MBMS Client:

- SHALL based on information from PoC application layer on activated MBMS service(s) start monitoring MICH for MCCH acquisition in next modification period as specified in [3GPP TS 25.331];

- SHALL perform MCCH acquisition as specified in [3GPP TS 25.331 in order to receive service as provided by Multicast PoC Channel with clarifications in subclause 7.1.2 "*Detecting a Multicast PoC Channel*";

- SHALL based on information received in MCCH acquisition procedure configure the MBMS radio bearer for the Multicast PoC Channel as specified [3GPP TS 25.331];

- SHALL based on information received in the Control Plane on type of MBMS broadcast service (broadcast with counting or broadcast without counting) signal the change to RAN by invocation of MBMS Modification Request procedure as specified in [3GPP TS 25.331];

- SHALL inform RNC to release p-t-p radio bearer at detection of Multicast PoC Channel by invocation of MBMS Modification Request procedure as specified in [3GPP TS 25.331];

- SHALL participate in MBMS Counting procedure triggered by RRM in RAN in order to indicate to RAN the PoC Client interest of receiving the indicated activated MBMS services as [3GPP TS 25.331]; and,

- SHALL initiate reception of the Media over the Multicast PoC Channel as specified in [3GPP TS 25.331] with the clarifications in subclause 7.1.3 "*Connecting to a Multicast PoC Channel*".

7.1.1.2 General (eUTRAN)

The PoC Client acting as a MBMS Client:

- SHALL, based on information from the PoC application layer on activated MBMS service(s) of interest, monitor System Information Block 13 on the BCCH to acquire information about the MCCHs available as specified in [3GPP TS 36.331];

- SHALL acquire and monitor the available MCCHs for activated MBMS service(s) of interest as specified in [3GPP TS 36.331], based on information from the PoC application layer in order to receive service as provided by the Multicast PoC Channel with clarifications in subclause 7.1.2 "*Detecting a Multicast PoC Channel*";

- SHALL establish an MBMS Radio Bearer (MRB) for the Multicast PoC Channel from information obtained from the respective MCCH based on the MBMS bearer configuration procedures in [3GPP TS 36.331];

- SHALL participate in the MBMS Counting Procedure (if in RRC_CONNECTED state) for MBMS services of interest as specified in [3GPP TS 36.331];

- SHALL inform the network about its MBMS interest via performing the MBMS interest indication procedure as specified in [3GPP TS 36.331].

- SHALL initiate reception of the Media over the Multicast PoC Channel as specified in [3GPP TS 36.331] with the clarifications in subclause 7.1.3 "Connecting to a Multicast PoC Channel".

7.1.2   Detecting a Multicast PoC Channel

The detection of a Multicast PoC Channel is done differently depending upon the access network as described in the following subclauses.

7.1.2.1   Detecting a Multicast PoC Channel (UTRAN)

The PoC Client SHALL detect a Multicast PoC Channel by checking that the value of IE "MBMS Service ID" coded as octets 3 to 5 of the IE "Temporary Mobile Group Identity" in the [RRC] MBMS MODIFIED SERVICES INFORMATION or [RRC] MBMS UNMODIFIED SERVICES INFORMATION is equivalent to the "MBMS Service ID" portion of the TMGI [see 3GPP TS 26.346] in the SIP INFO request received in subclause 6.1.2 "*Multicast PoC Channel announcements*". Additionally, the considerations regarding the "PLMN identity" part of the MBMS service identity contained in [3GPP TS 25.331] SHALL be applied.

> NOTE 1: The TMGI is received in the MIME SDP body of the SIP INFO request announcing the Multicast PoC Channel.

> NOTE 2: The IE "MBMS Service ID" is the sub element of the IE "MBMS Transmission identity" of the [RRC] MBMS MODIFIED SERVICES INFORMATION or [RRC] MBMS UNMODIFIED SERVICES INFORMATION message. The IE "MBMS short transmission ID" of the [RRC] MBMS ACCESS INFORMATION message indexes The IE "MBMS Transmission identity".

7.1.2.2   Detecting a Multicast PoC Channel (eUTRAN)

The PoC Client SHALL detect a Multicast PoC Channel by checking that the value of the "serviceId" information element in the MBSFNAreaConfiguration message received on the MCCH, coded as octets 3 to 5 of the IE "Temporary Mobile Group Identity" (TMGI) as defined in [3GPP TS 24.008], is equivalent to the "MBMS Service ID" portion of the TMGI [see 3GPP TS 26.346] in the SIP INFO request received in subclause 6.1.2 "Multicast PoC Channel announcements". Additionally, the MNC and MCC portions of the TMGI included in the SIP INFO request SHALL be equivalent to that obtained from the respective "PLMN-Identity" IE contained in System Information Block Type1 (see [3GPP TS 36.331]).

> NOTE 1: The TMGI is received in the MIME SDP body of the SIP INFO request announcing the Multicast PoC Channel.

> NOTE 2: The "PLMN-Identity" IE is retrieved by using the "plmn-index" IE described in NOTE 3 as an index into the "plmn-IdentityList" IE contained in System Information Block Type 1 on the BCCH (see [3GPP TS 36.331]).

> NOTE 3: Both the "serviceId" and "plmn-index" IEs are sub-elements of the "tmgi" sub-element of the "MBMS-SessionInfo" IE which is a sub-element of the "PMCH-InfoList" IE of the MBSFNAreaConfiguration message. See [3GPP TS 36.331];

7.1.3   Connecting to a Multicast PoC Channel

On receipt of the [RRC] MBMS MODIFIED SERVICES INFORMATION message (UTRAN) or the MBSFNAreaConfiguration message (eUTRAN), the PoC Client:

1.   SHALL detect the Multicast PoC Channel as specified in subclause 7.1.1 "*General*";
2.   SHALL configure the p-t-m radio bearer for the Multicast PoC Channel as specified in subclause 7.1.1 "*General*"; and,

3. SHALL initiate reception of the Media Stream over the Multicast PoC Channel as specified in subclause 7.1.1 "*General*" but SHALL discard the Media Stream until the PoC Client receives the SIP 200 "OK" response to the SIP UPDATE request as described in 6.1.2.1 "*Announcement of the start of a Multicast PoC Channel*".

NOTE: The PoC Client acting as a MBMS Client, which completed the p-t-m radio bearer configuration in step 2, can already receive the Media Stream over the Multicast PoC Channel but cannot decrypt the Media Stream until the PoC Client receives the session key in the SIP 200 "OK" response to the SIP UPDATE request. Therefore the PoC Client renders the Media Stream being sent over the unicast Media session until the PoC Client receives the session key.

7.1.4 Stopping a Multicast PoC Channel

NOTE: The PoC Server can stop the Multicast PoC Channel during any time in an on-going PoC Session.

Upon receiving a [RRC] MBMS MODIFIED SERVICES INFORMATION message (UTRAN) with the IE "MBMS required UE action" set to "Release PTM RB" , the PoC Client SHALL perform the radio configuration as specified in [3GPP TS 25.331] in order to release the radio bearer.

For the eUTRAN case, an MCCH information change is indicated as described in [3GPP TS 36.331]. The PoC Client (acting as an MBMS client) will then monitor the MBSFNAreaConfiguration message on the MCCH. If it determines that an MBMS service that the PoC Client was using for the Multicast PoC Channel has been stopped, the PoC Client SHALL release the MRB as described in [3GPP TS 36.331].

7.2 Participating PoC Function using MBMS

The PoC Server performing the Participating PoC Function starts, updates or stops the Multicast PoC Channel according to rules and procedures of [RFC3588] as specified by [3GPP TS 29.061].

7.2.1 Starting a Multicast PoC Channel

When the PoC Server acting as the BM-SC decides to start a Multicast PoC Channel then the PoC Server:

1. SHALL establish a TCP connection to the Core Network if TCP connection does not already exist;

2. SHALL perform a capability exchange with the Core Network as specified in [3GPP TS 29.061] "*Usage of Diameter on Gmb interface*" (GPRS) or "*Usage of Diameter on SGmb interface*" (EPS) if capability exchange is not already done;

3. SHALL generate a RAR message according to rules and procedures of [3GPP TS 29.061] as specified in "Usage of Diameter on Gmb interface" (GPRS) or "Usage of Diameter on SGmb interface" (EPS) and SHALL include all mandatory headers with the clarifications below:

    a. SHALL set the MBMS-StartStop-Indication AVP to 'START';

    b. SHALL include one or more MBMS Service Area Identity based on local policy in the MBMS-Service-Area AVP;

NOTE 1: The local policy can e.g. be based on the PoC Group Identity.

    c. SHALL include a list of one or more downstream MBMS control plane nodes, SGSN(s) (for GPRS) or MME(s)/SGSN(s) (for EPS) based on local policy in the 3GPP-SGSN-Address AVP;

    d. SHALL include a Allocation/Retention Priority value in the MBMS-Required-QoS AVP (GPRS) or QoS-Information AVP (EPS) based on the QoE profile of the PoC Session as indicated in the Table 1 "*Allocation/Retention Priority based on QoE profile of the PoC Session*" below:

