PTN Brings a Shift to Packet-Centric Optical Transport

ZTE中兴

ZTE TECHNOLOGIES

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Leading Edge ▮

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ZTE Profile

ZTE is a leading global provider of telecommunications equipment and network solutions. ZTE's product range is the most complete in the world—covering virtually every sector of the wireline, wireless and handset markets. The company delivers products and services to customers in more than 120 countries.

ZTE Tops 2007 Global CDMA Market

Company clinches 43% of CDMA infrastructure contracts worldwide

ZTE tops the global CDMA market in terms of the number of CDMA contracts signed in 2007. This finding is based on "China's CDMA Market Development Research Report" published by China MII's CATR (China Academy of Telecommunication Research, December 2007). The report shows that ZTE has 43% of the CDMA infrastructure contracts signed in 2007, placing the company way ahead of its competitors worldwide.

In 2007 alone, ZTE delivered more than 24,000 units of CDMA base stations worldwide, achieving more than 100% annual growth rate over 2006. As of to date, ZTE tallies up to 68,000 units of CDMA base stations shipments, stabilizing its position as one of the tier-one providers worldwide.

"We are very proud that for the second consecutive year, our CDMA business continues to pace the global market. This only shows that the R&D we have invested in developing highly reliable CDMA product combined with our commitment to quickly bringing the equipment to the market and customers is paying off," said Mr. Zhu Jinyun, General Manager of ZTE's CDMA product. "This year, in line with our vision of 'universalizing' CDMA handsets, we will continue to provide the global market with CDMA products with lower TCO (total cost of ownership), All-IP CDMA2000 network solutions and advanced EV-DO Rev.A and UMB (Ultra Mobile Broadband) technology."

(ZTE Corporation)

ZTE Announced the 2007 Estimated Business Growth Report

Accomplishment of a 50-70% business growth compared to same period last year

After an initial calculation, ZTE has achieved a 50 to 70% net profit growth in the period of January to December 2007 compared to the same period last year, according to the Generally Accepted Accounting Principle of China. ZTE's aggressive expansion of its overseas operation contributes to the dramatic growth for the year. In 2006, the net profit for ZTE amounted to RMB807 million. With these significant achievements, ZTE is recognized in the industry as one of the few listed companies in China that is able to reward more than 10 times of

profits to investors in a decade's time.

As the leading provider in the 3G market, ZTE seizes development opportunities in line with its business goals, and the company has achieved significant growth in its international business. Based on the mid-year report result of a 99% growth when compared to the same period last year, revenue growth from ZTE's international business for the first three quarters further rose to 106%, with the total amount occupying a 54.6% of the company's total revenue, driving the growth of the company as a whole. *(ZTE Corporation)*

ZTE Implements New Technology for 911 Emergency Service in Uruguay

ZTE announced that it has signed an agreement with the Interior Ministry of Uruguay to implement a technological system that will allow unifying all emergency calls to 911 and deviate directly to the Police, the National Direction of Firemen and National Direction of Walking Police.

The high technology system targets to improve the communication capacities to provide a more efficient service in public service matters.

The informatic packet is conformed by a wireless system with WiMAX technology that will allow the interconnection of high speed between offices of the Interior Ministry, the access of data of people with antecedents, vehicle identification, and the installation of cameras in streets, parks and Montevideo stadiums. This project also includes prison management that contemplates installation of a control system for administrative areas and internal vigilance in the detention centers.

Once concluded the installation of the terminals, in February 2008, ZTE will commence the training of the personnel of the Interior Ministry that will use the new technology. It is estimated that in one year, after the training, most part of the system will be operative. This project reports to the company a business for 12 million dollars.

(ZTE Corporation)

ZTE Partners with LTT to Build First Ever WiMAX Commercial Network in Africa

ZTE has recently signed a framework agreement with Libya Telecom & Technology (LTT) to help build a large scale WiMAX 802.16e commercial network in the continent, covering eight major cities in Libya including its capital, Tripoli.

Under the agreement, ZTE will provide a series of distributed and end-to-end IP WiMAX product solutions including compact and high-capacity base stations, access gateway, network management system, MPLS (Multi-Protocol Label Switching) and IMS (IP Multimedia System). The network is expected to be completed and ready for service by the third quarter of 2008.

In deploying the WiMAX network in Libya, ZTE will be installing MIMO (Multiple-Input Multiple-Output), OFDMA (Orthogonal Frequency Division Multiple Access) and high-efficiency power amplifiers, among other key technologies. These will help enhance the coverage radius of the network and reduce the required number of base stations, allowing LTT to efficiently speed up network installation. Once the network is up and running, subscribers in Libya will have various wireless access services including VoIP (Voice over IP), high-speed download and mobile television using wireless broadband connections.

(ZTE Corporation)

ZTE Unveils 5.76 Mbps HSUPA at GSMA Mobile World Congress 2008

ZTE is demonstrating the company's newly Inter Operability Testing (IOT) tested 5.76 Mbps HSUPA network equipment at the GSMA Mobile World Congress held in Barcelona from February 11th to 14th 2008. This follows the successful launch of ZTE's 7.2 Mbps HSDPA and 2 Mbps HSUPA network equipment at China's PT/Wireless & Networks Comm exhibition in October 2007.

HSUPA is a UMTS uplink enhancement technology introduced in 3GPP R6. It has two phases: in Phase 1 the maximum uplink data throughput is 1.9 Mbps; in Phase 2 the maximum data throughput is up to 5.76 Mbps. HSUPA technology increases capacity and throughput, and improves spectrum efficiency as well, satisfying the growing demand for mobile services in wireless broadband networks.

"We are proud to have completed the 5.76 Mbps HSUPA IOT with terminals using Qualcomm chips," said Fang Hui, ZTE's General Manager of WCDMA Products. "Our ability to launch the solution at the MWC show further validates our industry leading technology expertise in the HSPA field."

ZTE's extensive HSPA R&D programme led to the company's initial deployment of HSPA in 2004 which featured the foundations of a smooth upgrade path enabling seamless hardware development. This was followed in 2006 by the deployment of 14.4 Mbps HSDPA and in 2007

ZTE's booth at the GSMA Mobile World Congress 2008

of 7.2 Mbps HSDPA/HSUPA. At the same time ZTE successfully carried out initial IOT tests and implemented interoperability partnerships with other major telecoms equipment vendors.

(ZTE Corporation)

ZTE Co-organizes Global WiMAX Operation Congress

ZTE was among the key participants in the recently concluded WiMAX Operation Congress, co-organized by the company together with Intel and Yankee Group, a renowned U.S. technology research and consulting firm.

The two-day forum, held in Singapore from 30th to 31st January 2008 attracted some 25 leading carriers from Asia, Africa, South America and Europe, as well as industry gurus from base terminal manufacturers, service providers and research firms. The congress served as a venue for them to discuss current WiMAX technology developments, market trends and commercial deployment of the technology the end users' perspective.

At the show, ZTE also exhibited various cutting-edge solutions, including USB dougle, express card, modem and outdoor terminal, as well as a variety of Intel chips and terminal solutions. In addition, it demonstrated a series of wireless broadband services with dynamic and static bandwidth capabilities. ZTE's video surveillance demo attracted enormous attention, with the distinctive seamless monitoring images showing advanced uploading features that WiMAX technology could offer.

"This seminar has given WiMAX players worldwide the opportunity to share their experience and knowledge. It also provided the platform for collaboration among operators and vendors with the aim of boosting global deployment of the technology," said Ms. Ying Lai Chang, SingTel's Vice President of Consumer Products, who gave an opening speech at the seminar and also joined the panel discussion.

(ZTE Corporation)

T-Mobile Busts Backhaul Bottleneck

January 16, 2008

T-Mobile is taking the HSDPA backhaul bottleneck challenge head-on with the commercial launch of an Ethernet-over-DSL solution from RAD Data Communications.

By deploying an Ethernet-over-DSL solution, T-Mobile is ahead of the pack as many operators are considering Ethernet-based backhaul to increase capacity in the transport network at a lower cost than deploying many expensive E1 leased lines.

RAD first announced T-Mobile as a customer back in May last year. But now, the German giant has confirmed the success of field trials of RAD's ACE-3000 gateway. T-Mobile has been backhauling commercial high-speed downlink packet access (HSDPA) traffic over the gateway in Germany since late October last year.

(www.unstrung.com)

Telefonica Raises Interest in China

January 18, 2008

Spanish carrier Telefonica said that it has raised its holding in Chinese fixed line operator, China Netcom, from 5% to 7.22%, at a cost of Eur309m.

Reports suggest that in the future, Telefonica intends to raise its stake to 10% or more.

A number of overseas carriers, Telefonica and Vodafone included, are taking a strong interest in China, one of the world's fastest growing mobile markets, ahead of the allocation of 3G licences in the country.

(www.totaltele.com)

DoCoMo Disbands WiMAX Partnership

January 21, 2008

Following its failure to secure a chunk of WiMAX spectrum in December 2007, leading Japanese carrier NTT DoCoMo has dissolved its wireless broadband partnership with ACCA Wireless.

Network technology firm ACCA had entered into a strategic partnership with DoCoMo last summer, for the purpose of securing a license to provide broadband wireless services based on mobile WiMAX technology.

But Japan's Ministry of Internal Affairs and Communications granted the two available broadband wireless service licenses to rival operator KDDI and PHS operator Willcom, rendering the DoCoMo partnership no longer relevant.

(www.totaltele.com)

Algerie Telecom Pioneers African FTTH Strategy

January 28, 2008

This year will witness a national Fibre-To-The-Home (FTTH) network throughout Algeria in what is believed to be Africa's first business strategy to incorporate FTTH. The impetus comes from the opportunities for Algeria of adopting triple-play technology.

Algerie Telecom, which is aiming for 3 million ADSL customers by the end of next year (six times its present number), has now become the first operator anywhere in Africa to incorporate Fibre-To-The-Home (FTTH) as a key section of its business strategy.

(www.cn-c114.net)

India's BSNL Rolls out Mobile WiMAX

January 30, 2008

State-owned Bharat Sanchar Nigam Ltd (BSNL) is set to deploy a mobile WiMAX network expected to provide broadband services to a population of more than 200 million.

In its website, SOMA Networks said it was chosen by BSNL to deploy its WiMAX network across three of India's fastest-growing telecom markets–Gujarat, Maharashtra and Goa, and Andhra Pradesh.

