



White Paper on Messaging Services Interworking Architecture

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1. Scope

This document presents an architecture that could be used to facilitate the interworking between different mobile messaging services. This architecture is based on the analysis of the use-cases presented in the corresponding Requirements Document.

The basic assumptions of this architecture include:

- The interworking between messaging services occurs only within a single messaging service provider at the receiving end of a message.
- The interworking between messaging services should provide support for the messaging options used by the originator (i.e. if the message sender requests notification of delivery, and the destination messaging service supports delivery notifications, then the interworking function should facilitate this), unless the destination messaging service is unable to provide the requested messaging options.
- The User Profile should indicate what messaging services the user is subscribed to, and the preferred messaging service to use to receive different types of messages, e.g. prefers to receive “voice” messages in his voicemail-box.
- The Presence status should indicate what messaging services the user is currently available on.
- Existence of unique identifier that provides ability to access recipient’s user profile and obtain the recipient address.
- There is a need for the architecture to be interoperable with the industry-accepted IMS/MMD architecture.

The proposed architecture is intended to identify additional enablers that may need specification by OMA, however, these should be covered by additional work-items that are accepted by the OMA-TP. The architecture proposed in this document is intended to be input for the Converged IP Messaging work-item, and any subsequent technical work on interworking of messaging services will be performed in the scope of that work-item.

2. References

- [ARCH-PRINC] “OMA Architecture Principles”, Version 1.2, Open Mobile Alliance™, OMA-ArchitecturePrinciples-V1_2, URL: <http://www.openmobilealliance.org/>
- [MsgIntwRD] “Interworking of Messaging Services Requirements”, Version 1.0, Open Mobile Alliance™, OMA-RD-MsgInterworking-V1_0, URL: <http://www.openmobilealliance.org/>
- [OMA-DICT] “OMA Dictionary”, Version 2.4, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_4, URL: <http://www.openmobilealliance.org/>
- [OSE] “OMA Service Environment”, Version 1.0, Open Mobile Alliance™, OMA-TS-Service-Environment-V1_0, URL: <http://www.openmobilealliance.org/>
- [Presence] “Presence SIMPLE Architecture Document”, Version 1.0, Open Mobile Alliance™, OMA-AD-Presence_SIMPLE-V1_0, 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>
- [RFC2822] “Internet Message Format”, P. Resnick, April, 2001, URL: <http://www.ietf.org/rfc/rfc2822.txt>
- [STI] “Architecture of the Environment using the Standard Transcoding Interface”, Version 1.0, Open Mobile Alliance™, OMA-AD-STI-V1_0, URL: <http://www.openmobilealliance.org/>

3. Terminology and Conventions

3.1 Conventions

This is an informative document, which is not intended to provide testable requirements to implementations.

3.2 Definitions

Interface	See [OMA-DICT].
Message body	Content of the message that is intended for the recipient to read/see/hear. May include several media parts.
Message envelope	Meta-data associated with a message that indicates the address of the originator and of the intended recipient(s) of the message. May be separate from message body or message headers.
Message headers	Collection of message header fields as described in [RFC2822]
Messaging client	A user agent capable of generating messaging requests and receiving, processing, and displaying messages.
Messaging server	A networked entity that provides for submission, transfer, and retrieval of messages between different clients. May also provide for persistent storage of messages for later retrieval.
Reference Point	See [OMA-DICT].

3.3 Abbreviations

AdR	Address Resolution
IM	Immediate Messaging Service
IMS	IP Multimedia Subsystem
MIW	Messaging Services Interworking
MMD	Multi-Media Domain
MMS	Multimedia Messaging Service
MR	Inter-service Messaging Relay
OMA	Open Mobile Alliance
P2P	Person-to-person
PoC	Push-to-talk over Cellular
SMS	Short Messaging Service

4. Introduction

The Mobile Industry has specified different messaging services that allow end-users to communicate and send messages to other users. Each of these messaging services specify how the messages within the particular technology are transmitted –

- between the messaging clients and the messaging servers
- between messaging servers supporting the same messaging services
- between messaging applications and the messaging servers

However, there is very little attention given to the issue of how a message may be transferred between messaging services.

As a result of investigating the different aspects of the interworking between messaging services, the Messaging Working Group (MWG) has come to a perception of what a generic messaging service needs, vis-à-vis support of enablers to complete messaging use-cases and the interfaces needed to support the messaging. This functionality can, in turn, be indicative of the common functionality that is supported by many messaging services. This could be used to supply a generic messaging environment of support enablers that would not need to be redefined for each new messaging service or enabler that may be defined in the future.

