

ZTE TECHNOLOGIES

Vol. 9 No. 12

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WiMAX
— A New Highlight for IMS

ZTE中兴



ZTE Top Honors in 2007

Company Image Honors

- ZTE was included in the "Top 10 Listed Companies in China" by BusinessWeek.
- ZTE was included in the "Most Respectable Companies in China in 2006" by the Economic Observer and Beijing University for 3 years continuously.
- ZTE was included in the "Top 10 IT & Telecommunication Companies in India".
- ZTE was chosen among the "Top 20 Most Globally Competitive Chinese Companies" in a business contest jointly organized by Roland Berger Strategy Consultants and Global Entrepreneurs Journal in China.
- ZTE was included in the "Top 10 Most Influential listed Companies in China" for 3 years continuously by China Stock Co. This award has been recognized as a crown award in China's capital market.
- ZTE was included in the "12 China's Emerging Global Brands" and "12 Most Noteworthy Chinese Brands" by BusinessWeek.
- ZTE was awarded the "Chartered Institute of Management Accountants (CIMA) 2007 Quality Employer Partner Awards". This year marks the first time that local Chinese companies are recognized by the awards.
- ZTE was listed in "2007 Cara Global 100 Best Companies" by Bill Cara, an experienced finance professional and analyst. ZTE was one of the 5 Chinese companies included in this list.

Product and Technology Honors

- ZTE ranked first of the "10 Most Competitive Companies in China Fiber Telecommunication Industry".
- ZTE's Ethernet Softswitch series was awarded "China's Famous Brands 2007".
- ZTE received the prestigious InfoVision award for its GPON+VDSL2 solution at the Broadband World Forum Europe 2007 in Berlin, Germany.

ZTE TECHNOLOGIES

A Monthly Publication

Vol. 9 No. 12 Issue 95 December/2007

Leading Edge

11

WiMAX—A New Highlight for IMS

With an all-IP network in place and the high bandwidth that WiMAX enables, operators will be given tremendous ability to offer bandwidth-dependent mobile applications.

Third Eye

8

Chinese Equipment Vendors Dominate the Initial 3G Network Deployment in China

Chinese vendors have earned their opportunities and market positions in TD-SCDMA by understanding market dynamics and investing in TD-SCDMA in early stage of the game.

Case Study

13

Application of Intelligent Network in Singapore

ZTE's quick response to tailored service needs, advanced technology, professional knowledge and deep understanding of the market requirements are greatly appreciated by StarHub.

Tech Feature

18

Maximizing ROI on ZTE's DSL Products

ZTE's DSL products help operators achieve the greatest ROI by reducing the costs of network construction, IPTV service delivery, evolution to FTTH and operation and maintenance.

Corporate News

- 3 ZTE Bullish on Emerging Markets
- 3 ZTE Showcases 2M TD-HSDPA Technology
- 4 ZTE Demonstrates Integration of IMS Platform with NGOSS Framework
- 4 ZTE Aims to Boost IMS
- 5 iSuppli's Report Confirms ZTE's Position in WiMAX Industry
- 5 Frost & Sullivan's Report Validates ZTE's Pioneering Position in the Industry
- 5 ZTE Begins Industry Base Construction in Tianjin

Industrial News

- 6 Ericsson Contract from T-Mobile UK
- 6 Samsung Predicts Further Boom for Flash Chips
- 6 BSNL Plans \$750M WiMAX Splash
- 6 TD-SCDMA Makes Beijing Olympic Games Roster
- 6 Yahoo Says Mobile Internet Use to Overtake Fixed in 10 Years
- 6 Vodafone Seeking to Increase Chinese Presence

Press Clipping

- 7 Smooth Progress on TD-SCDMA Work Cited
- The construction of TD-SCDMA trial networks in cities such as Beijing and Shanghai should be completed by January and heading for the final optimization by China Mobile.

CONTENTS

ZTE TECHNOLOGIES

Case Study

ZTE Expands CDMA Presence in India's BSNL 16

Tech Feature

WiMAX Transmission Solution 20

The combination of CWDM and MSTP, which can bring multiple benefits while ensuring a low cost of network, is the best solution for WiMAX transmission.

Embracing IP-Based GSM Solutions 23

As GSM is the dominant wireless technology, the IP-based GSM network is definitely the trend for future network development.

ZTE's New-Generation V3+ NodeB Series: The Path to 3G Profitability 25

ZTE's new-generation WCDMA V3+ NodeB series can help operators build a quality and profitable 3G network at a lower TCO.

ZTE's xPON+VDSL2 Solution 27

ZTE's GPON+VDSL2 solution targets the FTTB/FTTC and FTTCab application scenarios and utilizes the existing copper cable resources to provide high bandwidth multi-play service access.



Handsets

ZTE Delivers a Record 10 Million Handsets in India 29

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ZTE中兴 ZTE CORPORATION

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 Bullish on Emerging Markets

Company Represents Telecom Equipment Providers at China's 20th Mobile Telecom Development Forum

ZTE recently participated in one of the most celebrated events in the mainland to commemorate the 20th year of the commercial deployment of large-scale cellular mobile telecom system in China. With ZTE's Chairman Hou Weigui as special guest, ZTE joined other leading industry providers such as China Mobile, China Unicom, and major organizations at the China's 20th Mobile Telecom Development Forum, held on November 18th in Beijing. The annual conference reviews the history of mobile telecom development in China as

well as presents relevant and latest domestic telecommunication industry data.

ZTE was the only vendor from the telecom equipment provider area to be invited to present at the forum. Mr. Hou delivered a keynote address on the emergence of China telecom providers, as well as how ZTE sees future developments that will shape the local telecom industry in the years to come.



