

# Message Service System Evolution and General Frameworks

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## Abstract:

With the development of message service in telecom networks as well as the Internet, multiple message service formats have been emerging, including Short Message Service (SMS), Multimedia Messaging Service (MMS), Mobile Email Message (MEM) and Instant Message (IM). Based on the latest research achievements of OMA CPM Organization and GSMA RCS Organization, the message service evolution may have two phases: Integration and convergence, with corresponding overall framework realization methods.

Generally speaking, the message service denotes a service transferring the message content between users or between user and application by adopting storage-transmit mechanism. The message service is developed in two routes: One is a route dating from the message service in the middle of 1990's, developing with the evolution of Core Network (CN) from Circuit Switching (CS) domain to Packet Switching (PS) domain in the telecom network and experiencing the Short Message Service (SMS), Multimedia Messaging Service (MMS), and Mobile Email Message (MEM); another one is a development route dating from the birth of Email service in Internet in 1971 to the appearance of Instant Message (IM) service in the middle of 1990. Under the background of all-IP network, Fixed and Mobile Convergence (FMC) as well as the convergence of telecom network and the Internet, the message services evolved in the two routes mutually affect and

promote and develop toward convergence and unification.

## 1 Development Course of Message Service

### 1.1 Message Service in Telecom Networks

In the telecom network, the message service develops based on the network evolution and is mainly divided into three phases: CS domain message service, PS domain message service and IP Multimedia Subsystem (IMS) domain message service.

The CS domain message service is mainly SMS<sup>[1]</sup> and adopts signaling 7 as bearer. The message content is packed in the signaling data packet to finish the transfer from short message center to mobile phone terminal. The message content is sent to the target user mobile phone terminal after being temporarily stored in the short message center. The maximal advantages of SMS are simple, fast, safe, easy to use, simple in charging, rapid in message transferring, accurate in short message content and safe in arriving at the target user, while its shortcoming is that it can transfer text content only with the length limited to 140 bytes.

The PS domain message services are mainly MMS and MME<sup>[2-7]</sup>. The mobile phone terminal establishes data link via wireless access network and CN, and sends the MMS content or MEM content to the MME center or MEM center through the data link. The MME center or MEM center store messages at the network side and then send the content to the target user mobile phone terminal by push or pull way. The MMS and MEM have the advantages of transferring the data content of multimedia with longer length to the mobilephone terminal user, meeting users' multi-media communication demand, while have the

disadvantage of longer transceiving time during the whole transceiving process in 2.5 G network, having worse user service experience.

The IMS domain message services include IM<sup>[8-11]</sup> and Mobile Instant Message (MIM) based on Session Initial Protocol for Instant Message and Presence Leveraging Extensions (SIMPLE) defined by the Open Mobile Alliance (OMA) Organization. The mobile phone terminal client end can get the buddy list message and buddy state message via the wireless access network and after the registration of IMS domain based on packet data network, and receives and transmits the text message and multimedia content with buddies via SIMPLE IM service. MIM has the advantages of supplying users with message exchange with text and multimedia content included seamlessly, which not only has the advantages of being simple and fast but also overcomes the shortcoming of limited transfer content length of short message transfer, and compared with multimedia message, it has better user experience. Due to network and terminal, operators deploying MIM service are not many, and MIM between operators cannot interconnect with each other, which hinders MIM promotion and popularization.

### 1.2 Internet Message Services

The development of message service of the Internet was basically driven by user demand and network wideband, and the message service took Email as theme for a very long time after the appearance of Email service. During the rapid development of the Internet in 1990's, the first generation Internet IM service came such as ICQ, and later the IM service developed in the second and third generations. Currently, the well-known IM services include MSN, Tencent QQ and Skype. The IM service replaces Email service gradually.

During the development of message services, the message services of telecom networks and the Internet are in mutual reference and promotion, for example, the generation of MEM service is the result of learning the Email service of the Internet by the message service of the telecom network, and the mobile IM

service is also generated by referring the IM service of the Internet.

