IMS and Converged Service Network

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Abstract:
The current telecom target network architecture with IP Multimedia Subsystem (IMS) as the core lacks the actual verification of existing large-scale networks and faces the stiff competition from Internet technologies. In the process of promoting the commercial usage of IMS services, the Service Delivery Platform (SDP) is evolving into a more convergent and open Service Delivery Environment (SDE) and will become the mainstream of the next generation Telecom Service Network. ZTE's concept of the Converged Service Network (CSN) is to integrate various network service capabilities to realize the unification of data, service, capability and management and thus the fast provisioning of various Value-Added Services (VASs), which helps the carriers to maintain a leading position in the value chain, meeting the telecom carriers' requirements for service network development.

Telecom networks are evolving into broadband networks along with the technology development. On the one hand, the fixed broadband network develops rapidly, and the amount of users increases fast. On the other hand, the broadband revolution is emerging in the mobile networks. More and more technical breakthroughs have been made by wireless network R&D groups, which increases the wireless network bandwidth continuously and thus leads the entire telecom network to a broadband era. Full IP becomes an inevitable choice in the market during the development of the broadband application technology. A trend of IP over Everything emerges. The entire telecom network aims at the full IP in the direction of core network—access network—bearer network.

The transparency of the full IP network to the upper-layer service bearer directly promotes the separation of service and bearer, making it the most important tendency in the current development of the telecom industry technology and environment. Meanwhile, users can have uniform service experience through different access networks as the IP technology becomes a common network feature of all the telecom networks, making Information and Communication Technology (ICT) convergence and multimedia distinct characters of new service experience.

As viewed from the telecom service development, traditional voice services are satiating the world telecom market, while more and more new services are emerging and taking shape. The traditional telecom industry and the Internet industry are gradually converging. Traditional telecom operations face a great conceptual innovation[1]. On the one hand, telecom carriers are eager to extend new development space through the introduction of new service applications, grow new profit-making services and hope to maintain their leading positions by controlling the service value chain. On the other hand, the New Generation Network (NGN) service providers growing from the Internet have got great development, so they hope to realize the separation of network carrier and Service Provider (SP) by taking the chance of the historical separation of service and bearer network during the telecom development, and lead the service environment by controlling the content provisioning.

The carrier-dominated telecom VASs and the SP-dominated and Content Provider (CP)-dominated Internet services are converged and extended to each other, the increase and decrease of the competitive edge determine the future development of telecom services. The core competitive edge for the telecom operation relies on the control of the service environment. The domination and control of new services become the competition focus of the future telecom development.

IP Multimedia Subsystem (IMS) is a full IP solution for the service access and management control in the future full IP network environment for the telecom industry. The principle of IMS is to add a carrier-controlled service control plane in the transparent full IP network environment to ensure that the carriers maintain a dominant position in the telecom service development in the future. IMS has been widely supported by standardization organizations such as 3GPP2, ETSI and ITU-T and telecom carriers and device vendors in the world since it was put forward in 3GPP R5. The IMS-based telecom target network architecture will become the mainstream

telecom network in the future.

However, it must be seen that the current position of IMS is not stable, and it faces the stiff competition from Internet technologies. Telecom carriers in the world are focusing on how to launch a variety of new service applications rapidly based on the IMS architecture and how to retain telecom subscribers. The future development of IMS directly determines the increase and decrease of the competition between the telecom network and the Internet in the full IP environment.

This article analyzes and summarizes the current development of the IMS services and the relationship between Service Delivery Environment (SDE) and the IMS development. It also discusses the concept of the next generation of Converged Service Network(CSN)put forward by ZTE Corporation based on the understanding of the future service network development.

1 IMS Service Development Status

Although IMS has made remarkable progress in a series of experiments and trials since 2006, the IMS-centric telecom target network architecture still lacks the actual verification of large-scale deployment in the existing networks and faces the stiff completion from Internet technologies. We discussed in an article in 2005 that the weakest point of IMS is that it always lacks attractive, characteristic services, and the existing service platforms/engines do not have the market dynamics for the migration to IMS, resulting in uncertainty in the future IMS development.

