Special Issue on Core Network Products

The Development of Core Networks in the New Era

—An Interview with Mr. Xu Ziyang, General Manager of Core Network Products of ZTE Corporation
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ZTE Trials IMS with Orange Poland

The IMS network trial can interoperate with legacy GSM and PSTN networks and a newly constructed CDMA2000 1X network via the MGCF and IM-MGW.

ZTE Records Sterling GSM Volume Shipment in Q1 2008

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ZTE Records Sterling GSM Volume Shipment in Q1 2008

Sales grew by 100% over same period last year

ZTE announced that volume shipment in Q1 2008 of its GSM products grew by 100% compared to the same period last year, sustaining a strong growth momentum and within the company’s annual sales target.

The impressive record is attributed to the continuous robustness and expansion of the international GSM market, which the company took advantage of by launching several GSM product marketing campaigns in Asia Pacific. The strategy paid off allowing ZTE to clinch a number of multi-million deals, especially for its service equipment products.

“It is indeed another significant record for us to register 100% shipment for our GSM products in Q1 this year, which is in line with our aggressive campaign to get a solid foothold of the global GSM market,” said Mr. He Zhaogang, General Manager of ZTE GSM products. “With our commitment to developing and introducing new technology innovation equipped with outstanding capabilities and functionality over available products in the market, we managed to maintain an excellent track record and affirmed our market position as one of the top players in the global GSM arena.”

ZTE to Build Zapp’s 3G Network in Romania

ZTE reinforces European market position by helping Romanian operator to roll-out 3G network and replace existing CDMA infrastructure

ZTE announced it has been selected by Zapp, Romania’s fourth largest mobile operator, to roll-out a WCDMA/HSDPA commercial network. This deal further reinforces ZTE’s position in Europe. Zapp plans on launching its 3G commercial services in early autumn 2008 and the network should be completed by 2011.

The WCDMA/HSDPA equipment provided by ZTE is compatible with Zapp’s existing network and will be used to build a network running over the 2100 MHz frequency and that will be fully dedicated to data services. This network will enhance the quality and speed of services offered by Zapp by increasing the transfer rate from 2.4 Mbps to up to 7.2 Mbps.

ZTE Hosts TISPAN#17bis Meeting in Beijing

ZTE successfully hosted the TISPAN#17bis meeting in Beijing from May 26th to 30th, 2008. The Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN) is a standardization body of ETSI, specializing in fixed networks and Internet convergence. It plays an important role in the standardization work on service requirements, core network architecture, RACS and IPTV.

This is the first TISPAN meeting held in the country of Asia, aiming to expand its influence and cooperation in the regions outside Europe. As a member of ETSI, ZTE has long been participating in the TISPAN activities. The hosting of this meeting is an evidence of ZTE’s active cooperation with advanced international standardization organizations and its contribution to the standardization work.

During the meeting, ZTE and TISPAN jointly held a workshop to discuss NGN technologies, services and standardization issues. In the workshop, 10 participants representing ETSI, network operators, equipment vendors and research institutions from China, Europe and Japan delivered keynote addresses. The representative from ZTE made a speech titled “ZTE Involvement in NGN”.

(ZTE Corporation)
ZTE Showed off Its BSS/OSS Solutions

ZTE announced its participation in the 8th Annual Asia-Pacific Billing & Revenue Assurance Conference in Singapore from May 12th to 15th 2008 to deliver a keynote on its latest ZSmart operations and business support solutions and share the latest Business Support Systems/Operations Support Systems (BSS/OSS) technology with key industry players.

Now running on its seventh year, the Annual Asia-Pacific Billing & Revenue Assurance Conference has become the largest and most influential BSS/OSS event in Asia-Pacific. With a theme “We Do the Billing Smart”, this year’s conference aims at enhancing business relationships among global telecom operators in order to develop tailored-made BSS/OSS solutions.

On May 12, Mr. Yong Zhou, Director of Global Marketing, ZTEsoft, shared his insights on how OSS/BSS solutions are playing a significant role in the telecom industry, and discussed how ZTE’s end-to-end convergent operations and business support solutions are helping operators provide time-to-market services while reducing investment costs, and hence obtaining true service convergence.

“With today’s complex service offering environment, an efficient business operation support system is critical for operators in order to keep pace with the competition. A precise business operating procedure, together with the underlying support system that enhances the method is key in fulfilling the whole business model,” said Mr. Zhou. “Built on unified platform architecture, the ZSmart suite has rich business service components, including extended service function packages for different networks and services, which can be assembled flexibly to provide diversified solutions for different subscribers, various networks and telecom operators of different sizes.”

(ZTE Corporation)

ZTE Unveils Industry’s First IMS System with Convergent BSS/OSS in France

ZTE demonstrated the industry’s first operational end-to-end IP Multimedia Subsystem (IMS) with convergent BSS/OSS at the Management World 2008, an annual global event targeted for the Management of Information, Communications, and Entertainment Services sector organized by TeleManagement Forum (TM Forum) in Nice, France from May 20th to 22nd, 2008.

ZTE has been conducting a series of testing to enhance its IMS offering. Last year, it successfully participated and completed Phase I of “Seamless OSS/BSS for IMS services” in Dallas, and demonstrated the integration of its IMS products with TM Forum’s New Generation Operations Systems and Software (NGOSS) framework—the first time in the industry that an IMS platform was seamlessly integrated with NGOSS framework. This year, ZTE is continuing Phase II of the integration initiative to further demonstrate the comprehensive multi-service convergence of IMS services.

ZTE’s end-to-end IMS system comprises IMS client/terminal, access network, unified core network, universal service platform, and convergent BSS/OSS system. It provides full operational IMS and Fixed Mobile Convergence (FMC) services support, across fixed-line phone, mobile phone and laptops, including IMS services deployment, provisioning, billing, as well as both online and offline charging. Some typical IMS services can also be performed including Instant Messaging (IM), Presence (PS), Video Telephony (VT) and Dynamic Address Book (DAB).

(ZTE Corporation)
India’s Unitech Gears Up for Telecom  
June 2, 2008

Unitech, an Indian real estate firm that was granted nationwide telecom licenses in January, has kick-started the process of creating a telecom unit now that it’s receiving wireless spectrum from the government.

Unitech has poached Rohit Chandra from regional operator Aircel Ltd., where he was executive director, and put him in charge of the new business as its CEO. The company said in a statement that Chandra will “be responsible for providing strategic direction and operational focus to Unitech’s telecom operations,” which he’ll help set up.

Ashok Sud, previously president of regulatory and corporate affairs at Tata Teleservices Ltd., is also coming on board as president of corporate affairs. (www.unstrung.com)

485m to Receive Mobile TV by 2013  
June 4, 2008

The number of people receiving Mobile TV will reach 485 million by 2013 according to predictions made by Cantab Wireless.

The new analyst report published by Cantab Wireless argues that subscriber growth is anticipated to be strongest in Asia at first, especially in Korea and Japan. From 2010 onwards, Europe and the USA are expected to catch up. Especially in Europe the shortage of radio spectrum before the analogue TV networks shutdown may delay the launch of mobile TV networks in some countries, most importantly in the UK. Also, from 2012 to 2013 onwards, cellular operators may start providing mobile TV services via their upgraded 3.9G/4G networks, which will offer greatly increased capacity. They will become serious competitors to broadcast TV systems. (www.totaltele.com)

Influence of Telecom Restructuring in China’s Telecom Market  
June 5, 2008

On May 24, 2008, a telecom-restructuring plan was decided, triggering a new round of discussions in a telecom industry. In accordance with the restructuring plan, China Telecom would purchase the CDMA network (both assets and subscribers) of China Unicom; China Unicom would be merged with China Netcom; the fundamental telecom service of China Satcom would be merged into the business of China Telecom; and China Railcom would be merged into China Mobile. After the restructuring, three major operators, namely China Unicom, China Mobile and China Telecom, would come into being, and this will influence China’s telecom market as follows: A “three-way struggle for hegemony” will be formed in the next 2-3 years; telecom restructuring will bring huge market opportunities to communications equipment manufacturers; telecom restructuring will accelerate the all-round upgrade of telecom operation support systems. (www.cn-c114.net)

China Mobile Subscribers Break 400m Mark  
June 23, 2008

The number of China Mobile’s subscribers increased 7.491 million in May to reach an all-time high of 407 million.