This initiative is in line with the Indian government's "Vision 2010" strategy, intended to improve broadband coverage to support the country's technology sector.

(www.telecomasia.net)

FROST & SULLIVAN

SMS – Cash Cow for Service Providers

Yong Lih Khoo, from the global-growth consulting firm Frost & Sullivan

Introduction

Since Short Message Service (SMS) was first commercial delivered over the Vodafone GSM network at United Kingdom in December 1992, this service becomes one of the most popular mobile services nowadays, after voice call. Although every SMS is limited maximum up to 160 alphanumeric characters, but the addition of new features such as concatenated SMS functionality enable users to enter more than 160 alphanumeric characters. The introduction of foreign language text message such as Chinese, Japanese, Arabic and others, managed to attract the interest of mass consumer market. Furthermore, the implementation of SMS-based innovative value-added services such as Operator Logo, Ringtones, and Picture Messaging on the proprietary handsets in the late-90 had attracted numerous new start-up of Application Service Providers (ASP) to develop more attractive and innovative value-added services for both retail and enterprise market segments.

The enhancement of technology development in billing, such as implementing real-time SMS prepaid charging for every Mobile Originated (MO) and SMS-based premium contents enable the service providers to open up
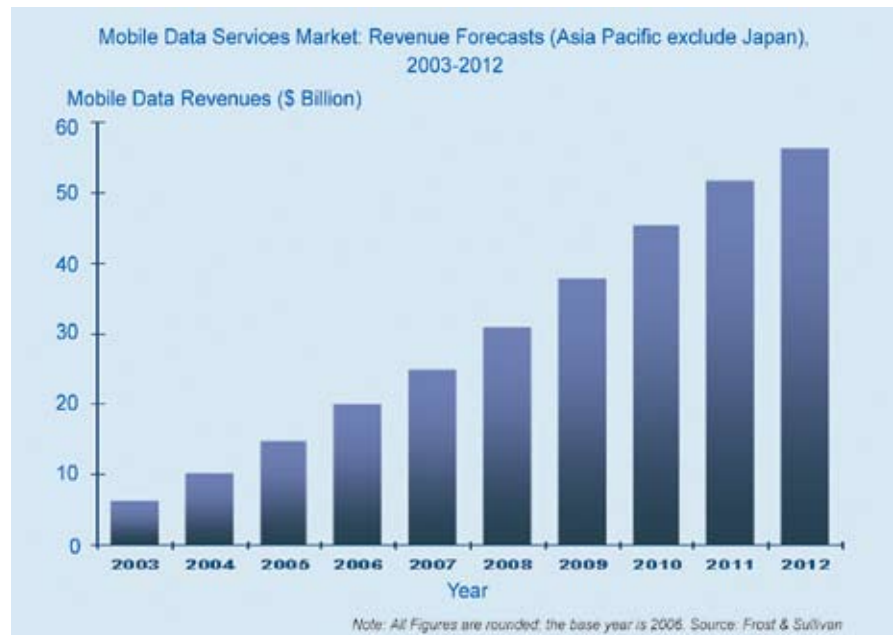
these services for the mobile prepaid market segment, which has the biggest subscriber market share in the emerging markets.

Strong Growth for SMS Services

Intense competition among the service providers to grow their market share and the implementation of market strategy in service differentiation, has given the opportunity to the ASPs to introduce various innovative SMS-based value-added services over the past five years such as SMS Voting, SMS location based services, SMS advertising (discount voucher, reward points redemption), SMS banking (mobile remittance), SMS information push services and others.

At the end of 2006, the total mobile data services revenue recorded in Asia Pacific region (exclude Japan), was USD 20.1 billion, increased by 36.1 percent compared to year 2005, where the revenues generated from SMS messaging and SMS-based value-added services accounted as high as 85 to 90 percent. Chinese market accounted 40.6 percent of total mobile data services revenue in the region, followed by South Korean market with 21.6 percent. The total mobile data services revenue is expected to reach USD 56.3 billion in 2012 with the cumulative average growth rate (CAGR) of 18.8 percent between 2006 and 2012.

In the Philippines, the market with mobile penetration rate of 57.2 percent by 2007 has the highest SMS traffic transaction per subscriber in the region, counting more than 800 messages send monthly per subscriber. Smart Communications, Inc. (SMART), the largest mobile service provider in the Philippines market with 56.8 percent market share by subscribers in 2007, recorded more than half of total revenue in mobile data services, which

Mobile Data Services Market: Revenue Forecasts (Asia Pacific exclude Japan), 2003-2012

Note: All Figures are rounded; the base year is 2006. Source: Frost & Sullivan

represented 51 percent at the end of September 2007. China Mobile Limited (China Mobile), the world largest mobile service provider with 332.4 million subscribers in June 2007, recorded average of 1.3 billion SMS daily traffic volume for the first six months of 2007, increased by 40.6 percent compare to same period in 2006. Shanghai Mobile, a wholly owned subsidiary of China Mobile, partners with ZTE to build the world largest Short Messaging Service Center (SMSC) network in Shanghai with total system capacity of 28,800 SMS per second.

Challenges and Solutions for SMS Services

Due to the healthy growth in SMS traffic annually, in tandem with the increment of mobile subscribers, mobile service providers have to keep pace with the system and network capacity expansion. At the end of 2006, the total mobile subscribers in Asia Pacific region (exclude Japan) recorded 0.86 billion. It is expected to reach 1.94 billion in 2012 with the CAGR of 13.7 percent between 2006 and 2012. Mobile

service providers in Asia Pacific region are expected to make total investment at the range between USD 469 million and USD 515 million annually in SMS-related system and network equipments in 2008 and 2009.

However, the intense competition, in term of competitive charging rate among the service providers has put the pressure on the Average Revenue Per User (ARPU). Today, the industry introduces more cost-effective solution called "First Delivery Attempt" (FDA) which is to co-exist with SMSC. The key function of FDA is to deliver the short message (SM) directly to the users, instead of "store-and-forward"approach at the SMSC. The SM that needs to retry will auto-forward to the SMSC. In this case, the delivery time of SM is shortening and also enhances the QoS. Multiple FDA nodes in the distributed SMS network are able to diversify the incoming SMS traffic, and minimize the risk of system congestion especially the sudden traffic surge during the peak hours or festival seasons such as Christmas, New Year Day, Springs Festival, Valentines Day and others.

SMART, from the Philippines, deployed FDA solution in their SMS network to ensure smooth SM delivery during the peak periods.

The issues of spamming SMS have given some negative impact to the consumers about the message contents/ information sent from the unknown sources. The rumors spread in the SM can trigger the tensions for local society and communities. The industry has implemented the anti-spamming solution with mobile service providers by providing the features of scanning, filtering and barring the suspicious SM from delivery.

Future Potential for SMS Services

The factors of low mobile penetration rate in the emerging markets with large population such as China with 39.9 percent in 2007, 35.2 percent for Indonesian market and 19.8 percent for Indian market, and lack of basic telecommunication services in fixed network at the rural areas had seen strong demand in mobile services after the service providers allocated budget to expand mobile network coverage in those untapped areas. Furthermore, the marketing promotions by the service providers, especially in the emerging markets, bundled with the low cost handsets and low cost prepaid starter SIM-pack had managed to attract the subscribers from low income market segment. The strong demand in mobile services will also spur the growth in SMS services due to its simplicity, ubiquitous, easy-to-use and cost-effective.

The growing number of ASPs and the strategic partnership with the mobile service providers in customization for new applications development had seen numerous innovative SMS-based value-added services offered in the market. One of the examples is the introduction

of Advanced SMS Platform by the industry, such as ZTE's Advanced SMS Platform with ZXSC100, to provide more personalized SMS features which are also the popular trend among the young urbanites nowadays. Those features offered are:

- SM Personal Signature by auto-appending the configurable users' signature, nickname at the end of user's SM;
- SM Forwarding function is to auto-forward the SM to another activated mobile number;
- SM Copy function is to duplicate the SM and send to both end user and another activated mobile number;
- SM Auto-Reply function is to send the configured auto-reply message such as "Out-of-Office", to the sender;
- SM Firewall function is to filter those junk SM or spam SM according to the predefined rules;
- SM Storage function is to provide an extra storage to keep the history SM which is able to view on the web portal.

TM International (Cambodia) Co. Ltd (TMIC) partner with ZTE to deploy SMSC with Advanced SMS Platform in 2007.

Although the implementation of high speed wireless transmission services through 3G/3.5G networks with the capabilities to offer full multimedia value-added services such as Mobile Instant Messaging, Video Mail and others, may post threats to SMS services, but the current issues of limitation in 3G network coverage, 3G handset devices available in the market and relative higher charging rate for 3G services, are targeted to the affordable subscribers in premium market segment, compare to the popularity of SMS services in the mass consumers for both retail and enterprise market segments.

Case Studies

PT. Telekomunikasi Selular (Telkomsel), the largest mobile service provider in Indonesia with 55.6 percent market share by subscribers in 2007, partners with ZTE to deploy SMSCs with FDA functionalities. The total system capacity by June 2008 will reach 3,000 Mobile Terminated (MT) per second, which is 1,000 MT per second per node in order to cater for high demand in SMS services. Indonesia had the second strongest annual growth rate by subscribers for mobile services with 33.5 percent in 2007 after India in Asia Pacific region.

Furthermore, the capability of providing the IP-based connection, SIGTRAN (SS7 over IP) between the ZTE's SMSC and Telkomsel's mobile core network is able to reduce the operating expenditure (OPEX) for service providers in the long term, compare to the higher leasing cost for the high-speed link (HSL) in circuit-switched (CS) network.

Summary

Intense competition among service providers caused price cut in voice minutes charging, the revenue contributed from mobile data services for service providers, especially the basic SMS and SMS-based premium contents services, become more significant due to its easy-to-use and cost-effective solution for the mass consumer markets.

