



Customized Multimedia Ringing Architecture

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1. Scope

(Informative)

This document describes the architecture designed to fulfil the requirements outlined in the Customized Multimedia Ringing Requirements document [OMA-CMR-RD]. The description of the architecture comprises the definition of functional components and the interfaces/reference points used or exposed by these functional components.

2. References

2.1 Normative References

- [OMA-CMR-RD] “Customized Multimedia Ringing Requirements”, Open Mobile Alliance™, OMA-RD-CMR-V1_0, URL:<http://www.openmobilealliance.org/>
- [OMA-DICT] “Dictionary for OMA Specifications”, Version 2.8, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_8, URL:<http://www.openmobilealliance.org/>
- [OMA-LOCSIP] “Location in SIP/IP core ”, Open Mobile Alliance™, OMA-ERP-LOCSIP-V1_0, URL:<http://www.openmobilealliance.org/>
- Note: The LOCSIP-AD is still a draft.
- [OMA-MLS-AD] “Mobile Location Service Architecture”, Open Mobile Alliance™, OMA-AD-MLS-V1_2, URL:<http://www.openmobilealliance.org/>
- [OMA-PRS-AD] “Presence SIMPLE Architecture”, Open Mobile Alliance™, OMA-AD-Presence_SIMPLE-V1_1, URL:<http://www.openmobilealliance.org/>
- [OMA-XDM-AD] “XML Document Management Architecture”, Open Mobile Alliance™, OMA-AD-XDM-V1_1, URL:<http://www.openmobilealliance.org/>
- [RFC2119] “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, March 1997, URL:<http://www.ietf.org/rfc/rfc2119.txt>

2.2 Informative References

- [OMA-SEC-CF] “OMA Application Layer Security Common Functions V1.0” , Open Mobile Alliance™, OMA-ERP-SEC_CF-V1_0, URL:<http://www.openmobilealliance.org/>
- [OMA-Charging-AD] "Charging Architecture", Version 1.0, Open Mobile Alliance™, OMA-AD-Charging-V1_0, URL: <http://www.openmobilealliance.org/>

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

CMR End User	A CMR End User is an individual who experiences the CMR service. A CMR End User could be any end user, including CMR Subscriber.
CMR Resource	Any multimedia content such as audio, video, text, picture, VCard or their combination. They are provided by the CMR Subscriber or CP and should be authenticated by SP.
CMR Resource Metadata	Information used to characterize a particular CMR Resource, e.g. media type, resource code, resource name, resource copyright owner, etc.
CMR Resource Box	A logical resource package which represents multiple CMR Resources with the same media type and with the associated predefined rule of selecting a CMR Resource from the box to present. A Resource Box is equivalent to a single CMR Resource for purchasing/copying/deleting/modifying.
CMR Subscriber	A CMR subscriber is an individual who has subscribed CMR enabled services. A CMR subscriber can manage his/her service data e.g. Personal Resource Library and Preference Settings.
Content Provider	See [OMA-DICT]
Entity	See [OMA-DICT]
IMS	See [OMA-DICT]
Interface	See [OMA-DICT]
Location Client	See [OMA-LOCSIP]
Location policy XDMS	See [OMA-LOCSIP]
Location Server	See [OMA-LOCSIP]
MLS Client	See [OMA-MLS-AD]
Personal Resource Library	Set of CMR Resources available for a particular CMR Subscriber which are subject to be used in the service. This library could contain the list of resources and associated information, e.g. expire time. This library could be managed by the CMR Subscriber (e.g. purchase a new resource; delete an old one, etc).
Preference Settings	Set of rules that specify which (e.g. different CMR Resources for different calling party groups), when (e.g. under a particular event) and how (e.g. playing sequence of resources in a CMR Resource Box) CMR Resource should be presented in CMR Services.
Presence Server	See [OMA-PRS-AD]
Reference Point	See [OMA-DICT]
Resource List Server	See [OMA-PRS-AD]
Service Provider	See [OMA-DICT]
Target	See [OMA-LOCSIP]
Watcher	See [OMA-PRS-AD]

3.3 Abbreviations

CMR	Customized Multimedia Ringing
-----	-------------------------------

CP	Content Provider
CS	Circuit Switch
IMS	IP Multimedia Subsystem
MLS	Mobile Location Service
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
OMA	Open Mobile Alliance
RLS	Resource List Server
SIP	Session Initiation Protocol
SP	Service Provider
SSO	Single Sign-On
XDM	XML Document Management
XDMC	XML Document Management Client
XDMS	XML Document Management Server

4. Introduction

(Informative)

The Customized Multimedia Ringing (CMR) Enabler is expected to enhance a CMR End User's experience through presenting the customised multimedia resources instead of the traditional ring back tone or ringing tone according to a specified event, e.g. the establishment of a call, the arrival of a message or mail.

This document defines the architecture of the CMR Enabler based on the requirements defined in [OMA-CMR-RD].

The CMR Enabler is designed to be useable by various network technologies (i.e. network types and/or bearers).

4.1 Version 1.0

This version of architecture document covers all requirements of [OMA-CMR-RD].

5. Architectural Model

5.1 Dependencies

The CMR Enabler depends on technologies provided by other external OMA Enablers, including the following:

- Presence technology: Presence Enabler as described in [OMA-PRS-AD]
- XML document management technology: XDM Enabler as described in [OMA-XDM-AD]
- Location technology: Location Enabler as described in [OMA-MLS-AD]
- Charging technology: Charging Enabler as described in [OMA-Charging-AD]
- Location in SIP/IP Core: Location Enabler as described in [OMA-LOCSIP]

5.2 Architectural Diagram

Figure 1 describes the Functional Components and Interfaces of the CMR Enabler. The Functional Components and Interfaces in the CMR Enabler Architecture are described in depth in section 5.3.

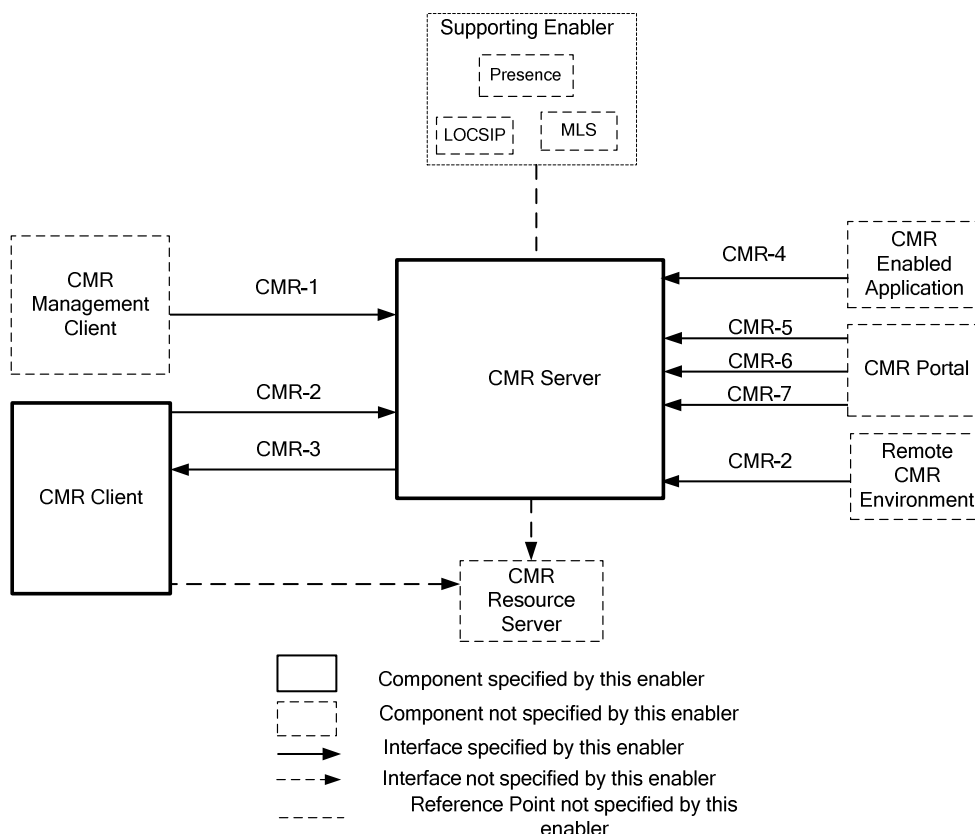


Figure 1: CMR Enabler architecture

The CMR Server interacts with supporting Enablers e.g., Location Enabler, Presence Enabler for fulfilling specific CMR enabler requirements. The interactions between the CMR Enabler and these supporting Enablers are described in Appendix C.