QoE profile	Allocation/Retention Priority[1]		
	GERAN (GPRS)	UTRAN (GPRS)	eUTRAN/UTRAN (EPS)
'Basic'	3	1-15 based on local policy in the PoC Server	1-15 based on local policy in the PoC Server
'Premium'	3		
'Professional'	2		
'Official Government Use' set to 4	1		
'Official Government Use' set to 3	1		
'Official Government Use' set to 2	1		
'Official Government Use' set to 1	1		
'Official Government Use' set to 0	1		

Table 1: Allocation/Retention Priority based on QoE profile of the PoC Session.

e.   SHALL include the quality of service information element coded as shown in [3GPP TS 24.008] in the MBMS-Required-QoS AVP (GPRS) or as shown in [3GPP TS 29.212] in the QoS-Information AVP (EPS) based on the quality of service information requested by the PoC Session based on local policy.

f.   SHALL set the MBMS-Session-Duration AVP to all 0's i.e. indefinite time;

g.   SHALL set the MBMS-Service-Type AVP to 'BROADCAST (GPRS only)';

h.   SHALL set the MBMS-Counting-Information AVP to 'COUNTING-APPLICABLE' or 'COUNTING-NOT-APPLICABLE' according to the Service Provider Policy (GPRS only);

i.   SHALL allocate a MBMS Session Identity value and include the allocated value in the MBMS-Session-Identity AVP;

j.   SHALL include a unique value in the TMGI AVP identifying the Multicast PoC Channel;

k.   SHALL include the MBMS-2G-3G-Indicator AVP with the value set to '2G', '3G' or '2G-AND-3G' (GPRS) or the MBMS-Access-Indicator AVP set to 'UTRAN', 'eUTRAN' or 'UTRAN-AND-E-UTRAN' (EPS);

l.   SHALL include multicast address where the GGSN/MBMS GW SHOULD receive the MBMS bearer data for this MBMS session in Framed-IP-Address AVP if IPv4 is used. For IPv6 address the AVP Framed-Interface-Id and Framed-IPv6-Prefix SHALL be used instead;

m.   SHALL include the MBMS-User-Data-Mode-Indication AVP with the value set to 'Multicast and Unicast (1)' or 'Unicast (0) ' according to the PoC Server's own capability;

NOTE: The GGSN or MBMS GW will indicate its own capabilities regarding multicast or unicast for reception of the MBMS user plane data when it sends the RAA message in response.

4.   SHALL send the RAR message according to the rules and procedures of the Core Network.

NOTE 2:   The Framed-IPv6-Prefix AVP contains the IPv6 prefix of the multicast address. The Framed-Interface-Id AVP contains the IPv6 interface identifier of the multicast address. The Framed-IP-Address AVP contains the IPv4 multicast address.

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[1] Note that higher-priority Allocation/Retention Priorities are indicated by lower numeric Allocation/Retention Priority values, i.e., '1' is the highest priority and '15' is the lowest.

On receipt of a RAA message the PoC Server:

1. SHALL establish the Multicast PoC Channel as described in the subclause 6.2.1.1 "*Multicast PoC Channel announcements*" if the Experimental-Result AVP fall within the Success category; or,

2. SHOULD retransmit the RAR within a reasonable time if the Result-Code AVP or the Experimental-Result AVP fall within the Transient Failures category; or,

3. SHALL not make a new attempt to start the Multicast PoC Channel if the Result-Code AVP or the Experimental-Result AVP fall within the Permanent Failures category.

7.2.2   File repair

The PoC Server behaviour for file repair is described in the subclause 5.4.1 "*File Distribution MBMS*".

7.2.3   Stopping the Multicast PoC Channel

When the PoC Server decides to stop the Multicast PoC Channel the PoC Server

1. SHALL generate a RAR message according to rules and procedures of [3GPP TS 29.061] "*RAR Re-Auth-Request Command"* and SHALL include all mandatory headers with the clarifications below:

    a)   SHALL set the MBMS-StartStop-Indication AVP to 'STOP';

    b)   SHALL include the MBMS Session Identity (allocated when the Multicast PoC Channel was started by the PoC Server) in the MBMS-Session-Identity AVP value;

2. SHALL send the RAR message according to the rules and procedures of the Core Network.

NOTE: The Framed-IPv6-Prefix AVP contains the IPv6 prefix of the multicast address. The Framed-Interface-Id AVP contains the IPv6 interface identifier of the multicast address. The Framed-IP-Address AVP contains the IPv4 multicast address.

On receipt of a RAA message the PoC Server MAY disconnect the TCP connection towards the Core Network according to a local policy.

7.2.4   Updating the Multicast PoC Channel

The PoC Server MAY update the Multicast PoC Channel parameters due to local policy.

NOTE 1: Only the MBMS Service Area and/or list of MBMS control plane nodes may be updated for GPRS. The Allocation/Retention Priority AVP may additionally be updated for EPS only.

When the Multicast PoC Channel parameters are updated, the PoC Server:

1. SHALL generate a RAR message according to rules and procedures of [3GPP TS 29.061] "*RAR Re-Auth-Request Command"* and SHALL include all mandatory headers with the clarifications below:

    a)   SHALL set the MBMS-StartStop-Indication AVP to 'UPDATE';

    b)   SHALL include the MBMS Session Identity (allocated when the Multicast PoC Channel was started by the PoC Server) in the MBMS-Session-Identity AVP value;

    c)   SHALL include the updated MBMS Service Area Identity in the MBMS-Service-Area AVP;

    d)   SHALL include updated MBMS control plane nodes, SGSN(s) (for GPRS) or MME(s)/SGSN(s) (for EPS), in the 3GPP-SGSN-Address AVP;

    e)   SHALL include a Allocation/Retention Priority value in the MBMS-Required-QoS AVP (GPRS) or as shown in [3GPP TS 29.212] in the QoS-Information AVP (EPS) based on the QoE profile of the PoC Session as indicated in the Table 2 "*Allocation/Retention Priority based on QoE profile of the PoC Session*" below:

QoE profile	Allocation/Retention Priority[2]		
	GERAN (GPRS)	UTRAN (GPRS)	eUTRAN/UTRAN (EPS)
'Basic'	3	1-15 based on local policy in the PoC Server	1-25 based on local policy in the PoC Server.
'Premium'	2		
'Professional'	2		
'Official Government Use' set to 4	1		
'Official Government Use' set to 3	1		
'Official Government Use' set to 2	1		
'Official Government Use' set to 1	1		
'Official Government Use' set to 0	1		

Table 2: Allocation/Retention Priority based on QoE profile of the PoC Session.

    f)   SHALL include the quality of service information element coded as shown in [3GPP TS 24.008] in the MBMS-Required-QoS AVP (GPRS) or as shown in [3GPP TS 29.212] in the QoS-Information AVP (EPS) based on the quality of service information requested by the PoC Session based on local policy.

    g)   SHALL set the MBMS-Session-Duration AVP to all 0's i.e. indefinite time;

    h)   SHALL set the MBMS-Service-Type AVP to 'BROADCAST (GPRS only)';

    i)   SHALL set the MBMS-Counting-Information AVP to 'COUNTING-APPLICABLE' or 'COUNTING-NOT-APPLICABLE' according to the Service Provider Policy (GPRS only);

    j)   SHALL include the TMGI in the TMGI AVP identifying the Multicast PoC Channel;

    k)   SHALL include the MBMS-2G-3G-Indicator AVP with the value set to '2G', '3G' or '2G-AND-3G' (GPRS) or the MBMS-Access-Indicator AVP set to 'UTRAN', 'eUTRAN' or 'UTRAN-AND-E-UTRAN' (EPS); and,

    l)   SHALL include the MBMS-User-Data-Mode-Indication AVP with the value set to 'Multicast and Unicast (1)'.

    NOTE 2: The GGSN or MBMS GW will indicate its own capabilities regarding multicast or unicast for reception of the MBMS user plane data when it sends the RAA message in response.

  2.   SHALL send the RAR message according to the rules and procedures of the Core Network.

  NOTE 3: The Framed-IPv6-Prefix AVP contains the IPv6 prefix of the multicast address. The Framed-Interface-Id AVP contains the IPv6 interface identifier of the multicast address. The Framed-IP-Address AVP contains the IPv4 multicast address.

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[2] Note that higher Allocation/Retention Priorities are indicated by lower numeric Allocation/Retention Priority values, i.e., '1' is the highest priority and '15' is the lowest.