Furthermore, the introduction of various innovative SMS-based value-added services and the features enhancement at the SMSC, such as ZTE's FDA messaging technology with SIGTRAN and Advanced SMS Platform, will continuously bring more attractiveness in SMS services for the mass consumers and at the same time will generate more revenue to the service providers. **ZTE TECHNOLOGIES**

PTN Brings a Shift to Packet-Centric Optical Transport

Wu Xiangjun

Being a basic support network for telecom services operation, the transport network is progressing to satisfy the multi-service bearer requirement. The Synchronous Digital Hierarchy (SDH) equipment based on circuit cross connection has experienced the golden age of development over the past ten years, covering nearly all equipment hierarchies in the telecom network including core layer, convergence layer and access layer. Later on, driven by IP services, Multi-service Transport Platform (MSTP) equipment has been greatly improved. Although the MSTP equipment, with additional interfaces to some data services, can implement transparent data transmission and simple service convergence, it is still the circuit cross-connected SDH equipment. In recent years, as IP-based services such as fixed-line data and 3G services have spread

from the edge to the core of the telecom network, the transport network will be inevitably transformed to IP, i.e., it will evolve from a circuit cross-connected nature to a packet-switched network.

It is generally agreed among both network operators and equipment vendors to introduce a packet-switched core into the transport network. Vendors and standard organizations have launched their packet transport network (PTN) equipment one after another based on three major technologies: Transport Multi-protocol Label Switching (T-MPLS), Provider Backbone Transport (PBT) and Ethernet Over MPLS (EOMPLS).

T-MPLS

T-MPLS adopts the IP-based MPLS technology to simplify the complex control protocols and data plane, to enhance OAM, protection switching and restoration capabilities, and to offer

reliable QoS and bandwidth statistic multiplexing functions. The relevant T-MPLS standards provide a complete carrier-class solution for the deployment of packet-switched transport network. But one point that should be noted is that T-MPLS removes the IP functions that are independent of transmission so as to maintain a complete point-to-point OAM mechanism.

The T-MPLS technology has the following benefits:
- Leverages technical advantages of the connection-oriented MPLS in QoS, bandwidth sharing and Diff-Serv;
- Simplifies the complex MPLS protocol stack and data plane, and removes unnecessary forwarding processes to meet the need for packet transport;
- Introduces the layered network concept, making the T-MPLS network layers independent of user

signals and control network signals;

■ Provides OAM and protection switching capabilities.

PBT

PBT, an enhancement to Provider Backbone Bridge (PBB), allows carriers to provide engineered and protected point-to-point service. It operates by adding configured routes to nearly standard Provider Backbone Bridged Network (PBBN). With improvements made to PBB, PBT provides distinct advantages. It is simpler and more secure since the provider MAC is not visible to the user MAC, and the backbone network doesn't need to handle the user MAC. Moreover, it offers high reliability, good expandability and manageability.

The PBT technology provides the following features:

■ Utilizes the provider MAC and B-TAG for service forwarding, enabling carriers to control the carrier-class Ethernet and isolate the user network;

■ Adds new tag called I-TAG to identify a service instance;

■ Disables traditional Ethernet functions at the network layer including complex MAC address learning, broadcasting and spanning tree protocols (STP) to avoid flooding of broadcast packets;

■ Utilizes the provider MAC and VLAN ID to direct the forwarding of traffic through the network, thus offering connection-oriented features and ability to implement functions necessary for carrier-class network including protection switching, OAM, QoS and traffic engineering.

■ Supports full compatibility with traditional Ethernet bridge hardware.

EOMPLS

EOMPLS, a simplified version of MPLS, uses the link layer set up by the MPLS protocol to carry Ethernet services and transport multiple services via the Pseudo Wire Emulation Edge-to-Edge (PWE3) technology. It removes IP connectionless protocols, reserves the original link control protocols and enhances OAM and protection capabilities. The EOMPLS technology can directly use the MPLS control plane to set up connections.

At present, it is difficult to determine which one of the above three packet transport technologies will become the mainstream technology. It depends on the winner in the game among three major technology camps and the maturity of the downstream industry chain. The three technologies have something in common, which are also the requisites for PTN equipment, listed below:

■ Provides packet-switched core to improve transport efficiency of IP-based services;

■ Provides connection-oriented features to satisfy carrier-class requirements for manageability and configurability;

■ Provides OAM and connection protection capabilities.

The three technologies, based on data bridge equipment and MPLS routers, have the packet-switched nature but offer relatively complex link control protocols. PTN equipment is designed to simplify these complex control protocols. It enhances link connection management and supervision, and adds unique protection functions of the SDH equipment while reducing protocol complexity.

Although different in core software running, the three technologies tend to provide similar hardware and may ultimately converge.

ZTE's R&D Strength on PTN

As a well-known optical communications equipment manufacturer, ZTE takes an active part in drafting and modifying PTN standards. The company participated in the ITU T-MPLS industry standardization work, with over nine proposals being approved and accepted; it also actively participated in the PTN interoperability test worldwide.

ZTE's ZXMP S385 came out with excellent performance in the EANTC test conducted in September 2007. The equipment implemented GE interoperability at the User Network Interface (UNI) and the Network Node Interface (NNI) respectively, and SDH/SONET interoperability at the NNI and passed all T-MPLS test items including label mapping, Diff-Serv, label switching, linear path protection switching and OAM. In the T-MPLS path protection switching test, ZXMP S385 achieved the best result in the industry. ZTE has completed the industry's first T-MPLS based PTN interoperability test with multiple vendors like Alcatel-Lucent and Tellabs.

ZTE will soon launch its packet-switched based PTN product series, which inherits basic features of carrier-class transport equipment such as QoS, OAM/APS and clock delivery, and it can be loaded with different softwares to accommodate T-MPLS, PBT and EOMPLS technologies. ZTE designs its PTN products considering their compatibility with the traditional MSTP products, allowing smooth service interoperability and unified management of the two equipment.

A full packet-based transmission network is an inevitable trend, which will lead to a revolution in transmission. ZTE's optical network product department has actively conducted research and development of the relative products. The department is also capable of delivering total solutions to the ultimate converged network–the packet-switched optical network.

ZTE TECHNOLOGIES

Innovative Indoor Coverage Solution for Next-Generation GSM

Zhu Jie

The rapid development in wireless technologies and complex operation scenarios are imposing new and innovative requirements on GSM networks. For example, WiFi Access Point (AP) and home gateway have been considered optional for traditional mobile networks. Today the meaning of a GSM network, the most commonly used wireless platform worldwide, has been enriched and even overturned.

With the growing Fixed-Mobile Convergence (FMC) trend and the marketing of Enhanced Data rates for GSM Evolution (EDGE) technology, GSM networks are facing new opportunities and challenges. Indoor coverage has increasingly become a major concern of mobile operators

because nearly 70% of voice traffic comes from indoor usage of the mobile phone and data services and FMC applications frequently occur indoors. To meet the rising customer expectations for seamless coverage, ZTE puts forward an innovative indoor coverage solution for Next-Generation GSM (NG-GSM).

NG-GSM has three major characteristics: efficient utilization of resources including wireless resource, power resource and transmission resource; software defined radio; and customized services such as FMC to satisfy customers' diversified needs.

Considering the weaknesses in traditional indoor coverage solution (high-cost cable, high engineering cost, inconvenient capacity expansion and

inability to provide FMC feature), ZTE adopts a GSM Pico BTS–ZXG10 S8001 in its new indoor coverage solution, aiming to provide very efficient, robust, low-cost and low-power wireless applications.

ZTE's indoor coverage solution supports the following functionalities:

■ **EGPRS and WiFi**

ZTE's NG-GSM indoor coverage solution supports circuit-switched voice services including Full Rate, Enhanced Full Rate, Half Rate, Adaptive Multi-Rate (FR/EFR/HR/AMR); circuit-switched data services such as 9.6 Kbps, 4.8 Kbps and 2.4 Kbps full-rate data traffic; General Packet Radio Service (GPRS) coding schemes (CS-1 to CS-4) and Enhanced GPRS (EGPRS) modulation coding schemes (MCS1 to MCS9); and unlicensed mobile access such as optional WiFi.

■ **IP transmission**

ZXG10 S8001 has IP Abis interface. The Abis over IP brings the advantages of lower cost and flexible networking of IP backhaul, maximizing transmission resource utilization.

■ **Power over Ethernet**

ZXG10 S8001 is a GSM BTS used for indoor pico-cell coverage. Its power supply is specially designed for indoor application. It supports both GSM EDGE Radio Access Network (GERAN) and WiFi access. Based on the IP Abis structure, ZXG10 S8001 can be energized by the local AC power, lithium battery or the Power over Ethernet (PoE) supply.

■ **Fast and easy installation**

ZXG10 S8001 is the smallest portable GSM BTS in the industry. Because it has small size and light weight, it is very convenient to carry and install. It can be mounted onto a wall or ceiling, or placed on a desk.

■ **ADSL and home gateway**

ZTE's NG-GSM indoor coverage solution offers optional choices to

multiple application scenarios. It supports ADSL and home gateway for enterprise and home applications. ZTE is developing optional functions to meet more wireless indoor applications in the future, making people enjoy wireless control and flexible data services access anywhere and anytime.

A typical networking of ZXG10 S8001 is shown in Figure 1, where the red dotted line represents small enterprises or home applications and
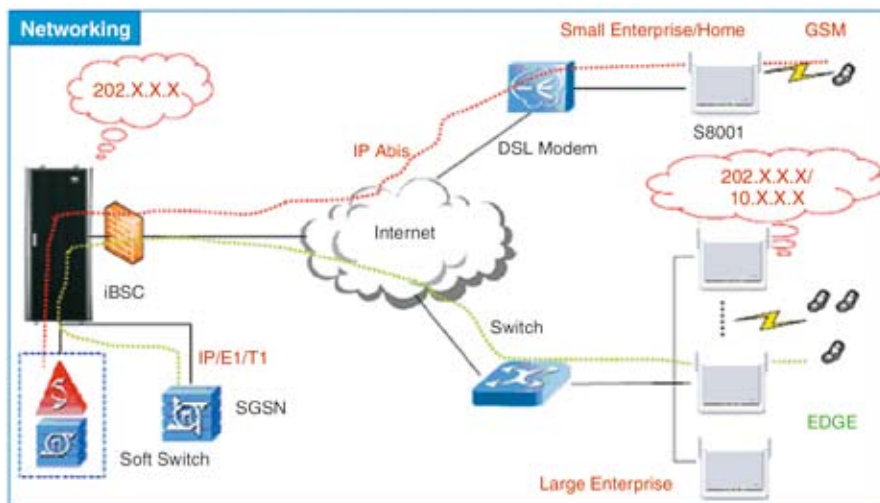

Figure 1   Typical Networking of ZXG10 S8001

Figure 2   Two shell types of ZXG10 S8001

The specifications of this Pico BTS are given in the following table.