4.1 Planned Phases

The work for the Interworking of Messaging Services is directed at identifying enablers that are necessary for transfer of messages between different messaging services. These enablers would then need to be addressed in separate work-items and may be assigned to different workgroups for specification, keeping the messaging requirements in mind as part of the enabler requirements.

5. Architectural Model

The Messaging Interworking is intended to exist, from a system architecture view, between messaging services, for example, between an Immediate Messaging service and a Multimedia Messaging Service. The Interworking enabler includes connections to basic functionality of all messaging services and highlights these “common functionalities”.

The Messaging Interworking Enabler should allow for definition of different workflows in order to support the interconnection of different messaging services. This workflow orientation will allow for the greatest degree of flexibility in supporting the different connections. As a minimum all of the workflows should include the following functionality –

- Receiving messages from one messaging service, the *originating messaging service*.
- Accessing the recipient’s *user profile* to determine the messaging services that *recipient* is subscribed to.
- Accessing the recipient’s *user profile* to determine the *recipient’s preferred messaging service*.
- Accessing the recipient’s *presence status* to determine the messaging services that the *recipient* actual has available.
- Applying proper *address resolution* to the recipient address to transpose to the proper address format.
- Applying a format adaptation to the message envelope or headers to comply to the recipient messaging service.
- Applying transcoding to the content of the message to comply with conformance guidelines of recipient messaging service.
- Submitting the message to the recipient messaging service for delivery to the intended recipient.
- If required, storing the message while the message is still in transit between the originating messaging service and the recipient messaging service.
- Providing a status indication to the originating messaging service.
- Relaying and translation of messaging options (e.g. delivery notifications) between the peer messaging services.

This functionality can, in turn, be indicative of the common functionality that is supported by many messaging services. This could be used to supply a generic messaging environment of support enablers that would not need to be redefined for each new messaging service or enabler that may be defined in the future.

5.1 Dependencies

Messaging Services Interworking (MIW) is generally dependent on the OMA Service Environment (OSE) as specified by [OMA-OSE] for interactions with other OMA enablers and, in particular, MIW is dependent on the OMA Presence Enabler for presence capabilities. Although certain instances of MIW can operate without Presence functionality, this OMA enabler is needed to realize many of the requirements in the RD [MsgIntwRD]. MIW is, likewise, dependent on the STI enabler to provide transcoding functionality of both the message content as well as, for certain instances, transformation of the message meta-data, as expressed by the message header information, to conform to the target messaging format.

MIW is additionally dependent on an interface to the Charging enabler to generate the proper charging data records for the operations that are performed by the MR.

In addition to these dependencies, MIW is dependent on services from additional entities that are currently not defined in OMA, but have the potential to be specified as new enablers. In particular, the architecture identifies a “User Profile” entity that would provide information concerning the connectivity of a particular end-user. The view of this architecture is that the User Profile Enabler should:

- Support an interface to allow messaging servers to retrieve information about the messaging services.
- Support a unique identifier for a user – that can be used to access the user information

- Messaging services information should include –
 - an indication of what messaging services the user is subscribed to
 - the user's address for each messaging service that he is subscribed to
 - an indication of a preferred messaging service to receive different media through

5.2 General considerations

When considering the most optimal architecture for the functionality of the enabler, several considerations were raised. Different configurations were suggested including –

1. Specifying that there is a network server that implements the interworking functionality. Within this configuration, there are two possible configurations – either the server is within the domain of the originator or within the domain of the recipient of the message.
2. It would be the responsibility of the messaging client (e.g., MMS or SMS client) to process an “error” indication that the intended recipient is not available on the particular messaging service and directing the user to the proper composer. Such a solution, for integrated messaging, is already being proposed by other industry bodies.

This second configuration of a solution was discounted because of the following preliminary considerations:

- If the user wishes to compose a message that needs to be sent to multiple recipients and different groups of the recipients prefer using different target messaging services, then the proposed solution would require the originator of the message to compose different messages for each group of users. This would not comply with the requirement that the user should not need to know about the underlying messaging paradigm used.
- The proposal also entails multiple round-trip exchanges between the originating network and the destination network to negotiate the proper messaging service to be used.

The first solution was chosen since it seemed to fulfill the requirements of making the underlying technologies transparent to the users. There remained the open question of whether the implied server should be on the originating or destination side (or be left open for implementation) of the messaging network. The consideration that lead toward the recommendation was access to the recipient user information that is controlled by the destination network and not necessarily accessible to the originating network.

5.3 Architectural Diagram

The following diagram gives the block diagram of the logical entities that comprise the interworking of different messaging services.