## 2 Unified Message Service

The unified message service<sup>[12]</sup> was a special stage during the message service development process. This concept was formed in 1990's, rapidly developed in 2003, and was mainly a message service facing enterprise clients initiated by IT vendors like Cisco. For enterprise users, they used both the internal communication tools like Email and IM, and the telecom network communication ways like SMS, MMS and fax. They can obviously feel the message barrier between the message services. The unified message service was pushed aiming to breaking the barrier between terminal and media so that users can connect with anyone at any time by using different technologies, media, and terminals. The unified message service planned to realize the message services intercommunication in the way of erecting gateway in technology and performing message formats conversion. However, the unified message service was not better developed, because the application chance for the enterprise users to the unified message service was not mature, that erecting gateway is hard to meet the fast changes of network environments, and that a large amount of message formats conversion and storage systems cost much.

## 3 Message Service Development Trend

The idea of unified message service is a good one; to some extent, it represents the development direction of message service: The barrier between message services is broken by solving the intercommunication between message services so that the message service is under the way of unification and convergence. In recent years, all IP-based networks and the convergence of telecom networks and the Internet have made great progress, which makes solid basis for realizing the unification of message service. The network convergence also pushes the research of service convergence. The message

service convergence is an instance of the service convergence.

With the evolution of CN, the telecom network generates various message services such as SMS generated in CS domain stage, MMS and MEM generated in PS domain stage, and more. Based on different CNs, the message service systems have severe barriers, and users can intercommunicate only by using same type message service. With the growth of market demand, the functions between message services appear overlapping and coverage, for example, the MMS covers the SMS, the MEM is basically similar to MMS, and the mobile IM also covers the SMS and MEM. Meanwhile, the value-added services based on message services are also mutually independent because of the mutually independence of message services, which hinders Content Provider (CP) and Service Provider (SP) to provide value-added services based on the abovementioned message systems.

The message services of the Internet are mainly Email and IM, provided by different Internet Service Providers (ISPs). Users using Internet IM service can seamlessly exchange information by text, multimedia, voice, etc. The service experience from the Internet provides real reference for the service experience of users using telecom network. Users generate larger doubt to the complicated and redundant message service of telecom network at the time of receiving the IM service of Internet. The telecom operators also find the problems thereof and seek solution.

To sum up, it is an overall trend for the message service going to intercommunication and convergence; and the telecom vendors, operators and even IT factories are all performing helpful exploration such as Ericsson, Alcatel-Lucent, Comverse, etc. OMA, GSM Association (GSMA) and other standardization organizations all actively push the development of message service.

## 4 Message Service System Overall Framework

Currently, there are two measures adopted by the telecom factories and standard organizations in the way of

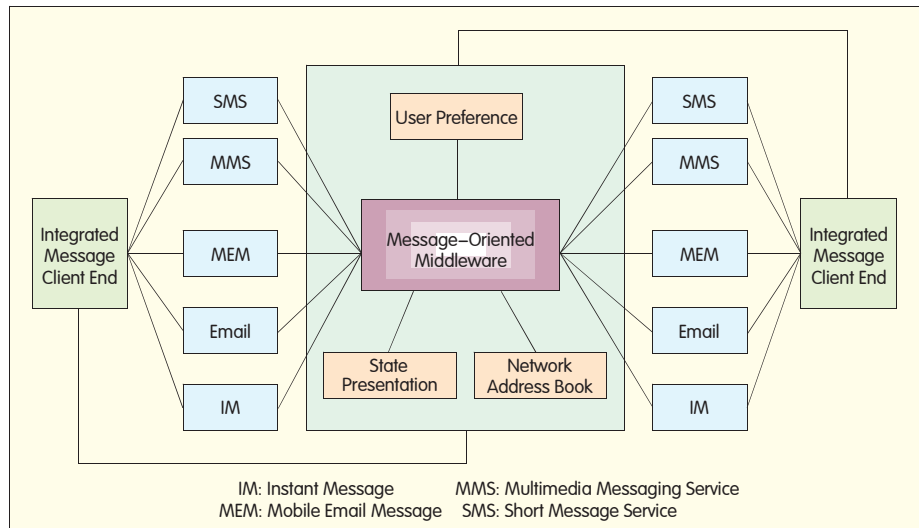
pushing the message service to intercommunication and convergence: Integrated method and convergence method.