Appendix A. Change History (Informative)

A.1 Approved Version History

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

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-TS-PCPS-Multicast-V1_0	17 Aug 2014	All	Baseline as submitted in: 2014-0160-INP_PCPS_1.0_TS_Multicast_Baseline
	22 Sep 2014	Sections 2, 3, 5.6	Added changes per agreed CR 2014-0161R02-CR_TS_Multicast_Section_5_6_Mcast_Channel
		Sections 2, 5 and 6	Added changes per agreed CR 2014-0162R01-CR_TS_Multicast_RFC_2976
		Section 2, 3 and 7	Added changes per agreed CR 2014-0163R01-CR_TS_Multicast_Sec_7_1_1thru7_1_3
		Section 7	Added changes per agreed CR 2014-0167R01-CR_TS_Multicast_Sec_7_1_4
		Sections 2 and 7	Added changes per agreed CR 2014-0175-CR_TS_Multicast_7_2_Updates
		Sections 2 and 6	Added changes per agreed CR 2014-0177-CR_TS_Multicast_RFC6064
		Sections 5 and 6	Added changes per agreed CR 2014-0191-CR_TS_Multicast_Ext_Sec_Numbers
	08 Oct 2014	Sections 5.1.4, 5.6.4, 6.2.3.1.2, 6.2.4.1, 6.2.4.2	Added changes per agreed CR 2014-0196R01-CR_TS_Multicast_Counting_Editorials
		Sections 1.0, 2.1, 3.3, 4.1.1, 5.3, 5.5, 5.5.1, 5.5.2, 5.6.1, 5.6.2, 5.6.3, 5.7	Added changes per agreed CR 2014-0219R01-CR_TS_Multicast_OMA_Ref_Updates_1to5_7
		Sections 5.8, 6.1, 6.1.1, 6.1.2.1, 6.1.2.2, 6.1.3, 6.1.3.1, 6.1.3.2, 6.1.3.3, 6.1.4, 6.1.5, 6.1.5.1, 6.1.5.2, 6.1.5.3, 6.2.1.2, 6.2.3.1.1, 6.2.3.1.2, 6.2.4.1, 6.2.4.2	Added changes per agreed CR 2014-0220-CR_TS_Multicast_OMA_Ref_Updates_5_8toEnd
		Appendix C.1, C.1.1	Added changes per agreed CR 2014-0221R02-CR_TS_Multicast_C_1_1_Flow_Updates

Document Identifier	Date	Sections	Description
		Sections 5.6.1, 5.6.2, 5.6.3, 6.1.3.1, 6.1.5.1, 6.1.5.3, 6.2.3.1.1, 6.2.3.1.2, 6.2.4.1, 6.2.4.2	Added changes per agreed CR 2014-0250R01-CR_TS_Restore_Multicast_Ext_Sec_Numbers
	12 Dec 2014	Appendix C.1.3	Added changes per agreed CR: 2014-0299R01-CR_TS_Multicast_C_1_3_Flow_Updates
		Appendix C.1.2	Added changes per agreed CR: 2014-0300R03-CR_TS_Multicast_C_1_2_Flow_Updates
		Appendix C.1.4.1	Added changes per agreed CR: 2014-0304R02-CR_TS_Multicast_C_1_4_1_Flow_Updates
		Appendix C.1.4.2	Added changes per agreed CR: 2014-0305R02-CR_TS_Multicast_C_1_4_2_Flow_Updates 2014-0305R01-CR_TS_Multicast_C_1_4_2_Flow_Updates Note: Changes in 2014-0305R02 supercede 2014-0305R01.
		Appendix C.1.5	Added changes per agreed CR: 2014-0306R02-CR_TS_Multicast_C_1_5_Flow_Updates
		Section 2.1, Appendix B	Added changes per agreed CR: 2014-0336-CR_TS_Multicast_SCR_Update
		Section 4., 4.1	Added changes per agreed CR: 2014-0350-CR_Multicast_intro_conrr_D006
		All sections	All issue resolutions (#D001-D029) from 20141212CONRR resolved and included in this version. Subsequent to company review, this version is for candidate approval.
Candidate Version OMA-TS-PCPS-Multicast-V1_0	20 Feb 2015	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2015-0062-INP_PCPS_V1_0_ERP_and_ETR_for_Candidate_Approval

Appendix B.   Static Conformance Requirements   (Normative)

NOTE: This section is unchanged for PCPS V1.0. It contains the SCR from PoC v2.1.

The SCRs defined in the following tables include SCRs for:

- The PoC Client; and,

- the PoC Server.

The SCRs are defined as described in [OMA_SCR_Rules].

Each SCR table identifies a list of supported features as:

- Item: Identifier for a feature. It MUST be of type ScrItem.

- Function: Short description of the feature.

- Reference: Section(s) of the specification(s) with more details on the feature.

- Requirement: Other features required by this feature, independent of whether those other features are mandatory or optional. The notation in the dependency grammar MUST be used for this column when other features are required, else the column MUST be left empty.

Dependency grammar used in this section is specified in [OMA_SCR_Rules]:

TerminalExpression =	ScrReference / NOT TerminalExpression / TerminalExpression LogicalOperator TerminalExpression / " (" TerminalExpression ")"
ScrReference =	ScrItem / ScrGroup
ScrItem =	SpecScrName "−" GroupType "−" DeviceType "−" NumericId "-" Status / SpecScrName "−" DeviceType "−" NumericId "-" Status
ScrGroup =	SpecScrName ":" FeatureType / SpecScrName "−" GroupType "−" DeviceType "−" FeatureType

SpecScrName = 1*Character;

GroupType = 1*Character;

DeviceType = "C" / "S"; C – client, S – server

NumericId = Number Number Number

Status = "M" / "O"; M - Mandatory, O - Optional

LogicalOperator = "AND" / "OR"; AND has higher precedence than OR and OR is inclusive

FeatureType = "MCF" / "OCF" / "MSF" / "OSF";

Character = %x41-5A;

NOTE: The following convention applies for the labels regarding the PoC version:

- PoCv2.1 - SCR Item that is new in PoCv2.1.

B.1   SCR for the Client

Item	Function	Reference	Requirement
POC_MC- MPOC -C-001-O	Support Multicast PoC PoCv2.1	5, 6.1, 7.1, [OMA-PoC-UP] 7.1.2, [OMA-PoC-UP] 7.4.1	POC MC-MPOC-C-002-O
POC_MC- MPOC -C-002-O	Support for Continuous Media over a Multicast PoC Channel PoCv2.1	5.6.2	POC_MC- MPOC -C-001-O
POC_MC- MPOC -C-003-O	Support for Discrete Media over a Multicast PoC Channel PoCv2.1	5.3, 5.4, 5.5, 5.6.3	POC_MC- MPOC -C-001-O

B.2   SCR for the Server performing the Participating Function

Item	Function	Reference	Requirement
POC_MC- MPOC -S-001-O	Support Multicast PoC PoCv2.1	6.2, 7.2, [OMA-PoC-UP] 7.2 [OMA-PoC-UP] 7.4.2 [OMA-PoC-UP] 7.10	POC_MC- MPOC -S-002-O
POC_MC- MPOC -S-002-O	Support for Continuous Media over a Multicast PoC Channel PoCv2.1	5.6.2	POC_MC- MPOC -S-001-O
POC_MC- MPOC -S-003-O	Support for Discrete Media over a Multicast PoC Channel PoCv2.1	5.3, 5.4, 5.5, 5.6.3	POC_MC- MPOC -S-001-O
POC_MC- MPOC -S-004-O	Support for Traffic Optimization when a Multicast PoC Channel is used PoCv2.1	5.6.2	POC_UP-TOP-S-001-O, POC_MC- MPOC -S-001-O

Appendix C.   Examples of signalling flows   (Informative)

C.1   MBMS message flows

This clause describes example message flows for Multicast PoC using MBMS as the radio access technology.

In order to get an overview of the Multicast PoC message flows, the messaging and associated step descriptions are shown below. However, only the messaging between the Radio Access/Core Network and the PoC Client and PoC Server are shown.

Only some RRC messages are described in this section in reality many other RRC messages will appear between the PoC Client and the Radio Network Controller.

The parameter coding in this appendix is informative and not intended to be used when implementing the Multicast PoC. For detailed coding see the appropriate specification.

C.1.1   Starting a Multicast PoC Channel

This subclause shows how a PoC Server performing the Participating PoC Function acting as a BM-SC starts a Multicast PoC Channel during an ongoing PoC Session and how information about the ongoing PoC Session and Multicast PoC Channel details are broadcasted to the PoC Client.

The PoC Server is performing the role of a BM-SC.

The PoC Client is performing the role of a MBMS Client.