In contrast, China’s leading fixed-line operator, China Telecom, suffered a net subscriber loss of 820,000 in May, which was also the 10th consecutive month of net subscriber lose, according to monthly industrial figures. By the end of May, China Telecom’s total subscribers stood at 215 million.

China carried out a massive scheme in May to restructure its telecommunications sector, which involves the country’s top five telecom companies, all state-owned, including mobile operators China Mobile and China Unicom, and fixed-line service providers China Tietong, China Telecom and China Netcom. They will be restructured into three groups, each able to provide both mobile and fixed-line services. It has been widely speculated that China will issue three licenses for 3G following the telecom reshuffle. (www.telecomasia.net)
Recently, the world-famous telecom consulting company Ovum describes in their two consulting reports why the online convergent billing system is the trend of the next generation network billing solutions from multiple aspects such as cost reduction, quick market reaction, and network and business convergence. They also say ZTE’s ZSmart OCS products are in a good position.

Ovum makes complete market analysis on real-time online convergent billing in one of the two reports. In the opinion of Ovum, service providers and telecoms vendors today vary in their strategies and construction approaches to next-generation networks. It is important that they not only focus on the service and technology aspects, but also address the subscriber and business concerns. A real-time convergent charging solution provides new business drivers for services and significantly enhances flexibility in pricing plans. The report also describes Ovum’s advantages from so many aspects as operation cost, user experience and multi-service convergence and future market opportunities, and raises many application cases of ZTE’s ZSmart OCS products in Singapore, Vietnam, India, China and etc.

The other report focuses on the application cases of ZTE’s ZSmart OCS products in China Telecom. The report says that ZTE has worked with China Telecom in OCS for a long time, and ranked first in the OCS comprehensive test organized by China Telecom. In international markets, ZTE’s ZSmart OCS products also receive widespread attention and recognition in the industry.

In the end, Ovum says that successful commercial cases in China Telecom lay the basis for ZTE in the global OCS markets, and ZTE’s ZSmart OCS is in a good position.

It is reported that ZTE’s ZSmart BSS/OSS solutions, which have been deployed for carriers in more than 30 countries and regions and are serving more than 150 million end users, remain a rapid growth rate over 50% annually.

"Chinese equipment vendor ZTE is in a good position to benefit from the sale of OCS solutions, based on its work with early adopter China Telecom.

With this opportunity in the OCS market, ZTE, after successfully demonstrating its capability with China Telecom, now has a strong reference case by which to make its presence felt."

(Source: Ovum)
The Development of Core Networks in the New Era

—An Interview with Mr. Xu Ziyang, General Manager of Core Network Products of ZTE Corporation

ZTE launched a new product line in 2007—core network product line, which is another initiative to integrate product lines to meet customer needs as well as technology and market trends. What drives ZTE to restructure its core network product line? What kind of opportunities and challenges will core networks have in the new era of telecommunication industry? In order to answer these questions, the journalist of ZTE TECHNOLOGIES interviewed Mr. Xu Ziyang, General Manager of Core Network Products of ZTE Corporation.

Mr. Xu Ziyang, General Manager of Core Network Products of ZTE Corporation, has long been engaged in the research and development of software for mobile Softswitch support system since he joined ZTE in 1998. He was appointed as Director of GSM Software Development Department, Vice General Manager of UMTS Core Network Products, and General Manager of Core Network Products, and has gained rich experience in the research, development and marketing of core network products.
Journalist: Could you tell us about the development of core networks in 2007 and the future development plan?

Xu Ziyang: ZTE’s core network product line includes fixed core network, mobile core network, IP Multimedia Subsystem (IMS), and so on. It belongs to the wireless product family, which grew by 61% in 2007 and is expected to be among the top three in the world by 2010. In order to fulfill the ambitious target, it must achieve over 50% growth annually, which is a huge challenge.

In 2008, the domestic 3G market enters a new era. According to our business plan of 2008-2009, the domestic 3G market and overseas market will run neck and neck. The former is the last battlefield to conquer in China and we are sure to win, while the latter will contribute over 70% during 2009-2010. As China is rising rapidly, we benefit to grow remarkably in the international arena by making our way to become the leading player.

J: We have heard about the integration of the core network product line in 2007, which integrates the core networks from different product lines into one line. Can you share the background of this event?

Xu Ziyang: We were motivated to integrate core networks by three elements: the intrinsic development trend of core network technology, the demand of users, and the competition of operators.

From the development perspective, there are two key words which can summarize the technology of core networks in the 1980s and 1990s: Time-Division Multiplexing (TDM) and narrowband. During this period, the development pattern was fragmented because all the networks were separated from one another and each network could only deliver one single service. In addition, the data structure was narrowband and users had to pay a high price. The modern core networks, by contrast, obviously show the trend toward IP and broadband connectivity. Fixed networks evolve from TDM to NGN Softswitch and the fixed data are transmitted over broadband instead of narrowband. Mobile networks evolve from TDM to mobile Softswitch and the mobile data are transmitted at the high speed of WiMAX and HSPA instead of the low speed of GPRS and CDMA. Therefore, we are now at the transitional phase from TDM to IP in technology and we have already achieved 70% to 80% of transformation. All the networks are the convergence of IP and broadband, and the network architecture tends to be the same. IMS is widely accepted in the industry as the future development of core networks, but it only tells us what the future network is about, without telling us how to transform from TDM to IP networks and how the operators can migrate their IP networks to IMS at present. As a result, operators are confused. Although the roadmap of core networks evolving from TDM to IP and then to IMS is quite clear, the future operation and maintenance are not well defined. Therefore, we hope to provide operators with complete solutions for evolution from the mixed TDM and IP networks to all IP networks, and finally to IMS networks through the integration of the production line.

From the users’ perspective, low price is an important demand. In order to get a low price, government must encourage operators to compete with one another to attract users. The market has so many operators that there is a problem for users to get access. Users hope to use the same account number to access various services offered by different operators, so the networks must be converged. The key to the core network is to allow the convergence of control equipment, in particular the user data equipment.

From the operators’ perspective, the competition between them is fiercer and the pressure to survive is higher. Traditional fixed network operators are badly in need of expanding mobile subscriber base while mobile operators hope to develop broadband data services. They hope that the existing and future networks will be converged into an operable network that can offer various accesses and help them achieve smooth evolution to IMS networks.

Driven by the above-mentioned three factors, we finished the integration of core network product line in 2007. The integration enhances our ability to deliver total solutions to operators and accelerates our reaction to their customization demands.

J: After the integration is complete, what are the strengths of ZTE’s core networks?

Xu Ziyang: The highlight of core networks is the integrated multi-access solution. All the core network products are based on the same hardware platform with the same support protocols and software at the bottom layer, but the single difference lies in the application software at the upper layer. Hence, ZTE’s core networks are able to provide integrated...
access to both wireless and wireline services. Our Home Location Register (HLR) equipment can support fixed, mobile and packet services, so users complete their authentications in one HLR, which greatly helps operators implement unified user management.

Apart from that, we are dedicated to the packet data services in the future. At present, we have finished integrating all access modes in a single set of equipment, so both broadband or narrowband services can be accessible at one point. How can a single access point benefits operators? In fact, operators can filter the 7-layer protocols in user profile to find out details on traffic content so that they can implement the content-based billing. Now we can provide high-speed multiple access to packet data services and deliver customer-made solutions, which helps us stand out.

ZTE is the only core network supplier in the world that delivers the solutions supporting fixed and mobile network systems. This is a differentiated advantage of our core network products. The solutions cater for the needs of both fixed and mobile operators. Thanks to the all-inclusive network solutions, ZTE can better understand the networks of operators, provide greater customization capability and faster reaction, thus helping operators smoothly evolve their existing networks to targeted networks and implement unified network management.

J: As they are facing more pressure in competition, operators are paying increasing attention to the Total Cost of Ownership (TCO). What solution does ZTE provide to reduce TCO?