Items	Specifications
Capacity	1 TRX
Dimension (H×W×D mm)	265× 200 × 58
Weight	<2Kg
Operating Temperature	-5°C to +45°C
Relative Humidity	20% to 80%
Receiver Sensitivity	-100dBm
TX Output Power	30mW to 200mW
Peak Power Consumption	<13W
Power Supply	Power over Ethernet (PoE) (Optional) Local AC power, lithium battery
Power Requirements	220V AC (130V AC to 300V AC) 110V AC (88V AC to 132V AC)
Installation	Hang up on the wall or place on the desk
Protection Class	IP30
MTBF	≥ 100,000 hours

the green dotted line indicates large enterprise applications.

The Pico BTS, ZXG10 S8001 is designed in two shell types having the same size, as shown in Figure 2.

ZXG10 S8001 has a coverage radius of about 50 meters and can penetrate deep inside a building (about 3 layers of wall). The pilot statistic data shows that the Pico BTS provides an efficient way to solve the indoor coverage problem while lowering the total cost by at least 30%.

ZTE's GSM Pico BTS is regarded as an indoor wireless gateway that satisfies indoor mobile coverage and higher speed data communication requirements. It supports all functions of GERAN BTS, including EGPRS function from MCS1 to MCS9, and WiFi access. Its small physical dimensions and light weight make it easier to deploy, install and swap; its IP-based Abis interface and optional function design make it adaptable in future evolution. It is a good choice for blind area coverage, hot spot coverage and data service expansion. **ZTE** TECHNOLOGIES

ZTE's UMTS Home Access Solution

Zhu Junman, Zhang Jing

As 3G networks enjoy increasing popularity worldwide, more and more subscribers are expecting to access high-quality and high-speed data services. Local and foreign mobile operators are all striving to enter the more lucrative broadband market instead of remaining subject to the restraints of traditional mobile communications. Today the Universal Mobile Telecommunication System (UMTS) can use the High Speed Downlink Packet Access (HSDPA) and High Speed Uplink Packet Access (HSUPA) technologies to offer more flexible wireless broadband services to subscribers.

Current estimates say that approximately 80 percent of data

services are used indoors. Therefore, the key for the operators to survive in the competition is to deliver highly efficient indoor coverage solution that supports high-speed data service applications and smooth evolution to fixed mobile convergence (FMC).

Introduction to ZX UHA Solution

ZTE has proposed an innovative UMTS indoor coverage solution, or UMTS Home Access (ZX UHA) solution. To fully meet the requirements of the operators and subscribers, the UHA solution uses ZTE's UMTS Home NodeB (ZX HNodeB for short) to implement low-cost indoor coverage. ZX HNodeB is designed in full compliance with 3GPP standards. In addition to standard 3GPP network architecture and interfaces, ZX HNodeB provides home and enterprise users with many attractions such as low cost, user-defined access authority, user location notice and customized functions. ZTE is the first in the industry to commercially launch its UHA solution.

Both operators and subscribers can benefit from the ZX UHA solution. It is a cost-effective means for operators to enhance their network capability and attract new home access subscribers. The benefits of the ZX UHA solution brings operators are described below:

- Offers abundant wireless data services via the fixed access network while lowering the mobile network's CAPEX;
- Provides a better QoS guarantee with interference reduction;
- Develops more attractive tariff plans;
- Controls all services via the access point and gets ready for the all-IP era;
- Attracts end-users through easy access to high-speed data services.

From an end user's perspective, the ZX UHA solution provides cheap, convenient and quality services. It helps end users save fixed line installation fee, allowing them to enjoy the best "family package" price through the access of multiple terminals without having to buy any special terminal; it allows easy dialing access to feature-rich services via the mobile terminal without re-entering user name and password; it allows one family to access all fixed and mobile services through one number and to be charged in one bill, and allows all home terminals to share a common mailbox; and it allows end users to enjoy quality services by significantly expanding home coverage and enhancing data bandwidth.

Network architecture

The ZX UHA solution has the strengths of both Unlicensed Mobile Access (UMA) and Wireless Local Area Network (WLAN) in delivering wireless access services, and avoids their weaknesses such as unlicensed frequency bands. Its network architecture is shown in Figure 1.

The ZX UHA solution, based on the standard 3GPP network architecture, can access traditional core networks (CN) including ZX HNodeB, Domestic Node Concentrator (DNC) and Security Gateway (SGW). Among them, ZX HNodeB (or ZXWR H8901) and DNC are the main network elements.

ZX HNodeB is an indoor wireless gateway based on the UMTS FDD technology. It adopts the 3GPP standard, Uu interface, to support the access of 3G terminals, and the IP-based standard, lub interface, to access 3G mobile networks. Moreover, it also has the features of a home gateway, such as WiFi access, xDSL modem, routing, and VoIP. The ZX HNodeB photo is shown in Figure 2.

Figure 2   ZX HNodeB

ZX DNC acts as a radio network controller (RNC) in the UHA system that can be connected to the CN via the standard lu interface. In addition to the functionalities of RNC defined in 3GPP, it also supports some specific control and IPSec gateway functions such as user access control, HNodeB access control, HNodeB location management and network parameters delivery.

System interfaces

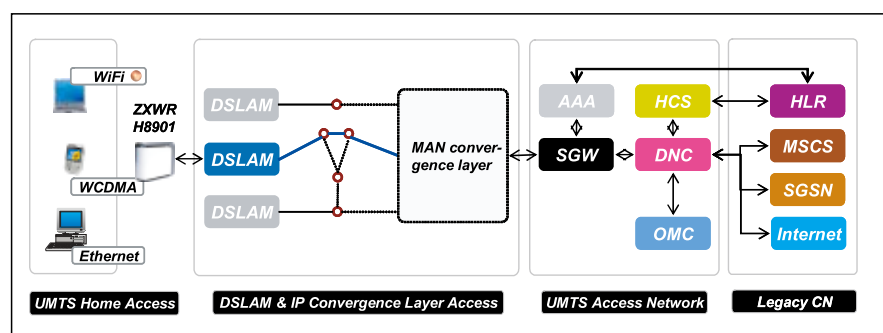The ZX UHA system has open and standard internal and external interfaces

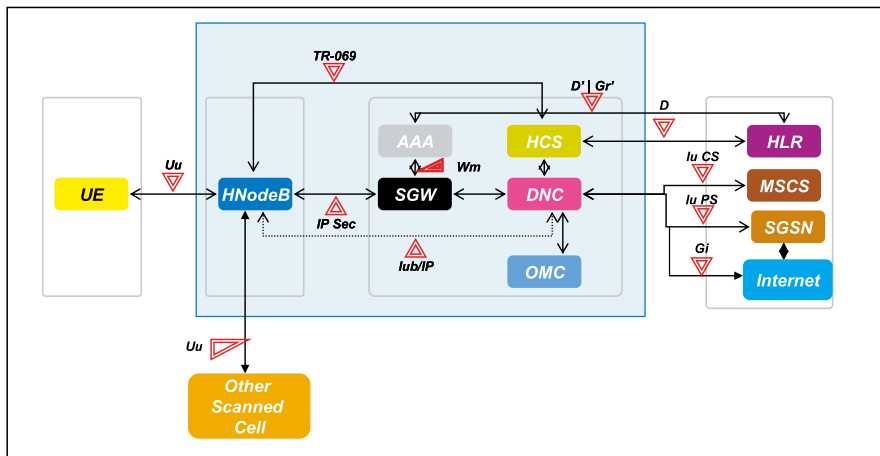**Figure 1   Network architecture of ZX UHA solution**

Figure 3   ZX UHA system interfaces

as illustrated in Figure 3.

From the figure we can conclude that the ZX UHA system has no impact on the UMTS network or special requirements for UMTS terminals. It is an open system with all internal and external interfaces in full compliance with relative 3GPP, IETF and IEEE standards.

Features of ZX UHA Solution

As a home access solution in the WCDMA system, ZX UHA can fully support functionalities defined in 3GPP while offering user-related features, such as Plug and Play (PnP) and authorization management, to match the specific home and enterprise application scenarios.

Support of UMTS services and seamless access to UMTS network

ZX UHA supports all UMTS R99 and HSDPA services including voice, video and data communications. Moreover, it supports roaming or handoff between outdoor macro cells and HNodeB cells.

Safe and reliable user authorization management

ZX UHA provides user equipment (UE) access permission, HNodeB access permission and installation location management to make sure that the HNodeB is used legally. It also supports powerful geographical location indication and user location notice to implement highly reliable, fast and accurate positioning.

Easy maintenance

ZX UHA supports automatic configuration, adaptive network planning and easy-to-use PnP capability. The equipment maintenance and software upgrade can be controlled remotely. Besides, it provides priority cell selection, allowing the UE to be prioritized in the HNodeB cell to access quality network service at lower cost when it is located in common areas covered by PLMAN cell and HNodeB cell.

IP-based characteristics

ZX UHA can transfer IP data through multiple access modes such as ADSL, VDSL, ADSL2+, WiMAX and FTTx. In addition to 3GPP QoS, ZX UHA also supports IP transmission QoS to guarantee higher priority of certain special users and services. The IPSec protocol between ZX HNodeB and ZX DNC can guarantee safe message passing.

Evolution of ZX UHA Solution

ZX UHA solution involves three phases of evolution, which are all compatible with legacy CN, IMS CN, 3GPP R99/R5 terminals and IMS terminals. As illustrated in Figure 1, the network architecture of ZX UHA solution in the first phase is based on ZX DNC and ZX HNodeB. The network architecture of phase-2 ZX UHA solution is shown in Figure 4.

In the second phase, DNC integrates the Serving GPRS Support Node (SGSN) and Gateway GPRS Support Node (GGSN) functionalities. It provides the Gi interface for interconnection with IMS, the Internet and application servers. To reduce the load of the core network, it can be connected to GGSN via the Gn interface.