#### 4.1 Integrated Method and Overall Framework

The integrated method provides user with service experience based on message intercommunication without changing the original message service equipment at the network side. Users transceive messages by the unified interface message service client end. The integrated message service system performs message format conversion and route between the existing message centers, ensuring fast and accurate intercommunication of message service. Figure 1 shows the overall system framework.

The original message service system in Figure 1, including SMS, MMS, MEM, IM and Email, need no changes, but only requires a message-oriented middleware device between systems to realize the intercommunication between original message services and conversion and adaptation of message formats. In order to improve user service experience, the network side also has user preference setting system, state presentation system as well as network address book. The user preference system is used for preference information setting, for example, in some time, forwarding the received message from a user. The state presentation system is for providing contact person state information for user, for example, whether the user is online and the multimedia message is online, etc. The network address book saves the contact person address information of user like Email address, MSN address, etc. except cell phone numbers. The network address book, state presentation and user preference jointly provide route selection information for message-oriented middleware. For all the message services, the user terminal uses the unified interface and stored message service client end, and enables user to use different typed message services by attaching network address book with state presentation information.

The key technologies related in the system are as follows:



▲ Figure 1. Overall framework of integrated message service.

- Mutual conversion of message formats, such as the conversion of MMS format to MEM format and how to store the parameter and how to ensure service experience consistency during conversion process.

- Message service intelligent router. The system needs to judge how to route to the destination users according to destination user state, message content length type and destination user preference to ensure fast message intercommunication between users.

- Network address book function. By all kinds of address information of network storage user contact person and the combination with user state presentation information, it provides the selection method reference before message intercommunication. How to dynamically combine the state presentation for other message service system is the problem to be solved.

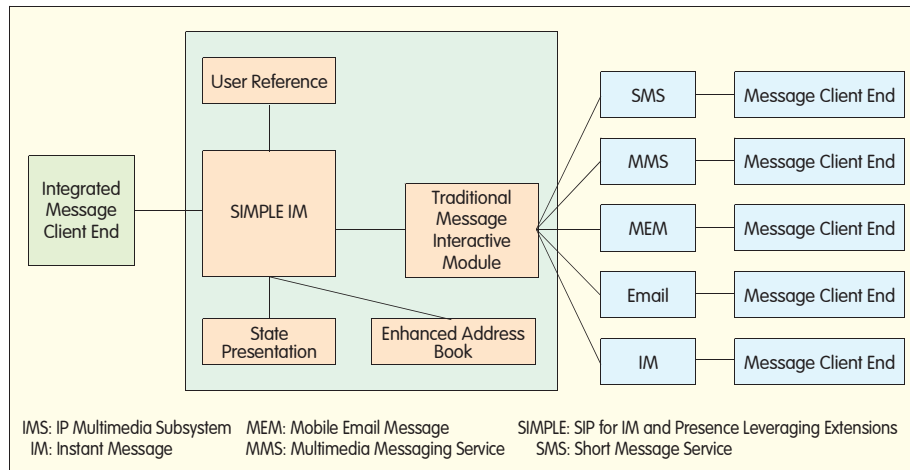
#### 4.2 Convergence Method and Overall Framework

The convergence method is to realize the original message service experience based on the next generation CN, by which the network side equipment providing message service for user needs to be totally constructed. Compared with the integrated method, the convergence method message service system extends the message scope without limiting to the non-real-time or quasi-real-time information exchange, and also takes the

real-time voice interaction as one of the service functions. This is a result conducted by Internet IM. Currently, almost all the Internet IM services support the message interactive method with voice included. The convergence method has two different ways: One is the realization of reusing the existing service engine taking GSMA RCS as a representative, and another one the realization of completely designing service engine taking OMA Organization Convergence IP Message (CPM)<sup>[13-16]</sup> project as a representative.