Xu Ziyang: We promise to reduce TCO in the following perspectives. When designing the network, we consider the structure of operators’ targeted network in the next two or three years. Therefore, we make sure that their current investment will be continuously guaranteed in the future; when configuring the equipment, we also take into consideration the smooth evolution of hardware, so that future operators can protect their initial investment by upgrading software when they want to transform the networks; during the network operation, we propose the concept of centralized operation and maintenance of local networks which are featured by regional operation, flat structure and centralized maintenance, so we make it much easier for operators to manage the networks; when the networks are being operated, our license can be easily transferred from one network to another. For instance, operators can get access to a CDMA network while they used to access WCDMA network; we offer intelligent power technology that enables CPU to run at low power consumption when the network load is small; and in addition to reducing expenditure, we also manage to increase revenue for operators by adding feature-rich services through the core networks to attract subscribers. So far, we have succeeded in implementing unified management of mobile users, packet users and fixed-line users on one database, which will enable the operators to execute unified accounting in the future.

J: ZTE put forward the CORE\(^2\) concept in its core network product line. Can you explain its essence to us?

Xu Ziyang: ZTE put forward the CORE\(^2\) concept based on its understanding of core networks. “C” refers to convergence, the developing trend of the industry. The intrinsic technology of core network, the demands of users and the competition among operators all lead to the convergence of networks. “O” refers to openness, the basic requirement for the evolution of core networks. Operators attach great importance to the open network standards.
In response, we endeavor to promote the open standards by adopting the universal hardware platform and offering generic subscriber profile. “R” refers to reliability, the key requirement for core networks. In order to achieve stability of the core networks, we must develop the equipment of high reliability and provide a complete local support service. “E” refers to efficiency. The biggest problem for operators to implement network transformation is to reduce Capital Expenditure (CAPEX) and Operational Expenditure (OPEX). Efficiency manifests itself in our service provisioning capability and our concern to reduce CAPEX and OPEX for operators. At present, operators’ CAPEX is not very high, so we should focus on reducing OPEX. For this reason, we launched the “Green Sunshine Initiative” for the core networks to solve the following problems for operators in their long-term operation. The first problem is to reduce power consumption in the equipment room, and we put forward an energy saving solution. The second problem is to have a shared channel after we adopt all-IP network, and we provide various solutions to channel sharing. The third problem is to reduce footprints of the equipment, and we develop the switch with the size less than one tenth of the original one, which greatly saves the floor space.

The four letters above, CORE, show how ZTE comprehends the core networks. If the four key elements are fulfilled, operators can have a highly efficient and reliable network that supports sustainable operation and conforms to the evolution trend.

J: Today terminals are evolving from traditional voice terminals to multimedia and intelligent terminals. What requirements does such an evolution have for the core networks?

Xu Ziyang: Nowadays there are two existing evolutionary trends of terminals: multi-access terminals and intelligent terminals. The former includes CDMA/GSM dual-mode handsets. In fact, operators show more concern about the conventional access mode assisted by broadband access. The multi-access mode exerts more influence on operators in building core networks. All traffic flows accessed by users are converged at the core network that can direct which service platform the flows will go to. In this case, we must figure out which mode we can use to build the network so as to meet different needs of operators. The network of China Telecom, for example, can be accessed via the conventional R4 network or the IMS network. We select networks based on detailed analysis of operators’ circumstances and we are good at doing it.

The other trend is intelligent terminals that have some powerful service capabilities. As terminals are more and more powerful, some services previously handled by the core network are now gradually transferred to terminals for handling. The most typical case is that calls will be originated and terminated at the terminals through the SIP protocol when the evolution to IMS network is finished. So, the core network merely controls users, which leads to the separation of service control logic and user control. The service control part will be gradually transferred to the terminals and service platforms. Hence, the core network acts as a “dumb terminal” that is simply responsible for setting up a connection path.

J: Operators tend to operate all services. How can this tendency challenge core networks?

Xu Ziyang: The reason why operators tend to operate all services is intense competition. Due to the subscribers’ potential requirement for tariff reduction, operators consider deploying all services to attract more subscribers. When operators are fighting for market share, various demands arise. For example, fixed network operators are considering how to leverage their broadband advantages by combining mobile and broadband networks; mobile operators are considering how to offer users fixed-line access through the Wireless Local Loop (WLL) and wireless packet data network; and emerging operators are considering how to build an advanced network. Since operators have different market positioning, their requirements are different. Our core network product line must provide differentiated solutions accordingly. Admittedly, transformation is a double-blade sword for operators, which means that you can attract subscribers as well as lose them. But if you don’t transform, you will certainly be driven out of the market. Therefore, operators are under huge pressure and they need to work with equipment suppliers to deliver custom-made solutions. We think that the biggest challenge for operators is how to leverage their own advantages in the process of transformation, and we are poised to help them overcome it.
Project Overview

As a leading global provider of end-to-end IMS products and solutions, ZTE deployed an IMS trial network for PTK Centertel, Orange Poland in December 2007. This is the first IMS network in the world that is based on the EV-DO Rev.A technology.

PTK Centertel is the No. 1 mobile operator in Poland marketed under the Orange brand. Orange Poland operates basic mobile voice and value-added services, such as data, multimedia services, mobile TV, etc.

In order to save frequency resource, Orange Poland plans to use the CDMA2000 1x EV-DO technology and deliver both high-speed data and VoIP services over the 450 MHz radio spectrum. Under this background, ZTE proposed its IMS-based VoIP solution.

Network architecture

ZTE provides an end-to-end IMS solution in this network trial. Its architecture is divided into four layers: access layer, bearer layer, control layer and service layer, as shown in Figure 1. The four layers are in full compliance with the design principle of IMS.

- The access layer supports the CDMA2000 1x EV-DO technology.
- The bearer layer, comprised of Packet Data Serving Node (PDSN), Media Gateway (MGW), Multimedia Resource Function Processor (MRFP), switches and routers, is responsible for transferring VoIP related signals and media.
- As the core IMS equipment, ZXUN

Figure 1  Architecture of the IMS network trial
Call Session Control Function (CSCF) is responsible for session control, service triggering, and provision of unified IMS Service Control (ISC) interface for the upper service layer. ZXUN Home Subscriber Server (HSS) acts as the subscriber database.

The service layer offers VoIP and supplementary services.

Network interoperation
As Orange Poland operates GSM, WCDMA and PSTN networks, the interoperability of a newly deployed IMS network becomes its major concern.

The IMS network trial can interoperate with legacy GSM and PSTN networks and a newly constructed CDMA2000 1X network via the Media Gateway Control Function (MGCF) and IM Media Gateway (IM-MGW). The MGCF controls the media channel connection of IM-MGW, the selection of the corresponding CSCF for incoming calls from the legacy circuit switched (CS) network, and the signal conversion between the ISUP of legacy CS network and the SIP of IMS network.

Considering the impact on the current network, the IM-MGW is configured at the border between IMS and the CS domain. The Signaling Gateway (SGW) responsible for signal protocol conversion between SS7 and SIP is integrated with the IM-MGW. Therefore, only the IM-MGW is physically connected with the CS domain and it can complete interoperation with the media plane under the control of the MGCF through H.248 protocol.

Services provided
In the IMS network trial, the Supplementary Service Server (ZXUN SSS) is responsible for providing all the services including VoIP and supplementary services, as listed in Table 1.

Table 1  Services provided by the IMS network trial

<table>
<thead>
<tr>
<th>Basic Services</th>
<th>Voice telephony service</th>
<th>Video telephony service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementary Services</td>
<td>Calling Line Identity Presentation (CLIP)</td>
<td>Calling Line Identity Restriction (CLIR)</td>
</tr>
<tr>
<td></td>
<td>Calling Forwarding Unconditional (CFU)</td>
<td>Call Forwarding Busy (CFB)</td>
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<tr>
<td></td>
<td>Call Forwarding on No Reply (CFNRy)</td>
<td>Call Forwarding on mobile subscriber Not Reachable (CFNRc)</td>
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<td></td>
<td>Call Waiting (CW)</td>
<td>Call Hold (HOLD)</td>
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<td></td>
<td>Outgoing Call Barring (OCB)</td>
<td>Incoming Call Barring (ICB)</td>
</tr>
<tr>
<td></td>
<td>Multi Party Service (MPTY)</td>
<td>Anonymous Call Rejection (ACR)</td>
</tr>
</tbody>
</table>

Intelligent terminal
Terminals play a key role in the IMS network. ZTE provides a wide variety of terminals such as IMS client (SoftDA), IM-MGW. The Soft Digital Assistant (SoftDA) supplied by ZTE in this trial network is an intelligent terminal that runs on PC, laptop and PDA and supports multiple IMS services such as Voice Telephony, Video Telephony, Instant Messaging, Presence, Group Management, Originating Identity Presentation (OIP), Multimedia Ring Back Tone, Click to Dial, etc.

