

LECTURE SERIES

Mobile Ubiquitous Service Environment

Zhang Ping, Ji Yang, Feng Zhiyong

(Research Center for Wireless New Technology, Beijing University of Posts and Telecommunications, Beijing 100876, China)

2

The Mobile Ubiquitous Service Environment (MUSE), established through the coordination and integration of mobile telecommunications and ubiquitous network, in the pursuit of Always Best Experience (ABE), represents the major development trend for the next generation mobile wireless network. Research on MUSE will involve the integration of the computing model system, service platform system, operating system and terminal structure system, all of which involve exploration and innovation of a new networking structure, its control and management as well as way of measuring. The change in network resources triggers the change in network computing models. To let readers have a basic understanding of MUSE, this lecture introduces it in four sections. This section focuses on the development and demand analysis of the service platform.

4 Status Quo and Development Trends of the Service Platform

The service platform is a technical environment to support service provisioning. Through the functional interfaces, it provides an environment for development, deployment, access, management and billing of the upper-layer services, and allows the service capabilities formed by the lower-layer resources to be used by the upper-layer applications. Moreover, it provides the information system management and operation with coordination, management and control of all resources.

The Mobile Ubiquitous Service Environment (MUSE) is a vision built for the future world of information. It features intelligent adaptive applications, ubiquitous and heterogeneous integrated networks, ubiquitous user ambient environments, fast service development and deployment, as well as the industry chain and business mode with a potential of creating values. For the evolution of the service platform, the MUSE vision raises new requirements on functionality and performance.

4.1 Standard Specifications

The available standard specifications in the industry are a summary of the existing platforms, which can provide

references and criteria for developing the future service platform.

The available prevailing standard specifications are Telecom Information Network Architecture (TINA), Open Mobile Alliance (OMA), Open Service Architecture (OSA), Mobile Execution Environment (MEXE), and Customized Applications for Mobile Network Enhanced Logic (CAMEL). TINA was first discussed in 1990, and it underwent a process from simply drafting the specifications to implementing product services, in which the architecture specifications were optimized and perfected. OMA was founded in 2002 when the mobile communications industry finally realized the importance of service standardization. To date, OMA contains almost all participants in the value chain of the industry including mobile communications equipment vendors, operators, IT vendors, service providers and content providers. OSA and MEXE were put forward by the 3GPP in 1999. OSA is a mechanism provided by the 3GPP for service development, while MEXE is specified in the 3GPP R4. The 3GPP R4 was successfully completed in March 2001. In 1997, the European Telecommunications Standards Institute (ETSI) put forward CAMEL to solve the problem of interoperability between the Global System for Mobile communications (GSM) and Intelligent Network (IN).

CAMEL is now the preferred specifications for implementing intelligent services for GSM.

4.2 Solutions

Many telecom equipment and computer vendors roll out their own solutions to the integrated service platform. The mature service platform products available have been launched mainly by HP, Microsoft, Motorola, Siemens and IBM.

The HP Mobile Service Delivery Platform (HP-MSDP) launched by HP is used to meet the 2.5G/3G mobile users' demands for diversified data services. It enables interactive SMS, interactive computer communication or voice activation, and supports the search through various websites to find the users' needed information resources.

The Service Delivery Platform (SDP) defined by Microsoft is a universal service delivery platform provided for CPs, SPs and network operators. It makes full use of existing resources of the telecom operators to enable fast service creation and packaged service offerings.

The Open Mobile Internet Platform (OMIP) developed by Siemens is a telecom-class mobile Internet service platform. It is a universal management platform for the operator to manage their service partners, and also a universal integrated platform for the third-party application providers to implement

mobile service access. It performs, in a unified manner, the functions such as application access control, network resource management and background integration. Moreover, it provides privacy control of user data as needed by the application.

To cater for new requirements of the operators, IBM has rolled out its Service Provider Delivery Environment (SPDE) solution. The SPDE is an open-standards-based framework free from the restrictions of wireless, wired or internet-based communication networks. It can be used to independently create and manage new services, and transfer the services to various computing devices.

