Service Delivery Platforms for Network Operators

Kansuke Kuroyanagi
Yuichi Mori

OVERVIEW: SDPs deployed by mobile network operators have been successfully growing particularly in non-voice services such as media content, messaging, and location information services. Now, technological innovations in networking, such as high-speed mobile access and next-generation all IP networks, are to lead discussion about how to revise the SDP architectures to make the most of new network capabilities. The new SDPs work with a variety of broadband access networks to provide value-added non-voice, voice, broadcast and network control services to all kinds of user terminals. Also, making the network functionality available to third parties, which is based on web service technologies, creates new value in the form of Internet applications used in various industries.

INTRODUCTION

NETWORK technologies and services have evolved through a virtuous circle of innovation. Service systems built by network operators offer business opportunities to third parties such as content providers, and they have contributed to the quick launch of new services. This article will discuss the underlying system to generate service revenue

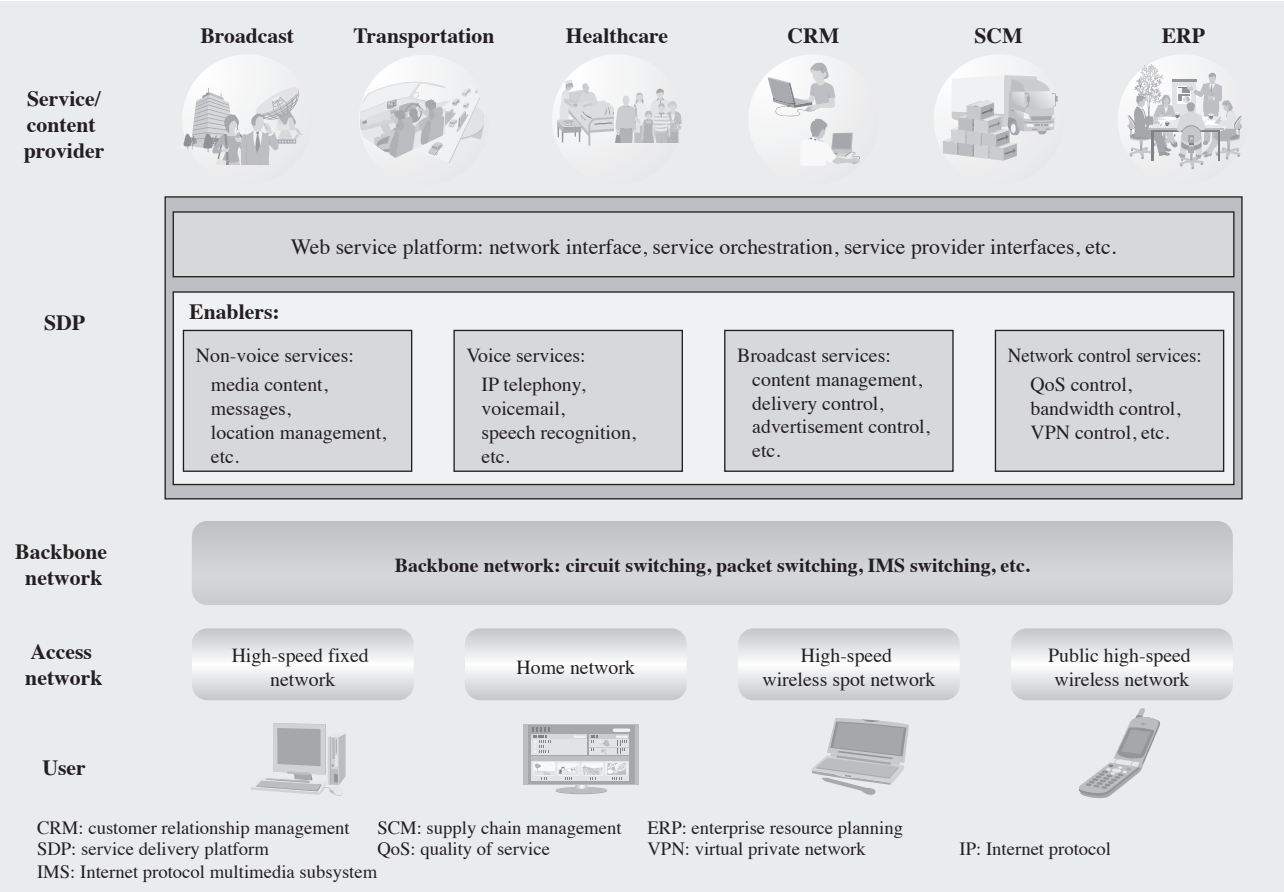

Fig. 1—Service Delivery Platform for Ubiquitous Broadband Era.
Network operators in the era of ubiquitous broadband need a hybrid SDP that provides their customers with valuable services and makes their network resources available to service providers of various applications.

for network operators, or the SDP (service delivery platform). These SDPs have been introduced by mobile network operators with successful consumer-targeted content businesses, and have grown both in size and in available services.