Project Highlights

End-to-end IMS solution
As one of the few vendors in the industry that can provide end-to-end solution, ZTE has built a complete IMS solution—ZIMS™, focusing on Fixed Mobile Convergence (FMC) based on Release 6/7 of the 3GPP specification and Release 1 of the TISPAN NGN specification. It is an end-to-end solution including terminal, access, core, and service platform.

Truly access agnostic IMS solution
The ZIMS™ solution supports various access technologies including WCDMA, TD-SCDMA, CDMA2000, WLAN/LAN, WiMAX, Cable Broadband Access, and xDSL. With strong interoperability, ZIMS™ provides a graceful solution without any misalignment between fixed and mobile roadmaps.

Open and standard architecture
The IMS architecture was derived from 3GPP Release 5 and became stable and interoperable in Release 7.

Flexible service provisioning
The IMS network trial based on open and standard architecture allows Orange Poland to deploy new services easily and quickly, providing end users with robust multimedia services across roaming boundaries and over diverse access technologies.

Low CAPEX and OPEX
Both high-speed data and VoIP services are delivered over the same 450 MHz band using the CDMA2000 1x EV-DO technology, thus helping Orange Poland significantly reduce their total cost of ownership (TCO).
European Zapp Rolls out HSPA Network

ZTE’s PS Core Network Wins Favor from Customer

Mei Ya

ZTE has been chosen over other potential vendors due to the fact that its solutions deliver the most cost-effective benefits, quality, and functionality. This will lead to higher operational and technological efficiency and will result in cost reduction, while still providing customers with the most advanced 3G services.

—Chris Bataillard, CEO of Zapp

Zapp Romania, the third largest mobile operator in Romania, launched CDMA2000 technology as early as in 2001, and now offers mobile voice, fixed and mobile broadband, WLL voice, and data services. Zapp Romania is the first carrier who combines CDMA2000 that provides high speed connection with CDMA 450 that enables large coverage. It is one of the world’s leading CDMA 450 operators with a network covering about 90% of the Romanian population.

All-IP Solution

As the competition in the Romanian telecommunications market is becoming increasingly fierce, how to rapidly install a network, allocate numbers, develop users and win market share has become a top concern of Zapp Romania after it had won a license for 3G services in the 2.1GHz band at the end of 2006. To consolidate its market position, Zapp Romania decided to install a WCDMA/HSPA network to attract more users by providing high-speed data services.

At the end of 2007, Zapp selected ZTE as its exclusive supplier for the rollout of a nationwide WCDMA/HSPA network and the expansion of its current CDMA network. The WCDMA/HSPA network, including five sets of PS core networks, offers HSDPA/HSUPA capabilities, enabling quality high-speed wireless broadband services for users.

ZTE, which won the contract from Zapp with its perfect and widely commercialized core network solutions, custom
made an all-IP solution for the operator. This solution can improve Zapp’s market competitiveness and network profitability with such advantages as Total Cost of Ownership (TCO) savings, smooth network migration, and enhanced user experience.

Compared with the conventional networking methods, the all-IP solution saves more Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) for carriers and is more flexible, increasing the network’s comprehensive competitiveness maximally. ZTE’s core network products adopt a universal hardware platform and a modular design. Featuring large capacity and high integration, they can meet the needs of HSPA operation, future expansion, and power control. A single resource frame in SGSN, namely Backplane of Gigabit Switch Network (BGSN), supports a throughput of 4.9Gbps and 900,000 PDP contexts. A single Backplane of Packet Switched Network (BPSN) frame in GGSN provides a throughput of 4.8Gbps (without content-based charging). In this project, a single core node provides a peak traffic of about 3Gbps, but both the SGSN and GGSN use less than one rack, satisfying the operator’s requirements in equipment room and power control. The universal platform makes smooth network migration possible while reducing the operation and maintenance costs. The softswitch and IP transmission save a lot of transmission resources. All these fully protect customer’s investment, winning customer recognition.

ZTE’s all-IP solution enables Zapp to improve its overall competitiveness in the Romanian telecommunications market. The core network products featuring large capacity, high integration and high reliability have become the cornerstone of the whole network, enabling users to truly experience the HSPA information highway.

**Efficient Execution**

Since Zapp obtained the 3G license, ZTE has been in active contact with the operator. Especially in September 2007, ZTE established a project team specializing in talks with Zapp mainly about the commercial CDMA/WCDMA services. Through joint efforts of relevant parties, ZTE won the deals for the commercial CDMA and WCDMA networks.

The WCDMA/HSPA network was planned to be built in two phases. The phase 1 project, which has to be completed in 2008, includes building core networks in three areas, and the phase 2 project, starting in 2009, includes building core networks in the remaining two areas as well as expanding the capacity of the networks constructed in 2008.

Faced with the fierce competition, Zapp Romania has to rapidly deploy its network to ensure its competitive market position. It planned to launch HSPA high-speed wireless data services in 19 major cities in Romania by the end of June 2008. To achieve a fast network roll-out, ZTE delivered all the equipment and entered the project’s commissioning and installation stage within three months after it gained the commercial contract in December 2007.

Through close cooperation between the personnel at the frontline and at home, the project has made some major progresses: in March 2008, the network was commissioned in the Timisoara metropolitan area, and the project’s first packet switched call was put through as scheduled. In April 2008, ZTE left Cluj and Zapp Portugal. In December 2007, Zapp chose ZTE to address all the WCDMA and CDMA equipment and service needs for both Zapp Romania and Zapp Portugal.

**Solution highlights**

- **All-IP**
- **Low TCO**
- **Excellent engineering and delivery capabilities**

**Benefits for Zapp Romania**

- The All-IP network architecture lowers the network construction and operation costs.
- The operator's existing investment is protected maximally while its network and operational competitiveness is increased with the introduction of HSPA.
- Fast network deployment helps the operator to win market opportunities.

**Milestones**

- In April 2008, the network was commissioned in the Cluj metropolitan area. By then, the network was operational in two cities.
- In March 2008, ZTE entered the project stage of commissioning and installation after all the equipment was delivered. The network was commissioned in the Timisoara metropolitan area and the project’s first packet switched call was put through as scheduled.
- In December 2007, Zapp chose ZTE to address all the WCDMA and CDMA equipment and service needs for both Zapp Romania and Zapp Portugal.
The Development of Central Database

With the development of IT and communications technologies, service provisioning capability is becoming the key feature of a telecom network. The core in network evaluation has been transferred from infrastructure evaluation such as network coverage and transmission bandwidth to comprehensive evaluation including the capabilities to manage end users, to deliver diversified services, and to offer unified brand service in different networks.

In the core network, user data are stored in different network elements such as Home Location Register (HLR), Service Control Point (SCP), and Authentication, Authorization, and Accounting (AAA) Server. This distributed storage leads to inconsistency of user data, making it hard for the operator to manage them and thus increasing Capital Expenditure (CAPEX) and Operating Expenditure (OPEX). To solve this problem, a new Central Database (CDB) framework is introduced, as shown in Figure 1.

Figure 1  CDB framework
The CDB provides unified and convergent data storage management. It simplifies the network topology by using fewer network elements and interfaces; it has large storage capacity to remove the bottleneck on a single network element; it provides geographical redundancy for data security; it brings convenience in service development, shortens the development period, and facilitates service deployment. With the features listed above, the CDB can help operators reduce CAPEX/OPEX and generate more revenue.

The CDB enables user data to be stored in a unified system and accessed by multiple core and service network elements. To meet the requirements for high performance, high reliability and high security, the CDB integrates logical functions of multiple network elements widely distributed in different geographic areas, and provides modular expansion capability via open interface.