(1) GSMA RCS Overall Architecture  
RCS was established in April of 2008 and mainly organized by operators. It reuses the existing service enabler, takes the existing SIMPLE IM service enabler as center and fast meets the multimedia communication demand of user convergence by extending and adding enhanced address book and traditional service interactive module. Figure 2 illustrates the overall architecture of system.

RCS system is mainly composed of IMS network-based IM system and gateway equipment intercommunicating with the traditional message service. In order to improve user service experience, the user preference setting system, state presentation system and enhanced address book system are needed. The convergence message client end basically adopts telecom network SIMPLE IM client end. The enhanced address book has similar



▲ Figure 2. IMS network based message service overall framework reusing service enabler.

function with the network address book in Figure 1 and provides various contact person address information for user, and the difference lies in a different external interface caused by the difference of CN. The state presentation is similar to that in Figure 1 in the aspect of function, and the difference is the content of state information which is no longer limited to certain service type. The user preference setting system is also different from that in Figure 1 and makes emphasis on the selection of address and information type. Currently, RCS work only finishes part of message convergence service based on SIMPLE IM. Figure 2 only draws the intercommunication with traditional message service and the related voice service function is then realized by IMS network. If it is group meeting service function, then the corresponding meeting server is used for realization. In a word, try to use the existing service enabler or make little modification on the existing service engine.

The key technologies related in the system are as follows:

- Intercommunication with the traditional message service. During the message intercommunication, it ensures the correction of message format conversion without changing the service experience of traditional message user.
- Collaboration with existing service enabler. In order to ensure the quality of user experience, data information handled by different service enablers need to keep synchronization and coordinate mutually.

- User preference information data structure design. Due to various traditional services and complicated next generation network environment, how to design reasonable user preference information structure to ensure better expansion and high efficiency so that users feel convenience and fast in use.

#### (2) OMA CPM Overall Framework

In September of 2006, more than ten telecom operators and vendors established CPM standard projects in OMA Organization, providing point-to-point, point-to-multipoint and point-to-application convergence service experiences for users using multi-address multi-terminal. The service experiences include:

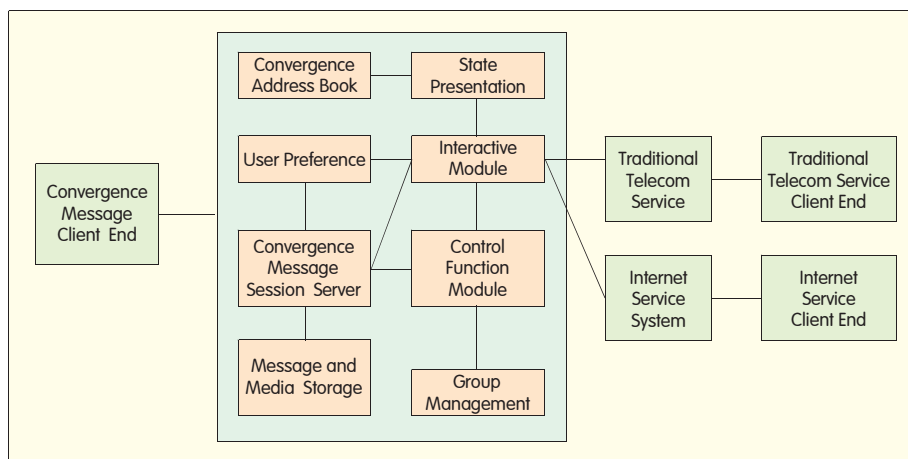
- Text and MMS experiences such as SMS, MMS, SIMPLE, IMPS and Email.
- Service experiences based on voice such as POC and VoIP.
- Service experiences based on

audio and voice such as video phone, network camera and stream media.