ZTE's Chairman Hou Weigui addresses at the Forum

ZTE Showcases 2M TD-HSDPA Technology



ZTE's Booth

ZTE showcased its 2M TD-HSDPA high-speed wireless downloading technology solution at the GSMA Mobile Asia Congress 2007 held from November 12th to 14th at The Venetian® Macau. The GSMA Mobile Asia Congress (formerly 3GSM World Congress Asia) is the sister event of the Mobile World Congress in Barcelona.

With its 2M TD-HSDPA technology solution, ZTE clearly shows its vision to further enhance the TD-SCDMA concept and make it a part of consumers' mobile wireless communication experience. ZTE's 2M TD-HSDPA technology provides user endpoint's downstream data rate as high as 2M, allowing users to enjoy smooth high-definition movies online, download documents in bulk, as well as experience many top-line multimedia functions. 2M speed rate is best achieved on 1.6M broadband single carrier, while 20Mbps can be achieved on multi-HSDPA carriers.

(ZTE Corporation)

ZTE Demonstrates Integration of IMS Platform with NGOSS Framework

ZTE announced that it successfully demonstrated the integration of its innovative IMS products with Telemanagement Forum's (TMF) New Generation Operations Systems and Software (NGOSS) framework as part of the TMF's Catalyst Project. The demonstration signifies the first seamless integration of an IMS platform with NGOSS framework in the industry.

"The project provided valuable experience to operators around the world in building an OSS/BSS system seamlessly supporting IMS services," said Mr. Zhang Zhijiang, General Leader of Technology Department, China Unicom.

The Catalyst Project was championed by China Unicom and Chunghwa Telecom with the objective of

providing an industry reference model for service providers using the NGOSS framework to manage the IMS service provision and enable IMS-based services with flexible charging policies. The demonstration scenarios included deployment, activation, charging and management of a full-duplex, video-telephony service available for a range of devices including SIP video phones and laptops. ZTE's IMS core portfolio together with Amdocs' IMS charging solution and CRM system, Microsoft's Connected Service Framework (CSF) for service activation, provided an end-to-end IMS solution to support subscription management, service fulfillment and billing, as demonstrated in the event.

(ZTE Corporation)

ZTE Aims to Boost IMS

November 28, 2007, Ryan Lawler

ZTE demonstrated interoperability between its IMS and the TMF's NGOSS framework. The idea was to show "how to apply NGOSS and IMS for network service management solutions," says Weijun Lee, vice president of Network Architecture of ZTE USA.

Carriers are trying to tie together network assets from various parts of their businesses including wireline, wireless, and broadband access. But OSS is holding back those efforts.

"The problem with most carriers is that they have either homegrown or many different OSS platforms," says Akshay Sharma, research director of Carrier Network Infrastructure at Gartner/Dataquest.

That makes it harder to roll out new services. NGOSS has the potential to bring those OSS systems together and fix that problem, which in turn could help IMS-based fixed and mobile services take off, Lee says. *(www.lightreading.com)*

iSuppli's Report Confirms ZTE's Position in WiMAX Industry

ZTE has recently been validated by a renowned market intelligence firm, iSuppli, as one of the biggest champions in the WiMAX industry according to its October 2007 report on "WiMAX: The Best Opportunity for China Vendors". ZTE's leading position in the WiMAX arena has been further bolstered by recent partnership agreements signed with Sprint Nextel in the U.S. and Multi-National Telecom Operator (MTO) in Singapore.

The iSuppli report predicts that the number of WiMAX mobile users worldwide is projected to reach 29 million by 2011. Revenues derived from infrastructure and mobile devices are anticipated to reach US\$5.5 billion and \$3.9 billion, respectively.

"As a founding board member of the WiMAX Forum, ZTE supports and contributes to the global development of WiMAX. We have been collaborating with more than 60 providers worldwide

to help them meet their customers' needs by offering a reliable WiMAX high-broadband platform," says Zhao Songpu, General Manager of WiMAX Products, ZTE Corporation. "We will further intensify our R&D efforts and the optimization of end-to-end mobile WiMAX solutions to accelerate its commercial deployment."

Frost & Sullivan's Report Validates ZTE's Pioneering Position in the Industry

ZTE continues to receive positive recognition from leading international research firms in line with the company's outstanding contribution to the development of advanced technologies for the telecom industry. Frost & Sullivan, a leading international research and consulting organization has released a report on Next Generation Contact Centre (NGCC) deployment in contact centers that reinforces ZTE's thought-leadership position in the industry. The report states that contact center systems have evolved from the fourth generation IP enabled CC (IPCC) to the fifth generation NGCC, of which ZTE plays a significant role in developing the

required technology.

In the report, Frost & Sullivan presented an impartial comparison and research findings on IPCC and NGCC. NGCC is a service platform that surpasses previous technologies and provides an open application programming interface (API) function for third party applications. It is built on an open next generation network (NGN) architecture, making it compatible with all forms of media, allowing greater flexibility, functionality and expansion, separating call processing and control functions. More importantly, NGCC enables video, data and video triple-play application under the contact centers environment. *(ZTE Corporation)*



Ericsson Contract from T-Mobile UK

December 3, 2007

Ericsson said it and T-Mobile UK, part of Deutsche Telekom, have signed a five-year managed services contract to modernize the T-Mobile UK network and provide managed services with a comprehensive range of professional services.

Ericsson said the strategically important contract includes modernization of T-Mobile's infrastructure, field operations and multi-vendor spare parts management. The contract came into effect on the Dec. 1, 2007.