**ZTE’s USPP Solution**

With all features of CDB, ZTE’s Universal Subscriber Profile Platform (USPP) is composed of two parts: Front End (FE) and Back End (BE), as shown in Figure 2.

The FE, based on ZTE’s mature all-IP platform, supports both SS7 and IP signaling interfaces, and allows simultaneous access to multiple services and applications including HLR, Home Subscriber Server (HSS), General User Profile (GUP) Server, Mobile Number Portability (MNP), and AAA Server. The FE has the advantages of smooth capacity expansion, high performance and large capacity, providing high integration for the USPP and a basic guarantee for service customization.

The BE, also called Universal Directory Server (UDS), is a distributed data platform that provides real-time data synchronization and open Directory Server interface in compliance with the X.500 standard. The directory server manages user, service and network data in directory tree mode. The user data and applications stored in the BE are loosely coupled. The FE can access the user data via the industry standard directory protocols such as Lightweight Directory Access Protocol (LDAP) and Directory Access Protocol (DAP). With the loosely coupled structure, different applications can have independent access to user data stored in the UDS via the LDAP or DAP, making possible to deliver more flexible application logic. ZTE’s USPP has the following features:

**Modular expansion capability**

By increasing the number of data storage nodes, the USPP has a linear capacity expansion, supporting maximum data storage capability of up to 100 million subscribers. With high capacity of data storage, the USPP simplifies network topology, reduces the number of interfaces used, and thus lowers CAPEX and OPEX.

**Universal user data platform**

The loose coupling between user data and applications ensures that the USPP can implement unified management of user data stored in multiple network elements including HSS and HLR, and support multiple network applications via the open access interface.

**Multi-level load control mechanism**

According to the resource utilization statistics for CPU, memory and link load, the USPP establishes a multi-level load control mechanism to ensure reliable handling of high-priority traffic during the peak hours.

**Two-tiered database architecture**

The USPP is composed of memory database and physical database. On the one hand, it provides data reliability through multi-tiered storage, and on the other hand, it reduces service response time through the memory database.

**Distributed geographical redundancy mechanism**

Both the FE and the UDS provide the flexible load-sharing and N+K geographical redundancy mechanism, which guarantees higher reliability than the conventional N+1 or 1+1 geographical redundancy mechanism.
IMS Enables Perfect Enterprise Applications

Qin Jidong

Mike, a salesman of Company X, takes a business trip to Country A today. After arriving at the airport, he learns that his flight is delayed. He calls his colleagues in Country A through an internal short number, informs them about the delay, and then accesses the e-mail system of his company to receive e-mails through the wireless network of the airport. After arriving at his office in Country A, Mike starts a conference call through the office network and discusses the market situation with his colleagues in headquarters.

The above scenario is a fraction of the enterprise application of an IMS-based integrated communication system.

In recent years, enterprise applications have become personalized, diversified and integrated: various means of communications have been constantly applied to the exchange of information in enterprises; there is an increasing demand for multimedia communications; the demand for communication services has been extended to information service; and the traditional communications no longer meet the demand of enterprise users.

The transformation to integrated information service providers has become an inevitable choice for telecom operators to expand their market. As an important source of revenue and profit for the operators, enterprise applications have become a key market in their business transformation. Therefore, how to develop an integrated communications solution for enterprise users and provide quality enterprise application service have become two major concerns of telecom operators.

Why Apply IMS to Enterprise Integrated Communications

The IP Multimedia Subsystem (IMS) is a subsystem proposed by 3GPP in Release 5 to support IP multimedia services. Based on the Session Initiation Protocol (SIP) and the support of access independence, the IMS is a platform accepted in the industry for multimedia service control and network convergence, and is also a key step for telecom operators to evolve to all-IP service providers. It is widely recognized by various international standardization organizations as the core architecture for next-generation networks.
The IMS adopts a unified core network, operates over IP, and has horizontal service architecture. It supports various terminals in broadband access and convergence, offering an integrated service experience.

The IMS network is an operable and manageable secure IP-based network with QoS assurance, and also a broadband multimedia system based on the IP architecture. With both Information Technology (IT) and Communication Technology (CT) advantages, the IMS network can effectively promote Information Communication Technologies (ICT) convergence and provide diversified enterprise information services.

Specifically, the IMS has the following advantages in helping operators deploy enterprise applications:

- **The IMS convergent network architecture not only saves network construction and maintenance costs, but also enhances centralized network management capability.**

- **With the IP bearer, the IMS expands the traditional local and regional enterprise information networks to wide area IP networks.**

- **With the feature of access independence, the IMS ensures that enterprise users, whether in the office or on a business trip, are able to enjoy integrated service experience through different networks with different terminals.**

- **With the horizontal service architecture and flexible service trigger mechanism, the IMS can provide richer services at a higher speed and a lower cost. Its strong capability in delivering multimedia services meets the diversified service requirements of enterprises.**

- **As an IP-based network with strong network convergence, resource control and service provisioning capabilities, the IMS supports convergence of the telecommunications system and enterprise Office Automation (OA) network.**

**ZTE’s IMS Solution for Enterprise Applications**

Based on a profound understanding of network evolution and customer requirements, and years of experience in commercial deployment of the ZIMS™ solution, ZTE has rolled out an IMS-based enterprise application solution, providing a perfect solution for operators to build superior enterprise integrated communication networks.

As shown in Figure 1, the solution incorporates all functional modules defined by 3GPP, 3GPP2 and TISPAN, providing end-to-end network equipment. It supports multiple terminals and access modes, provides open service platform, centralized data management and unified authentication, and boasts powerful convergent service provisioning capability.

Furthermore, the solution can effectively meet the enterprises’ demands for personalized, diversified and integrated communications and flexibly integrate with the enterprises’ OA systems.

ZTE’s IMS enterprise application solution has the following features:

- **End-to-end solution that provides a whole series of network elements in compliance with 3GPP/3GPP2/TISPAN international standards and allows fixed-mobile convergence**

- **Good scalability that can meet different networking requirements**

- **Open service platform, fast service provisioning and custom development that can meet the enterprises’ requirements for personalized and diversified services**

- **Strong terminal support and multiple multimedia terminal solutions**

- **Unified communications platform that delivers voice, video, data and instant messaging services**

- **Seamless integration with enterprise IT systems that can enhance user experience**

- **Unified network management system that can manage network elements and services based on their roles and domains**

![Figure 1: ZTE’s IMS enterprise application solution](image-url)
Rich IMS-Based Enterprise Services

With years of R&D achievements and market experience in the telecom industry, ZTE has profound understanding of communication requirements of the enterprises. Its IMS-based enterprise application solution offers four types of services: IP call, multimedia conference, collaborative work, and assistant service, as shown in Figure 2.

Let’s continue the scenario given at the beginning of this article. After arriving at his office in Country A, Mike finds that the actual situation of the local market is quite different from what was expected, so he has to hold a temporary meeting to discuss the sales strategies with his colleagues in headquarters.

In ZTE’s IMS enterprise communications network, it is very easy to hold a meeting. There is no need to reserve a special meeting room. By picking up your terminal at hand, you can hold a real-time video conference, which enables participants at different locations to hear and see one another as if they are in the same meeting room.

Mike accesses the IMS network of the headquarters through the office network in Country A. After being authenticated, Mike holds a temporary meeting using the IMS multimedia conference service. He activates the function of file sharing, shows the market situation to his colleagues and sets down new sales strategies after discussion.

After the meeting, Mike opens the enterprise contact list to report to the director about this meeting.

The enterprise contact list is set up based on the organization structure of the enterprise, which is managed and maintained by the enterprise administrator. Most services in the IMS enterprise communications network can be directly used by one or two clicks on the contact list. The function of a dynamic directory is also integrated, allowing a user to select a proper means of communications according to the current state of the person he contacts, making communications faster and more convenient.

On the contact list, Mike finds that the director is on a business trip now, so he clicks the list and chooses to make a mobile call to report the result of the meeting to him. The director gives a very high evaluation on Mike’s timely adjustment of strategies according to the market situation.