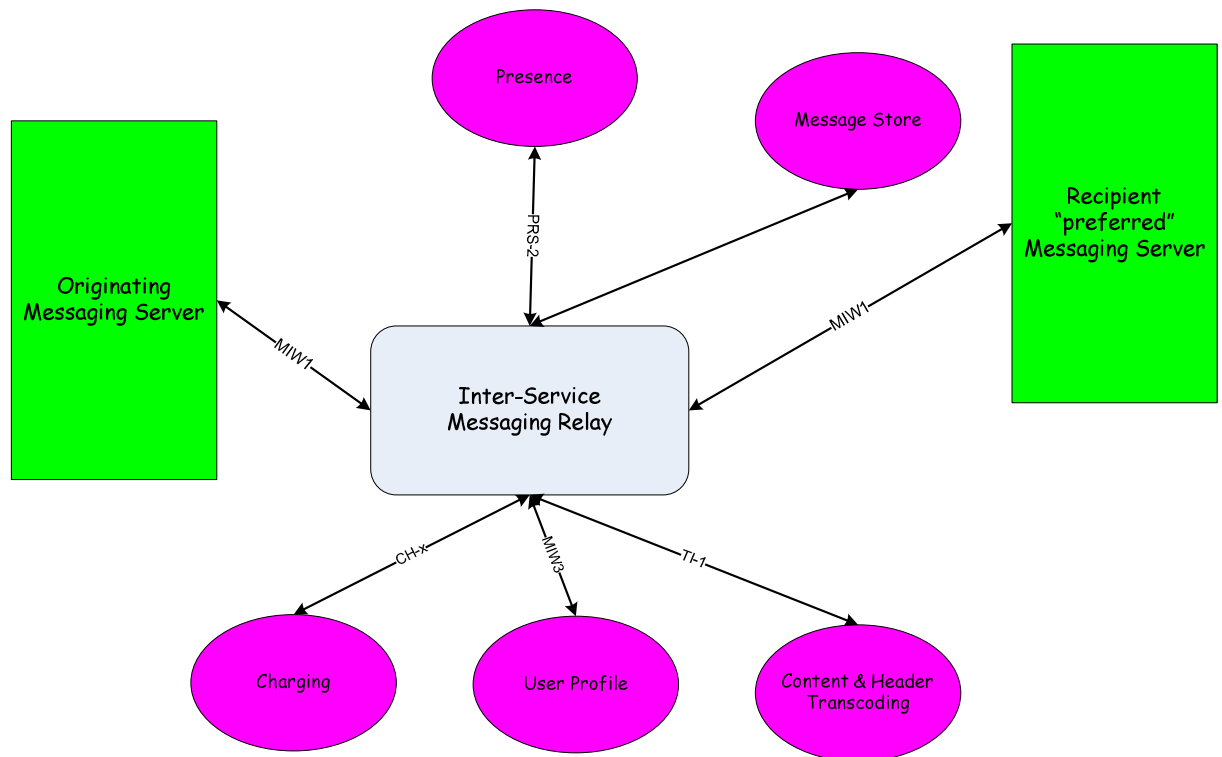


Figure 1: Basic architecture of Interworking of Messaging Services

The following subsections describe the logical entities in this architecture

5.4 Functional Components and Interfaces

5.4.1 Inter-Service Messaging Relay

This logical entity is responsible for the transfer of a message between two messaging services. The responsibilities of the MR include:

- Provide a flexible and configurable processing of messages that are transferred between different messaging services. The processing may take into consideration various factors that are dependent on the messaging environment and the message format.
- Provide a store-and-forward message transfer service for the interworking between the messaging services, when necessary.
- Identifying, based on the address-resolution, recipient user-profile, and presence status, the target messaging service.
- Conversion of the message format to the accepted format of the recipient messaging service.

- Producing the proper charging data records for the transfer to the target messaging service.
- Providing a status indication to the originating messaging service.
- Relaying and translation of messaging options (e.g. delivery notifications) between the peer messaging services.

Messages to which messaging interworking needs to be applied are forwarded to the messaging relay by the originating messaging server. How the originating messaging server decides whether messaging interworking needs to be applied is implementation-specific.

5.4.2 Charging

The MR provides Charging Data Records, for billing purposes, to this external enabler. This entity is out-of-scope for this enabler.

5.4.3 User Profile

This logical entity provides support for –

- Maintaining a list of all messaging (or P2P communication) services that a user is subscribed to.
- Maintaining a list of preferred messaging service, per message type, e.g. “voice” to PoC, “picture” to email.
- Queries for identifying candidate messaging services for receiving a message.
- Updating information relating to the messaging services subscribed to and preferred by the user.