5.3 Functional Components and Interfaces/Reference Points definition

5.3.1 CMR Functional Components

5.3.1.1 CMR Server

The CMR Server implements the network side of the CMR Enabler and provides the functions as described in the subsequent sections.

5.3.1.1.1 Service Management Function

The Service Management Function has the responsibility for the following actions.

- Management(e.g. query/add/update/delete) of the CMR Subscriber's Preference Settings, the Preference Settings include:
 - Default CMR Resources
 - CMR Resources presentation rules based on different criteria/ the combination of the criteria: calling/called group, time/date, presence and location information etc.
 - The presenting priority
 - CMR Resource filter rules
 - Presentation control settings (e.g. stopping/continuing CMR presentation upon a particular event)
- Management of the CMR Subscriber's Personal Resource Library, including:
 - Defining CMR Resource Box
 - Subscribing/deleting/renewing subscription of the CMR resource and CMR Resource Box
 - Copy the CMR Resources from other CMR Subscriber's Personal Resource Library off-line(after the presentation) or on-line (during the presentation) subject to the CMR Resource owner's privacy
 - Subscribing CMR Resource for other Subscribers (i.e. adding the resource to the other CMR Subscriber's Personal Resource Library)
- Subscription expiration management, including:
 - Providing notification message to CMR Subscriber when CMR Resource subscription will expire or has expired.
- CMR service settings management(e.g. query/add/update/delete) by SP, the service settings include:
 - Default system setting
 - Tariff rules
 - Service subscription
- Record of CMR service management activities

5.3.1.1.2 Resource Management Function

The Resource Management Function has the responsibility for the following actions.

- Storage of CMR Resource metadata
- CMR Resource property(metadata) management, the metadata may include (but not limited to):
 - media type, resource name, resource price, resource provider, life cycle, status(availability) etc
- Record of CMR Resource management activities

5.3.1.1.3 Presentation Control Function

The Presentation Control Function has the responsibility for the following actions.

- Proper CMR Resource selection as per CMR Subscriber's Preference Settings, per event
- CMR Resource presentation
 - Control CMR Resource (audio/video type) play (to the CMR Client) by interaction with CMR Resource Server
 - Interact with CMR Client for CMR Resource presentation, e.g.
 - Send the URI of the CMR Resource in the call/session request/response to the CMR Client (applicable for IMS network)
 - Support early media negotiation between CMR Server and CMR Client (applicable for IMS network)
- CMR Resource dynamic presentation control
 - Receiving the instructions from other entities (e.g. CMR Client, other CMR Server) for dynamic presentation control , e.g. filtering, stopping or continuing CMR Resource presentation
 - Controlling the CMR Resource playing by interaction with CMR Resource Server, e.g. stop playing CMR Resource
 - Sending dynamic presentation control request to other entities (e.g. other CMR Server)
- Dynamic information acquisition
 - Collecting CMR Subscriber's location information by interacting with the Location enabler
 - Collecting CMR Subscriber's presence information by interacting with the Presence enabler

5.3.1.2 CMR Client

The CMR Client resides in the CMR End User's Device.

The CMR Client:

- Interacts with CMR Server for requesting CMR services
- Interacts with CMR Server for presentation control during CMR Resource presentation (e.g. stopping, changing the presenting CMR Resource)
- Interacts with CMR Server for presentation control before CMR Resource presentation (e.g. filtering the CMR Resource)
- Interacts with the CMR Server for on-line copy of CMR Resources during the presentation
- CMR Resource presentation
 - Establish media channel with CMR Resource Server, receive and present CMR Resources
 - Retrieve the CMR Resources form CMR Resource Server and present the CMR Resources locally

5.3.2 External Functional Components

5.3.2.1 CMR Resource Server

The CMR Resource Server supports media storage and processing (e.g. audio/video transcoding) of CMR Resources. The CMR Resources are controlled by the SPs for security reasons, e.g. the SPs could check the CMR Resources before uploading them to the CMR Resource Server. How the SPs control the CMR Resources are subjected to SPs' policy and is not specified in this specification.

The CMR Resource Server supports different ways of media delivery to the CMR Client., including (but not exhaustive)

- Play the CMR Resource to the CMR Client on the request of the CMR Server by using existing technologies, for example, delivery of audio/video CMR Resources by using the standard functions of the underlying infrastructure
- Send the CMR Resource on request of the CMR Client using standard protocols(e.g. HTTP) and the CMR Client could play it locally

5.3.2.2 CMR Portal

CMR Portal is provided to the CMR Subscriber/CP/SP for CMR Resource metadata management and service management.

CMR Portal aggregates access to CMR Resource metadata and service data for easy reach to CMR Subscriber/CP/SP, including service level authorization and SSO functions.

5.3.2.3 CMR Enabled Application

CMR Enabled Application is an external functional component that provides the CMR related service feature in its application by making use of the functionalities provided by the CMR Enabler. Other OMA Enabler can act as the CMR Enabled Application to invoke the interface exposed by CMR Enabler for using CMR functionalities.

5.3.2.4 CMR Management Client

The CMR Management Client resides in the CMR Subscriber's Device which is used by the CMR Subscriber to perform the personal CMR service management.

The CMR Management Client interacts with the CMR Server for:

- CMR subscriber's Personal Resource Library Management
 - Defining CMR Resource Box
 - Subscribing/deleting/ renewing subscription of the CMR Resource and CMR Resource Box
 - Copy the CMR Resources from other CMR Subscriber's Personal Resource Library on-line or off-line
 - Subscribing CMR Resource for other CMR Subscribers (i.e. add the resource to the other CMR Subscribers' Personal Resource Library)
- CMR subscriber's Preference Settings management, the Preference Settings include:
 - Default CMR Resource
 - CMR Resources presentation rules
 - The presenting priority
 - CMR Resource filter rules
 - Presentation control settings (e.g. stopping/continuing CMR presentation upon a particular event)
- CMR Resource subscription expiration management
 - Receiving CMR Resource subscription expiration notification from CMR Server when CMR Resource subscription will expire or has expired.

The protocol for transfer the expiration notification will not be specified in this specification.

5.3.2.5 Remote CMR Environment

The remote CMR environment is the CMR environment residing in another (remote) network.

This remote CMR environment is a mirror of the environment described in this document, and can contain the full set of CMR functional components described in this document or a subset thereof.

The CMR Enabler interacts with the remote CMR environment to allow CMR Server of the local CMR environment to interact with CMR Server of the other (remote) network.

5.3.3 Description of the Interfaces

5.3.3.1 CMR-1

The CMR-1 Interface is exposed by the CMR Server.

The CMR-1 Interface is used by the CMR Management Client to send service management requests initiated by a CMR Subscriber to the CMR Server and receive the responses from the CMR Server. The supported functionalities of this Interface include:

- Personal Resource Library management e.g. purchase/copy(including on-line and off-line copy)/delete of the CMR Resources related to a specific CMR Subscriber
- Preference management e.g. query/create/modify/delete the Preference Settings related to a specific CMR Subscriber

5.3.3.2 CMR-2

The CMR-2 Interface is exposed by the CMR Server.

The CMR-2 Interface is used to by the CMR Client to:

- Send the call/session requests, the requests may contain CMR Client's media capabilities, filtering information and other information
- Receive the responses from the CMR Server, optionally containing the URI of CMR Resource
- Send CMR presentation control (e.g. stop) requests and receive the responses
- Send on-line copy requests and receive the responses

The CMR-2 Interface is also used by the Server Requestor (typically remote CMR Server) to:

- Send the call/session requests, the requests may contain CMR Client's media capabilities, filtering information and /or additionally URI of CMR Resource etc.
- Receive the responses from the CMR Server, optionally containing the URI of CMR Resource

5.3.3.3 CMR-3

The CMR-3 Interface is exposed by the CMR Client.