The obvious weak point makes IMS face the similar mess that the Parlay/OSA service architecture was facing several years ago. That is, although the IMS-based service architecture has a series of advantages, none of the carries' profitable services is IMS-based. The carriers use other service platforms/engines such as Intelligent Network (IN), SMS, WAP and streaming media, and they have invested a lot in construction. So why should we abandon the mature service platforms, which have already been commercially used, and move the services to the IMS basis without scale verification? This makes IMS lack the drive for large-scale market deployment. The carriers will still see the coexistence of IMS services and non-IMS services for a long time because of this situation even if IMS is deployed on a large scale[2].

There are always suspicions to the support of the basic Session Initiation Protocol (SIP), which is used for IMS, for the services. Some experts pointed out in 2006 that SIP is only to establish and disconnect "sessions" but provides few management for the ongoing session process. But unstable network connection during movement is exactly a characteristic of wireless communication, so continuous management and monitoring of the session process are required. And they concluded that SIP is not suitable for wireless communication. Meanwhile, the obvious reality is that, SIP is only applied to a small proportion of services, no matter if they are telecom services or Internet applications. SIP is far from being the mainstream protocol for the services/applications. Therefore, the process for the services/applications to move in to the IMS platform can be depicted as a process of changing non-SIP applications to SIP applications at the bottom layer, where the workload is very large (especially the workload of service standardization).

This weak point becomes clearer in 2006 and 2007. Since the tendency of large-scale movement of the existing telecom service platforms/engines to IMS never appears, we have to consider such a problem for the IMS even in the trial network deployment: how to allow the IMS terminal users to still use the non-SIP applications to which they are accustomed? From another point of view, if the deployed IMS solution cannot control the non-SIP applications, which are in greater proportion to the carrier network traffic flow, the carriers will not be able to avoid becoming channel providers in the future, and the basic value for the existence of IMS will disappear.

To solve this urgent problem, a new thinking has gradually emerged since the past year, that is, if the existing non-SIP applications cannot be changed to SIP applications, we need to extend the existing IMS service architecture itself so that it can also manage and control both non-SIP and non-IMS application based on the SIP application management and control[3]. New development tendency emerges with the new thinking—establish an open and converged SDE on the basis of IMS and realize the unified management, control and provisioning of non-SIP and non-IMS services, and thus meet the requirement for the development of the

next generation services[4].

2 IMS and SDE

SDE is an extension on the basis of Service Delivery Platform (SDP). SDP itself is not a new concept, generally it is regarded as a multi-component platform, which is used to reduce the time from service development to provisioning to the users, reduce operation and maintenance costs and lower the risk of service development. On the one hand, SDP forms a full open-standard management system for the fast development, provisioning, running, management and billing of VASs. On the other hand, SDP can be closely integrated with carriers' IT infrastructure and maximizes the utilization of resources of the Operation Support System (OSS) portal server. The SDP technology is still being explored and there is no uniform opinion for the architecture of SDP. Different device vendors had their own understanding and product solutions over the past years. SDP has also been used to provide telecom services, such as Local Number Portability, Prepaid Service and 800 Service, for some carriers as a common service architecture.

SDE is extended based on the SDP platform. According to the definition of the Current Analysis consultation company, SDE is a common architecture for managing and controlling both IMS service applications and non-IMS service applications (such as Web applications and IN services). It combines IMS's advantages with SDP and has the following features:

- SDE is a mechanism for promoting the conversion of carrier's service network layers from vertical to horizontal. It allows services to be fast provided and retired, enables network resources to be reused, and makes it easier to develop and provide user-centric customized services.
- SDE can take full advantage of the service mechanism provided by the IMS system, and integrates with IMS seamlessly. As viewed from the IMS architecture, SDE is an extension of IMS at the service layer.
- SDE allows other mainstream service applications (e.g., IPTV) to be in the unified service framework with IMS services. With SDE, service capabilities (such as status presentation, mobility management, and policy management) provided by IMS can be interacted with the services in the non-SIP/IMS domain, thus promoting the commercial deployment of IMS services.
- SDE allows the introduction of third-party service applications, and even the introduction of Internet-based service applications through gateway, thus bringing telecom users more service experiences and promoting carriers' competitive edge in the service market.