5.4.4 Content & Header Transcoding

This logical entity provides services of transcoding of:

- the content of a message.
- the format of a message (e.g. message envelope, message headers).

5.4.5 Message Store

This logical entity provides persistent storage of messages in the network that may be accessed by the messaging servers and the MR to store and retrieve the message being sent. The messaging servers and the MR use the Message Store to implement their store-and-forwards behaviour. The Message Store should not be used as a communication channel between entities, i.e. a messaging server may not have access to the messages stored by the MR, and vice-versa.

5.4.6 Presence

This logical entity provides support for –

- Availability of user by maintaining a list of all actual message services (e.g., IM and MMS) via which the user is available.

This logical entity may provide user profile information that is cached as part of the Presence enabler functions and is relevant to the different messaging services. The optional functionality of providing user profile information implies that the interface to the User Profile logical entity may be the responsibility of the Presence enabler rather than the MR. This may be configuration dependent.

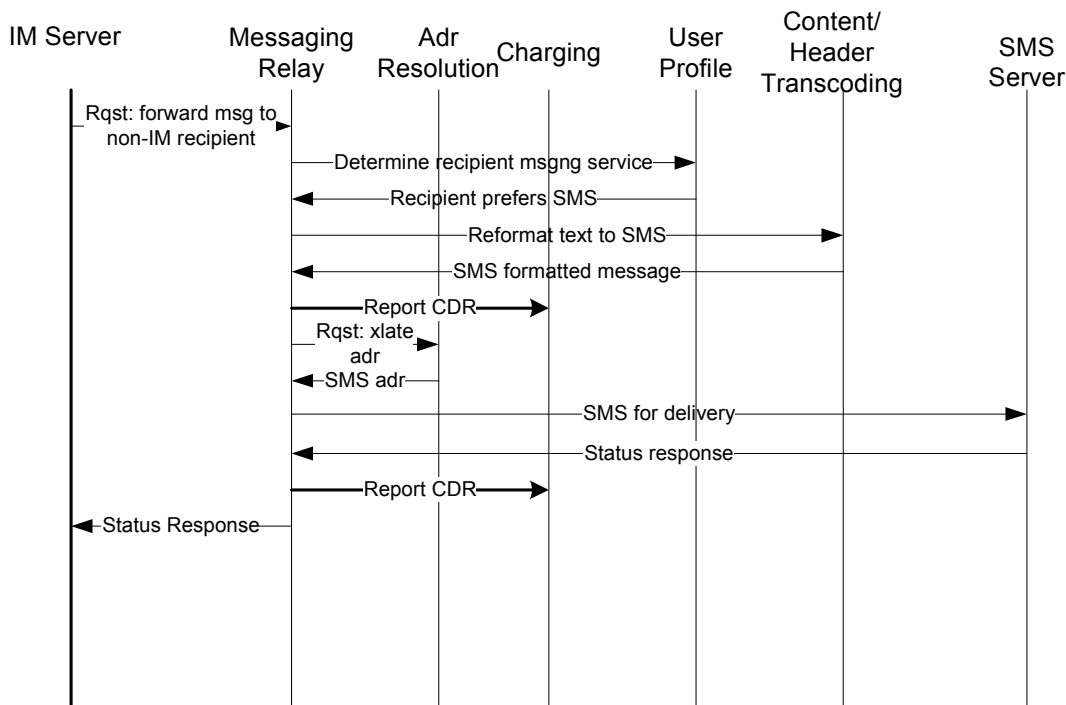
5.4.7 Reference Points

Ref Point	Between Entities	Description
MIW1	Messaging server & MR	Reference point that allows a messaging server to invoke the MR functionality and allows the MR to transfer the message to recipient messaging server. The reference point is also used to transport messaging options (e.g. delivery notifications). The reference point may be based on the native inter-server protocols, e.g. MM4 in MMS, of the P2P Communication enablers.
CH-x	Messaging relay & Charging	This is an I1 interface to the Charging enabler as defined by the different standards for the purpose of submitting data for generation of Call Data Records.
MIW3	Messaging relay & User Profile	Reference point that supports retrieval of user preferences & subscription information. This functionality may be provided indirectly via the PRS-2 reference point, if supported by the Presence Enabler.
TI-1	Messaging relay & Content/Header Transcoding	This is an I1 interface to the Standard Transcoding Interface as specified in [STI].
PRS-2	Messaging relay & presence	This is an I1 interface to the Presence Enabler as specified in [Presence].