With the support of the rich and colorful services available in ZTE’s IMS enterprise integrated communication network, Mike makes a timely response to the market change and successfully fulfils his sales task in Country A.
A Discussion on WiMAX/Wi-Fi Interworking

Zhou Wenyu, Li Zhixing

Foreword

In recent years, WiMAX and Wi-Fi have become the hottest topics in the communications industry. Wi-Fi is a short range transmission technology suitable for small coverage. The industry chain for Wi-Fi is mature, with the widespread of low-cost Wi-Fi terminals. WiMAX can be deployed on a large scale, but as a new wireless technology, it requires initial high investments. Having different purposes and advantages, WiMAX and Wi-Fi technologies can complement each other, which makes the study on their relationship and convergence especially meaningful.

As a board member of the WiMAX Forum, ZTE has been dedicated to providing quality WiMAX products and total solutions.

Advantages of WiMAX over Wi-Fi

WiMAX was created and optimized for Wireless Metropolitan Area Network (WMAN). The WiMAX air interface standards IEEE802.16d (for fixed access) and IEEE 802.16e (for mobile access) were launched in 2004 and 2005 respectively.

Compared with Wi-Fi, WiMAX has some inherent advantages, such as high security, extensive reach, high scalability and operability, as shown in Table 1.

Table 1  A comparison between Wi-Fi and WiMAX

<table>
<thead>
<tr>
<th>Feature</th>
<th>Wi-Fi</th>
<th>WiMAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Up to 300 feet (about 91.4 meters)</td>
<td>Up to 30 miles (about 48.3 kilometers); cell radius of 4-6 miles</td>
</tr>
<tr>
<td>Coverage</td>
<td>Optimized for indoor performance, short range</td>
<td>Outdoor Non-Line-of-Sight (NLOS) performance; support for advanced antenna technologies</td>
</tr>
<tr>
<td>Scalability</td>
<td>Supporting one to dozens users, one Customer Premises Equipment (CPE) per user; fixed 20MHz channel width</td>
<td>Effectively supporting one to hundreds pieces of CPE; unlimited subscribers within each CPE; flexible channel sizes from 1.5MHz to 20MHz</td>
</tr>
<tr>
<td>Bit rate</td>
<td>2.7bits/s/Hz</td>
<td>5bit/s/Hz, and up to 75Mbit/s in a 20MHz channel</td>
</tr>
<tr>
<td>QoS</td>
<td>No QoS support</td>
<td>Support for QoS at the MAC level, which enables differentiated services for voice and video</td>
</tr>
<tr>
<td>Security mechanism</td>
<td>Wired Equivalent Privacy (WEP) authentication; pre-shared key</td>
<td>Extensible Authentication Protocol (EAP)-based authentication; Advanced Encryption Standard (AES); Privacy Key Management (PKM)</td>
</tr>
</tbody>
</table>
Network Interworking Requirements

Compared with independent networking, network convergence can be of benefit for both end users and operators. The user hopes to use the same account number, password, get the same account bill, extend the existing services to a new system, and be granted seamless service continuity between different systems. The unified bill, account and password make account management easier for the user. Seamless service continuity improves user’s service experience.

The operator also expects to maintain the same subscriber relationship, using one accounting system, one billing center, the same address space management, and one service platform. Using the same accounting and billing systems can significantly reduce operator’s operation, maintenance and hardware costs while realizing the service continuity between different systems and keeping the old system functioning.

3GPP TR 22.934 and 3GPP2 S.R0087 define scenarios of 3GPP/Wi-Fi interworking and 3GPP2/Wi-Fi interworking respectively. Each scenario can include or omit the lower level scenarios. In each scenario, Wi-Fi network can be complementary to 3GPP and 3GPP2 networks, or be parallel to them. The article will study the interworking between WiMAX and Wi-Fi according to the solutions specified by 3GPP and 3GPP2. WiMAX and Wi-Fi interworking scenarios can be divided into the following three types:
- Common billing and customer care
- WiMAX-based access control and billing
- Service continuity

Methods of WiMAX/Wi-Fi Interworking

Interworking solution 1 (common billing and accounting)
In this solution (Figure 2), the Wi-Fi network is subordinate to the WiMAX network. The Authentication, Authorization and Accounting (AAA), associated with Wi-Fi users, are provided by the WiMAX network elements. The Wi-Fi user billing information is collected at the Accounting Gateway (AGW) and reported to the billing system of the WiMAX network.

Both the Wi-Fi and WiMAX terminals use the Network Access Identifiers (NAIs) as user IDs. Extensible Authentication Protocol Method for UMTS Authentication and Key Agreement (EAP-AKA) can be adopted as the authentication method.

**Interworking solution 3 (service continuity)**

This solution (Figure 3) allows subscribers to access the IP services provided by the WiMAX system through the Wi-Fi network.

The Wi-Fi and WiMAX networks share AAA and Home Agent (HA). To enable seamless handover between the two networks, the HA, as the anchor point, needs to maintain the IP address of the dual-mode Wi-Fi/WiMAX terminal. During the switching, the dual-mode terminal keeps two connections with the HA; before the new connection is set up, data are transferred between the HA and the terminal through the old link; and after the new connection is established, data are transferred through the new link while the old link is disabled.

It can be found from the comparison that each interworking solution has its own advantages and disadvantages. The practical deployment mode should be selected according to such factors as service types, implementation environment, and cost. Generally, WiMAX and Wi-Fi belong to networks at different stages of development. The best solution is to implement the Wi-Fi and WiMAX interworking without any impact on the operation of the two networks or any alteration to the existing network protocols.

The loosely coupled solutions, which have such advantages as minimized changes to existing networks and mature technologies, are expected to have more room for development, and although they still have some shortcomings, various improvement works are now underway.

Other solutions also have their advantages in certain application scenarios. With the deepening study on the interworking solutions, seamless handover of 3G services across heterogeneous networks will be finally achieved, thus bringing true convenience to end users.

Table 2 compares the technologies and costs of these three solutions.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Level of Technical Difficulty</th>
<th>Degree of Coupling</th>
<th>Price of Coupling</th>
<th>Affected Network Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interworking solution 1</td>
<td>Easy</td>
<td>Loose</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Interworking solution 2</td>
<td>Middle</td>
<td>Middle</td>
<td>Middle</td>
<td>AAA</td>
</tr>
<tr>
<td>Interworking solution 3</td>
<td>Difficult</td>
<td>Tight</td>
<td>High</td>
<td>Terminal, AAA, AC, HA</td>
</tr>
</tbody>
</table>

**Conclusion**

ZTE’s product range is the most complete in the world—from fixed line, 3GPP, 3GPP2 to WiMAX network products, and the core networks of these systems have similarities. The company’s complete product range places it in an advantageous situation to study network convergence. ZTE provides industry-leading network convergence products and solutions.
Impetus for the New Business Mode

In the past 10 years, the gain mode of telecom operation was relatively simple with operators always keeping in mind to pursue the increase of subscriber base because their cash flow is sufficient. But now the rising in the number of subscribers slows down, operators are considering how to find more revenue sources, which means to pursue the growing scale and reduce cost based on the existing market.

However, the basic gain mode of telecom operation can not be changed in essence only through this way because it is just one layer of transformation and the Average Revenue Per User (ARPU) would be reduced according to the market development rule.

But what is the essential change? More and more research shows that the transformation of service and operation mode might be essential in creating new gain points. Nowadays, the introduction of multimedia services is expanding the industry chain, which involves more Content Providers/Service Providers (CPs/SPs) besides telecom operators. By sharing profits with the CPs/SPs in the industry chain, telecom operators would greatly boost their potential. They are changing the role of traditional voice service providers into multiple service providers and network platform providers.

Triple play is becoming the catch phrase in recent years. It integrates VoIP, video and data services on a single network, offering converged service experience for subscribers. Triple play services not only enhance ARPU but also have a positive effect on Return On Investment (ROI). For example, operators usually get a 100% ROI of a DSL network after 5 or 6 years if they deploy only traditional voice services, and 100% ROI after 2 or 3 years if they deliver additional video services.

With the new business mode, operators can extend triple play into multiple play service bundles by adding mobile services like mobile entertainment and mobile surveillance.