Networks are now in a phase of evolution characterized by the integration of IP (Internet protocol) technologies and the emergence of high-speed mobile access technologies. The SDPs for this new environment need to be advanced in terms of the scope of networks and terminals they support, the services they offer, and the business opportunities they provide (see Fig.1). This has led to debate on what architectures should be adopted[1].

The following sections discuss the Hitachi's involvement with SDPs for network operators and the future outlook for this business.

MOBILE NETWORK SERVICES

Background

SDPs for mobile network operators were first introduced around 2000, creating a new market that has rapidly spread to world major operators. The Japanese market pioneered the implementation of commercialized services by mobile network operators, with many new services appearing ahead of standardization initiatives such as the OMA (Open Mobile Alliance)[2].

These platforms provide an open environment that supports both various services and proven revenue models. Along with providing their subscribers with revenue generating services such as messaging, network operators have succeeded in providing an open business environment for many service providers so that they can increase as well as introduce new content and services efficiently. The service providers with simple service systems have been able to offer monetized services to a large number of customers by using the charging and settlement features furnished by network operators. The network operators have increased their own revenue with fees for revenue collection for service providers and packet communications charges. In addition, flourishing attractive contents and customers' acknowledgement of premium values attributable to ubiquitous access are the reasons of the rapid adoption of these business models in mobile industry.

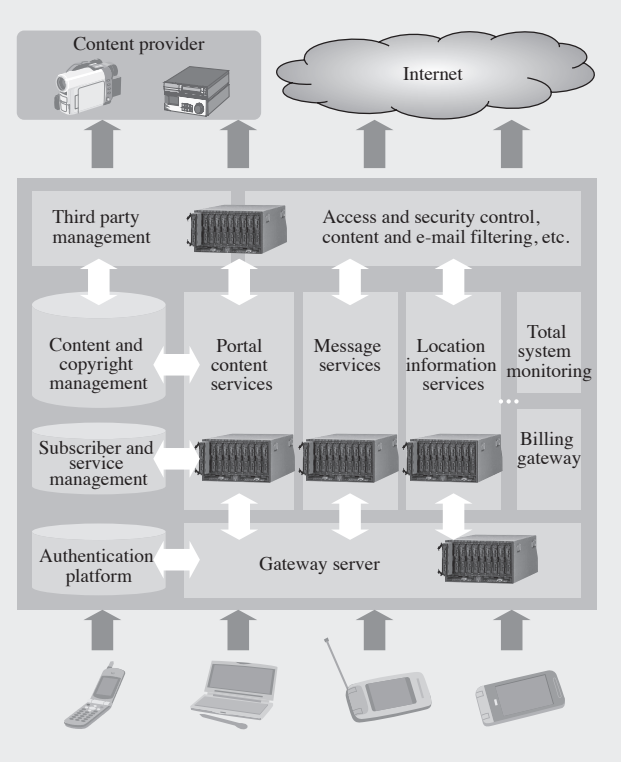

Fig. 2— Mobile Network Operator SDP.
SDP provides mobile users with services such as Internet access, content services, messaging, and location information services.