Figure 2 "*Starting a Multicast PoC Channel*" shows the message flow for the scenario.
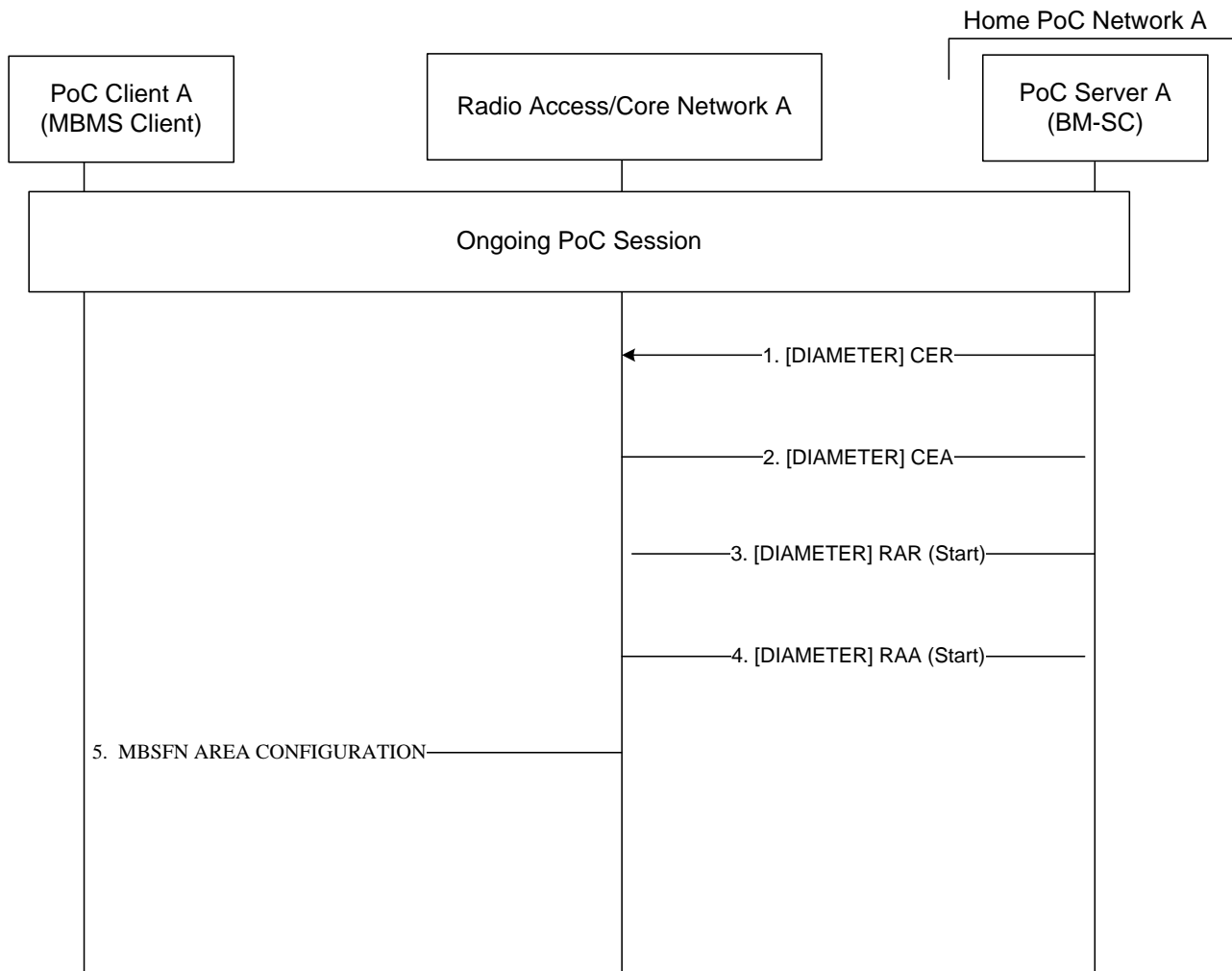
Figure 2: Starting a Multicast PoC Channel.

During an ongoing PoC Session the PoC Server performing the Participating PoC Function serving PoC User A at PoC Client A decides to start a Multicast PoC Channel.

The steps of the flow are as follows:

1. **[DIAMETER] CER (from PoC Server A to Radio Access/Core Network A)**

   The PoC Server A (BM-SC) sends a [DIAMETER] CER message to the Radio Access/Core Network A.

2. **[DIAMETER] CEA (from Radio Access/Core Network A to PoC Server A)**

   The **Radio Access/**Core Network A sends a [DIAMETER] CEA message to the PoC Server A (BM-SC).

3. **[DIAMETER] RAR (Start) (from PoC Server A to Radio Access/Core Network A)**

   The PoC Server A (BM-SC) sends a [DIAMETER] RAR (Start) to the Radio Access/ Core Network A.

DIAMETER HEADERS	Value

Framed-Interface-Id	0:0:0:1F
Framed –Interface-IPv6-Prefix	FD01:0:0:0/64
Framed-IP-Address AVP	224.0.0.106
MBMS-StartStop-Indication	0
MBMS-Service-Area	67
Allocation/Retention Priority	'3'
QoS Profile	The quality of service information element is coded as shown in figure 10.5.138/3GPP TS 24.008 and table 10.5.156/3GPP TS 24.008.
MBMS-Session-Duration	'000'
MBMS-Session-Identity	4
MBMS-Session-Repetition-number	'0'
TMGI	MBMS Serv Id: 24 MCC:310 MNC:66
3GPP-SGSN-Address	33.0.0.106
3GPP-SGSN-IPv6-Address	0222:0:0:1F00
MBMS-ACCESS-Indicator	2
MBMS-User-Data-Mode-Indication	1

NOTE: For GPRS systems, the "MBMS Service Type" and "MBMS Counting Information" AVPs will also be present. The "MBMS 2G 3G Indicator" AVP will be used in place of the "MBMS-ACCESS-Indicator" AVP shown.

4. [DIAMETER] RAA (start) (from Radio Access/Core Network A to PoC Server A)

The Radio Access/Core Network A sends a [DIAMETER] RAA (Start) to the PoC Server (BM-SC).

DIAMETER HEADERS	Value	
Experimental-Result-Code	DIAMETER_SUCCESS	2001

5. [RRC] MBSFN AREA CONFIGURATION (from Radio Access/Core Network A to PoC Client)

Radio Access/Core Network A sends a [RRC] MBMS MBSFN AREA CONFIGURATION message over the MCCH logical channel which is received by the PoC Client A.

NOTE: For GPRS, Radio Access/Core Network A sends a [RRC] MBSFN MODIFIED SERVICES INFO message instead of the MBSFN AREA CONFIGURATION message over the MSCH logical channel which is received by PoC Client A.

C.1.2   Connecting to a Multicast PoC Channel

This subclause shows how a PoC Client connects to a Multicast PoC Channel during an ongoing PoC Session.

The PoC Server is performing the role of a Participating PoC Function.

The PoC Client is either performing the role of a PoC Client or the role of a MBMS Client.

Figure 3 "*Connecting to a Multicast PoC Channel*" shows the message flow for the scenario.

Figure 3: Connecting to a Multicast PoC Channel.

The steps of the flow are as follows:

1. SIP INFO request (from PoC Server A to SIP/IP Core A)

The PoC Server A (participating) sends a SIP INFO request to SIP/IP Core A.

Request-URI	sip:PoC-UserA@networkA.net; gr=urn:uuid:00000000-0000-1000-

8000-000A95A0E128

SIP HEADERS

User-Agent:	PoC-serv/OMA2.1
Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap:97 AMR
i=	speech
a=	label:aa
a	recvonly
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa bb
m=	audio 1234 RTP/AVP 98
a=	rtpmap:98 AMR
c=	IN IP6 0:0:0:1F
a=	label bb
a	sendonly
a=	mbms-mode:broadcast-mbsfn 24

NOTE: For GPRS Systems, the mbms-mode parameter will be set to "broadcast 24 1"

2. SIP INFO request (from SIP/IP Core A to PoC Client A)

The SIP/IP Core A routes the SIP INFO request to PoC Client A.

Request-URI	sip:PoC-ClientA@PoCClientA.networkA.net

SIP HEADERS

User-Agent:	PoC-serv/OMA2.1

Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap:97 AMR
i=	speech
a=	label:aa
a	recvonly
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa bb
m=	audio 1234 RTP/AVP 98
a=	rtpmap:98 AMR
c=	IN IP6 0:0:0:1F
a=	label bb
a	sendonly
a=	mbms-mode:broadcast-mbsfn 24

NOTE: For GPRS Systems, the mbms-mode parameter will be set to "broadcast 24 1"

3. SIP 200 "OK" response (from PoC Client A to SIP/IP Core A)

The PoC Client A sends a SIP 200 OK response message to SIP/IP Core A.

SIP HEADERS

Require:	timer
Server:	PoC-client/OMA2.1 Acme-Talk5000/v1.01
Session-Expires:	1800;refresher=uas
Contact:	<sip:PoC-UserA@networkA.net;gr=urn:uuid:00000000-0000- 1000-8000-000A95A0E128 >;+sip.instance="< urn:gsma:imei:90420156-025763-0>";+g.poc.talkburst;

+g.poc.multicast

Allow: INVITE,ACK,CANCEL,BYE,REFER,

4. SIP 200 "OK" response (from SIP/IP Core A to PoC Server A)

The SIP/IP Core A routes the SIP 200 "OK" response to PoC Server A.

Contents contained in the SIP 200 "OK" response is the same as in step 3.

5. [RRC] MBSFN AREA CONFIGURATION (from Radio Access/Core Network A to PoC Client)

Radio Access/Core Network A sends a [RRC] MBSFN AREA CONFIGURATION message over the MCCH logical channel which is received by the PoC Client (MBMS Client).