4.3 Development Trends

To deploy the emerging new application services such as SMS, video conference, Video on Demand (VOD) and teleconference, most operators set up independent service platforms and application servers. However, the closed service-based mode has many disadvantages: lengthy system construction period, slow service provisioning, repeated investment, unable to share user service resources, difficulty in integrating networks and services, hard to meet the requirements for integrated services, difficult management, complex maintenance and high cost.

Meanwhile, OSA has long been accepted as the basic concept of 3G network, and the industry has agreed that the open service architecture is a basic feature of future service provisioning. It is an inevitable trend for mobile networks to evolve from 2G to 3G. Whether in response to future technical development or to satisfy the present market demands, it is urgent to provide a new service platform featuring simple management, low maintenance cost, and fast and easy service development.

In the field of the network service layer, the two prestigious standardization organizations, Parlay and OMA, released their latest research results. Parlay has rolled out its Web-based ParlayX Application Programming Interface (API) based on the Common Object Request Broker Architecture (CORBA) Parlay API. It is expected to make service

development easier and encourage more IT application vendors to join the development of telecom services. While continuing the work previously conducted by the former WAP Forum, OMA puts forward the concept of "common capabilities" in the hope to change a vertical-structured service system into a horizontal one, so that different service systems can share authentication, billing, management and other service support functions. On all accounts, to build and operate services on an open and extensible universal platform has become the mainstream for development of the service platforms, and has also become a common understanding of the operators and equipment vendors in the industry.

5 Demand Analysis of the Service Platform

5.1 Basic Features of Future Wireless Communications World

(1) People-oriented Applications and Services

The future wireless communications world is people-oriented, and has a deep knowledge of the target users' consumption habits, ability and demands. It also manages to control the target user's resources. Moreover, it offers personalized and tailored services and functionalities to different user groups.

Besides, the future wireless communications world is intelligent and ubiquitous. The services the users want can intelligently and automatically be delivered to them via the context awareness and proactive environment. The service mode of "what you access is what you get, and what you think is what you get" will surround the users, offering ubiquitous and satisfactory service.

(2) Integration of Heterogeneous Network Environments

The future wireless communications world will be a heterogeneous network that can deliver diversified and personalized services. Furthermore, it is ubiquitous and can offer seamless services without the need of users providing the service location and perform the background operation to dispatch services and priorities. In order

to offer seamless and consistent services to users at all times, the future network environment must screen the network heterogeneity and trivial details at the bottom layer, with the aim to provide users with the best service experience based on variation in the environment.

(3) Functional-component-based Terminal

Today's terminals provide relatively concentrated functions and are restricted in their ability to access, as well as their handling and display. Certainly these will restrict the deployment of a certain service that requires higher display and access ability on the terminal. The future terminal is not necessarily in the form of a single entity, and it may be a high-level terminal consisting of multiple terminals. This means it must be a functional-component-based entity. The functional-component-based entity means that the terminal is divided into several functional components concerning network access, terminal input, display output and data processing according to the service support capabilities. In accordance with the specifications for standard interfaces and layered protocols, and based on the dynamic and intelligent dispatch and control policies, the functional components can be combined or separated to constitute an entire terminal.

(4) Various Links of the Industry Chain

In the future wireless communications world, the prospects of service innovation will be greatly restrained if operators depend only on their own ability. However, when a new industry chain is set up, more people can get involved in the development of new services to better satisfy the actual needs of users. Based on an open architecture in the future, operators may outsource lame functional services and those functional services they cannot provide, giving them over to more professional SPs/CPs for implementation. Through the alliance with SPs/CPs, operators can make up for the shortage of their own resources while lowering the cost of service implementation and facilitating integration of functional services. Therefore, leveraging the partnership in the industry chain to allow SPs/CPs and equipment vendors to offer new feature-rich services may efficiently use

LECTURE SERIES

the existing industry value chain or build a new one, and thus create a win-win situation.

With the continuous adjustment to the operation and business modes of new services in the future wireless communications world, some new links will emerge on the industry chain. For example, some service agencies emerge to develop business (that is, service agencies are responsible for developing and managing customers), while operators only provide service platforms.