Figure 1 shows a typical SDE architecture[5].

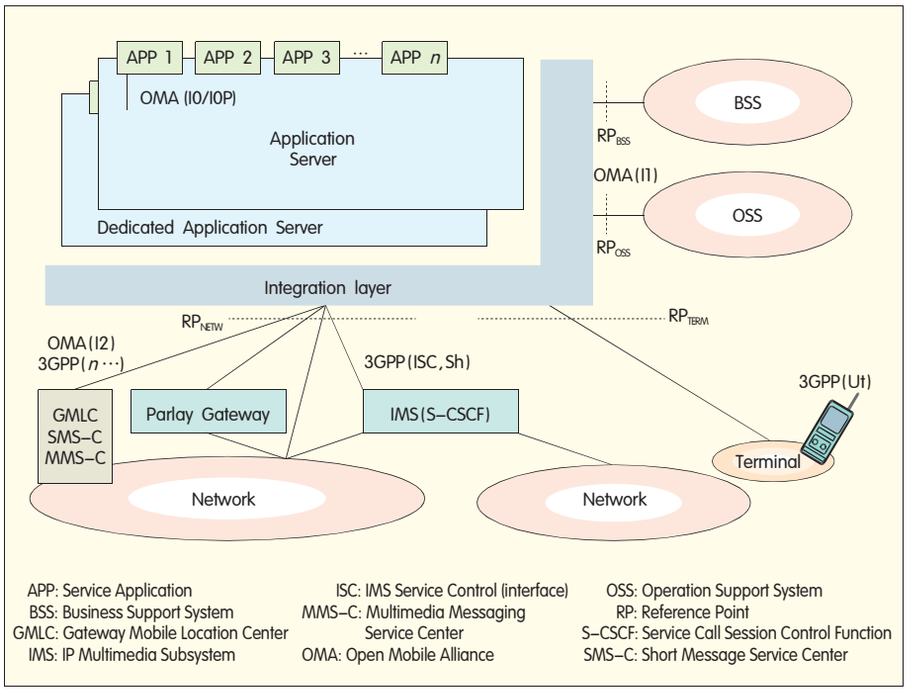
3 Concept of Converged Service Network

In conclusion, the SDP service platform is evolving into a more convergent and open SDE service environment on the way to the commercial use of IMS services, and will become the mainstream next generation Telecom Service Network. In this situation, ZTE puts forward the concept of CSN to satisfy the requirement of service network development for telecom carriers.

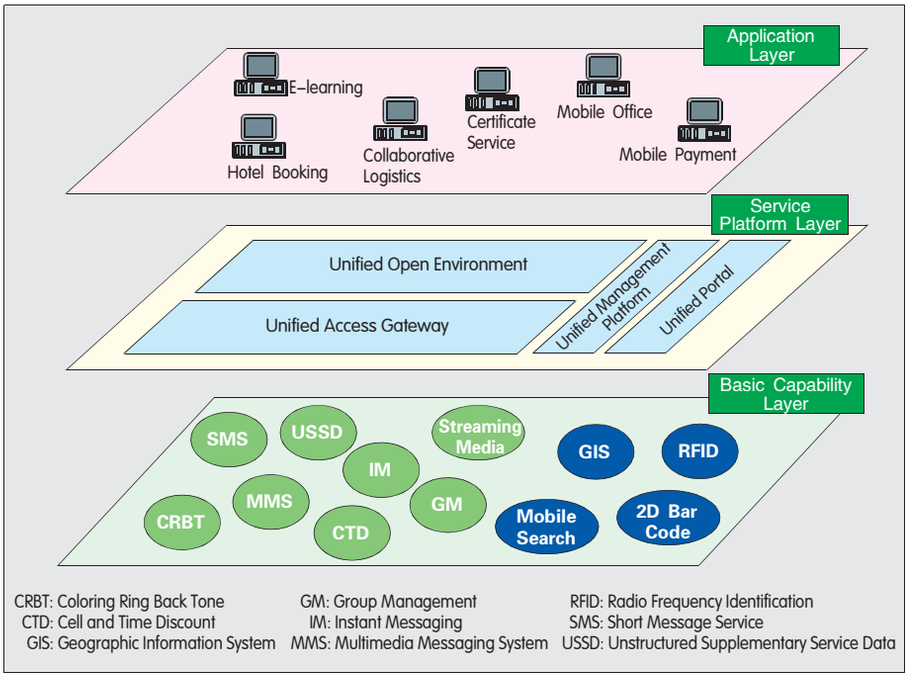
CSN is put forward to adapt to the convergence of network and technology and meet the requirement for carrier transformation. It realizes the unification of data, service, capability and management by integrating various network service capabilities, thus enabling the fast provisioning of various VASs and helping the carriers maintain their dominant positions in the value chain. Figure 2 illustrates its conceptual layers.