NOTE: For GPRS systems, Radio Access/Core Network A sends a [RRC] MBMS MODIFIED SERVICES INFO message instead of the MBSFN AREA CONFIGURATION message over the MCCH or DCCH logical channel which is received by PoC Client A.

6. SIP UPDATE request (from PoC Client A to SIP/IP Core A)

The PoC Client A sends a SIP UPDATE request to SIP/IP Core A.

Request-URI	sip:TokenA%PoC-Session-Identity1@PoC-ServerX.networkX.net% @PoC-ServerA.networkA.net

SIP HEADERS

User-Agent:	PoC-client/OMA2.1 Acme-Talk5000/v1.01
Contact:	<sip:PoC-UserA@networkA.net;gr=urn:uuid:00000000-0000-1000-8000-000A95A0E128>;+sip.instance="< urn:gsma:imei:90420156-025763-0>";+g.poc.talkburst; +g.poc.multicast
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::bbb:ccc:ddd:eee
a=	poc-qoe:premium
m=	audio 3456 RTP/AVP 95
a=	rtpmap: 95 AMR
i=	speech
a=	label:aa

a=	sendonly
m=	application 3457 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa bb
m=	audio 1234 RTP/AVP 98
a=	rtpmap:98 AMR
c=	IN IP6 0:0:0:1F
a=	label bb
a	recvonly
a=	mbms-mode:broadcast-mbsfn 24

NOTE: For GPRS Systems, the mbms-mode parameter will be set to "broadcast 24 1"

7. SIP UPDATE request (from SIP/IP Core A to PoC Server A)

The SIP/IP Core A routes the SIP UPDATE request to PoC Server A.

Contents contained in the SIP UPDATE request is the same as in step 6.

8. SIP 200 "OK" response (from PoC Server A to SIP/IP Core A)

The PoC Server A (participating) sends a SIP 200 "OK" response message to SIP/IP Core A.

SIP HEADERS

Require:	timer
Server:	PoC-serv/OMA2.1
Session-Expires:	1800;refresher=uac
Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session=prearranged >;+g.poc.talkburst;+g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 95
a=	rtpmap: 95 AMR

i=	speech
a=	label:aa
a=	recvonly
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa bb
m=	audio 1234 RTP/AVP 98
a=	rtpmap:98 AMR
c=	IN IP6 0:0:0:1F
a=	label bb
a	sendonly
a=	mbms-mode:broadcast-mbsfn 24

NOTE: For GPRS systems, the mbms-mode parameter will be set to "broadcast 24 1"

9. SIP 200 "OK" response (from SIP/IP Core A to PoC Client A)

The SIP/IP Core A routes the SIP 200 "OK" response to PoC Client A.

Contents contained in the SIP 200 "OK" response is the same as in step 8.

C.1.3   Updating the Multicast PoC Channel

This subclause shows how the PoC Server performing the Participating PoC Function can update the Multicast Access Network.

The update can be of the following types:

1.   New geographical areas can be added to the already existing areas using the same Core Network (described in this subclause); or,

2.   New geographical areas can be added to the already existing areas using another Core Network (described in subclause C.1.1 "*Starting a Multicast PoC Channel*"); or,

3.   Some of the geographical areas are removed from the already existing set of geographical areas in a Core Network that already handle the Multicast PoC Channel (described in this subclause); or,

4.   All geographical areas are removed from a Core Network that already handles the Multicast PoC Channel (described in subclause C.1.4 "*Stopping the Multicast PoC Channel*").

The PoC Server is performing the role of a BM-SC.

The PoC Client is performing the role of a MBMS Client.

Figure 4 "*Updating the Multicast PoC Channel*" shows the message flow for the scenario 1 and 3 above.
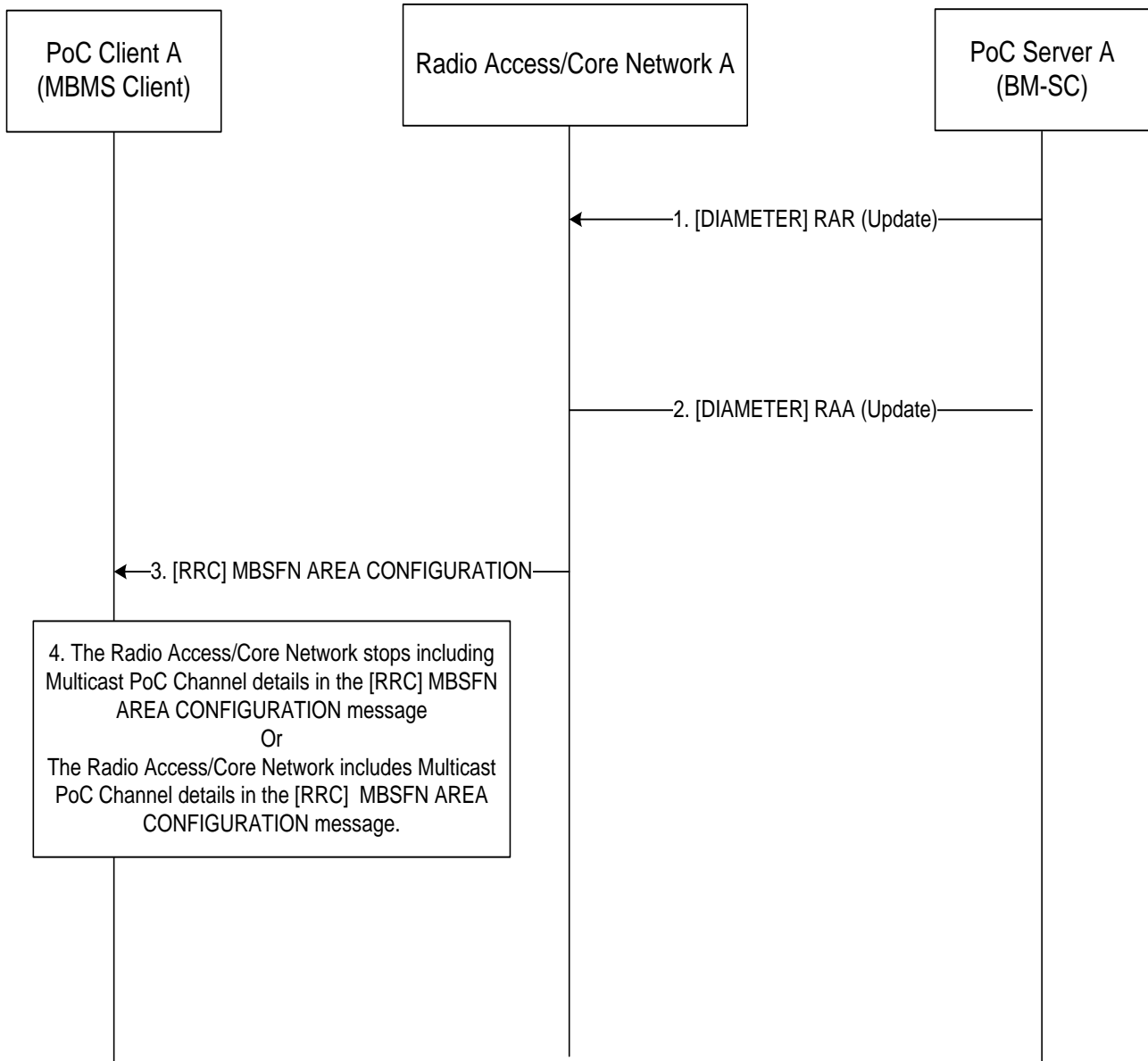
Figure 4: Updating the Multicast PoC Channel.

The PoC Server needs to update the MBMS parameters, e.g. adding more geographical areas when another PoC Session is going to use the same Multicast PoC Channel.

The steps of the flow are as follows:

1. [DIAMETER] RAR (Update) (from PoC Server A to Radio Access/Core Network A)

   The PoC Server A sends a [DIAMETER] RAR (Update) to Radio Access/Core Network A.

DIAMETER HEADERS	Value

Framed-Interface-Id	0:0:0:1F
Framed –Interface-IPv6-Prefix	FD01:0:0:0/64
Framed-IP-Address AVP	224.0.0.106
MBMS-StartStop-Indication	2
MBMS-Service-Area	Number of MBMS Service Area Codes: 4 List of MBMS Service Area Codes: 67 128 3267 95
Allocation/Retention Priority	'3'
QoS Profile	The quality of service information element is coded as shown in figure 10.5.138/3GPP TS 24.008 and table 10.5.156/3GPP TS 24.008.
MBMS-Session-Duration	'000'
MBMS-Session-Identity	4
MBMS-Session-Repetition-number	'0'
TMGI	MBMS Serv Id: 24 MCC:310 MNC:66
3GPP-SGSN-Address	33.0.0.106
3GPP-SGSN-IPv6-Address	0222:0:0:1F00
3GPP-SGSN-Address	33.0.0.107
3GPP-SGSN-IPv6-Address	0222:0:0:1F01
MBMS-ACCESS-indicator	2
MBMS-User-Data-Mode-Indication	1

NOTE: For GPRS systems, the "MBMS Service Type" and "MBMS Counting Information" AVPs will also be present. The "MBMS 2G 3G Indicator" AVP will be used in place of the "MBMS-ACCESS-Indicator" AVP shown.