With the development and evolution of communications technology, network convergence is unavoidable. It is urgent to solve the problem of fixed mobile convergence (FMC). Due to the
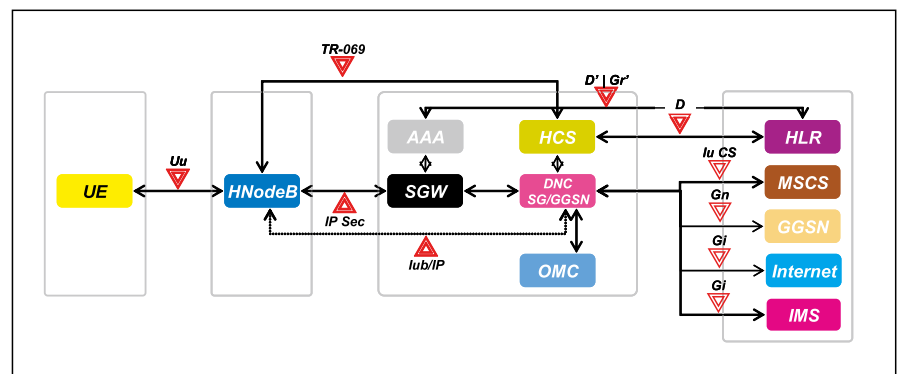

Figure 4   Network architecture of phase-2 ZX UHA solution

advantages of unified trigger and routing mechanisms as well as interoperability specifications, IMS is expected to become the mainstream technology for FMC by 2009. The phase-3 ZX UHA solution is based on the IMS network architecture, where DNC is integrated to an IMS network entity (PDG). It has a flat network architecture, as shown in Figure 5.

In the third phase, the Session Initiation Protocol (SIP)-based user data and signaling are carried over IP.

ZX HNodeB acts as a SIP client; the SIP server, as a core network element, provides the control functions while the QoS at the transport layer is guaranteed by IMS.

The first phase of ZX UHA solution has been available since the end of 2007. The second and third phases of the solution will be completed by 2008 Q2 and 2009 Q2 respectively. They support smooth evolution, offering an advanced FMC solution to operators.

In October 2007, ZTE rolled out the first commercial HNodeB (H8901 and DNC V1.0) that fully supports 3GPP R99 and HSDPA services. Its hardware supports HSUPA. With complete functionalities and outstanding performance, the ZX UHA system has passed the tests by different operators in many countries including HongKong, England, France and Italy.

Conclusion

Based on strong technical strength and a deep understanding of 3G market demands, ZTE has launched its ZX UHA solution featuring standard UMTS network architecture, open interfaces and customer-built functions that can satisfy the operators' requirements for enhanced indoor coverage, high-speed mobile data service provisioning and smooth evolution to FMC. The ZX UHA solution introduces new technologies and is able to maintain seamless connection to legacy networks at the same time, thus fully improving operators' competitiveness.
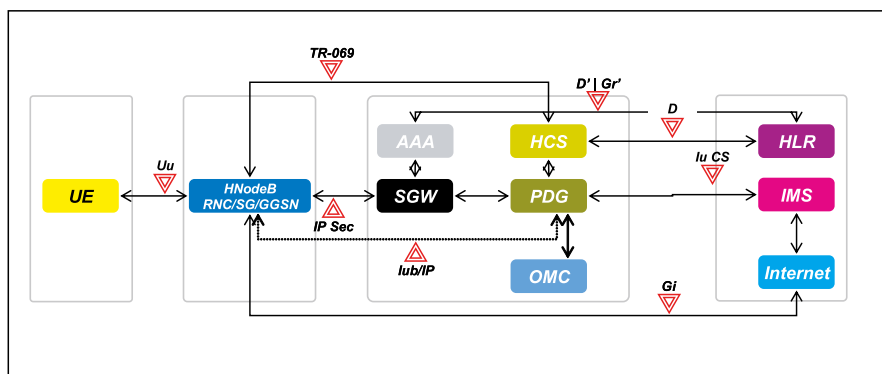
ZTE TECHNOLOGIES

Figure 5   Network architecture of phase-3 ZXUHA solution

ZTE Igniting Next Generation Broadband Revolution

Sameer Ashfaq Malik

Theme

For the first time in history, we can now claim to live in "One World", because the 21st century has ushered in a new era in man's ongoing quest for a better life and a better world. Due to the globalization phenomena, gaps are quickly removed among nations. While the physical divide is still present, the impact of the Information Highway on how we communicate and live in the present day is simply staggering. Through globalization, cultural exchange is now open and dynamic. Rapid improvements in information technology have allowed us to exchange information and communicate almost anywhere and anytime.

Broadband Services Drive Productivity and GDP Growth

Most of today's economies are knowledge-based or at least in transition from industrial to knowledge-based economies.

The Internet gives the productive population immediate access to any sort of information. The efficient use of this tool has given many large organizations a competitive edge and there has been a sudden shift during the last two to four years from the need to access information rapidly to the need to learn and absorb it.

The Impact of broadband services on productivity, broadband penetration and GDP growth is very well explained in Figure 1.

In fact, true, widespread, broadband availability can have an important impact upon the productivity and growth of both business organizations and national economies.

ZTE's Broadband Access Technologies

As a renowned telecommunications equipment and solutions provider, ZTE began to engage in the research on the broadband access technology and related products in 1997.
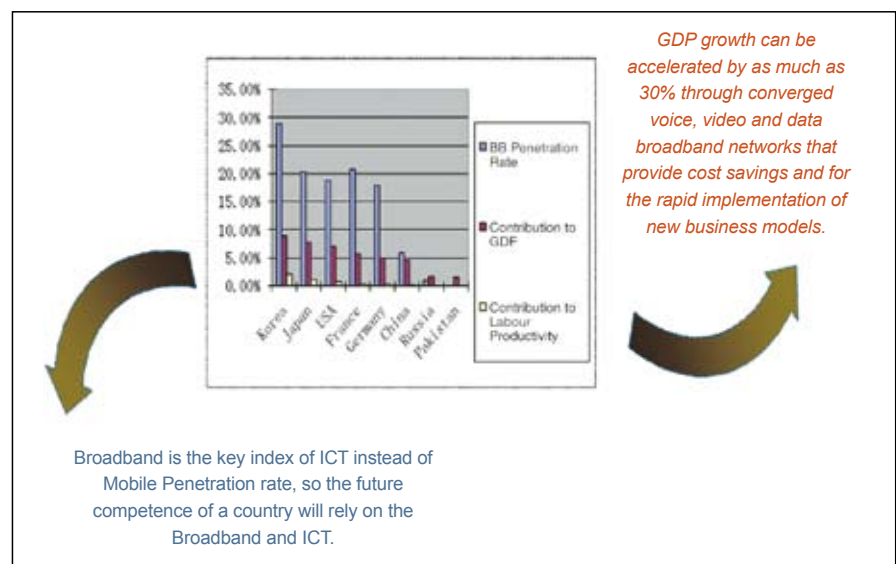

GDP growth can be accelerated by as much as 30% through converged voice, video and data broadband networks that provide cost savings and for the rapid implementation of new business models.

Broadband is the key index of ICT instead of Mobile Penetration rate, so the future competence of a country will rely on the Broadband and ICT.

Figure 1   Co-relation between ICT and GDP growth factor

As well represented in Figure 2, a single "killer service" will not stand long and new integrated service or solution will prevail in the coming future as market trend. Subscriber cares about the quality, the swiftness, and the cost of the service rather than the technology itself.

ZTE has good forward-looking insights in the perception of technology and marketplace and now its global DSL deployments have exceeded more than 18 million lines.

ZTE's DSL broadband access technology features no line reconstruction, fast deployment, high efficiency in tapping existing networks and high return on investments, so today it has been widely adopted as a mainstream broadband data access technology by operators. With the rapid construction of broadband data networks, ZTE deployed its DSL application solution in more than 40 countries and enjoyed top 3 market share in DSL broadband worldwide according to Gartner's report.

ZTE is the only vendor that provides MSAN to MSAG upgrade solutions, such as:
■ Upgrade OLT to MSAG without the need to change ONU and built-in MSTP
■ Upgrade ONU to MSAG to realize end-to-end VoIP

ZTE is providing a mix of EPON and VDSL2 technology to fulfill the ongoing demands of operators for higher broadband solution. Thus, ZTE is the first vendor to integrate VDSL2 and PON into MSAN system.

ZTE follows the development of PON technology and has developed a series of relative technologies. At the same time, it introduces PON technology into
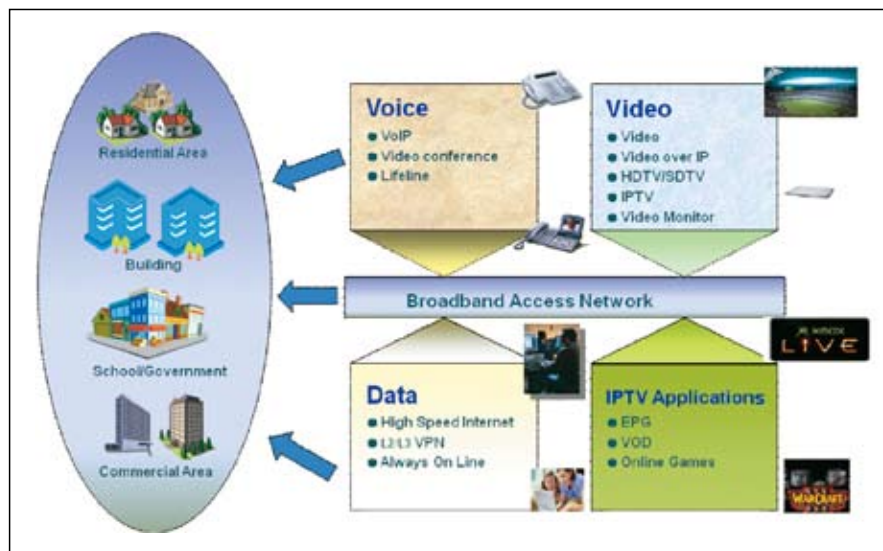

Figure 2　Service driven solution for broadband access network

DSLAM and MSAN products to enrich the broadband access methods.

ZTE's broadband solution supports converged applications that handle high-speed IP traffic to and from users, by providing 6 Mbit/s or higher access to enable the development of productivity, education and entertainment application solutions and will be scalable to higher speeds in the future.