The CMR-3 Interface is used by the CMR Server to:

- Send the call/session requests to the CMR Client, the requests may contain CMR specific information, e.g. calling party's media information, URI of CMR Resources,
- Receive the responses from the CMR Client

5.3.3.4 CMR-4

The CMR-4 Interface is exposed by the CMR Server.

The CMR-4 Interface is used by the CMR Enabled Applications to:

- Request the CMR Service (e.g. start/stop a CMR Subscriber's resources presentation to a CMR End User)
- Receive the response of the request

5.3.3.5 CMR-5

The CMR-5 Interface is exposed by the CMR Server.

The CMR-5 Interface is used by the CMR Portal to perform the CMR Resource metadata management.

5.3.3.6 CMR-6

The CMR-6 Interface is exposed by the CMR Server.

The CMR-6 Interface is used by the CMR Portal to perform the CMR service management, including:

- CMR subscriber' Preference Settings and CMR Personal Resource Library management by CMR Subscriber
- CMR service management by SP

5.3.3.7 CMR-7

The CMR-7 Interface is exposed by the CMR Server.

The CMR-7 Interface is used by the CMR Portal to:

Request and deliver the service report, including CMR Resource metadata management and CMR service management report etc.

5.3.4 Charging

(Informative)

Appropriate charging mechanisms may need to be provided by the underlying network or other suitable entities in order to support the charging requirements described in [OMA-CMR-RD]. One such mechanism is through the OMA Charging Enabler.

The OMA Charging Enabler [OMA-CHG-AD] coordinates charging data triggers and flow from OMA enablers into an underlying charging infrastructure, supporting online and offline charging. CMR entities that may optionally report Chargeable Events are:

- CMR Server

The interaction between CMR Server and the OMA Charging Enabler is described in Appendix C.

Description of how charging is performed is beyond the scope of the present specification.

5.4 Security Considerations

5.4.1 Authentication and Authorization

Network-independent mutual authentication mechanism between CMR Server and the entities (including CMR Client, CMR Management Client and CMR enabled Application, etc.) is needed. The security mechanism for authentication is specified in [OMA-SEC-CF].

- CMR Server (reusing SEC_CF) authenticates the entities to make sure that only authorized entities are permitted to manage the Preference Settings, CMR Resources, subscription information, and so on. CMR Server (reusing SEC_CF) authenticates CMR Subscriber by his/her identity (e.g. username/password). CMR Server (reusing SEC_CF) authenticates CP/SP by the CP/SP identity (e.g. CPID or SPID/password)
- Entities (reusing SEC_CF) also need to authenticate CMR Server to avoid some attacks, such as man-in-the-middle attack

In order to ensure that only authorized principles (including CMR Subscriber, CP, SP, etc.) are permitted to manage the Preference Settings or CMR Resources and control CMR Resource presentation, CMR Enabler may delegate authorization mechanisms to the Service Provider's deployment.

5.4.2 Data Integrity and Confidentiality

In order to protect the data (e.g. CMR Resources, Management Data) transferred in network against eavesdropping and modification, the CMR Enabler should be protected to support its data integrity and confidentiality. This protection should be subject to the CMR Subscriber's request and service provider's policies. A suitable mechanism for the data integrity and confidentiality is specified in [OMA-SEC-CF].

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No previous version within OMA

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-AD-CMR-V1_0	16 Nov 2008	All	Initial baseline version
	22 Nov 2008	1	Incorporates OMA-CD-CMR-2008-0008
	11 Dec 2008	4 2.1, 5.1	Incorporates OMA-CD-CMR-2008-0007R02 OMA-CD-CMR-2008-0009R03
	20 Jan 2009	5.2 5.3 5.2 5.3.2 2.1, 3.2 3.3	Incorporates OMA-CD-CMR-2008-0012R03 OMA-CD-CMR-2008-0013R02 OMA-CD-CMR-2008-0017R02 OMA-CD-CMR-2008-0019R01 OMA-CD-CMR-2008-0020 OMA-CD-CMR-2008-0021
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	17 Mar 2009	5.3.1.2 5.3.1.3 Figure 2, 5.3.1.1	Incorporates OMA-CD-CMR-2009-0034R01 OMA-CD-CMR-2009-0036R01 OMA-CD-CMR-2009-0038R01
	23 Mar 2009	5.3.1.2 5.3.1.1.1 Appendix B 5.2	Incorporates OMA-CD-CMR-2009-0040R01 OMA-CD-CMR-2009-0041R01 OMA-CD-CMR-2009-0043R01 OMA-CD-CMR-2009-0045R01
	30 Mar 2009	Figure 2, 5.3.2.6	Incorporates OMA-CD-CMR-2009-0048R02
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	17 Apr 2009	5.3.2.2 3.2, 3.3, Appendix C 5.3.1.3, Appendix B Appendix B Appendix B Appendix B 3.2, Appendix C	Incorporates OMA-CD-CMR-2009-0061R01 OMA-CD-CMR-2009-0062R01 OMA-CD-CMR-2009-0063 OMA-CD-CMR-2009-0064R01 OMA-CD-CMR-2009-0071R01 OMA-CD-CMR-2009-0072R01 OMA-CD-CMR-2009-0074R02
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Appendix B. Flows (informative)

B.1 Online Copy Flow

In this example, the CMR Subscriber B allows his/her CMR Resources to be copied by other CMR subscribers. This online copy flow is applicable when CMR End User A is also a CMR Subscriber and both CMR Subscribers belong to the same CMR Server. A CMR End User can send copy request to CMR Server even he/she is not a CMR Subscriber, but the CMR Server can't successfully execute the copy activity. This scenario is not covered in the following flow.