(5) Trust and Security

In the future wireless communications world, the trust mechanism, whether between the user and the operator or between the links of the industry chain, will be further perfected. The secure authentication will enable target users to roam freely through any-one-point access without worrying about privacy divulgence. New operation modes such as reliable prepaid service will be securely delivered to users. The trust among members of the industry chain will reduce business risks and help all members build a stable and mutually beneficial ecological circle with optimum development.

5.2 Feature Requirements for the Service Platform

The feature requirements for the future integrated service platform are presented as follows:

(1) Subscriber-oriented

As the final users of the services, subscribers play an important role in the industry chain. The future communications society will be a subscriber-oriented society.

The subscriber-oriented idea is to consider subscribers as the center in the process of system development, and take the users' demands into account at the initial stage and throughout the entire system design process.

Additionally, this idea supports the generating and provisioning of personalized services, and intelligently configures services needed by users, according to users' consumption habits, personal preferences and context awareness. It delivers a more natural interactive model, which focuses the users' attention on the task itself and enhances their service experience.

(2) Self-organizing

On the implementation perspective, it is hard to imagine that subscribers or dedicated operators can manage and control large numbers of devices in detail. Moreover, it is bad to make subscribers experience complex technical details when they use services. Therefore, the future service platform should have more powerful capabilities to maximally implement self-management, self-configuration and self-recovery, and to automatically adjust its action based on environment changes. Furthermore, the self-organizing doesn't mean that the network is completely independent of manual intervention, but rather, it means that the network can complete the automatic control based on users' benefit and preference, so as to finally implement service development and deployment.

(3) Adaptive

The universal service platform will face more changes in both social and technical environments. Different parts of the service platform may correspond to different relations in the industry chain, and new elements may be introduced to the whole environment to change the relation between technologies. In order to extend the life span of the entire service platform, the internal structure of the service platform must provide the ability to adapt to the changing environments.

(4) Context-aware

The service platform must have the capability of context awareness to minimally disturb subscribers. The platform has to be aware of the subscribers' states and surroundings, based on which it adjusts its actions of judging service logic and calling service. A subscriber's context information is quite abundant which includes physical location, physiological state, psychological state, individual history information and daily behavioral habits. The method of acquiring the necessary information is the key technology for implementing context-aware computing. Since the different contents come from a variety of distributed data sources, it is necessary for the service platform to collect and manage this kind of information, and use the related decision mechanisms to evaluate and analyze the

original data.

(5) Secure and Trustworthy

The network, where the service platform is located, is a heterogeneous integrated network that consists of multiple wireless access networks. These open wireless networks are easily attacked by malicious hackers at any time, anywhere and in any way. Moreover, with the subscriber-oriented service provisioning mode, the service platform must store a great amount of information that is only used for ubiquitous computing and includes personal privacy and security messages. Once this kind of information is used or spread with malicious intent, it will have a strong impact and influence on national security and social stability. Therefore, it is necessary for the service platform to have secure and trustworthy mechanisms, such as the authentication-and-trust-based security mechanism, and the personal privacy protection mechanism.

Manuscript received: 2006-11-20

Biographies



Zhang Ping is a professor and a doctoral supervisor in Beijing University of Posts and Telecommunications (BUPT). He is the Director of Wireless Technology Institute (WTI) of BUPT, Deputy Chairman of the Editorial Committee of BUPT Academic Journal, and member of Academic Committee of BUPT. He is also member of many important

expert groups, such as China C3G Research Group, State '863' Future Mobile Telecommunications Project Group, WWRF and its Prospect Committee, and 3G Mobile Telecommunications Technology Laboratory under Ministry of Information Industry of China.



Ji Yang, Ph.D., is an associate professor in BUPT, the Deputy Director of WTI of BUPT and the Director of Service and Application Research Group of the FUTURE Forum. His current direction for research is Beyond IMT2000 System, Network and Service Application.



Feng Zhiyong is an associate professor in BUPT and the Director of Network Department of WTI of BUPT. Her current direction for research is key technologies for the future mobile ubiquitous network.