Keys to Deploying Multiple Play Services

In spite of advantages and opportunities the new business mode can bring to fixed-line operators, the problems they have to face are how to deliver various combinations of voice, video and data services to meet the differentiated service requirements of users, and how to use the existing cable TV broadcast resource to deploy multiple play services.

In the conventional fixed network...
environment, it is difficult to deploy multiple play services in a quick and convenient manner due to the old network architecture, bandwidth limitation and incapability to provide open service provisioning mechanism. It is therefore inevitable for the fixed-line operators to implement their network transformation plan.

The following are the keys to successful deployment of multiple play services:

- **Open and converged platform:** Because multiple play refers to a comprehensive solution over different networks such as IPTV, fixed and mobile networks, it is necessary to build an open and converged platform that can deliver a wide range of bundled service packages.

- **Broadband resource:** Video services like IPTV need larger bandwidth than voice and data services. On the equipment side, it is necessary to provide sufficient user uplink bandwidth. It is also important to choose an appropriate video coding method which occupies less bandwidth while meeting the defined requirement for signal quality.

- **Multicast capability:** The large-scale deployment of IPTV services requires that access network provides controllable multicast capability.

### ZTE’s F3G Total Solution

To help fixed-line operators implement a successful network transformation plan, ZTE launched its F3G total solution in 2005, aiming at quickly delivering new converged services for legacy fixed-line and broadband subscribers, cost-effectively migrating existing networks into Next Generation Networks (NGNs), and smoothly evolving into full IP Multimedia Subsystem (IMS) in future.

ZTE’s F3G total solution comprises Class 4 replacement solution, Class 5 optimization solution, broadband access layer solution and multiple play solution. Its architecture is shown in Figure 1.

ZTE’s F3G total solution can deliver varieties of multiple play services such as IPTV, multi-party video conferencing and home gateway services. Mobile and (GE) non-blocking architecture, where there is at least 1 Gigabit date bus per slot and multiple GE uplinks (4Gbps), guaranteeing 13 Mbps non-blocking bandwidth for each subscriber. It provides the access equipment with multicast control and

![Figure 1 Architecture of ZTE’s F3G total solution](image)

**Conclusion**

As multiple play services have growing revenue potential and they are a great attraction to the customers, telecom operators are showing increasing interest in them. ZTE’s F3G total solution delivers unique multiple play service experience to customers. With the network architecture in compliance with the TISPAN NGN standard, the converged and open service platform, and cutting-edge broadband access technologies, ZTE’s F3G total solution can help fixed-line operators successfully implement network transformation and establish a perfect industry chain where all parties can benefit from one another.
An Overview of MBMS

Multicast and broadcast are technologies that allow datagrams to be sent from one data source to multiple destinations. They are different from Cell Broadcast Service (CBS) in traditional mobile networks, where only low bit-rate data are transmitted to all users over a shared broadcast channel of a cell.

Consumer’s demand for mobile communications has gone beyond telephone and messaging services. With the rapid development of the Internet, a wide variety of multimedia services emerges, such as Video on Demand (VoD), TV broadcast, videoconferencing, online education, and interactive gaming, which requires that multiple mobile users receive the same data simultaneously.

To effectively use mobile network resources, the 3rd Generation Partnership Project (3GPP) has specified the Multimedia Broadcast/Multicast Service (MBMS). MBMS is a point-to-multipoint service in which data are transmitted from a single source to multiple recipients in the mobile network. It improves the utilization of network resources, especially the utilization of air interfaces. MBMS defined by 3GPP enables not only multicast and broadcast of plain text, low rate messages, but also multicast and broadcast of high-speed multimedia services, which makes it an ideal technology for Mobile TV.

Network Topology

Figure 1 shows the network architecture of the Mobile TV system using MBMS. Broadcast Multicast Service Center (BM-SC) is a newly added node. The Gmb and Gi reference points are the interfaces between the BM-SC and the GGSN. The Gmb interface, which is also new, provides control plane functions, while the Gi interface provides bearer functions at the user plane.
ZTE’s MBMS solution, ZXME MBMS solution, supports two basic services: Datacasting and Clipcasting. ZXME MBMS solution can develop Live TV and near VoD based on broadcast/multicast services and browse-type interactive services based on WAP and SMS services.

**Datacasting**

After a user starts the terminal player, the ZXME MBMS platform can actively push service information to the user’s terminal. Such information as news, weather forecasts, constellation fortune can be customized according to a user’s preference.

The ZXME MBMS platform broadcasts the latest data to the terminals in one-hour intervals (adjustable). The user can read content summaries on the user interface or click for detailed information.

**Clipcasting**

The ZXME MBMS platform can push user-customized audio and video information to a user’s terminal when the user or the network is idle. It can provide 3GPP standard-based files of up to 10 minutes, and users can click the files and watch them in off-line status.

**Real-time streaming**

The ZXME MBMS platform can broadcast real-time audio and video via RTP protocol. User can receive them selectively. The MBMS client receives all the multimedia programs at the same time it decrypts the multimedia programs.

**Interactive services**

For the three services mentioned above, a user passively but selectively receives the contents and services broadcasted by the ZXME MBMS system. In order to improve the user experience and develop more value-added service, interactive applications could be performed based on the services mentioned above so that users can participate in services instead of only receiving contents.

**Highlights of ZXME MBMS Solution**

The advantages and characteristics of ZTE’s ZXME MBMS solution are shown as follows:

- With only minor changes, it can be integrated with the existing mobile networks, which is convenient for mobile TV services operators.
- As the minimum unit is a cell in cellular networks, it can be well integrated with location-based services, to facilitate the provision of differentiated services for users in different locations. Different contents will be broadcasted to different locations.
- Interactive services can be deployed by making full use of the two-way channels of cellular networks. The ZXME MBMS solution enables a wide array of interactive services including highly reliable download services, mobile radio and TV services, and Push services.
- Wireless resources can be more flexibly scheduled to improve network resource utilization. A User Equipment (UE) can lock a frequency to receive the multicast information in its cell.
- It can provide various diversity techniques (including the new techniques by which multiple users can share downlink transmission channels) to improve the receiving performance of terminals.
- In-depth coverage can be achieved by making full use of the existing mobile networks.
- It is a cost efficient solution as there is no need to construct new networks except adding some new functional modules to the existing communication networks.
- There is no need to add new receiving equipment or hardware to terminals.
- The hierarchical key system allows subscribers to choose programs they want to watch.
- The system supports upgrade to Long Term Evolution Enhanced MBMS (LTE E-MBMS).

TV, as a popular means of entertainment media, has permeated our lives. ZTE’s open and standard-based MBMS solution brings the traditional TV to a tiny screen, helping operators increase their profitability while enhancing user experience.
Chinese Handset Makers Keep Expanding International Market

May 12, 2008, Kevin Wang, from market research firm iSuppli

The total handset shipments from Chinese makers will dramatically grow to 232 million units by the end of 2007, which represents 80% annual growth rate than 2006. iSuppli forecasts that Chinese handset makers’ total shipments will be 278 million units in 2008. There are major two drivers for the exited growth of Chinese handset industry in 2007. One is that continuous growing domestic demand from both first buying market and replacement market. The other is that the handset export shipments from Chinese handset makers significantly increase this year.

In 2007, the domestic handset market totaled about 201 million units. The market consisted of 151 million licensed handset units and over 50 million gray market handsets. Foreign handset manufacturers, such as Nokia and Motorola, controlled 70% of the licensed handset market. Domestic OEM brands, like Lenovo, occupied the remaining 30%. However, domestic handset manufacturers completely dominated the gray market.

In terms of total handset shipments, ZTE was the largest Chinese handset manufacturer last year and sixth largest brand OEM in the world. The company shipped 27.5 million handsets in 2007, representing 276% growth compared to 2006. Last year, ZTE’s GSM and CDMA handset shipments were 12 million units and 11 million units respectively. Additionally, the company shipped about 2 million units WCDMA handset in 2007. With 4 million units fixed mobile terminals, ZTE’s total wireless terminals shipments reached over 30 million units.