2. [DIAMETER] RAA (Update) (from Radio Access/Core Network A to PoC Server A)

The Radio Access/Core Network A sends a [DIAMETER] RAA (Update) to the PoC Server (BM-SC).

Value

DIAMETER HEADERS

| Experimental-Result-Code | DIAMETER_SUCCESS | 2001 |

3. [RRC] MBSFN AREA CONFIGURATION (from Radio Access/Core Network A which is received by PoC Client A)

Radio Access/Core Network A sends a [RRC] MBSFN AREA CONFIGURATION message which is received by PoC Client A.

Radio Access/Core Network A stops including Multicast PoC Channel details in the [RRC] MBSFN AREA CONFIGURATION message or includes Multicast PoC Channel details in a [RRC] MBSFN AREA CONFIGURATION as appropriate. In this example, two MBMS Service Area IDs were added, so Multicast PoC Channel details will be included in those new areas in addition to the ones previously included.

NOTE: For GPRS, Radio Access/Core Network A sends a [RRC] MBMS MODIFIED SERVICES INFO message instead of the MBSFN AREA CONFIGURATION message over the MSCH logical channel which is received by PoC Client A.

C.1.4 Stop of a Multicast PoC Channel

This subclause shows how a PoC Server performing the Participating PoC Function stops a Multicast PoC Channel during an ongoing PoC Session.

Subclause C.1.4.1 "*Disconnecting from the Multicast PoC Channel*" shows how PoC Clients listening to the Multicast PoC Channel are disconnected,

Subclause C.1.4.1 "*Release of Multicast PoC Channel announcement*" shows how the PoC Clients not yet listening to the PoC Channel are informed about the stop of the Multicast PoC Channel.

C.1.4.1 Disconnecting from the Multicast PoC Channel

This subclause shows how the PoC Server disconnects all PoC Clients connected to the Multicast PoC Channel and finally stops the Multicast PoC Channel.

The PoC Server either performs the role of a Participating PoC Function or the role of a BM-SC.

The PoC Client either performs the role of a PoC Client or the role of a MBMS Client.

Figure 5 "*Stop of a Multicast PoC Channel*" shows the message flow for the scenario.
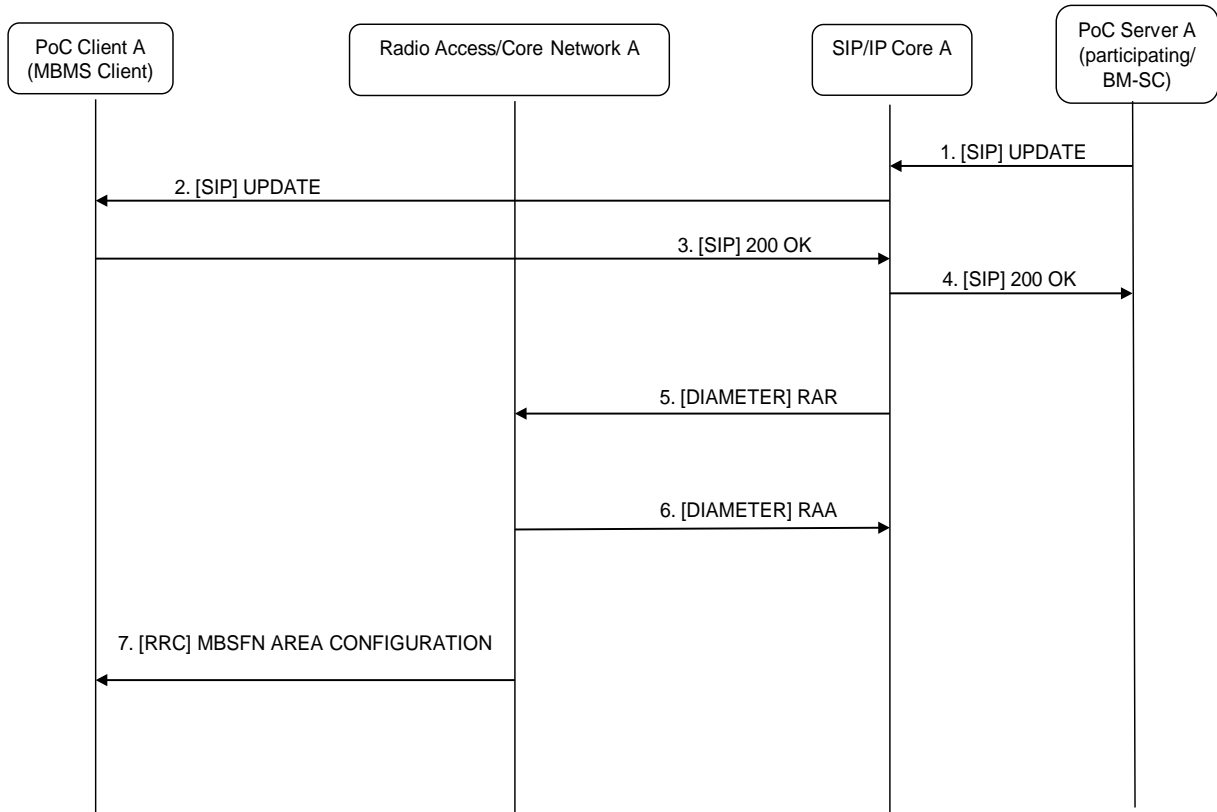
Figure 5: Stop of a Multicast PoC Channel.

NOTE: Not all RRC signals are shown and only the important RRC signals from PoC specification's perspective are shown.

The steps of the flow are as follows:

1. [SIP] UPDATE request (from the PoC Server A to SIP/IP Core A)

The PoC Server A (participating) sends a SIP UPDATE request to SIP/IP Core A.

Request-URI <sip:PoC-UserA@networkA.net;gr=urn:uuid:00000000-0000-1000-8000-000A95A0E128>

SIP HEADERS

User-Agent: PoC-serv/OMA2.1

Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap: 97 AMR
i=	speech
a=	label:aa
a=	sendrecv
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

2. [SIP] UPDATE request (from SIP/IP Core A to PoC Client A)

The SIP/IP Core A routes the SIP UPDATE request to PoC Client A.

Request-URI	<sip:PoC-ClientA@PoCClientA.networkA.net >

SIP HEADERS

User-Agent:	PoC-serv/OMA2.1
Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap: 97 AMR

i=	speech
a=	label:aa
a=	sendrecv
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

3. SIP 200 "OK" response (from PoC Client A to SIP/IP Core A)

The PoC Client A sends a SIP 200 "OK" response message to SIP/IP Core A.

SIP HEADERS

User-Agent:	PoC-client/OMA2.1 Acme-Talk5000/v1.01
Contact:	<sip:PoC-UserA@networkA.net;gr=urn:uuid:00000000-0000-1000-8000-000A95A0E128>;+sip.instance="<urn:gsma:imei:90420156-025763-0>";+g.poc.talkburst; +g.poc.multicast
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER

SDP PARAMETERS

c=	IN IP6 5555::bbb:ccc:ddd:eee
a=	poc-qoe:premium
m=	audio 3456 RTP/AVP 95
a=	rtpmap: 95 AMR
i=	Speech
a=	label:aa
a=	Sendrecv
m=	application 3457 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

4. SIP 200 "OK" response (from SIP/IP Core A to PoC Server A)

The SIP/IP Core A routes the SIP 200 "OK" response to PoC Server A.

Contents contained in the SIP 200 "OK" response is the same as in step 3.

5. [DIAMETER] RAR (Stop) (from PoC Server A to Radio Access/Core Network A)

The PoC Server A (BM-SC) sends a [DIAMETER] RAR to the Radio Access/Core Network A.

DIAMETER HEADERS	
MBMS-StartStop-Indication	1

6. [DIAMETER] RAA (from Radio Access/Core Network Ato PoC Server A)

Radio Access/Core Network A sends a [DIAMETER] RAA to the PoC Server (BM-SC).

7. [RRC] MBSFN AREA CONFIGURATION (from Radio Access/Core Network A to PoC Client A)

Radio Access/Core Network A sends a [RRC] MBSFN AREA CONFIGURATION message over the MCCH logical channel which is received by PoC Client A (MBMS Client).

NOTE: For GPRS, Radio Access/Core Network A sends a [RRC] MBMS MODIFIED SERVICES INFORMATION message instead of the MBSFN AREA CONFIGURATION message over the MCCH or DCCH logical channel which is received by PoC Client A.

C.1.4.2   Release of Multicast PoC Channel announcement

This subclause shows how the PoC Server announces the stop of the Multicast PoC Channel to PoC Clients not yet connected to the Multicast PoC Channel.