(www.totaltele.com)

Samsung Predicts Further Boom for Flash Chips

December 3, 2007

Samsung predicted that the oversupply of memory chips used in PCs is expected to ease in 2008 as growing demand for portable gadgets prompts a shift in production to flash chips, a Reuters report said.

The Reuters report said Samsung, which trails Finland's Nokia in mobile phones and jumped ahead of US rival Motorola this year, gave ambitious guidance on the business, forecasting it would sell 25% more phones next year compared with this year.

(www.telecomasia.net)

BSNL Plans \$750M WiMAX Splash

November 20, 2007

BSNL plans to splash out \$750 million on WiMAX networks to cover one sixth of India's 1 billion-plus population, and has already issued the first tender for WiMAX equipment.

The move marks BSNL's first big WiMAX deployment though not as big as some believe, according to the carrier. While some media reports estimate the equipment contract to be worth \$1 billion, BSNL tells Unstrung the planned WiMAX expenditure is closer to \$750 million.

(www.unstrung.com)

TD-SCDMA Makes Beijing Olympic Games Roster

November 12, 2007

China's largest mobile phone network operator will have a 3G network based on TD-SCDMA technology up and running in eight cities by the end of this year, in preparation for testing ahead of the Summer Olympic Games slated to start next August in Beijing, industry leaders say.

Network equipment maker ZTE has already started delivering systems to service provider China Mobile Communications, a ZTE manager said at the GSMA Mobile Asia Congress, which started Monday in Macau, China.

(www.infoworld.com)

Yahoo Says Mobile Internet Use to Overtake Fixed in 10 Years

November 23, 2007

In the next decade more people will log on to the Internet using a mobile device than on their computers, Yahoo predicted on Thursday.

"Within 10 years more people will be accessing the Internet from their mobile...than in the home from a PC," said Geraldine Wilson, Vice President of connected life at Yahoo Europe.

(www.totaltele.com)

Vodafone Seeking to Increase Chinese Presence

November 19, 2007

Vodafone, the world's largest mobile operator by revenue, has plans to use the government led restructuring of the telecoms market to increase its presence in the country.

The Chinese government is planning to shake up the local telecoms market as part of the roll out of 3G in country. And Vodafone intends to use its 3.3 per cent holding in leading carrier, China Mobile, as leverage to extend its reach in the world's largest mobile markets.

(www.telecoms.com)



Smooth Progress on TD-SCDMA Work Cited

November 13, 2007, Frederick Yeung

(from South China Morning Post, Hong Kong's leading English newspaper)

ZTE, the nation's leading telecommunications equipment vendor, said the construction of TD-SCDMA trial networks in cities such as Beijing and Shanghai should be completed by January and heading for the final optimization by China Mobile Communications, ZTE's senior executive told the South China Morning Post.

Shen Donglin, vice-president in wireless technology, yesterday said all network equipment was shipped and under construction and installation. It only remained for the company to transfer the TD-SCDMA networks to China Mobile.

"China Mobile will test the newly constructed network in January," Mr. Shen said in Macao. He said the network should be ready before the Beijing Olympics in August.

China Mobile chairman Wang Jianzhaou earlier this year said that the network construction would be completed by the end of October. Mr. Shen declined to comment on the progress but stressed there was no technical problem in building the networks.

ZTE is a major vendor for China Mobile's TD-SCDMA commercial trial in eight cities, accounting for 50 percent of the contracts awarded. It is the sole network vendor for the TD-SCDMA network in Beijing and partners with vendors in five other cities, namely, Tianjin, Shenzhen, Shenyang, Qinhuaodao and Xiamen.

Mr. Shen said the TD-SCDMA



network in Beijing should cover all urban areas and all Olympic venues. However, he declined to comment on network capacity, saying it was China Mobile's responsibility to determine this.

ZTE said the soon-to-be-completed TD-SCDMA trial network is 3.5G compatible, supporting a download speed of about two megabits per second and also the homegrown mobile television standard of TD-MBMS which will allow China Mobile to provide mobile television viewing during the Olympics.

ZTE also unveiled a 3.5G mobile handset that supports TD-MBMS mobile TV technology, letting users watch live TV coverage from Olympics venues using handsets.

"Mobile TV should be a relatively niche service and it may attract the attention of the young. Other users may not want it," he said.

Mr. Shen also said low battery consumption was one of the advantages of TD-SCDMA technology.

He said the Beijing Olympics should be a showcase of the country's telecom industry to the world. More than 500,000 overseas tourists are expected for the Games, and over 2.5 million mainland residents will also participate. "Not only mobile TV service, other new services such as push-to-talk over cellular network and mobile voting will demonstrate the strength of China's telecoms technology," he said.

The International Telecommunications Union, a United Nations body for global telecommunications standards, recently accepted WiMAX as one of the four 3G mobile technologies. Mr. Shen said he saw "no direct competition" between WiMAX, which is deployed in many emerging countries, and TD-SCDMA, which China supports. **ZTE TECHNOLOGIES**



Chinese Equipment Vendors Dominate the Initial 3G Network Deployment in China

October 2, XJ Wang
(from Yankee Group DecisionNoteSM Overview)

Market Winners and Losers

China Mobile recently completed its first large scale public tender of TD-SCDMA network equipment. The total value of the tender is 26.7 billion Yuan or 3.53 billion USD based on the

exchange of 1 USD to 7.56 Yuan. As shown in Figure 1, Chinese telecom equipment manufacturers ZTE and Datang are big winners, with combined market share close to 75%. Ericsson is a surprised loser with less than 1% market share. Motorola, Samsung, and Lucent (prior to merging into the Alcatel-Lucent company) are big losers who fail to participate in the bidding due to lack of infrastructure offering for TD-SCDMA. The performance of the joint venture of Siemens and Huawei is very mediocre, with a market share less than 15%.