In this figure, the CSN basic function layer realizes the general separation of service capabilities from applications and introduces third-party service capabilities through open interfaces. Meanwhile, it can take full advantage of the service capabilities provided by the IMS system.

The unified access gateway at the service platform layer realizes unified service capability operation by combining and reusing service capabilities. It also inhibits network complexity, allowing deployment to be independent of network. The unified open environment provides an environment for simple and fast service development and test. It also realizes unified service registration and discovery mechanism. The unified portal provides one-stop experience through unified access authentication. The unified management platform realizes unified service



▲Figure 1. International typical SDE architecture.



▲Figure 2. CSN conceptual layers.

management, operation and monitoring, service network self-adaptation, and unified content management.

The application layer introduces third-party service applications. It creates a persistent, well-circulated service environment through the convergence and derivation of capabilities and resources.

CSN is a full-network solution designed on the basis of horizontal architecture and Service-Oriented Architecture (SOA). It is designed to provide a service environment system (i.e., NGSE) suitable for user, CP, SP, carrier, and device vendor. It takes advantages of the telecom network, which allows management, operation, and QoS assurance. Based on the experience of success in IT and the Internet, it abstracts user, service, content and terminal as objects, and manages services and resources on network nodes through inheritance and derivation.

It allows the service network to be developed into a system integrating communication, recreation, coordination, information and media functions through opening and innovation.

CSN can solve five key problems:

(1) Capability layering and multiplexing-changing from vertical to horizontal architecture

Traditional networks are in a "vertical well" architecture, in which specific services are implemented through specific networks and solutions. These solutions use close coupling, providing low efficiency, multiplexing and sharing, with few varieties of service provisioning capabilities and slow construction, requiring reconstruction, which is not economical. The CSN uses a horizontal architecture, in which different layers are coupled loosely. Each layer is in a SOA architecture, providing high efficiency, high multiplexing, high sharing, high service provisioning capability, high speed and economy.

(2) Service capability opening and convergence

At present, services are provided by solution/device vendors, so it is a difficulty to provide various, customized services rapidly. Carriers integrate and open various telecom capabilities and screen network complexity, which attracts and enables more partners to develop various applications as general IT services. This allows the carriers to be transformed into information service providers.

(3) Unified management

The existing systems are independent and difficult to be connected with each other. It is hard for the carriers to perform unified marketing and management or utilize their overall advantages. Unified management and service, including user management, content management, CP/SP management, service management, system management and authentication and accounting, are the main features of the next generation services.

(4) Service adaptation and negotiation

Service adaptation and negotiation include user and terminal specific adaptation, service interworking, service continuation, service change, and service conflict negotiation.

(5) Data integration and unification

User, network and service data represent one of the core competitive edges of the carriers. Various data scatter in different systems and are hard to be shared. Unified data integration and access will provide a greater value. Data integration does not mean placing data together uniformly.

As viewed from the carriers, CSN is an innovation, which creates a more concordant Next Generation Service Environment (NGSE). It provides a reliable, manageable and controllable service capability convergence platform with point-to-point QoS assurance for the carriers and their partners. CSN is an open system that can maximize the utilization of the services and resources of the existing networks, greatly accelerating the service development and shortening the service deployment cycle. Its service-oriented architecture and service reuse mechanism minimize the carriers' reconstruction and investment, and lower the complexity of networking and maintenance. It can help the carriers realize the transform from channel provides to service capability operators, thus maintaining their dominant positions in the value chain.