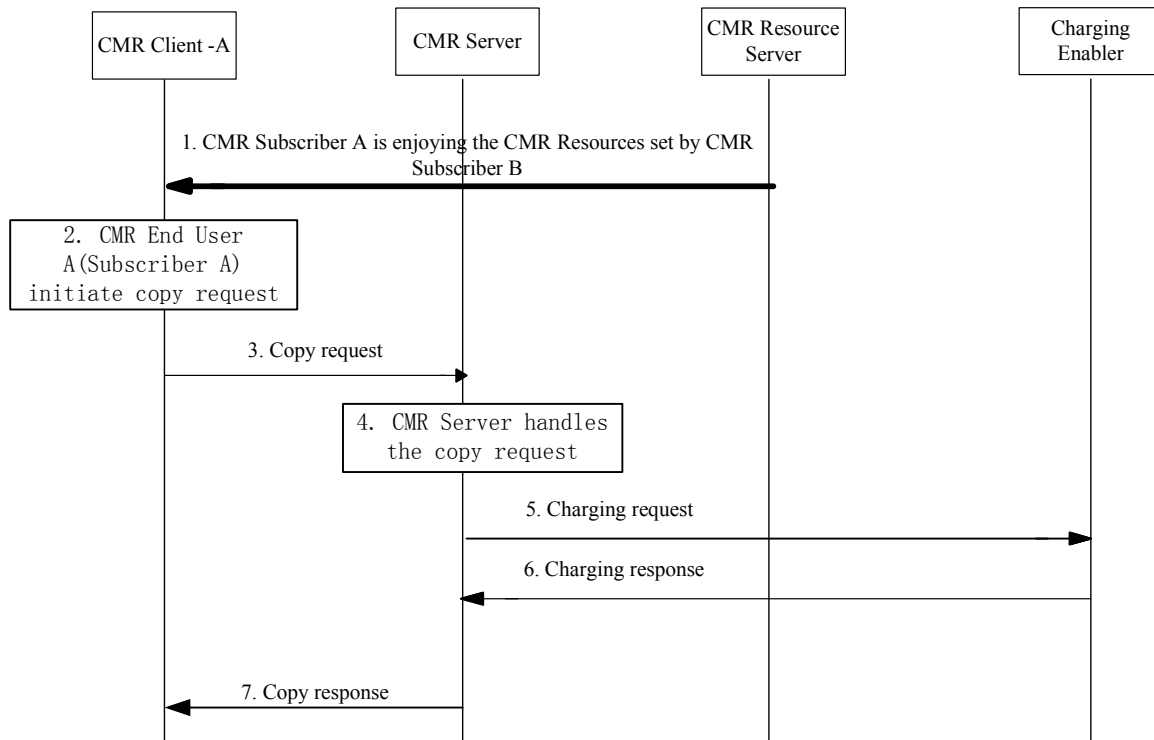


Figure 2: Online copy flow

1. The CMR End User A (Subscriber A) (calling party) was engaged in a call with CMR Subscriber B (called party) and is enjoying the CMR Resources of CMR Subscriber B. The CMR Server needs to record the currently presenting CMR Resources and the involved calling/called parties.
2. The CMR End User A (Subscriber A) wants to copy the CMR Resources he/she is experiencing and initiate the copy request
3. The CMR Client sends copy request to the CMR Server.
4. The CMR Server checks the privacy of the CMR Subscriber B, finds the currently presenting CMR Resources of CMR Subscriber B and then copies them to CMR Subscriber A's Personal Resource Library.
5. The CMR Server generates the charging event and sends the charging request to the Charging Enabler.
6. The Charging Enabler sends the charging response to the CMR Server.
7. The CMR Server records the copy activity and sends the copy response to the CMR Client.

[Note:] CMR Subscriber also could copy CMR Resources on-line through CMR Management Client. The online copy flow could refer to the flow of Service Management.

B.2 Presentation Control

This section provides the flow of stop operation as an example of the presentation control function.

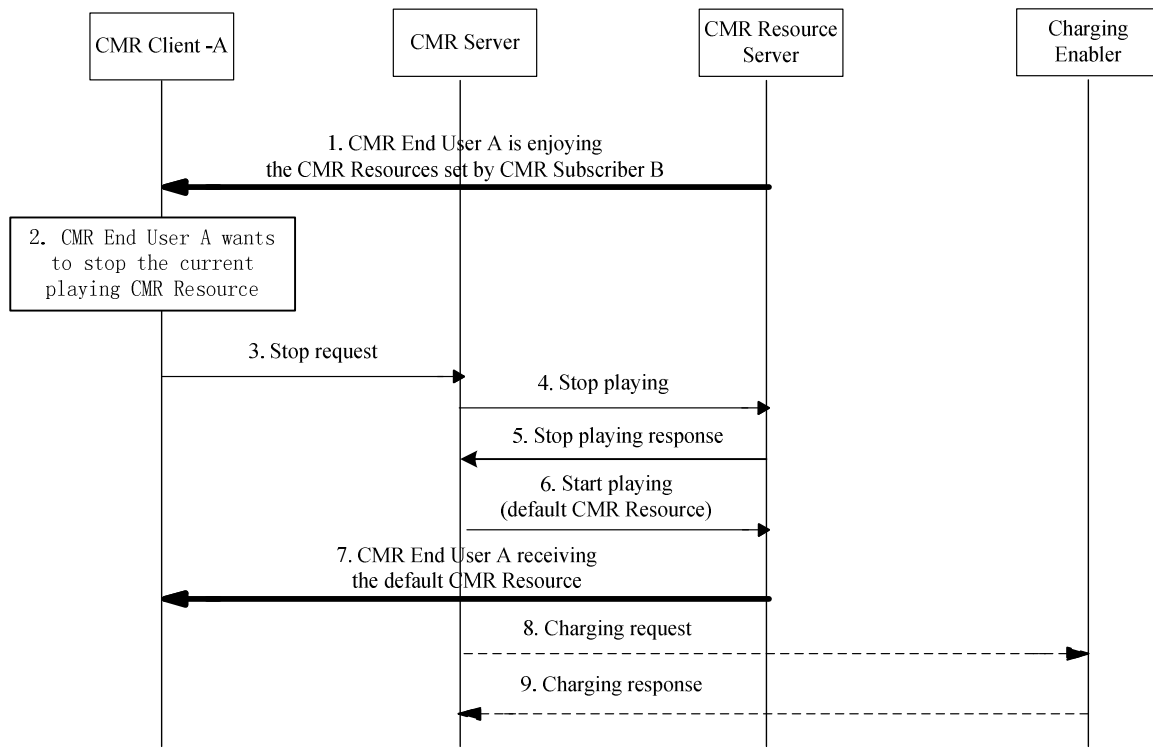


Figure 3: Presentation control (stop) flow

1. The CMR End User A (calling party) was engaged in communication with CMR Subscriber B (called party) and is enjoying the CMR Resources of CMR Subscriber B;
2. The CMR End User A wants to stop the CMR Resources he/she is experiencing;
3. The CMR Client A sends stop request to the CMR Server;
4. The CMR Server requests the CMR Resource Server to stop playing the current CMR Resources;
5. The CMR Resource Server responses the stop request;
6. The CMR Server requests the CMR Resource Server to play the default CMR Resource;
7. The CMR Client A receives the default CMR Resource;

[Note:] The default CMR Resource may not be played by the CMR Resource Server. Step 6 and 7 can be optional.

8. The CMR Server sends the charging request to the Charging Enabler;
9. The Charging Enabler sends the charging response to the CMR Server.

[Note:] Step 8 and step 9 are optional steps. These steps are needed if SP requires charging this activity.

B.3 Download Playing Flow

This section provides the flow of playing CMR Resource using download method and takes the customized ring back tone flow as an example.

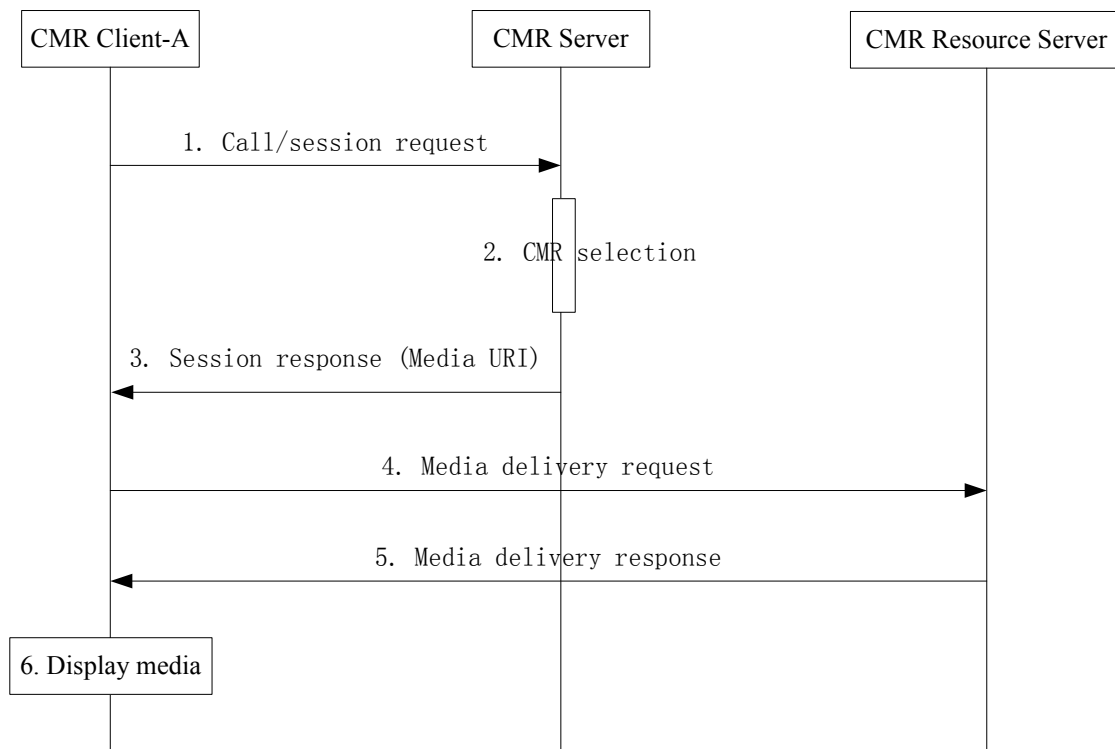


Figure 4: Download playing flow

1. CMR Client-A sends call/session request asking to play CMR Resource to CMR Client-A if the calling party or called party has subscribed the CMR service.
2. CMR Server selects appropriate CMR Resource.
3. CMR Server sends response including the URI of the selected CMR Resource to CMR Client-A.
4. CMR Client-A extracts media URI and sends media delivery request to CMR Resource Server for downloading the media.
5. CMR Resource Server sends the media to CMR Client-A.
6. CMR Client-A displays the received media.