System Example

Fig. 2 shows an example of the SDPs provided by Hitachi to mobile network operators for non-voice services. The SDP communicates with users via a gateway server connection to the backbone network that works in conjunction with an authentication platform. The SDP consists of servers that deliver content services, messaging and location information services, as well as large databases for subscriber and service management and for content and copyright management. It also includes a common system that includes functions such as a billing gateway and total system monitoring. Other functions, a third party management system and an access security control function, are provided for interworking with the Internet applications.

These systems have been developed using standards from bodies such as the OMA and the 3GPP (3rd Generation Partnership Project)[3]. Thus they provide a variety of services like content services, Internet access, messaging, location information services, to terminals designed for international use.

Furthermore, the SDP runs on a Linux[*1] blade server platform and incorporates technologies such as a high-speed protocol engine to realize a high-density scalable system.

SERVICE PLATFORMS FOR UBIQUITOUS BROADBAND

Changing Network Environments

The advent of commercial NGN (next-generation network) services has created a new trend whereby IP technology is integrating fields that in the past were developing separately, including telephony, Internet access, mobile communications, and broadcasting. In addition, high-speed wireless access technologies such as HSPA (high speed packet access), WLAN (wireless local area network), and the WiMAX (Worldwide Interoperability for Microwave Access)[*2] are realizing ubiquitous broadband networks.

From a business perspective, the emergence of competitive Internet service providers operating on an ad-supported revenue model and MVNO (mobile virtual network operator) will presumably accelerate the convergence between telecommunication services and Internet services.

Requirements for Service Systems

In response to the above changes in the business environment, the following improvements in service systems are required.

(1) Higher transaction processing performance

Broadband services will increase the volume of data and transaction. New applications will require more sophisticated features like media handling. Therefore high-performance and scalable data processing technology will become more important.

(2) Convergence of services and media

The continuing convergence of services in broadcasting and telecommunications will require mixed-media services such as speech/text conversion.

(3) Convergence of networks

Seamless services based on the convergence of fixed and mobile networks will be required.

(4) Convergence with Internet services

Network operators will enforce advertising services like searching. They will also provide new services that incorporate into various applications on the Internet.

*1 Linux is a trademark or registered trademark of Linus Torvalds in the USA and other countries.

*2 WiMAX is a registered trademark of the WiMAX Forum.

SDP Expansion Concepts

Hitachi is currently working on expanding SDPs in order to meet with the new requirements based on its expertise and experience in the SDP for mobile operators. Fig. 3 shows the concepts behind this expansion. User services will grow in speed and capacity to allow seamless use by users both of fixed and of mobile networks.

Since services are expanding to cover non-voice, voice, broadcast and network control applications, the convergence of these services will in turn produce new services. The Hitachi Group has developed non-voice solutions, including service control platforms for intelligent home appliances, voice solutions using IP telephony and speech synthesis/recognition, broadcast solutions like video delivery platforms and image recognition techniques, and network control solutions like VPN (virtual private network) control[(4)]. Hitachi will continuously work on further enhancements that will deliver revenue-generating solutions for network operators.

These network services will be available to service providers such as MVNOs with open application interfaces, and will work with various applications on the Internet.

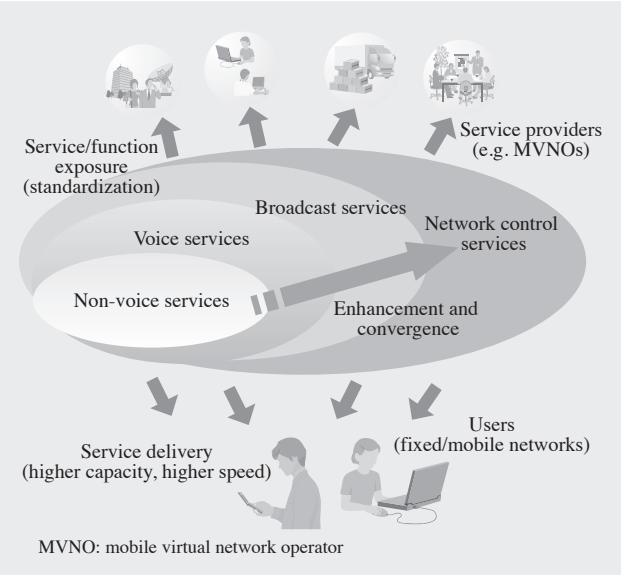

Fig. 3—SDP Expansion Concepts.
The SDPs will be enhanced to incorporate non-voice, voice, broadcast, and network control services, provide their users with integrated services, and make their functionality available to service providers.