SCDMA is just another technology standard. TD-SCDMA has become a national symbol of Chinese government's unwavering decision of promoting innovation and self-owned intellectual property rights. It is obvious that promoting TD-SCDMA is for the best interest of Chinese government and Chinese domestic manufacturers; Chinese government will use all of its power to embrace it. As a result, the world largest mobile operator China Mobile has been pointed by the Chinese government to adopt TD-SCDMA. In the past, China Mobile's top management had expressed the desire of deploying more mature WCDMA technology as its GSM network evolution path. Now the only one choice that China Mobile has to make is to deploy TD-SCDMA; and failure will not be an option. Noticeably, instead of the China Mobile Hong Kong

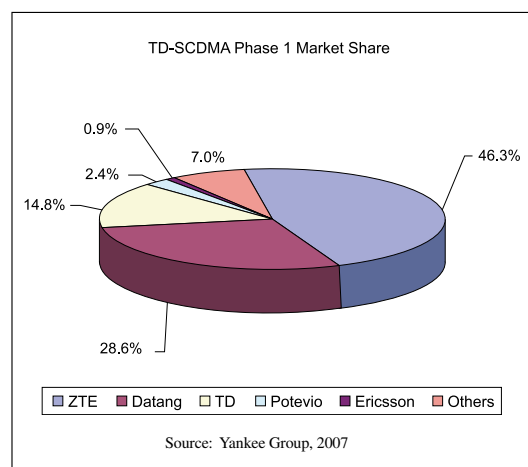


Figure 1 TD-SCDMA vendor market share

Market Analysis

No 3G license

Anyone in the Telecom industry thinks that TD-



good news to Chinese vendors such as ZTE, Huawei and Datang. The Chinese vendors have earned their opportunities and market positions in TD-SCDMA by understanding market dynamics and investing in TD-SCDMA in early stage of the game. It is unfair to simply say that the Chinese companies have a home-court advantage. From day one, multi-national telecom equipment manufacturers have been given opportunities to be part of the TD-SCDMA ecosystem, but most of them had taken a very negative and passive approach. Although these global companies have been doing business in China for decades, when comes to understand Chinese market dynamics, Chinese government's big influence on market, and Chinese people's desire of innovation, these global companies still show their nature of foreign companies.

None of the TD-SCDMA partnership has a real meaning

In our decision notes on May 26, 2005, TD-SCDMA was more robust with Ericsson's support and we identified that ZTE and Ericsson represented the stronger alliance than Siemens and Huawei, Datang and Alcatel, Potevio (Putian) and Nokia. However, the current TD-SCDMA bidding results have shown those partnerships are very weak and have no real market impact. Neither Ericsson (with ZTE) nor Nokia (with Potevio) have leveraged their partnership to gain market share. However, the partnership between Datang and Alcatel seems to work well. This is mostly due to Datang's weak position in the core network area. Datang has to rely on Alcatel's complementary core network offering.

ZTE's "fiber to tower" and TD-SCDMA/HSDPA implementation is the winning factor

One of the key technologies of TD-SCDMA is to use smart antenna. Using "fiber to tower" technology verse traditional copper cable is much more cost effective, and easier to deploy. ZTE's big win in Phase 1 TD-SCDMA tender are mostly contributed to its mature "fiber to tower" implementation in TD-SCDMA NodeB. We noticed that ZTE's "fiber to tower" technology was verified as early as July, 2006 in Qingdao.

TD-SCDMA/HSDPA is the other factor of winning Phase 1 TD-SCDMA tender. Currently, TD-SCDMA deployments in eight Olympics cities have been aiming at providing 3G services during 2008 Olympics. High speed data service will be a key 3G service offered during Olympics; HSDPA will be a key to enable the high speed data service. ZTE was the first one to announce TD-SCDMA/HSDPA capability in Feb 2006 during 3GSM congress in Barcelona.

Market Challenges

TD-SCDMA networks will take time to get mature and stable

Just like CDMA2000 and WCDMA, TD-SCDMA networks will need 2 to 3 years to get mature and stable. MII, China Mobile and TD-SCDMA vendors need to prepare for the early unexpected technology challenges. Particularly, China Mobile should give TD-SCDMA vendors enough time to improve the network quality and coverage.

TD-SCDMA terminal is still the bottleneck of TD-SCDMA development

Compare with TD-SCDMA infrastructure equipment, TD-SCDMA terminal is still the weakest link in the TD-SCDMA ecosystem. Without the active participation of handset market leaders like Nokia, Motorola and

Limited, which is the public listing arm of China mobile, it is China Mobile's state owned parent company who conducted the public tender. Without issuing any 3G licenses, MII has clearly given TD-SCDMA a lead time to enter the market, while blocking any trials of CDMA2000 EV-DO and WCDMA. To some extent, this shows MII's lack of total confidence in the maturity of TD-SCDMA. However, this is not the time for playing national pride; MII's current approach is very practical and realistic.

Chinese vendors' dominant position is not just because of home-court advantage

China Mobile's deployment of TD-SCDMA is bad news to multi-national telecom equipment manufacturers such as Ericsson, Nokia-Siemens, Alcatel-Lucent, Motorola and Samsung, but



Samsung, TD-SCDMA terminals will not have a very attractive portfolio to gain market share in Chinese domestic handset market. In the end, the consumers' adoption of TD-SCDMA will heavily rely on the device portfolio offered by China Mobile.