B.4 Server Playing Flow

This section provides the flow of playing audio or video type CMR Resource and takes the customized ring back tone flow as an example.

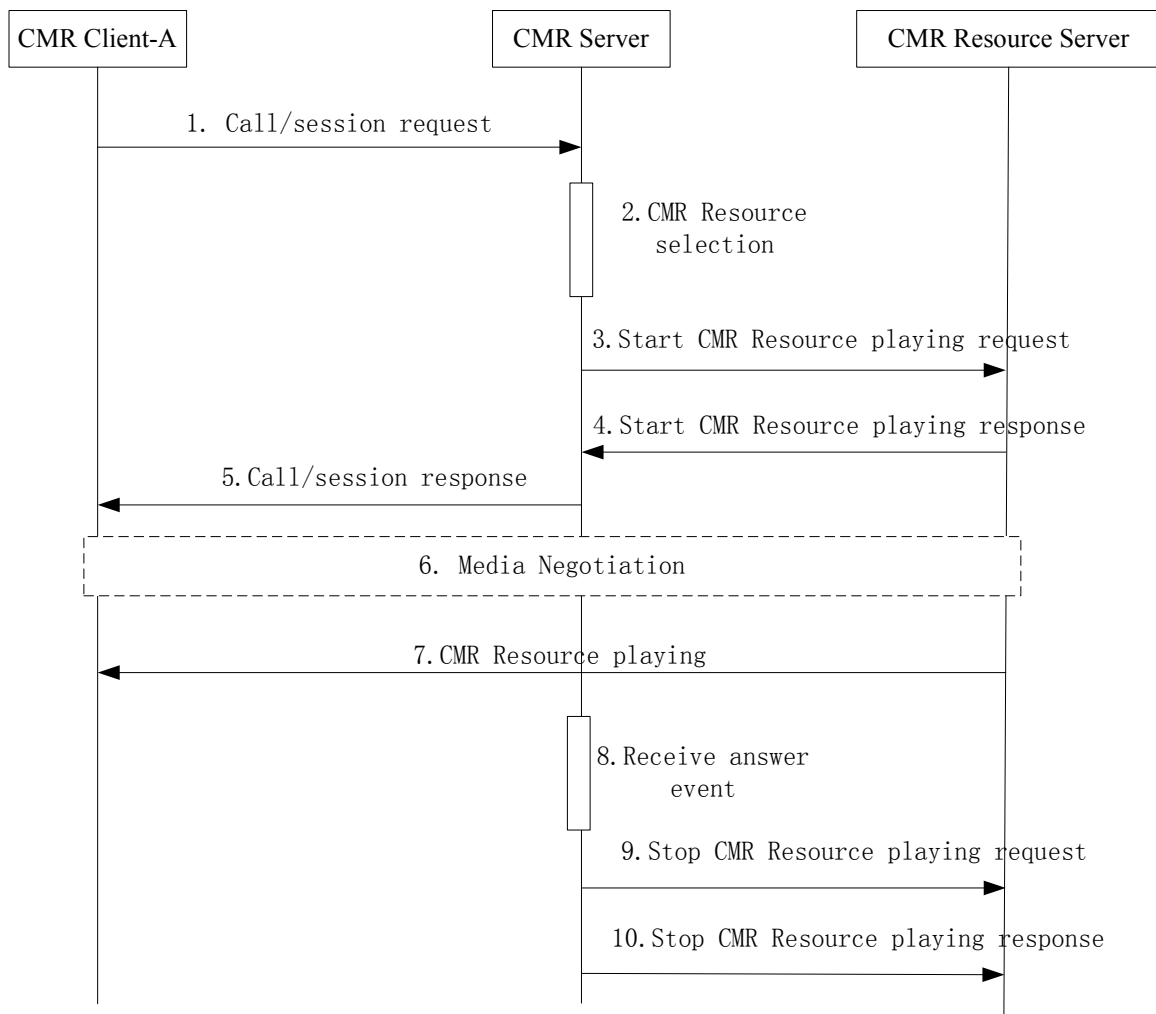


Figure 5: Server playing flow

1. CMR Client-A sends call/session request to CMR Server if the calling party or called party has subscribed the CMR service.
2. CMR Server selects appropriate CMR Resource to play.
3. CMR Server sends start CMR Resource playing request to CMR Resource Server.
4. CMR Resource Server sends response to CMR Server, optionally containing the CMR Resource media information.
5. CMR Server sends call/session response to CMR Client. It may contain media negotiation information when CMR is deployed in IMS network.
6. Media negotiation between CMR Client and CMR Resource Server.

[Note]: This step is optional. It is needed when the CMR service is deployed in CS network and video CMR Resource would be played.

7. After successful media negotiation, CMR Resource Server plays the CMR Resource to CMR Client-A.
8. CMR Server receives the answer event.
9. CMR Server sends stop CMR Resource playing request to CMR Resource Server.

10. CMR Resource Server sends response to CMR Server.

B.5 Download Playing Flow (CMR Enabled Application)

This section illustrates the interaction between CMR Enabled Application and CMR Server and provides the flow of playing CMR Resource using download method.

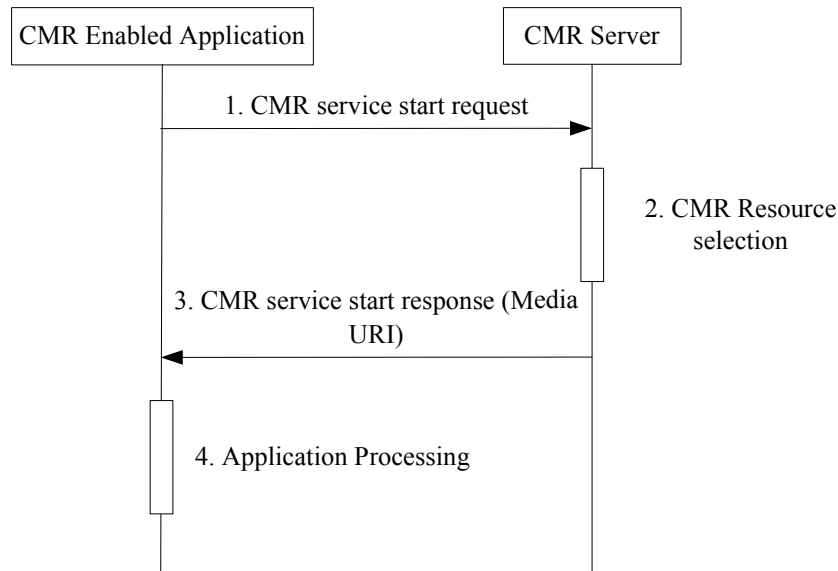


Figure 6: Download playing flow (CMR Enabled Application)

1. CMR Enabled Application sends CMR service start request to CMR Server.
2. CMR Server selects appropriate CMR Resource.
3. CMR Server sends CMR service start response including the URI of the selected CMR Resource to CMR Enabled Application.
4. CMR Enabled Application continues its processing: CMR Enabled Application sends the URI to CMR Client. And the following steps refer to step 4->8 in B.3.

B.6 Server Playing Flow (CMR Enabled Application)

This section illustrates the interaction between CMR Enabled Application and CMR Server and provides the flow of playing audio or video type CMR Resource.