5.5 Flows

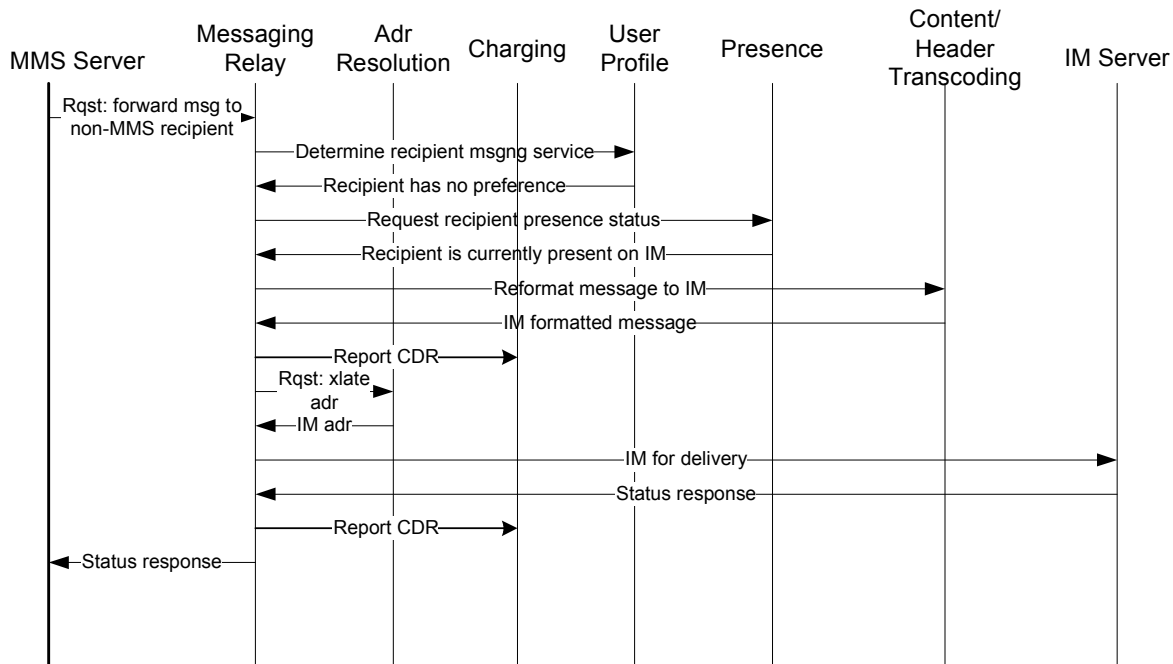
5.5.1 Flow 1: Relay to Recipient’s Preferred Messaging Service

The following diagram illustrates the flow of information between the different logical entities, of the Messaging Services Interworking architecture, as described here, when transmitting a message that began at an IM server and is being transmitted to a user’s SMS client, as determined via the recipient’s preferences.



5.5.2 Flow 2: Relay to Recipient's Present Messaging Service

The following diagram illustrates the flow of information between the different logical entities, of the Messaging Services Interworking architecture, as described here, when transmitting a message that began at an MMS server and is being transmitted to a user's IM client, as determined via the recipient's presence status.



Appendix A. Change History (Informative)

Document Identifier	Date	Sections	Description
OMA-WP-MsgSvc-Intw-Arch-20070503-D	03 May 2006	All	Initial version of WP as permanent doc on the basis of: AD-MsgSvc-Intw-V1_0-20060122-D OMA-MWG-2006-0014-CR-Followup-Changes
OMA-WP-MsgSvc_Intw_Arch-20060918-D	18 Sep 2006	2	Updated according to CR in doc OMA-MWG-2006-0050. Corrections in response to CONR comments.
OMA-WP-MsgSvc_Intw_Arch-20060921-D	21 Sep 2006	All	Editorial clean-up before TP R&A.
OMA-WP-MsgSvc_Intw_Arch-20061010-C	10 Oct 2006	n/a	Status changed to Candidate by TP: TP ref. # OMA-TP-2006-0345- INP_Messaging_Services_Interworking_V1_0_RRP_for_Candidate_ Approval
OMA-WP-MsgSvc_Intw_Arch-20070410-C	10 Apr 2007	n/a	Changed title for consistency and applied template for 2007.
OMA-WP-MsgSvc_Intw_Arch-20070501-A	01 May 2007	n/a	Status changed to Approved by TP: TP ref # OMA-TP-2007-0123R02- INP_MessagingServicesInterworking_RRP_for_Final_Approval