Market Predictions

TD-SCDMA will overtake CDMA2000 in 5 years

CDMA2000 is growing at a slow pace. China Mobile's adoption of TD-SCDMA will have a great impact on the 3G infrastructure market. We anticipate TD-SCDMA subscriber base will easily exceed CDMA2000 in China in the

opportunity in emerging Asia Pacific and African market due to its potential low-cost structure. However, TD-SCDMA has to be successful in China before playing an important role outside China.

ZTE will secure its leading market position and Nokia will gain more market share

As China Mobile continues to roll out TD-SCDMA networks across the country, TD-SCDMA equipment vendors with a complete handset portfolio will have advantage to win more market share. We anticipate TD-SCDMA terminal will play a key role in the upcoming TD-SCDMA development. The consumers' adoption

on its future growth if it fails to deliver 3G services during Olympics. While focusing on deployment of the infrastructure, ZTE should also foster the market and set the right expectation during early deployment. It will take time for a new network to run stably.

- Nokia needs to proactively develop TD-SCDMA terminals. Since it has missed the infrastructure opportunity, Nokia cannot afford to lose the device market opportunity. A good TD-SCDMA terminal portfolio will win China Mobile's support in the next phase of TD-SCDMA deployment tender. Also, because Nokia has a very limited CDMA device portfolio, it is very important for Nokia to strengthen its global device market position by capturing the market opportunity for TD-SCDMA devices.
- Datang and Alcatel need to seek strong support from TD-SCDMA terminal manufacturers. Its current No. 2 market share position is very fragile. Without a strong TD-SCDMA terminal portfolio, Datang will lose market share in the upcoming TD-SCDMA deployments.
- Ericsson needs to rearrange its TD-SCDMA strategy and to leverage the partnership with ZTE to gain more market share.
- China Mobile needs to focus on dual-mode (GSM/TD-SCDMA) operation due to the initial coverage challenges. It needs to actively cooperate with leading device manufacturers to develop GSM/TD-SCDMA terminals. Moreover, it needs to work closely with its infrastructure vendors to understand the early challenges in network deployment. Generally it takes 18 to 24 months for the network to run stably after the initial deployment.

ZTE TECHNOLOGIES

“ZTE will secure its leading market position and Nokia will gain more market share.”

next 3 to 4 years. As China Mobile who currently has more than 344 million subscribers continues to expand its subscriber base at double digits year on year, TD-SCDMA subscriber base will have a chance to catch up the subscriber base of CDMA2000, which is currently has about 360 million subscribers worldwide. However, it will take at least 5 years for TD-SCDMA to become the second largest 3G standard in terms of subscribers.

As China Mobile continues to execute its globalization strategy, we anticipate TD-SCDMA will become a real international 3G standard outside Chinese market. Pakistan is likely the first oversea market for TD-SCDMA, where China Mobile recently acquired Paktel and ZTE is the GSM infrastructure providers to Paktel.

TD-SCDMA will also have an

of TD-SCDMA will heavily rely on the attractiveness of TD-SCDMA devices.

Nokia will gain more market share as it completes its “fiber to tower” implementation for TD-SCDMA. We anticipate Nokia will leverage its handset portfolio to win deal from China Mobile.

ZTE will secure its leading position in the market due to its end-to-end capability. Its future market position will rely on its performance in the current TD-SCDMA deployment.

Datang and its partner Alcatel-Lucent will likely lose market share due to lack of a complete terminal portfolio.

Recommendations

- ZTE needs to fulfill its promise when deploying TD-SCDMA. Its current dominant market position, however, may have negative impact

WiMAX—A New Highlight for IMS

Hao Hai, Chen Dan

Overview

The fierce competition in the telecom industry and the growing customer demand for better service experience are driving operators to find a more reasonable and cost-effective way of building a highly efficient, high-speed and stable network.

IP Multimedia Subsystem (IMS) is an IP multimedia and telephony core network defined by international standard organizations such as 3GPP, 3GPP2 and TISPAN. IMS is access independent as it supports IP-to-IP session over multiple access types such as WCDMA, CDMA2000, WLAN, WiMAX, Cable, DSL and the traditional 2G. It is a standardized reference architecture that consists session control, connection control and an applications services framework along with subscriber and services data.

Worldwide Interoperability for Microwave Access (WiMAX) is a standards-based technology making the delivery of last mile wireless broadband access as an

alternative to cable and DSL. WiMAX will provide fixed, nomadic, portable, and, eventually, mobile wireless broadband connectivity without the need for direct line-of-sight to a base station. In a typical cell radius deployment of three to 10 kilometers, WiMAX Forum certified systems can be expected to deliver a capacity of up to 40 Mbps per channel for fixed and portable access applications.

WiMAX has been approved as a new 3G standard. It is bringing new challenges and opportunities for the telecom business. IMS is an IP-based multimedia service control platform, and represents the future network evolution direction. Combining WiMAX and IMS will bring all the IMS advantages to WiMAX users, enabling them to enjoy IMS rich services. Therefore, it is of great importance to address the IMS-WiMAX interworking issue.

IMS-WiMAX Interworking Solutions

Solution 1: Direct IMS access

Direct IMS access is a solution suitable for greenfield carriers adopting WiMAX as the major access network. WiMAX can also be used by carriers already running 3G networks.

As the standards on IMS over WiMAX are progressing, two stages for the IMS over WiMAX solution are recommended.

■ Stage 1: Giving no consideration to QoS

In this stage, we first adopt simple IP and then move to mobile IP. WiMAX acts only as an IP transport network providing IMS users with IP connectivity while the IMS network and related application servers offer them services. No signaling interaction happens between IMS and WIMAX for QoS control. In terms of charging, IMS and WIMAX are independent of each other. Users are charged for both WIMAX network access and IMS

services.