ZTE also launched the broadband operation and maintenance system in early 2003. This system provides technical support for the operators to subdivide their customers, deliver differentiated services and value-added services, optimize their networks, and

❝ ZTE deployed its DSL application solution in more than 40 countries and enjoyed top 3 market share in DSL broadband worldwide according to Gartner's report"

further implement, under scaled DSL application, the operation mode and profit-making mode, thus achieving the goal of improving revenue with lower costs, and enhancing efficiency with better services.

In a nutshell, ZTE integrates its advanced technologies and abundant network operation experience to roll out the integrated broadband solution system. Tone service will still be the major income of telecom carriers, however, the proportion of data, multi-media service will share the huge proportion and thus deployment of integrated broadband operation and maintenance system will improve the

telecom operators' supporting capabilities for all kinds of services, providing a reliable guarantee for the operation of high-quality services and the provision of carrier-grade broadband services.

Hence, ZTE is a global leader with mass deployed service delivery and management platforms for broadband solutions and has state-of-the-art FTTX, DSLAM, MSAN/MSAG solutions to offer fully integrated services to the end customers.
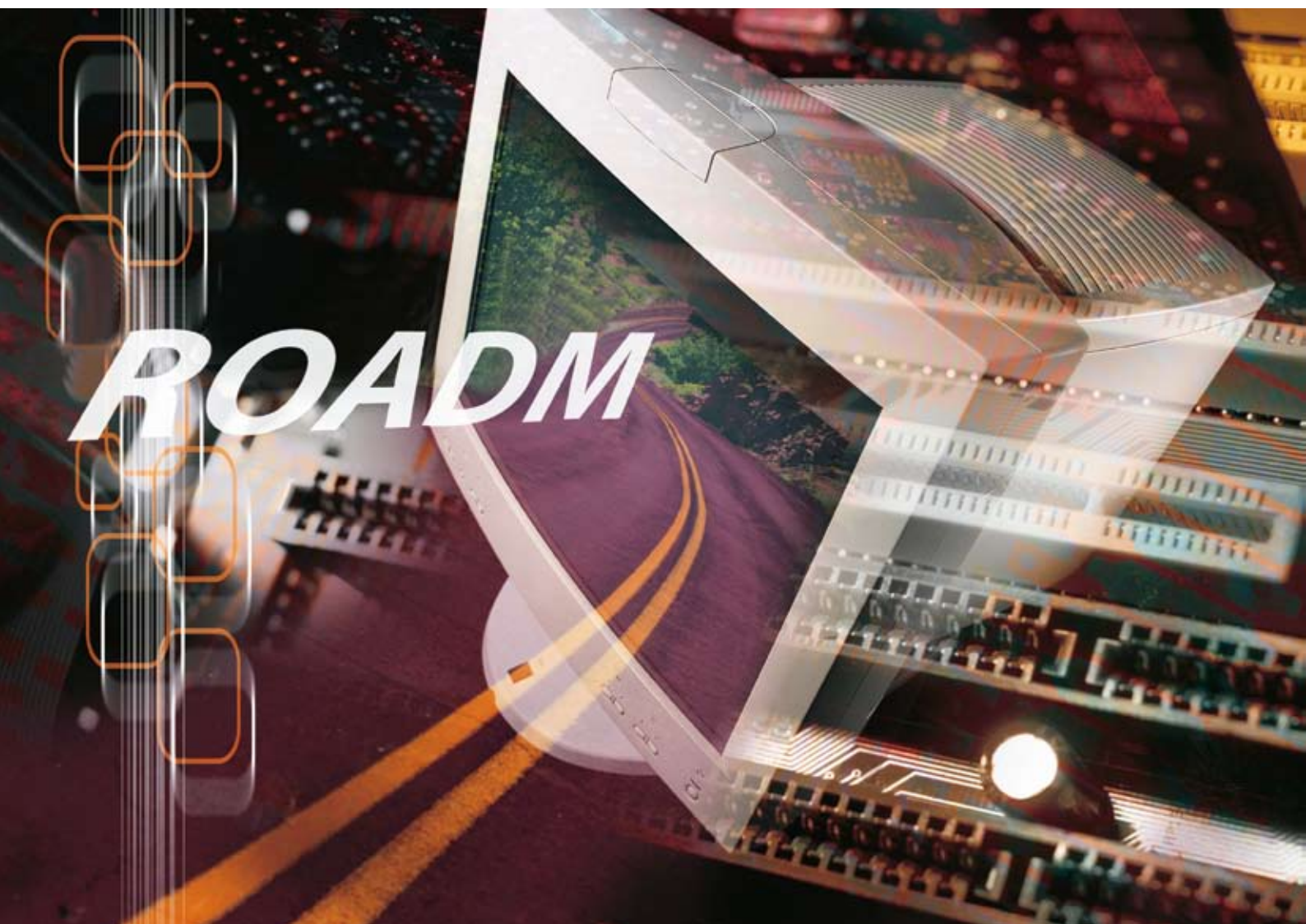
The Technology and Evolution of ROADM

Liu Xiaofeng

Background

Nowadays, IP-based services like IPTV, triple play and VoIP are emerging in every sector of telecommunications. Compared to traditional telecom services, these new services possess higher real-time nature and unpredictability. Therefore, it is necessary for the transport network to have higher flexibility, faster service provisioning and better network protection and recovery capabilities.

As the early Wave Division Multiplexing (WDM) system could not allow a true optical-layer networking, its Terminal Multiplexer (TM) is just a point-to-point (P2P) line system. Although the subsequent Optical Add/Drop Multiplexer (OADM) evolves from P2P networking to ring networking, it can simply add and drop a fixed number of optical channels at fixed wavelengths. Neither WDM nor OADM can meet the requirements of IP or packet-switched service networks on service scheduling capability, reliability, maintainability, scalability and manageability. In response to the trend towards IP networks, a new optical-layer networking technology, represented by Reconfigurable Optical Add/Drop Multiplexer (ROADM), is introduced; it offers a new idea to build the basic bearing network.

Brief Introduction to ROADM Technology

ROADM, a network element (NE) similar to SDH ADM, can add, drop and pass-through optical channels at one node. It can complete configuration and adjustment of add/drop wavelengths by remotely controlling its subsystems through software. Three technologies are available for the ROADM subsystems: Planar Lightwave Circuit (PLC), Wavelength Blocker (WB) and Wavelength Selective Switch (WSS).

PLC

The PLC-based ROADM uses the integrated Arrayed Waveguide Grating (AWG) to multiplex and de-multiplex wavelengths. The integrated optical switch passes through, blocks or adds wavelengths; the integrated Variable Optical Attenuator (VOA) implements dynamic equalization of optical power in each channel. PLC has the following advantages and disadvantages:
- ■ Advantages: mature and reliable multiplexer/demultiplexer, small

insertion loss in a node, low cost in adding/dropping many wavelengths and easy upgrade to OXC
- ■ Disadvantages: poor modular structure, high cost in initial configuration and unreliable large-capacity cross-connect matrix

WB

WB blocks the wavelength selected to be dropped. It is actually a 2-dimensional component supporting 100GHz and 50GHz channel spacing, as shown in Figure 1. With mature technology and low cost, WB is applicable for Long Haul (LH) and Ultra Long Haul (ULH) systems. WB has the following advantages and disadvantages:
- ■ Advantages: simple structure, modular structure, low cost in adding/dropping few wavelengths, flexible scalability, channel power equalization capability and support of broadcast services
- ■ Disadvantages: high cost in adding/dropping many wavelengths (high-cost separated tunable filter) and difficult upgrade to OXC

WSS

Based on the Micro Electro-Mechanical System (MEMS) platform, WSS features wide frequency band and low dispersion. It supports high-dimensional integration and complex control mechanism, and is becoming a preferred technology for multi-dimension ROADM. WSS has the following advantages and disadvantages.
- ■ Advantages: simple structure, flexible port assignment, good wavelength scalability and easy upgrade to OXC
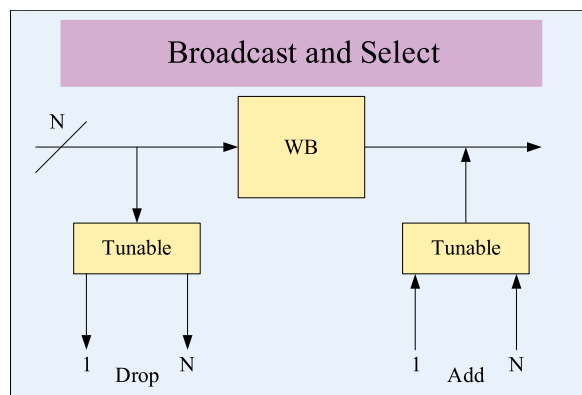- ■ Disadvantages: the add node has

Figure 1   Broadcast-and-select structure

high cost and the drop node doesn't support broadcast service

ROADM Evolution

The all-optical based ROADM has restrictions in network flexibility and bandwidth utilization because it only processes optical wavelengths but can not switch or aggregate sub-wavelengths such as GE and 2.5G services in a 10G wavelength system. Moreover, the volume and direction of traffic flow in the backbone network cannot be changed freely due to the restriction in physical transmission distance, which brings complexity in network planning.

The above weaknesses give rise to the introduction of the ROADM+OTN equipment. It adopts the all-optical mode to directly pass through or add/drop 10G or above wavelength services while dropping the GE or 2.5G wavelength services to the circuit cross-connected board and then add/drop and multiplex them in the electric domain.

ZTE's ROADM Products

Through the analysis on different customers' demands for intelligent transmission equipment and the comparison of advantages and disadvantages of the existing technologies, ZTE has made a development plan for multiple ROADM products to fulfill customers'
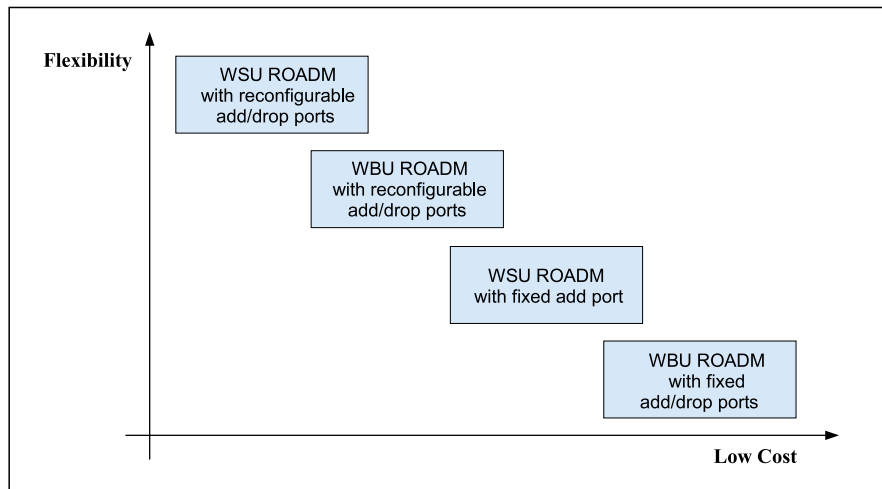
Figure 2   ROADM product types and their evolution

expectations and demands with respect to equipment function and cost. Figure 2 shows ROADM product types and their evolution trends.