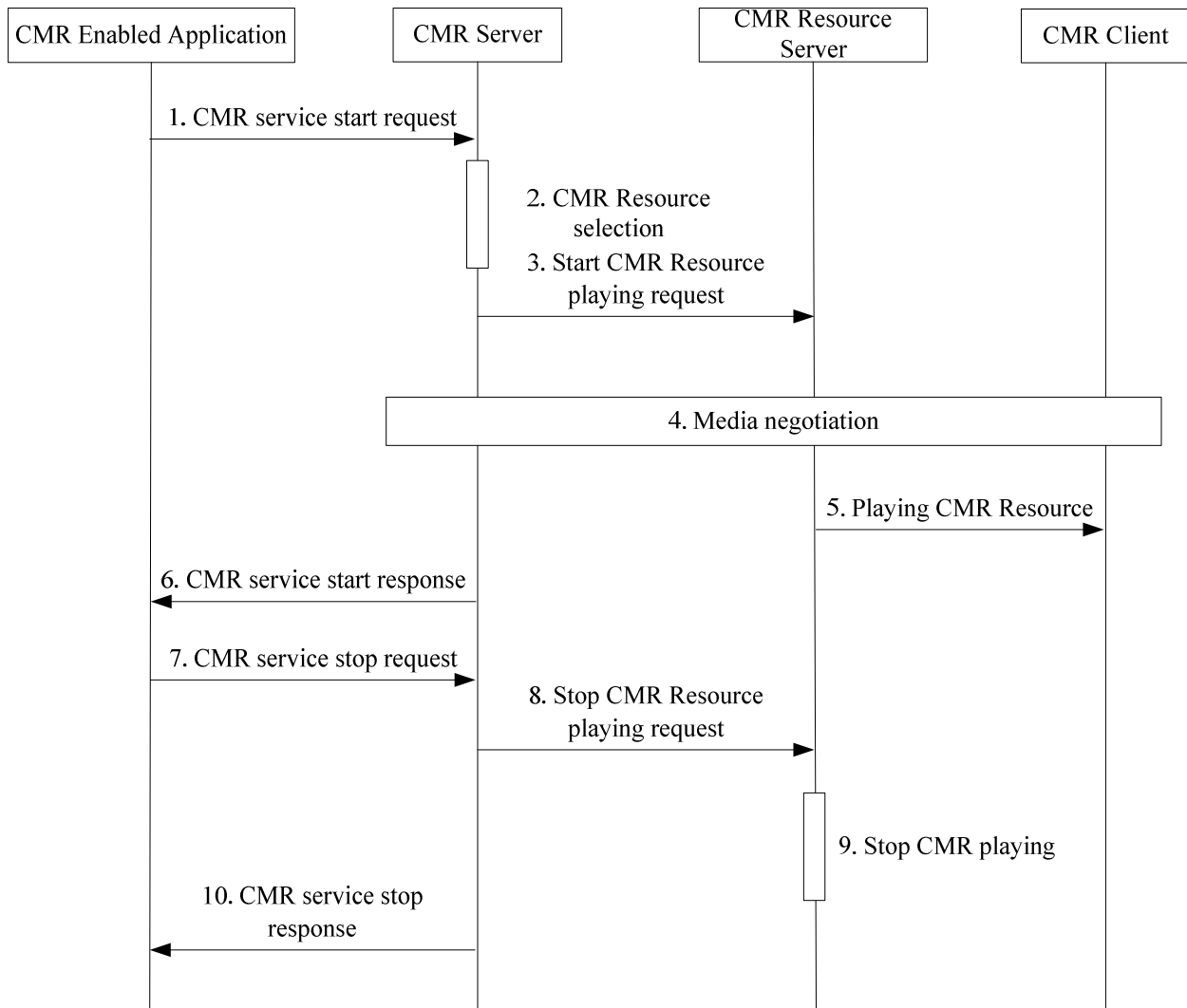


Figure 7: Server playing flow (CMR Enabled Application)

1. CMR Enabled Application sends CMR service start request to CMR Server.
2. CMR Server selects appropriate CMR Resource.
3. CMR Server sends start CMR Resource playing request to CMR Resource Server.
4. Media Negotiation is occurred and the media channel is set up between CMR Resource Server and CMR Client.
5. CMR Resource Server plays the selected CMR Resource to CMR Client.
6. CMR Server sends CMR service start response to CMR Enabled Application.
7. CMR Enabled Application sends CMR stop request for stopping CMR Resource playing to CMR Server.
8. CMR Server sends stop CMR Resource playing request to CMR Resource Server.
9. CMR Resource Server stops CMR Resource playing.
10. CMR Server sends CMR service stop response to CMR Enabled Application.

B.7 Flow of Service Management

This section provides the flow of service management as an example. CMR Subscriber could manage his/her Preference Settings and the Personal Resource Library via CMR Management Client or CMR Portal. SP could do the management actions via CMR Portal.

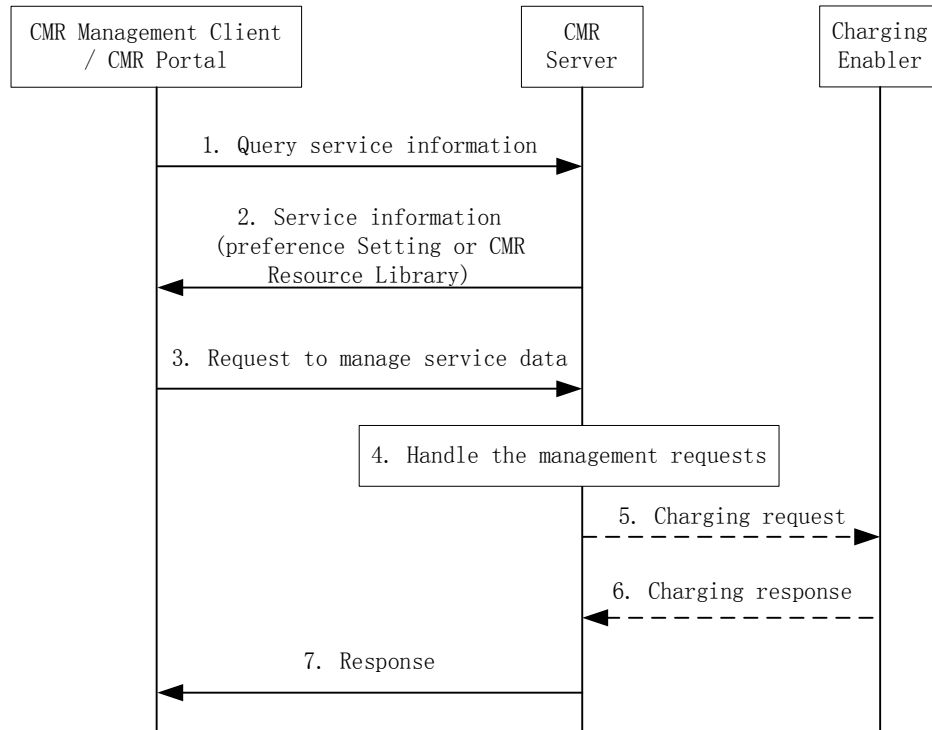


Figure 8: Flow of service management

1. CMR Management Client or CMR Portal sends the request of querying service information to CMR Server.
2. CMR Server sends the service information (including Preference Settings or Personal Resource Library) to CMR Management Client or CMR Portal.
3. CMR Subscriber wants to manage the Preference Settings or Personal Resource Library on CMR Management Client UI or via CMR Portal. CMR Management Client or CMR Portal requests CMR Server to manage (e.g. add/update/delete) the service data.
4. CMR Server manages the service data.
5. CMR Server generates charging events for service management activities and sends the charging request to Charging Enabler.
6. Charging Enabler sends the charging response to CMR Server.

[Note:] Step 5 and step 6 are optional steps. These steps are needed if SP requires charging the activities of managing CMR Service.

7. CMR Server records the CMR Subscriber's management activities and sends the management responses to CMR Management Client or CMR Portal.

B.8 Flow of CMR Resources Management

This section provides the flow of CMR Resources management as an example. SP/CP and CMR Subscriber could create/delete/modify CMR Resource Metadata via CMR Portal.