■ Stage 2: Adding QoS control and related functions

In this stage, the integration of the QoS control, policy and IMS is taken into consideration, and the functional entities such as the Policy and Charging Rules Function (PCRF), Policy Control and Enforcement Function (PCEF) and Policy Distribution Function (PDF) is added in the IMS domain.

A disadvantage of this loosely-coupled solution is that mobile IP is available in user equipment to support handoff between the networks, which will results in a great time delay; therefore, it will not be good for real-time service handoff. In a WiMAX environment, mobile IP will not support the 3GPP-based packet service access (excluding Internet service).

Solution 2: Combination of GGSN and AGW

In this solution (see Figure 1), the GGSN and AGW are physically integrated to share subscriber mobility management, authorization and charging. Therefore, operators can conveniently deploy various services. WiMAX subscribers can directly access the AGW-logical entity in GGSN via an aerial interface. The high system integration enables the two networks to share subscriber management, thus protecting operators' investment. Moreover, it reduces time delay in inter-network handoff, which facilitates the deployment of more services.

This tightly-coupled solution has

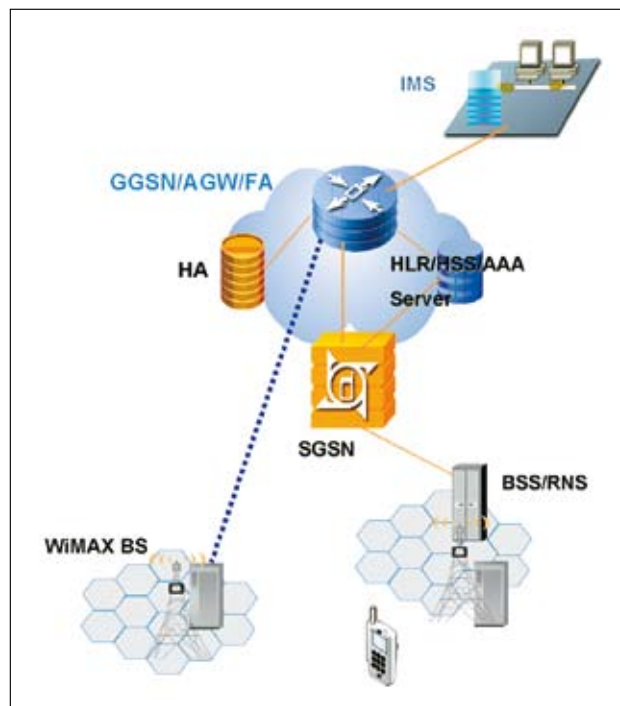


Figure 1 Integrated GGSN and AGW

many disadvantages: great changes must be made to the existing network devices; the protocols applied in the GGSN side are complicated; and it is necessary to provide complete load balance policy. The 3GPP network is heavily burdened as it carries all signaling information of the two networks.

Conclusion

The perfect combination of WiMAX and IMS makes it possible to build an all-IP network. With an all-IP network in place and the high bandwidth that WiMAX enables, operators will be given tremendous ability to offer bandwidth-dependent mobile applications. New forms of multimedia services are just few of the areas to feel the impact of IMS and WiMAX. The two solutions mentioned above for the flexible interworking of IMS and WiMAX aims to provide the market with an open, multi-access and application-rich IMS solution so that users can maximally benefit from the combination of IMS and WiMAX.

ZTE TECHNOLOGIES

Application of Intelligent Network in Singapore

Li Jian, Li Tao

Project Overview

On July 27, 2004, ZTE was awarded a turnkey project by StarHub, Singapore's second largest info-communication company, for supplying, installing and commissioning a Next Generation Intelligent Network (NGIN) to replace Nokia's IN. This contract was phase I. In July 2007, ZTE won the phase II contract to deploy an enhanced intelligent network (EIN) solution based on an online charging system (OCS) to replace GIT's IN service node. Services provided by ZTE's equipment can support multiple core networks (PSTN, NGN, Cable, GSM, 3G and IMS in the future) and meet the local market requirements.

Networking

The proposed system connects to

two IGWs, three LSs and seven MSCs. Its networking topology is illustrated in Figure 1.

System design and architecture

The system serves about 1.3 million

subscribers, which equals to 805 call attempts per second (CAPS). A set of application servers works for the PSTN network. A set of OCS-based EIN works for the GSM network. A voucher center is responsible for voucher management

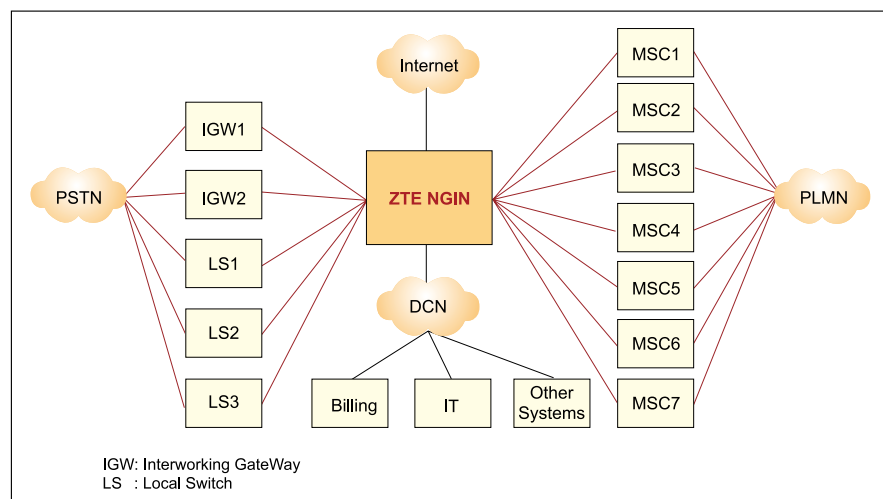


Figure 1 Networking topology



and voucher call processing. A CRBT system is designed to provide ring back tone service. The system also includes a USSD Callback Center providing USSD based recharge, balance query and international roaming, a centralized network management system and other accessories.