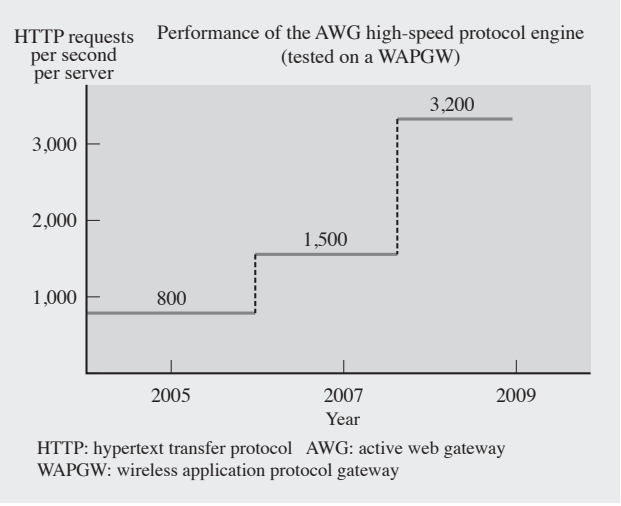

Fig. 4—Improvement in Performance of the Protocol Engine. An advanced multiplexing technique developed by the Hitachi Group can handle 3,200 HTTP requests per second running on a single blade server. Further enhancements are ongoing.

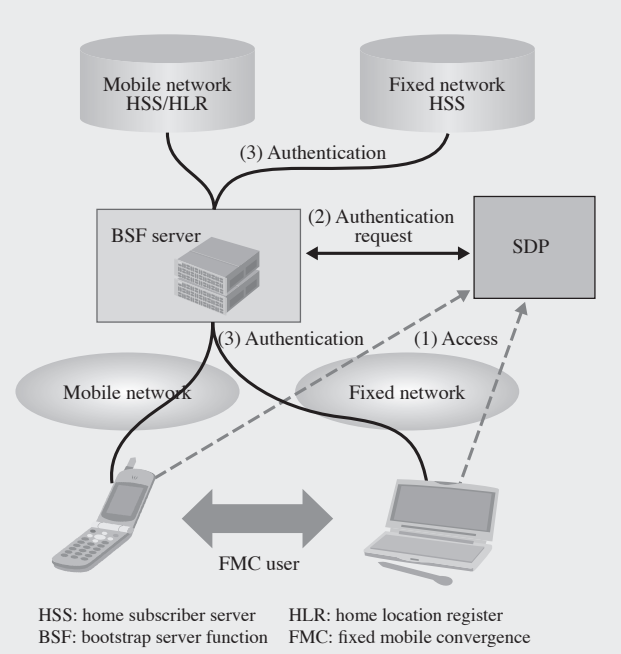

Fig. 5— FMC Authentication Platform Technology. As access networks become more diverse, services will be provided independently of the access network through a unified terminal authentication platform for both fixed and mobile networks.

TECHNOLOGIES SUPPORTING SDP

Technologies for High-performance Platforms

As broadband services generate a great deal of content volume, the number of transactions through networks including machine-to-machine communication such as surveillance cameras will grow exponentially. As a result, performance requirements will become an order of magnitude higher than existing SDPs.

On the other hand, it is also anticipated that the capability to look into the content of communicating data such as filtering and conversion functions will need to be further enhanced. Therefore protocol processing which can be customized and is highly scalable shall be one of the key technologies to sustain future SDPs.