As for the end users, CSN allows them to enjoy custom services related to the property labels, including user account, location, status, preference and shared content, and more convenient uniform experience. For example, users can look for the handy cooperative partners for urgent work communication, get discount information of their preferred brands and order products in time,

combine the columns from various electronic media, customize and push user–preferred electronic newspapers, create their own recreation content and provide it to other users, and share profits with carriers.

4 Conclusions

The Telecom Service Network faces convergence and severe competition from the Internet along with the telecom network broadband and full IP evolution. The current development of IMS services requires the extension of the old IMS service architecture so that it can manage and control non–SIP and non–IMS applications based on the management and control of SIP applications. In the process of promoting the commercial user of IMS services, the SDP is evolving into a more convergent and open SDE and will become the mainstream of the next generation Telecom Service Network.

ZTE's CSN concept is put forward to adapt to the convergence of network and technology and to meet the requirement for carrier transformation. It realizes the unification of data, service, capability and management by integrating various network service capabilities, thus enabling the fast provisioning of various VASs, helping the carriers to maintain their dominant positions in the value chain, and greatly satisfying telecom carriers' requirement for service network development.

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Biographies

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Dong Zhenjiang received his master's degree from Harbin Institute of Technology. He is the vice president for planning at the Communication Services R&D Institute of ZTE Corporation, and the Service Group leader of the company's Technical Expert Committee. He has been engaged in the development, design and planning of switch and IN products, including SDP, P2P, service engine, 3G services and ICT. He participated in and was responsible for many technical tasks sponsored by the National Development and Reformation Commission of China. He has published many articles about value–added services.

Roundup

ZTE "Talks to the Future" with Comprehensive Telecom Solutions Display at GSMA Mobile Asia Congress 2008

ZTE Corporation showcased a comprehensive range of its latest product portfolio at GSMA Mobile Asia Congress 2008 held November 18–20, 2008 in Macau, P. R. China.

Emphasizing its leading position in providing advanced and high quality products and solutions for the global communications industry to meet customers' needs, ZTE adopted an event theme of "Talking to the Future", and showcased the following products and solutions:

- Wireless Business: A comprehensive product portfolio including GSM, CDMA, WCDMA, WiMAX, LTE and TD–SCDMA solutions and products;
- Femtocell: Sophisticated ZTE's Femtocell's coverage solutions, as well as HOME NODE B base station;
- Converged RAN: Unified platform for multi–standard base stations based on SDR technology architecture uTCA, as well as SDR–BBU+RPU solutions;
- LTE: Update on the progress of LTE as well as display T2R2 LTE RU solutions;
- Core Networks: Key products that highlight the advanced core network solutions;
- Business Platform: System–wide, all–business solutions and open architecture, including ZTE's ANYSERVICE Solutions;
- Handset Business: Several types of 3G handset, such as GSM, WCDMA and TD–SCDMA;
- TD–SCDMA products and solutions: A series of TD–SCDMA innovative solutions at the TD–SCDMA Industry Alliance (TDIA) and latest TD–SCDMA terminals.

"Today, we are pleased to demonstrate our latest technology achievements by displaying a comprehensive range of products and solutions at GSMA Mobile Asia Congress 2008. This year, we are again highlighting our distinguishing capabilities and strengths over the competition to offer customers the best–in–class and cost effective product portfolio. We establish solid partnership with our global customers, creating a win–win business situation for the benefit of the entire telecom industry. We are committed to continue providing advanced products and solutions to help the industry smoothly migrate to next generation communications era," said Xu Ming, Vice President, Marketing System of ZTE Corporation.

To share its viewpoints on the current telecom landscape and where it will be heading to over the next few years, ZTE's senior executives delivered presentations to provide their insights on Next Generation Mobile Networks (NGMN) and TD–SCDMA industry developments.