CPM is targeted to extract the service function in the original service enabler, integrates these service functions to CPM by employing technology reuse and supports user to apply the service by multi-address and multi-terminal. Based on IMS network, the service experience above is realized by adopting new technical specification. Meanwhile, in order to ensure CPM reuse, CPM is positioned as service framework during design process.

The overall system framework realizing the converged service experiences is shown in Figure 3.

In the system shown in Figure 3, the convergence message session server is used to process user transceiving message and session request. The control function module is to handle group message and session service and can adopt third-party realization mode. The intercommunication module is applied for interacting with the traditional message as well as voice service. The group management provides group configuration information and policy information for control function module. The message and media storage collect storage user history message and history session information, display in accordance with certain structure and provide better service experience. The convergence address book stores multiple address information of user at network side, and combines with state presentation to show the state information of different address information and provide judge basis for service



▲ Figure 3. Newly designed message service overall framework based on IMS network.

interaction. Compared with the enhanced address book in Figure 2, the convergence address book has richer functions such as address information share, address information dynamic upgrade, etc. Compared with the state presentation in Figure 2, the state presentation information is clearer in classification and has higher expansibility. The user preference module intensively stores and manages user preference information for the purpose of use setting convenience and providing processing basis for convergence message session server and interactive module. Compared with the use preference in Figure 2, the preference information features more classification and humanization.

The key technologies related in system are as follows:

- Multi-address multi-terminal processing: Supporting user to adopt different access modes terminal use convergence message services and performing service HO and coordination among multi-terminal.
- History message and session content centralized storage: High efficiency storage message and session content to ensure information security and realize synchronization with multi-terminal that can ensure the real-time upgrade of terminal content.

## 5 Conclusion

To sum up, the message service trend toward intercommunication and

convergence is the overall development direction. During the exact process, user demands can be realized by adopting either the integrated method or convergence method based on actual condition. With the enrichment of service convergence research achievement, the message service system in convergence method will be an important milestone in message service development. It is a bifurcation point whether reusing the existing service enabler or the existing technology to create a completely new message service system. With the gradual definition of market demand, the two methods may be combined.

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### Biographies

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Li Fengjun received his master's degree from Huazhong University of Science and Technology. He is now engaged in the research of telecom services and applications at ZTE Corporation.

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Dong Zhenjiang received his master's degree from Harbin Industry University, now is a member of ZTE Corporation, and is appointed as Vice President of Business Research Institute undertaking telecom service and application research work.

#### Wang Hongwei



Wang Hongwei works in China Information Technology Consulting and Designing Institute and mainly engages in optical transmission system planning, design and operator construction planning work. He has been awarded third prize twice for outstanding design, published two special theses and obtained three National utility model patents.

## Roundup

### ZTE Leads Data Card Industry with Impressive 366% Growth

ZTE Corporation announced on August 25, 2009 that sales of its Data Card have topped 7 million in first half of 2009, representing an increase of 366% compared to the same period last year, the fastest growth amongst all manufacturers. ZTE rapidly expanded its leadership in the Data Card market last year with cumulative sales of more than 10 million in 2008 and 426% year-on-year growth—a second place position in the global market. This momentum laid a solid foundation for the company to achieve its goal of capturing 30% of the global Data Card market in 2009. With its ongoing expansion in overseas high-end and emerging markets, ZTE continues to showcase its considerable strength

and competitiveness in data card products.

ZTE received 40% of its data card sales revenue in 1H09 from developed countries, attributable to delivery of high quality products to meet growing and advanced market needs. ZTE recently received Data Card orders from T-Mobile, a division of world-class operator Deutsche Telekom, and WILLCOM, the 4th largest operator in Japan. In July, Telenor Group in Norway signed an agreement with ZTE to purchase USB Data Cards in the next 12 months. Besides, ZTE and COSMOTE, the largest mobile operator in Greece, have jointly introduced the world's fastest-download 3G Data Card, MF662, to the Greece market. (ZTE Corporation)