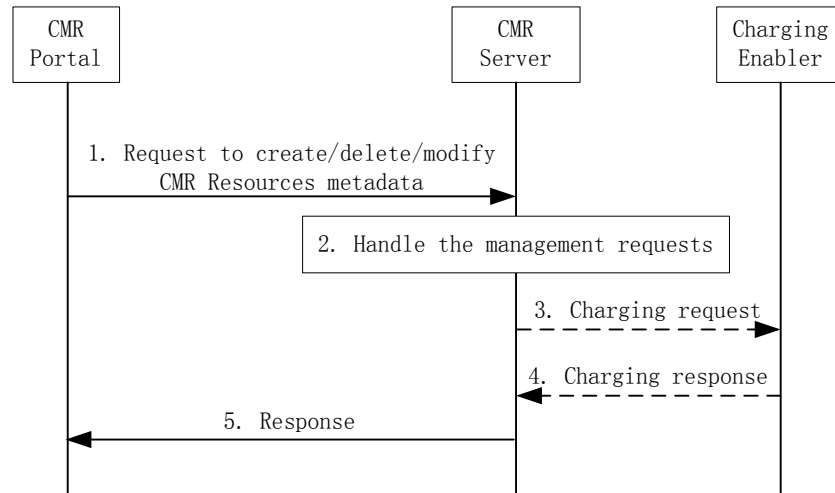


Figure 9: Flow of CMR Resources management

1. CMR Portal sends the request of creating/deleting/modifying CMR Resources Metadata to CMR Server.
2. CMR Server handles the requests.
3. CMR Server sends the charging request to Charging Enabler.
4. Charging Enabler sends the charging response to CMR Server.
5. CMR Server records the management activities and sends the management responses to CMR Portal.

[Note:] Step 3 and step 4 are optional steps. These steps are needed if SP requires charging the activities of managing CMR Resource or CMR Resources Metadata.

B.9 CMR Resource Filtering Flow

In this example, it assumes that the CMR End User A does not want to experience any CMR Resource when the call is initiated or by the pre-configured filtering setting on CMR Server.

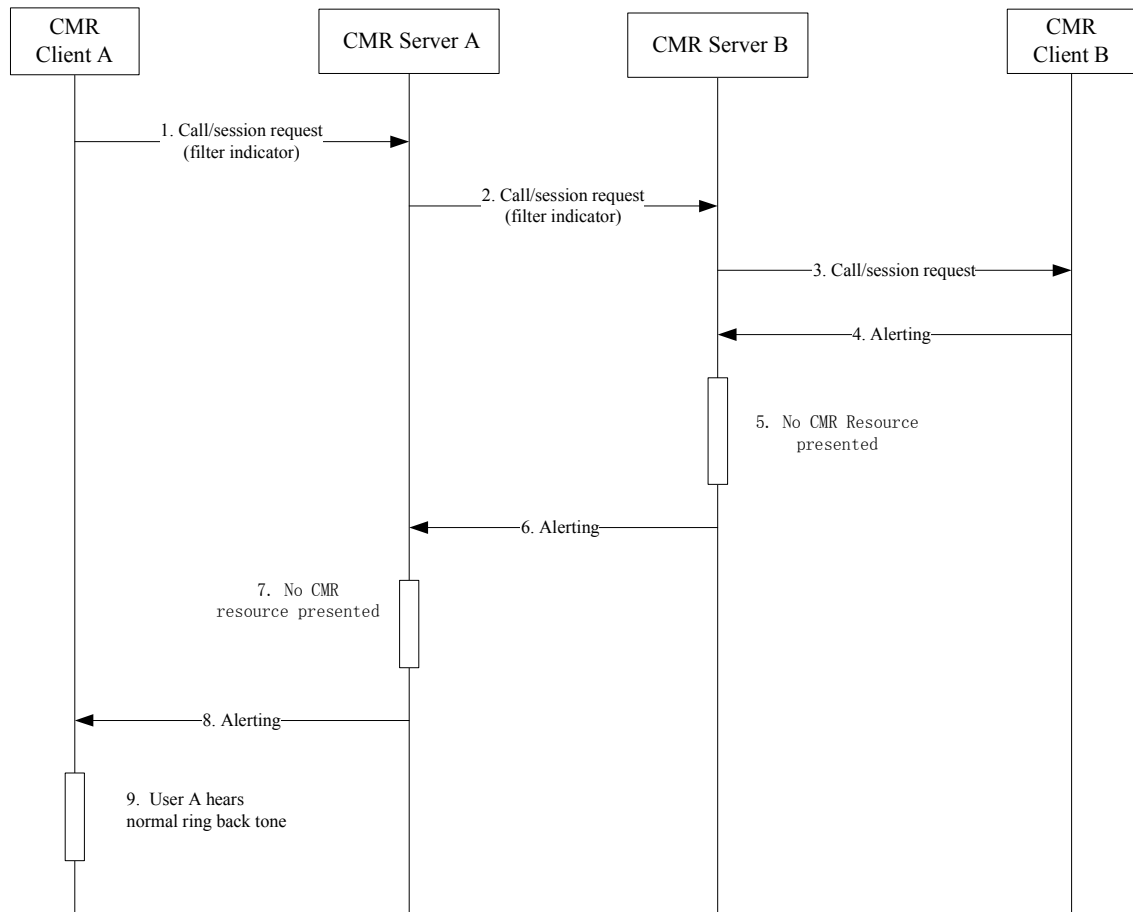


Figure 10: CMR Resource filtering flow

1. CMR Client A sends a call/session request (with filter indicator when CMR End User A wants to filter CMR Resource for this call).
2. CMR Server A evaluates the filter received in the call request or the filter setting of CMR End User A (who is a CMR Subscriber) pre-configured on the CMR Sever A and sends the call request with the filter indicator.
3. CMR Server B records the filter indicator associated with this call and sends the call request without the filter indicator towards CMR Client B.
4. CMR Client B returns alerting message when CMR Client B is idle.
5. CMR Server B filters CMR Resource according to recorded filter indication.
6. CMR Server B forwards the alerting message.
7. CMR Server A filters CMR Resource according to recorded filter indication.
8. CMR Server A forwards the received alerting message.
9. CMR End User A hears normal ring back tone.

Appendix C. CMR Enabler interaction with external Entities

C.1 CMR Server interaction with Charging Enabler

The CMR Server interacts with the Charging Enabler over CH-1 and CH-2 interfaces for CMR related off-line and on-line charging respectively as defined in [OMA-Charging-AD].

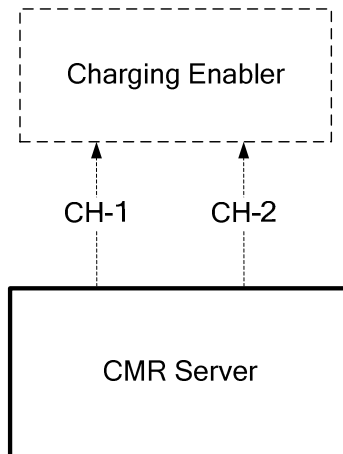


Figure 11: The interaction between CMR Server and Charging Enabler

C.2 CMR Server interaction with Location Enabler

CMR Enabler needs to request and get location information from Location Enabler when CMR Enabler supports selecting or generating a CMR Resource based on the CMR Subscriber’s location information.

C.2.1 CMR Server interaction with MLS

The CMR Server acts as the MLS Client and interacts with the Requesting Location Server via the Le Reference Point as defined in [OMA-MLS-AD] for the purpose of obtaining location information for CMR Subscribers.

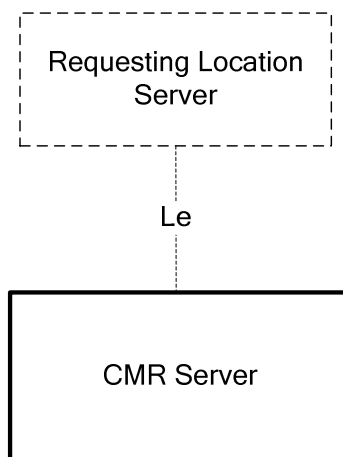


Figure 12: The interaction between CMR Server and Requesting Location Server

C.2.2 CMR Server interaction with LOCSIP

When CMR Enabler supports selecting or generating a CMR Resource based on the CMR Subscriber’s location information and LOCSIP is available, CMR Enabler can request and get location information from LOCSIP Enabler.