■ Low-cost ROADM products

Low-cost ROADM products have fixed add/drop ports or fixed add ports. They are applicable in situations that need wavelength add/drop configuration but have no requirement for port assignment.

The low-cost ROADM products fall into either one of these two types: WB ROADM with fixed add/drop ports and WSS ROADM with fixed add port. The WB ROADM employs the fixed filter and the fixed add wavelength service board in place of the expensive tunable filter and tunable laser. This saves costs but doesn't assign add/drop wavelengths to the port. The WSS ROADM adopts the fixed add wavelength service board and supports drop port assignment.

■ Versatile ROADM products

Versatile ROADM products can reconfigure add/drop wavelengths, assign any wavelength to any port, and have the flexibility to provide intelligent networking. They can be divided into two types: WB ROADM with reconfigurable add/drop ports and WSS ROADM with reconfigurable add/drop

ports. The WB ROADM utilizes the tunable filter and the tunable wavelength laser while the WSS ROADM employs only the tunable wavelength laser. The cost of versatile ROADM products depends on the cost of integrated components such as tunable filter and WSS.
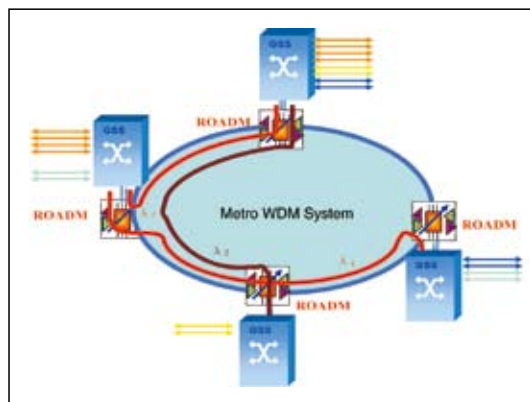

Figure 3   Integrated ROADM GSS platform

ZTE has successfully rolled out its Unitrans ROADM equipment ranging from low-cost ROADM products to versatile ROADM products. Under full configuration, the equipment can add/drop up to 40/80 wavelengths and configure any wavelength to any port.

■ ROADM+OTN products

To complement the weaknesses of existing ROADM, and to adapt to the

future technology advancement, ZTE has launched General Service Switch (GSS) platform, which is an electrical cross-connect subsystem.

GSS supports the ITU-T Recommendation G709, "Network Node Interface for the Optical Transport Networks" and Recommendation G.872, "Architecture of Optical Transport Network". It can cross-connect 2.5G sub-wavelengths on a backplane and the sub-wavelengths can be tunable at the aggregate end; it assigns signal entry and exit ends so that when connection request arrives, the route is generated automatically; it supports smooth system upgrade and independent expansions on the client and line sides, maximizing network bandwidth usage and saving investments.

GSS can be coupled with ROADM to cross-connect and dispatch optical wavelengths and sub-wavelengths, which greatly increases network dispatching flexibility and wavelength utilization, thus enabling the add/drop functionality on any data traffic.

Conclusion

It is a trend to build an intelligent DWDM network. Backed by flexible and powerful wavelength reconfigurable function, the ROADM equipment is capable of delivering a complete solution for the intelligent transport network. Operators can choose different ROADM equipment to satisfy their specific networking requirement. Today, price is still the key factor affecting the widespread deployment of ROADM equipment. Developing the ROADM-based protocols that support automatic and intelligent wavelength dispatch will become one of the main research trends for optical equipment vendors.   **ZTE TECHNOLOGIES**

ZTE's Integrated Power Solution

Wei Shuwang

Overview

The telecommunication power supply system consists of five parts: AC power distribution unit, DC power distribution unit, rectifiers, monitoring unit and storage batteries. Traditionally, the former four parts are installed in the same cabinet while the storage batteries are placed on a battery rack. Both the cabinet and the battery rack are placed in the same equipment room.

With the continuous development of telecommunications, there are many factors affecting the composition of the telecommunications power supply system. One important factor is the floor space of the equipment room. Operators hope that the power supply system will occupy smaller space so that they can pay less rent for the equipment room. A bulky power supply system means high business cost for operators. Therefore, there is an increasing demand for integrated telecommunications power supply system.

Integrated telecommunications power supply system means placing all five units of the power supply system into one cabinet for the purpose of saving space. Power supply products are typically bulky in size, and reducing their size might result in a decrease in system capacity. Operators usually require an integrated power supply system with a capacity of not more than 200AH. Most of the cabinet's space is occupied by 12V storage batteries. Generally, there will be one to four 48V battery packs and each pack contains four 12V storage batteries in series connection. The capacity of each battery pack is not more than 150AH.

Composition of Traditional Power Supply System

The makeup of a traditional power supply system is illustrated in Figure 1.

The traditional power supply system has been mature in structure after many years of development. Having
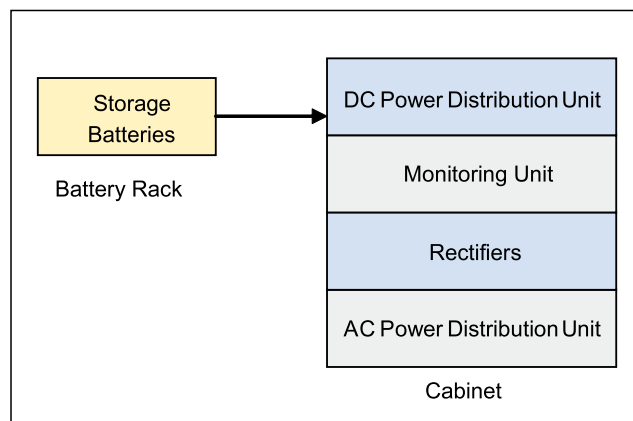

Figure 1   Traditional power supply system

a wide range of allowable AC input voltage and multi-level lightning protection mechanism are fundamental requirements for the telecommunications power supply system. Its future trend is towards high efficiency, high frequency, modular structure, intelligence and standardization.
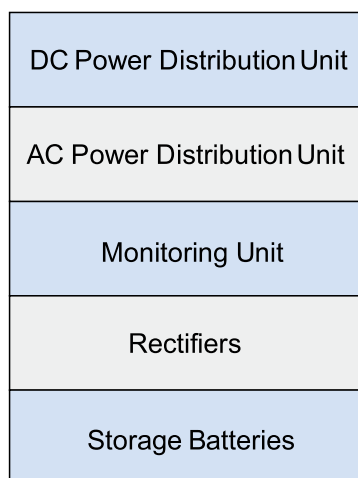
Composition of Integrated Power Supply System

An integrated power supply system contains the same five units except that they have different logical layouts. Its storage batteries are integrated into the

cabinet, as illustrated in Figure 2. For the sake of stability, the storage batteries are normally placed at the bottom of the cabinet. The integrated power solution is intended to help operators save equipment room space and reduce operational cost. It has the following features:

- Simple AC and DC power distribution
- Few load branches (less than 10 branches)
- Large-capacity storage batteries (300AH to 600AH)

| DC Power Distribution Unit |
| AC Power Distribution Unit |
| Monitoring Unit |
| Rectifiers |
| Storage Batteries |

Cabinet

Figure 2　Integrated power supply system

ZTE's Integrated Power Solution

Through more than ten years of development, ZTE is capable of delivering field-proven integrated power solution. Its integrated power supply system adopts modular design, with modules capable of being moved up and down inside the cabinet. The cabinet is designed in standard dimensions that can accommodate different power systems. ZTE's integrated power solution has found widespread commercial use and received favorable comments from operators worldwide.

Power distribution

The power distribution part includes the AC distribution unit and the DC distribution unit. The AC distribution unit completes AC power input, lightning protection and power distribution; the DC distribution unit is responsible for DC power output, storage battery access, lightning protection and power distribution. The AC power distribution unit adopts 2-level AC lightning protection mechanism with desirable decoupling design. The lightning protection at the DC side has also been improved. The two units can provide interface signals for the monitoring unit and support flexible AC and DC power distribution to meet users' needs.

Rectifiers

Rectifiers are key components of the integrated power supply system. They are responsible for converting the AC power to DC power. Normally, the AC voltage is converted to −48V or +24V DC voltage.

ZTE's new generation rectifiers are small in size and high in power density. The ZXD1500 (V4.0) rectifier and ZXD2400 (V4.0) rectifier have the same dimensions and can be installed in the same cabinet. This brings convenience in system expansion. The system capacity can be easily expanded simply by replacing the rectifier.

Monitoring unit

The monitoring unit, a management core of the integrated power supply system, collects necessary system information for monitoring at the foreground and background. It manages the system according to the pre-set parameters and reports alarms in the event of faults. The key component of the monitoring unit is the AVR microcontroller.

ZTE adopts the most advanced technologies as well as standard circuits and modules in hardware design and upgrades the monitoring software. The enhanced software can store history alarm and operation log, support online or remote download, and set multiple alarm levels.

Storage batteries

The storage batteries serve as an emergency standby power in the telecommunications power supply system. When the AC power is off, the system automatically shifts to the battery backup supply. The number of battery packs is configured according to the specific application needs. Generally, one to four 150AH/12V battery packs can be embedded in an integrated power supply system.