Under these circumstances, Hitachi has developed and evolved a high-speed protocol engine called AWG (active web gateway). Fig. 4 shows the improvements in performance of WAPGW (wireless application protocol gateway) that is developed with the technology. At the present stage of development, the system is capable of processing 3,200 HTTP (hypertext transfer protocol) requests per second when it is run on a single blade server [3 GHz×2 CPUs (central processing units)].

Technologies for Diversified Access Networks

The evolution of backbone networks will result in the interconnection of various access networks. Therefore, it is essential to have a secure authentication platform to identify service users.

The GBA (generic bootstrapping architecture) standard of the 3GPP is a promising technology for extending the mobile SDP's scope to fixed and mobile converged services. A client function on the SIM (subscriber identity module) card in the terminal queries the HSS (home subscriber server) or other network operator database for key information via the BSF (bootstrap server function) server. This provides a session authentication method that is agnostic to the access network (see Fig. 5).

Web Service Platforms

Network operators can pursue new business oppotunities by making the network functionality available to third party service providers via standardized interfaces. The Parlay Group[(5)] has specified the Parlay X interface based on web service technologies and implementation work is in progress based on this specification.

Meanwhile, as an architecture for web service platforms, the OMA has defined a framework called the OSE (OMA service environment) that is based on SOA (service-oriented architecture) technology. Under this concept, implementations that make use of existing service components will have an

architecture comprised of three main elements: a network interface for accessing service components, service orchestration for controlling service execution, and a service provider interface (see Fig. 6).

CONCLUSIONS

This article has overviewed the SDP deployed by mobile network operators and discussed its necessary enhancements to work with new network environments.

New SDPs are applicable not only for working with the infrastructure of mobile network operators as in the past but also for using in new applications with fixed network operators.

Hitachi has been dedicated itself to the development and delivery of total solutions for the SDP used by mobile operators. Hitachi is committed to continuously put its resources on the research and development of SDPs in order to sustain the development of network services toward the future.

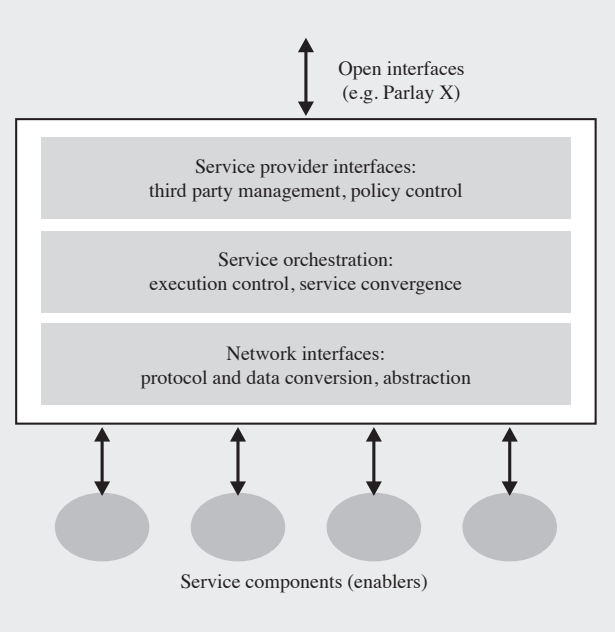

Fig. 6—Web Service Platform for SDPs.
This platform uses service components available via the network to provide service providers with defined web service interfaces.

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(5) The Parlay Group, http://www.parlay.org/

ABOUT THE AUTHORS

Kansuke Kuroyanagi
Joined Hitachi, Ltd. in 1985, and now works at the Solution Operations, the Network Systems Solutions Division, the Information & Telecommunication Systems. He is currently engaged in planning and development of service delivery platforms for network and broadcast operators. Mr. Kuroyanagi is a member of the Institute of Electronics, Information and Communication Engineers (IEICE) and the Institute of Electrical and Electronics Engineers (IEEE).

Yuichi Mori
Joined Hitachi, Ltd. in 1989, and now works at the SDP Solution Department, the Solution Operations, the Network Systems Solutions Division, the Information & Telecommunication Systems. He is currently engaged in development of service delivery platforms for network and broadcast operators.