Two interaction methods between CMR Server and LOCSIP Enabler are given: subscribing to location notification for a list of targets and subscribing to location notification for a single target. Two methods have different advantages:

Subscribing to location notification for a list of targets: flexible to subscribing to a list of CMR Subscribers and get location notifications as needed. When CMR Server wants to subscribe a new CMR Subscriber’s location information, it needs to maintain the list and doesn’t need to do subscription again.

Subscribing to location notification for a single target: flexible to subscribing to a CMR Subscriber’s location information and get notification as needed. When CMR Server wants to subscribe a new target’s location information, it needs to subscribe this new single target.

C.2.2.1 Subscribing to Location for a List of Targets

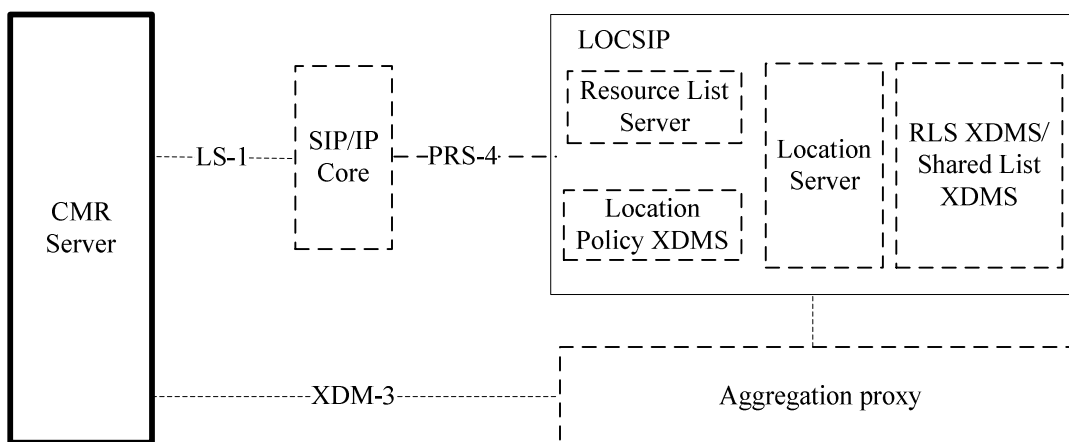


Figure 13: The interaction between CMR Server and LOCSIP Enabler (Subscribing to Location for a List of Targets)

The CMR Server acts as a Location Client to request/receive location information from the LOCSIP Enabler via the SIP/IP Core for the list of CMR Subscribers through LS-1 Reference Point.

The CMR Server interacts with LOCSIP Enabler via Aggregation Proxy for maintaining the list of CMR Subscribers whose location to be requested and management of the location policy document through XDM-3 Reference Point.

The Location Server and Location Policy XDMS are specified in the [OMA-LOCSIP].

.The functionality of the Aggregation Proxy is described in [OMA-XDM-AD].

C.2.2.2 Subscribing to Location Notification

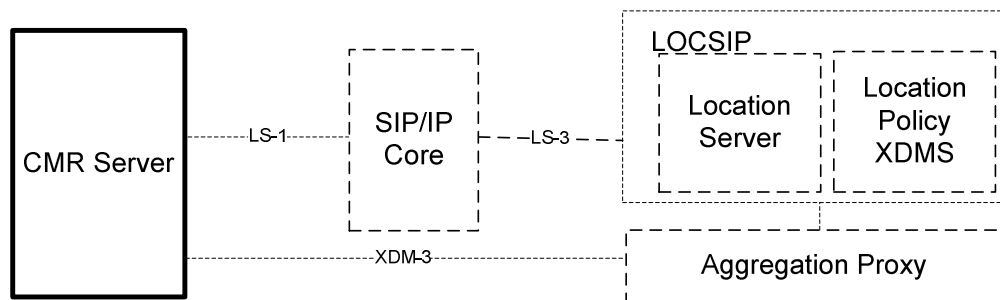


Figure 14: The interaction between CMR Server and LOCSIP Enabler (Subscribing to Location Notification)

The CMR Server acts as a Location Client to request/receive location information from the LOCSIP Enabler via the SIP/IP Core for a single CMR Subscriber through LS-1 and LS-3 Reference Point.

The CMR Server interacts with LOCSIP Enabler via Aggregation Proxy for management of the location policy document through XDM-3 Reference Point.

The CMR Server uses the methods defined by [OMA- LOCSIP] to acquire CMR Subscriber location information.

The Location Server and Location Policy XDMS are specified in the [OMA-LOCSIP].

C.3 CMR Server interaction with Presence Enabler

CMR Enabler needs to request and get presence information from Presence Enabler when CMR Enabler supports selecting or generating a CMR Resource based on the CMR Subscriber presence information.

Two interaction methods between CMR Server and Presence Enabler are given: subscribing to a Presence List and subscribing to a single presentity. Two methods have different advantages:

Subscribing to a presence list: flexible to subscribing to a list of CMR Subscribers' presence information and get notifications. When CMR Server wants to subscribe a new CMR Subscriber's presence information, it needs to maintain the list and doesn't need to do subscription again.

Subscribing to a single presentity: flexible to subscribing to a single CMR Subscriber's presence information and get notification as needed. When CMR Server wants to subscribe a new CMR Subscriber's presence information, it needs to subscribe this new presentity.

C.3.1 Subscribe to a Presence List

The CMR Server acts as a Watcher to use subscribe and notify method to get the presence status of a list of CMR Subscribers residing in SIP/IP Core. CMR Server interacts with the Resource List Server through PRS-2 and PRS-4 Reference Points.

The CMR Server acts as an XDMS to maintain the list of CMR Subscribers in the RLS XDMS via Aggregation Proxy through Reference Point XDM-3.

The functionality of the Aggregation Proxy is described in [**Error! Reference source not found.**].

The Watcher, RLS XDMS and Resource List Server are specified in [OMA-PPS-AD].

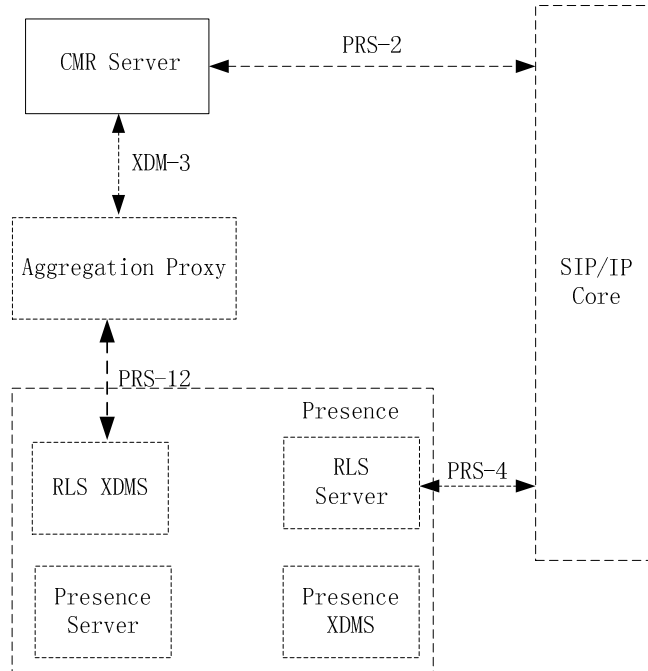


Figure 15: The interaction between CMR Server and Presence Enabler (Subscribe to a presence list)

C.3.2 Subscribe to a single presentity

The CMR Server acts as a Watcher to use subscribe and notify method to get the presence status of a single CMR Subscriber from the Presence Server through PRS-2 and PRS-3 Reference Points.

The Watcher, Presence Server are specified in [OMA-PPS-AD].

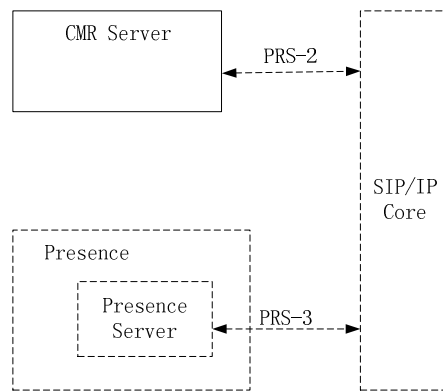


Figure 16: The interaction between CMR Server and Presence Enabler (Subscribe to a single presentity)