Conclusion

Different telecom equipment is energized by different power supply products. However, the space of the equipment room, especially the space of the base station, is quite limited. To save space and cost, operators usually desire to put different power products such as the DC/DC module, mini UPS and inverter into one cabinet. These embedded power products are all monitored by the same monitoring unit. With the development of telecom equipment room management and the increasing concern on business cost, the integration of power products tends to be more and more complex. **ZTE TECHNOLOGIES**

ZTE Deploys Managed Services in Ghana

Bao Guangjun

General

As a result of rapid technology development, changing customer demands and fierce competition, operators are increasingly adopting Managed Services, from where they outsource network and services related activities such as operation and maintenance, as a change agent to implement new business models.

ZTE's Managed Services are based on an agreed Service Level Agreement (SLA) with end-to-end Key Performance Indicators (KPIs) and responsibilities. ZTE has established a Managed Services team to provide the local operator

with paid telecom services including daily network operation, maintenance and management. These services are delivered to ensure secure and effective running of the specified network and facilities within a defined period of time. The Managed Services team provides technical support, and gives suggestions on network planning and development to help the operator reduce operational cost, and direct its efforts to core areas that generate more income.

ZTE's Managed Services bring the following benefits to the operator:

- Ensure network quality, security and reliability
- Lower Operational Expenditure (OPEX) and Capital Expenditure (CAPEX)
- Improve operation efficiency
- Speed up a new product's time-to-market
- Concentrate resources on key services

Ghana's Managed Services Project

The Ghana's Managed Services project was signed between ZTE Corporation and Hutchison Telecom and is now being implemented in Ghana, Africa. The project requires ZTE to provide three years of Managed Services for the whole network of Kasapa, a subsidiary of Hutchison Telecom and one of the four mobile operators in Ghana. This project involves two central equipment rooms and more than 110 sites, covering eight areas of the country.

The project was carried out with great difficulties. As a leader in the telecom industry, Hutchison Telecom posed severe specifications and requirements on the network, which put great pressure on the Managed Services provider.

There is a variety of core services on the network, of which many are highly customized, leading to great maintenance difficulties. Although

there are a small number of sites, they are located in different areas. The transportation condition is rather poor, and the power supply is quite inadequate in Ghana. About 40 of the 110 sites are not supplied by mains electricity, but are energized by diesel generators making power maintenance a hard work.

Figure 1   Plaques of recognition Kasapa won in 2006

Ghana is in scarcity of material resources; most of the maintenance materials must be imported. Besides, Ghana is located in the tropical rain forest area of West Africa, and suffers from heavy rainfalls in the rainy season. Furthermore, a lot of microwave transmission devices for the network have been used for more than 6 years. All these cause tremendous difficulties to implement Managed Services.

This is the first Managed Service project ZTE has ever implemented. Through continuous study and hard work, all members of ZTE's Managed Services team have been highly recognized by Kasapa for their diligence, wisdom, conscientiousness and dedication.

At the same time, the project has also helped Kasapa to win a good reputation in Ghana. In the first half of 2006, thanks to network quality and

development, Kasapa was awarded the "Top Mobile Provider in 1H 2006" by the Ghana Communications Committee. Kasapa also won three other awards issued by the Ghana Market Association, making it the only operator to receive three awards at once in Ghana. While earning many awards, Kasapa has given high-profile recognition to ZTE for its outstanding products and managed services.

ZTE's Managed Services

The Managed Services project had to meet the strict SLA and KPI requirements when it was started. ZTE's Managed Services team made a careful analysis of all inputs and outputs for the project. They worked out the detailed project implementation plans using the tools necessary for the outputs, and established the network maintenance rules and procedures. After that, they determined the specific person and time for each plan, and set one milestone after another. Every member of the project team took active actions, exerted concerted efforts and often overworked day and night.

To ensure stable network operation without transmission interruption,

power-off, data crash or base station failure, ZTE's Managed Services team took the following four precautions in the network operation and maintenance work:

■ **Preventive maintenance**

The Managed Service team has specified a Standard Operating Procedure (SOP) for each network element in the network, including transmission, power, switching, Base Station Controller (BSC), Base Transceiver Station (BTS), shelter, tower, diesel generator and air conditioner. The engineers responsible for daily maintenance performed preventive maintenance regularly, and recorded details of the running conditions of all the products according to the SOP requirement. These records are finally reported to the Managed Services expert group for analysis, and the analysis result help engineers take preventive precautions as required.

■ **Emergency maintenance**

In case of failure due to certain force majeure events, all maintenance group leaders, directed by the expert group, take charge of the emergency maintenance on site.

■ **Regular maintenance**

Regular maintenance includes weekly, monthly and quarterly maintenance according to the maintenance checklist.

■ **Irregular maintenance**

The administrative members of the team perform irregular on-the-spot maintenance tour. This task is to check the work of maintenance engineers and make major maintenance and rectification in certain sites.

Strong Managed Services Team

ZTE's Managed Services team started from scratch, and now it is getting stronger through continuous training and practice. The team trained 34 technicians and five administrative personnel in 2007. As shown in Figure 2, four of them were Chinese employees and the other 35 were local staff. This figure indicates 91% localization rate in Ghana.

The Managed Services are basically carried out in this mode: local employees perform the daily first-level maintenance; and then, Chinese and local employees perform the second and third levels of maintenance. Additionally, the service management is also localized. The team has trained several project managers, technical managers, and operation and maintenance directors.

Since the project was implemented in September 2005, ZTE's Managed Services team has overcome one difficulty after another to ensure smooth running of the network, and consequently ZTE has earned high recognition from Kasapa. Meanwhile, ZTE has gained a lot of experience in providing Managed Services, and established an effective and professional Managed Services team.
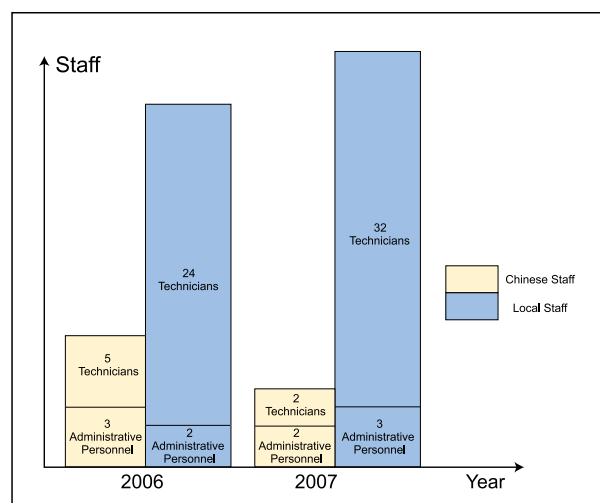

Figure 2 ZTE's Managed Services team in Ghana

This project is ZTE's first trial of Managed Services. It is also a milestone indicating the maturity of ZTE's Managed Services.

ZTE Breaks into the Group of Leading Global Handset Vendors

> **Being the only Chinese company among the world's top six mobile phone vendors, ZTE is widely regarded as one of the most fast-growing Asian enterprises in the telecom industry. This Shenzhen-based company is eyeing a top-notch mobile phone brand like its peers in higher positions from the first group, namely Nokia, Motorola and Sony-Ericsson"**

ZTE Corporation, one of China's largest telecom equipment vendors, is keeping abreast with South Korea's Samsung and LG in challenging traditional mobile phone magnates, according to a recent report by the Washington Post.

The report was based on the data of a market survey organization, Informa, which proclaimed that some 3.3 billion people, or half of the total population of the world, are using mobile phones.

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According to an earlier statement from ZTE, the company is providing services to 70 million subscribers throughout the world and sold 30 million mobile phones in 2007. The growth of the company is far quicker than Nokia and Samsung, and its market share is similar to that of LG and Sony-Ericsson.

Experts of the industry attributed ZTE's fast growth to some new and blooming markets in the globe as well as the improvement of ZTE's global operation capabilities. Early last year, ZTE reached a cooperation agreement with Vodafone, the world's largest mobile operator, for the provision of cost-effective mobile phones. According to the agreement, ZTE would supply some 2 million mobile phones to Vodafone in the first year. However, the Chinese company has so far supplied 6 million mobile phones, with more orders coming in hands. This has made ZTE a challenger for Nokia in cost-effective mobile phones oriented to new markets.

Nokia will reinforce its leading position in mobile phone sales in 2008,

and Samsung and LG are seeking for further development, according to the forecast of analysts from Korea Securities Trust Company.

Samsung will ship 230 million mobile phones, a 40.8% rise from last year. LG will ship 100 million mobile phones, a 28.8% rise from last year. They will pose great difficulties to Sony-Ericsson and Motorola, whose development has been decreasing due to the slowness in releasing new products and their relatively fewer product types, Korean analysts said.

"We are looking forward to a combat between the Asian group and the Western group," said an insider of the mobile phone industry. In terms of market share, these Asian vendors are almost equivalent to those traditional mobile phone magnates, among which, Nokia is actually playing a vital role.

Experts forecasted that the engines of the future mobile phone market would be emerging markets, including China, India, Brazil and Russia. Nokia has

shifted its focus from mature markets to emerging markets in order to maintain its market share.

ZTE has made significant breakthrough in developing markets, which could be best illustrated by its performance in India, the company's biggest overseas market. By the end of Q3 in 2007, ZTE had sold 10 million mobile phones in India and became the largest CDMA mobile phone brand there.

"ZTE's mobile phones have been supplied to more than 70 countries and regions in the world. We have set up cooperation with the world's top 10 multinational telecom operators, like Vodafone, Hutchison-Whampoa, French Telecom and British Telecom," said He Shiyou, ZTE's senior vice president and general manager of the mobile phone product division.

"Such cooperation has greatly improved ZTE's global operation capabilities and has given ZTE the recognition from operators abroad," he

said.

In 2007, ZTE joined hands with TELUS, a Canadian telecom operator, in selling EVDO mobile phone D90 in North America. It also partnered with Ukraine's PEOPLEnet in selling the Evolution 3G mobile phones. Together with Telefonica in Spain, ZTE supplied WCDMA 3G mobile phones. These efforts have laid a solid foundation for ZTE in making breakthroughs in the high-end 3G mobile phone market, according to Mr. He.

With globalized R&D and marketing teams, self-reliant technologies and products, powerful partners and a global service network, ZTE is dedicated to providing global customers with customized communication products and services. Mr. He expressed that in 2008, ZTE will continue exploring the emerging markets and will make an overall plan for high-end 3G mobile phones, multi-mode and intelligent mobile phones.

ZTE TECHNOLOGIES