Figure 6 "*Stop of Multicast PoC Channel announcement*" shows the message flow for the scenario.
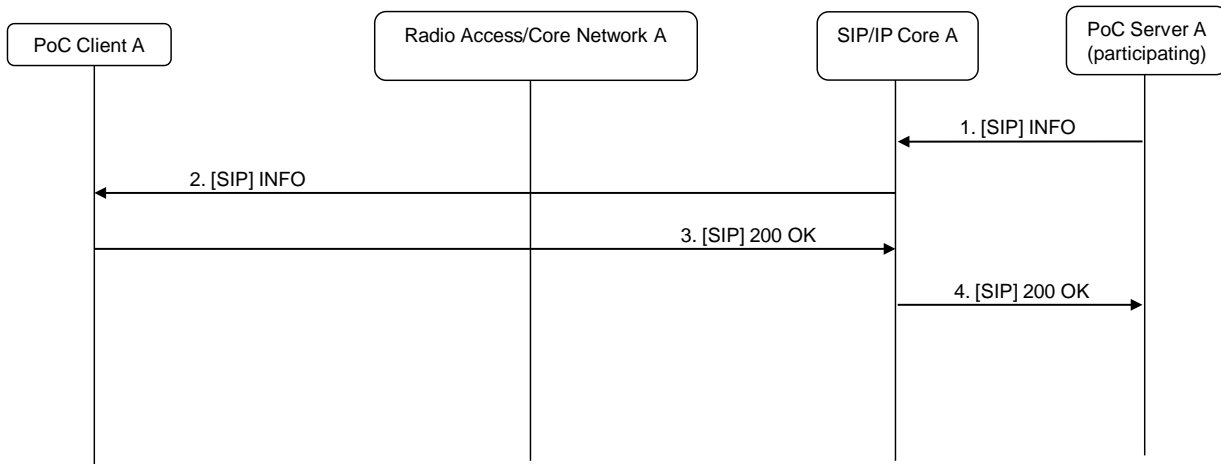
Figure 6: Stop of Multicast PoC Channel announcement.

The steps of the flows are as follows:

1. SIP INFO request (from PoC Server A to SIP/IP Core A)

The PoC Server A (participating) sends a SIP INFO request to SIP/IP Core A.

Request-URI	sip:PoC-UserA@networkA.net; gr=urn:uuid:00000000-0000-1000-8000-000A95A0E128

SIP HEADERS

User-Agent:	PoC-serv/OMA2.1
Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap:97 AMR

i=	speech
a=	label:aa
a	sendrecv
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

2. SIP INFO request (from SIP/IP Core A to PoC Client A)

The SIP/IP Core A routes the SIP INFO request to PoC Client A.

Request-URI	sip:PoC-ClientA@PoCClientA.networkA.net

SIP HEADERS

User-Agent:	PoC-serv/OMA2.1
Contact:	<sip:PoC-SessionABCDEF@PoC_ServerA.networkA.net;gr;session= prearranged >;+g.poc.talkburst; +g.poc.multicast;isfocus
Allow:	INVITE,ACK,CANCEL,BYE,PRACK,UPDATE,REFER,

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap:97 AMR
i=	speech
a=	label:aa
a	sendrecv
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

.

3. SIP 200 "OK" response (from PoC Client A to SIP/IP Core A)

The PoC Client A sends a SIP 200 "OK" response to SIP/IP Core A.

SIP HEADERS

Require:	timer
Server:	PoC-client/OMA2.1 Acme-Talk5000/v1.01
Session-Expires:	1800;refresher=uas
Contact:	<sip:PoC-UserA@networkA.net;gr= urn:uuid:00000000-0000-1000-8000-000A95A0E128>;+sip.instance="< urn:gsma:imei:90420156-025763-0>";+g.poc.talkburst; +g.poc.multicast
Allow:	INVITE,ACK,CANCEL,BYE,REFER,

4. SIP 200 "OK" response (from SIP/IP Core A to PoC Server A)

The SIP/IP Core A routes the SIP 200 "OK" response to PoC Server A.

Contents contained in the SIP 200 "OK" response is the same as in step 3.

C.1.5   Handoff from Multicast Area to non Multicast Area

This subclause shows how a PoC Client during on-going PoC Session switches from the Multicast PoC Channel to a unicast RTP Session.

The PoC Server is performing the role of a Participating PoC Function.

The PoC Client is either performing the role of a PoC Client or the role of a MBMS Client.

Figure 7 "*Handoff from Multicast Area to non Multicast Area*" shows the message flow for the scenario.
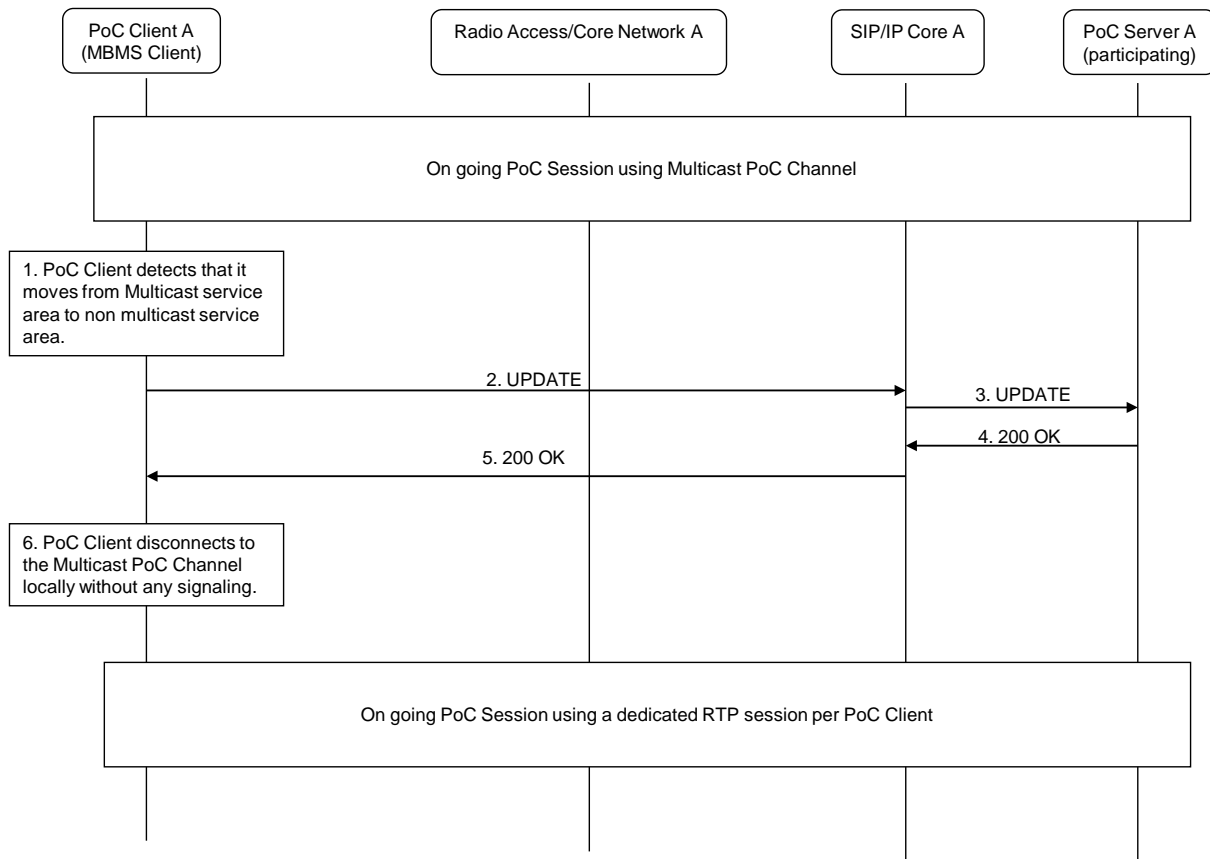
Figure 7: Handoff from Multicast Area to non Multicast Area.

The steps of the flow are as follows:

1. The PoC Client detects that it moves from Multicast service area to non Multicast service area.

2. SIP UPDATE request (from PoC Client A to SIP/IP Core A)

The PoC Client A sends a SIP UPDATE request to SIP/IP Core A.

Request-URI	sip:PoC-SessionABCDEF@PoC-ServerA.networkA.net;gr;session=prearranged
SIP HEADERS	
P-Preferred-Identity:	"PoC User A" <sip:PoC-UserA@networkA.net>
Accept-Contact:	*;+g.poc.talkburst; require;explicit
User-Agent:	PoC-client/OMA2.1 Acme-Talk5000/v1.01

Privacy:	Id
Contact:	<sip:PoC-UserA@networkA.net;gr= urn:uuid:00000000-0000-1000-8000-000A95A0E128>;+sip.instance="< urn:gsma:imei:90420156-025763-0>";+g.poc.talkburst
Supported:	timer
Session-Expires:	1800;refresher=uac
Allow:	INVITE,ACK,CANCEL,BYE,REFER,MESSAGE,SUBSCRIBE, NOTIFY,PUBLISH

SDP PARAMETERS

c=	IN IP6 5555::bbb:ccc:ddd:eee
a=	poc-qoe:premium
m=	audio 3456 RTP/AVP 95
a=	Rtpmap:95 AMR
i=	speech
a=	label:aa
a=	sendrecv
m=	application 3457 udp TBCP
a=	Fmtp:TBCP multimedia=1;local_grant =1
a=	floorid:0 mstrm:aa
m=	audio 0 RTP/AVP 98

3. SIP UPDATE request (from SIP/IP Core A to PoC Server A)

The SIP/IP Core A routes the SIP UPDATE request to PoC Server A.