The system operates in a dual-network dual-plane mode to avoid a single point of failure, greatly increasing the system's availability. To avoid IP data storm, Virtual Local Area Network (VLAN) is configured to isolate the data transmission according to data types.

Services provided

Both mobile and fixed services can be provided by ZTE intelligent network platform. In phase I, three fixed network services (domestic toll free services, international toll free services and fixed number portability) and three types of mobile services (VPN, CNA and FIC) are provided. In phase II, prepaid mobile, ring back tone, USSD callback and outbound IVR services will be provided. The prepaid subscriber capacity in the third year of Phase II will reach 1.3 million.

Geographical redundancy system

In this project, ZTE installed a geographical redundancy system based on HP Continuous Access Enterprise Virtual Array (EVA). It is a controller-based application that delivers real-time replication between HP StorageWorks Enterprise Virtual Arrays and provides the highest level of storage data protection capabilities to meet business continuity implementation goals. StarHub can achieve a competitive advantage by incorporating disaster-tolerant solutions and disaster tolerant managed services into their planning and daily routines, ensuring the data's security, availability and integrity.

Project Highlights

Standard interfaces

The system is compatible with standards and recommendations specified by ITU, ETSI and ANSI. It adopts the latest and industrial accepted technologies, with unlimited future upgrade capability. The real applications and authoritative tests unanimously proved its excellent interoperability with exchanges from all major vendors including Alcatel, Ericsson, Nokia, Nortel, and Siemens.

High availability

The system is designed as a dual-server cluster system with shared disk array, offering 1+1 hot standby backup for main servers.

To avoid natural disasters such as earthquake and fire, ZTE provided the geographical redundancy solution based on HP Continuous Access EVA.

Open service platform

The system is equipped with a powerful Service Creation Environment (SCE) that combines over 30 Service Independent Building-blocks (SIBs), which enables quick service creation and helps ensure that the current and future requirements can be met. The SCE can provide not only the traditional IN based services but also the Parlay based applications.

The SCE is an integrated programming environment offering powerful Parlay and Parlay X APIs. These APIs allow third party service providers to further develop services.

Enhanced security

Security is given high consideration when designing service. The system offers enhanced security measures to ensure data integrity and safety. When interconnected with external devices from other vendors, multiple encryption mechanisms or even third-party encryption algorithms are used to block unauthorized access.

Easy management

The system features perfect management functions, such as data and history management, dynamic monitoring, signal tracing, self-defined traffic reports, flexible charging and accounting management, and authority management. The varieties of management functions reduce the large amount of workload on the operators and ensure one-stop management for them.

Powerful service provision

ZTE is dedicated to providing the customers with not only a stable and reliable platform, but also with diversified services to ensure a profitable operation. Owing to the flexible and rich SIBs and powerful SCE functions, operators can provide sufficient IN

services, both standard and customized, to meet specific requirements of the quickly changing market.

Real-time and reliable charging

ZTE's enhanced IN with the OCS structure provides real-time processing of the billing requests from network elements, allowing service providers to implement timely, secure and reliable billing functions.

A powerful charging engine

Based on the mature billing data model and billing engine of ZTE, the charging engine is capable of configuring price strategies flexibly, thus adapting to different market demands.

The engine supports concurrent and content-based charging, providing powerful support for the marketing activities of StarHub.

Balance and credit management

With the powerful multi-balance and credit management, the system can control the real-time service provisioning, to reduce the risk of arrear payments and overdraft and provide more abundant features.

CS & PS supported

In the legacy system, the Packet-Switched (PS) and Circuit-Switched (CS) domains are separated; there are few services across both the PS and CS domains. However, the new system can perform both the SCP and Parlay Gateway functions. It provides the traditional No.7 signaling interface to offer IN services for PSTN, GSM and 3G. Meanwhile, NGN signaling protocols SIP and MGCP are supported to interconnect with the PS domain, providing broadband IP call service, number portability service as well as the traditional circuit switched voice service.

Adapting to NGN trend

With the development of IP technology, it is widely believed that the backbone network will migrate to an all-IP network. NGN will gradually replace the traditional PSTN network and become the main trend of fixed network evolution.

After the first phase of the project was deployed, the SIP and MGCP processing capabilities are greatly increased, and the system's service creation capabilities are enhanced. Multiple service creation environments including the traditional SCE, Open API (for 3rd party service provider), Parlay SCE and Parlay X SCE, which enables the rapid response to the market's service requirements, are available.

IMS enabled

The IP Multimedia Subsystem (IMS) proposed in 3GPP is regarded as the blueprint of the future all-IP network. IMS can also be regarded as a platform for the delivery of all kinds of mobile multimedia services, and it is the ultimate solution to the evolution towards the service provisioning system serving all-IP network.

ZTE keeps a close watch on the standardization of fixed networks across the globe and has been doing deep research on it. The system products can be smoothly evolved to IMS.