### Table 1  Top 10 Chinese Handset OEMs in 2007

<table>
<thead>
<tr>
<th>OEMs</th>
<th>Shipments in 2007 (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ZTE</td>
</tr>
<tr>
<td>2</td>
<td>Huawei</td>
</tr>
<tr>
<td>3</td>
<td>Tianyu</td>
</tr>
<tr>
<td>4</td>
<td>Bird</td>
</tr>
<tr>
<td>5</td>
<td>TCL</td>
</tr>
<tr>
<td>6</td>
<td>Lenovo</td>
</tr>
<tr>
<td>7</td>
<td>Amoi</td>
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<tr>
<td>8</td>
<td>Goinee</td>
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<td>9</td>
<td>Guohong</td>
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<td>10</td>
<td>Konka</td>
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iSuppli believes that ZTE and Huawei will continue to be dominant Chinese domestic handset manufacturers over the next five years. They will strengthen their partnerships with carriers in China and worldwide. In 2007, ZTE provided 3G handset to ten international carriers, such as Telefónica, Telecom Italia, Telstra and Hutchison Telecom etc. Both companies will concentrate on generating profits by developing high-end products such as smart phones and high speed downlink packet access (HSDPA) handsets besides providing ultra-low-cost phones.

Additionally, Chinese handset OEMs will continue to cooperate with international mobile carriers to provide ULC handset for emerging market such as India etc. Last year, ZTE shipped more than six million units ULC handset to Vodafone. Meanwhile, its accumulated CDMA handset shipments reached 10 million units in India, due to cooperation with Reliance, TATA and BSNL. Surprisingly, ZTE shipped over 1.5 million units handset in Indonesia due to contract from M-8.

In the domestic market, iSuppli believes that Tianyu, Goinee and Changhong will maintain growth in 2008 due to their very strong distribution channels. However, their poor in-house design capabilities will affect their expansion long-term. Lenovo, Amoi, Bird, TCL and Konka are struggling to maintain volume and profit margins this year.
TS site acquisition is a big challenge for both telecom operators and vendors, and it is of life-or-death significance in wireless network construction. It is the most intangible yet crucial factor, the process of which affects equipment delivery, network construction, project acceptance test, etc. and determines the network coverage and service quality of the network in question. The cost of site acquisition is generally much higher than the equipment value, thus it directly determines win-loss of business operation.

It was the first time that Indonesia’s Sinar Mas Group was involved in telecom operation; therefore, the job of site acquisition started from zero and was confronted with unimaginable complexity and difficulties. Nevertheless, ZTE Radio Frequency (RF) team, shoulder by shoulder with Sinar Mas RF team, took the responsibility of the whole process management, accumulated precious experience, accomplished the site acquisition, and guaranteed the successful implementation of the whole project.

Site Acquisition Process and Planned Risk Responses

It is difficult to select a suitable BTS site. The process of site acquisition in Sinar Mas Project is described as follows:

1. Submit the information of planned BTSs and radius of each site to the Site Acquisition Department after the network planning has been agreed.
2. Carry out site survey, find 3 candidate sites based on the planned sites, and submit the survey report for approval by the relevant network planning, transmission, engineering departments. If the candidate sites do not meet technical requirements, the site survey will be carried out again until suitable sites are found.
3. Give a priority order to the candidate sites, and submit it to the Site Acquisition Department, which takes the price and technical factors into account and conducts purchasing or renting negotiations, eventually resulting in leasing or purchasing contract. If the contract can not be reached, the sites will be selected and surveyed again.
4. Submit the confirmed sites for the local governments’ approval.

There are some factors that might fail to acquire quality sites. They are to be dealt with in the following ways.

Legitimate risk and counter measures

Indonesia’s telecommunications law has it that in the city center, a new tower can only be built when there are 3 operators co-use one tower; furthermore, there are various restrictions on the height of antenna poles and towers at the top of the building, which enhance the difficulties to build new towers in urban areas.

Accordingly, we propose three measures:

- In areas without legal bounds, we can select sites and build towers in the traditional way.
- In areas with legal bounds where there are many high buildings, we focus on the buildings of suitable height and place antenna poles at the top of them.
- In areas with legal bounds where there are many low buildings and villas, and there are no suitable tall buildings to place antenna poles, it is necessary to build towers for coverage. We can collect information about other operators’ towers; carry out negotiations to rent their towers. Besides, we can lower the designed height of the sites, place antenna poles at the top of relatively tall buildings, and persuade the operator to increase the density of BTS sites.

Management risk and counter measures

To lower cost, the site acquisition in Sinar Mas project is subcontracted to several local companies. However, it is a big challenge to manage so many sub-contractors. We took measures to clarify each other’s responsibilities, and maintained quality control through various processes.

Other risks and counter measures

Towers are not allowed to be built in areas near the airport, government,
Despite wide coverage benefits, the operators are reluctant to build sites on the mountain peaks out of considerations of high investments in transportation, transmission and power supply, and future difficulty in network maintenance. For these sites, it is better if transmission engineers get involved in advance to communicate sufficiently with operators to clarify whether these sites remain or not.

**Quality Control of Site Acquisition**

After thorough analysis of the site acquisition process and risks, we formulate a series of quality control strategies, the core of which includes optimized site confirmation process, complete documentation support and efficient team work.

**Optimized site confirmation process**

The key to quality control of site acquisition is to stipulate a reasonable site selection process and strictly implement the process. We worked out two confirmation processes in Sinar Mas project: Process A consists of 3 steps: document check, single site check and site grouping check, which applies to the areas where sites are easier to obtain; and process B consists of 2 steps: site survey document check and single site check, which applies to areas where sites are difficult to acquire or there is an urgent deadline requirement for site acquisition.

- **Document check:** Check whether the site survey report is complete, accurate and consistent in data. If there are problems, they will be fed back to the site acquisition department; if there are no problems, the single site check will be conducted.

- **Single site check:** Judge whether the location of the site is suitable, whether the height of the site meets design requirement, and whether there are serious interference or obstructions. The qualified sites will be further checked for site grouping while unqualified sites will be reported to the site-acquisition department so that the survey team can look for new sites. This step is to be accomplished by RF engineers with certain network planning and survey experience.

- **Site grouping check:** This is to ensure that the obtained sites meet the wireless coverage requirement. When the geographically adjacent sites have passed document check and single site check, they will be grouped for coverage examination, and all candidate sites will be ranked in order of priority. If the sites don't meet the grouping requirement, they will be marked “pending” and will be examined and ranked later. This step is done by experienced RF engineers.

**Complete documentation support**

In the process of site acquisition, the documentation support includes technical documents and managerial documents. According to the characteristics of Sinar Mas Project, special forms are designed to summarize the process of site confirmation every day. In practice, these documentation tools are perfected, which in turn improves work efficiency and facilitates project information updates.

**Efficient team work**

Oriented to efficient operation, a team consisting of network planning experts, network planning engineers, site acquisition experts and secretaries was set up.

- The network planning experts are responsible for establishing and managing the team, technical training, site grouping check, survey report acceptance, and on-site consultancy when there are difficult problems; the network planning engineers are responsible for single site check and on-site consultancy; secretaries are responsible for checking survey reports, filing daily documents, and coordinating with other departments; site acquisition experts are responsible for analyzing the reasons of unavailability of some sites and ruling out fraudulent facts.

As the team is properly organized with clear division of tasks, its role is brought into full play after a period of cooperation among team members. The information of sites can be confirmed and fed back on the very day of site survey.

**Summary**

ZTE RF team and Sinar Mas project members worked jointly to conquer difficulties in the site acquisition of Sinar Mas Project. After many trials and enhancements, they eventually complete the Phase I site acquisition, making a solid foundation for the project implementation.
How do you evolve to a converged NG-GSM/WCDMA/LTE network without any extra hardware?

Easy—you start with the right base station. For example, the all-new ZTE Multi-Carrier base station based on unified hardware platform that uses configurable software rather than separate hardware modules to support GSM and WCDMA simultaneously and achieve smooth evolution to LTE.

More than 60 operators in over 50 countries already use ZTE GSM equipment to supply some 15 million lines with improved efficiency, lower costs, more services and better integration with other open standards.

Now, we are ready to serve you. ZTE is a leading global provider of telecommunications equipment and network solutions.

We deliver innovative, custom-made products and services to customers in more than 135 countries, helping them achieve continued revenue growth, while shaping the future of the world’s communications.

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Welcome!