Contents contained in the SIP UPDATE request is the same as in step 2.

4. SIP 200 "OK" response (from PoC Server A to SIP/IP Core A)

The PoC Server A (BM-SC) sends a SIP 200 "OK" response to SIP/IP Core A.

SIP HEADERS

P-Asserted-Identity:	"OMA Golf Buddies" <sip:OMA-Golf-buddies @networkX.net;session=prearranged>
Contact	<sip:PoC-SessionABCDEF@PoC-

ServerA.networkA.net;gr;session=prearranged>;+g.poc.talkburst

Server:	PoC-serv/OMA2.1
Require:	Timer
Session-Expires:	1800;refresher=uac
Allow:	INVITE,ACK,CANCEL,BYE,PRACK, UPDATE, REFER,MESSAGE,SUBSCRIBE, NOTIFY,PUBLISH
Supported:	Norefersub

SDP PARAMETERS

c=	IN IP6 5555::aaa:bbb:ccc:ddd
a=	poc-qoe:premium
m=	audio 2642 RTP/AVP 97
a=	rtpmap:97 AMR
i=	speech
a=	label:aa
a	sendrecv
m=	application 2643 udp TBCP
a=	fmtp:TBCP multimedia=1;local_grant=1
a=	floorid:0 mstrm:aa bb
m=	audio 0 RTP/AVP 98

5. SIP 200 "OK" response (from SIP/IP Core A to PoC Client A)

The SIP/IP Core A routes the SIP 200 "OK" response to PoC Client A.

Contents contained in the SIP 200 "OK" response is the same as in step 4.

6. PoC Client disconnects to the Multicast PoC Channel locally without sending any signal to network.

Appendix D. Documentation of SIP, SDP and XML extensions (Informative)

D.1 Multicast PoC feature tags

This subclause describes the Multicast PoC feature tags.

D.1.1 Multicast PoC support

Media feature tag name: g.poc.multicast.

ASN.1 Identifier: New assignment by IANA.

Summary of the media feature indicated by this tag: This feature tag indicates that the device supports OMA Push to talk over Cellular (PoC) Multicast PoC.

Values appropriate for use with this feature tag: Boolean.

The feature tag is intended primarily for use in the following applications, protocols, services, or negotiation mechanisms:

> This feature tag is most useful in a communications application, for describing the capabilities of a device, such as a phone or PDA.

> Examples of typical use: Describing the Multicast PoC capabilities at PoC Session establishment to a PoC Server performing the Participating PoC Function.

Related standards or documents: OMA-TS-PoC_Multicast_PoC-V2_1_0 published at http://www.openmobilealliance.org/.

Security Considerations: Security considerations for this media feature tag are discussed in Section 11.1 of [RFC3840].

Name(s) & email address(es) of person(s) to contact for further information:

> 1. Name : OMA Push to Talk over Cellular (POC) Working Group

> 2. Email : technical-comments@mail.openmobilealliance.org

Intended usage: Common

Author/Change controller: The OMA PoC specifications are a work item of the OMA Push to Talk over Cellular (POC) Working Group. The Open Mobile Alliance has change control over these specifications, with mailing list address technical-comments@mail.openmobilealliance.org.

Appendix E.   IP packet structure for IP-in-IP tunnel IP data (Informative)

This appendix describes the reference IP data structure for MBMS User Plane data for IP-in-IP tunnel when unicast data transportation mode is used.

The figure below takes UDP as the underlying transport level protocol.

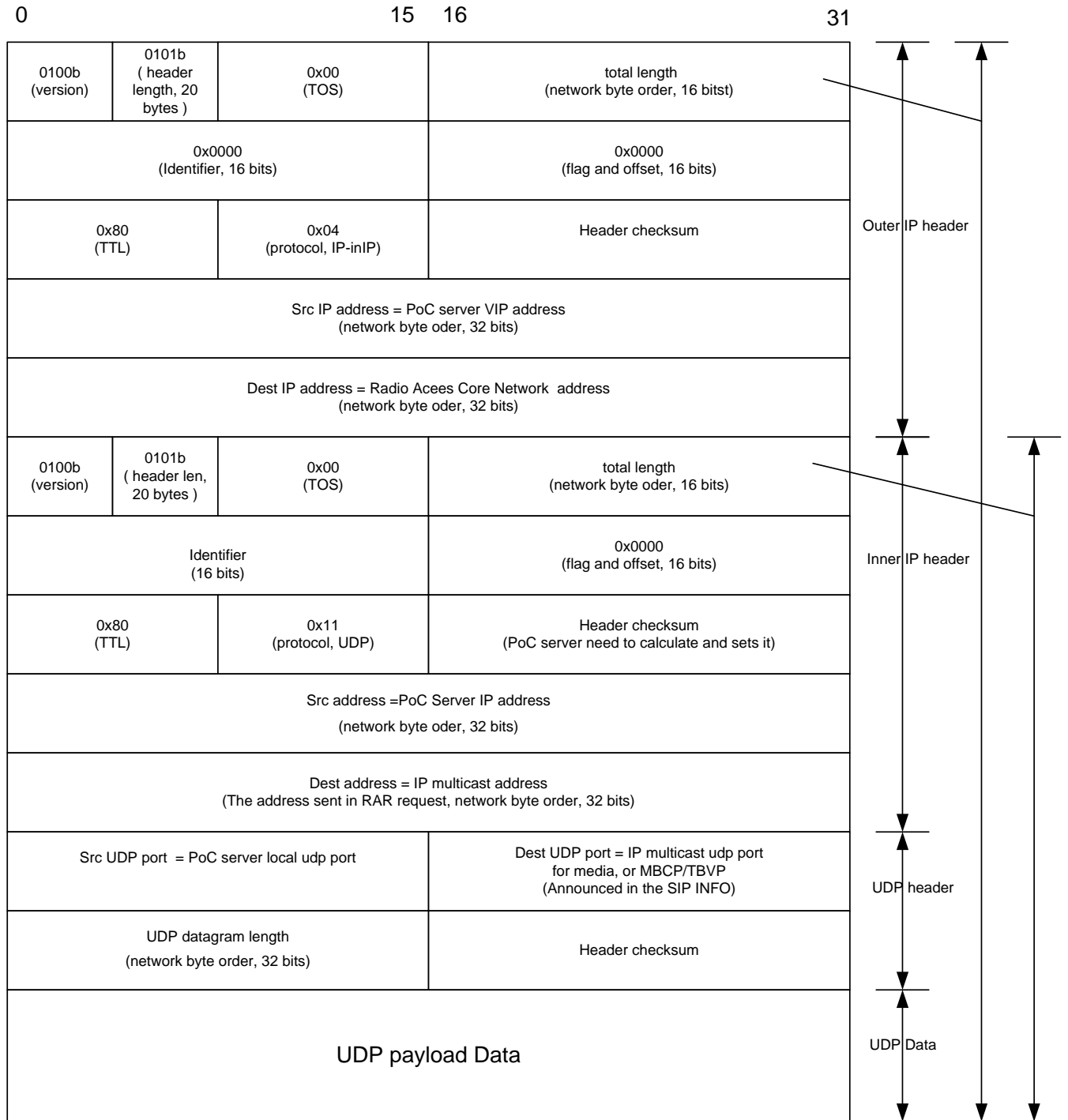| 0		15	16	31	
0100b (version)	0101b (header length, 20 bytes)	0x00 (TOS)	total length (network byte order, 16 bitst)		Outer IP header
0x0000 (Identifier, 16 bits)			0x0000 (flag and offset, 16 bits)		
0x80 (TTL)		0x04 (protocol, IP-inIP)	Header checksum		
Src IP address = PoC server VIP address (network byte oder, 32 bits)					
Dest IP address = Radio Acees Core Network address (network byte oder, 32 bits)					
0100b (version)	0101b (header len, 20 bytes)	0x00 (TOS)	total length (network byte oder, 16 bits)		Inner IP header
Identifier (16 bits)			0x0000 (flag and offset, 16 bits)		
0x80 (TTL)		0x11 (protocol, UDP)	Header checksum (PoC server need to calculate and sets it)		
Src address =PoC Server IP address (network byte oder, 32 bits)					
Dest address = IP multicast address (The address sent in RAR request, network byte order, 32 bits)					
Src UDP port = PoC server local udp port			Dest UDP port = IP multicast udp port for media, or MBCP/TBVP (Announced in the SIP INFO)		UDP header
UDP datagram length (network byte order, 32 bits)			Header checksum		
UDP payload Data					UDP Data

Figure 8: IP-in-IP data packet structure.