So far, StarHub's subscribers have been expanding since the first phase of the project was put into commercial use in Singapore while the second phase of the project is being implemented. ZTE's quick response to tailored service needs, advanced technology, professional knowledge and deep understanding of the market requirements are greatly appreciated by StarHub. With the upcoming commercial launch of the project's phase II, the partnership between the two companies is expected to be further strengthened. **ZTE TECHNOLOGIES**

ZTE Expands CDMA Presence in India's BSNL

Mao Qian

Background

Bharat Sanchar Nigam Limited (BSNL), formed in October 2000, is the biggest state-owned telecom operator in India who has been licensed to run PSTN, GSM and CDMA networks in the entire country except Delhi and Mumbai. The company provides comprehensive range of telecom services: wireline, wireless, Internet access, dedicated leased line, Virtual Private Network (VPN), etc.

In recent years, BSNL puts every effort to develop CDMA Wireless Local Loop (WLL) services. The company has the largest WLL network in South Asia, covering most areas of India. The CDMA WLL solution finds great appeal with BSNL as it has many attractions such as high performance-price ratio,

feature-rich services and fast network deployment.

ZTE CDMA Presence in BSNL

ZTE is the largest supplier of CDMA equipment to BSNL. To date, more than 85% of BSNL's CDMA equipment is supplied by ZTE, covering all telecom areas in India except Delhi and Mumbai. Shown in Figure 1 is the distribution of Indian administrative areas.

In order to speed up the deployment of CDMA WLL network around the country, BSNL has invited several public bids for this project within five years.

Early in 2002, ZTE made the first breakthrough in the Indian CDMA market with a contract win of 500,000-line CDMA IS95 project from BSNL. The CDMA IS95 network built

by ZTE was put into commercial use in 20 states of India and received favorable comments from BSNL. In 2003, ZTE won another bid to deploy the first CDMA2000 1X network with a capacity of 1.03 million lines for BSNL. With superior performance and stability, the CDMA2000 1X network helped BSNL rapidly expand its subscriber base and generate considerable profits. Based on the good cooperation with BSNL, ZTE was awarded successive network expansion contracts of 450,000 lines at the end of 2004, 513,000 line in June 2005, 630,000 lines in December 2005, 2.52 million lines in August 2006, 1261 BTSs in September 2006, and 50,000 lines in September 2006, as shown in Table 1.

Keys to ZTE's Success in BSNL

With over one billion inhabitants, India is the second most populous country in the world. According to the report from TRAI, India's teledensity stood at about 17.16% in 2006. The telecom industry in this country is bound to enjoy a promising market prospect. As the largest state-owned operator in India, BSNL aims to build a CDMA WLL network that can cover most of urban and rural areas in the country and help India increase its nationwide teledensity.

Seamless coverage

ZTE provides a whole package of CDMA products to meet the different requirements for network coverage. Its CDMA wireless network solutions can

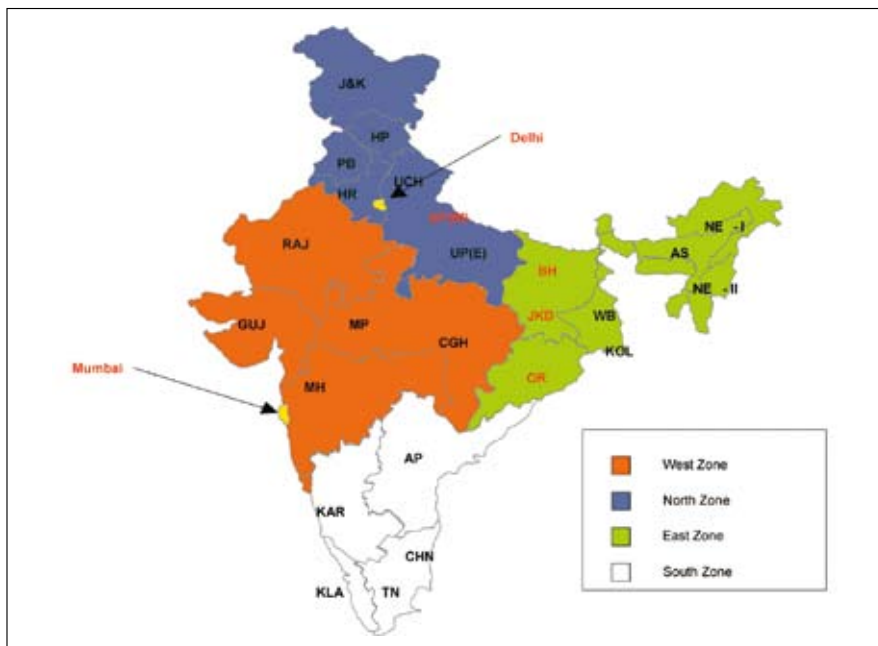


Figure 1 Distribution of Indian administrative areas

Table 1 BSNL CDMA Bidding Results

S/N	Time	Vendor	2G/3G	Capacity	Status
1	2002	ZTE	IS95	500,000 Lines	Commercial
2	2003	ZTE	1X	1,03 Million Lines	Commercial
3	December 2004	ZTE	1X	450,000 Lines	Under Deployment
4	June 2005	ZTE	1X	513,000 Lines	Under Deployment
5	December 2005	ZTE	1X+DO	630,000 Lines	Commercial
6	August 2006	ZTE	1X+DO	2.52 Million Lines	Under Deployment
7	September 2006	ZTE	1X	1261 BTSs	Under Deployment
8	September 2006	ZTE	1X	500,000 Lines (Upgrade from the V5 to A interface)	Under Deployment

implement wide area coverage, ultra-far distance coverage and extended indoor coverage. In building BSNL's CDMA WLL network, ZTE adopted varieties of BTS products including macro-BTS, micro-BTS, compact BTS, super BTS and remote Radio Frequency Station (RFS) to support flexible networking, enabling seamless network coverage.

Feature-rich services

ZTE delivers diversified services over the WLL network such as limited mobility, packet data, Public Call Office (PCO) and Fixed Wireless Terminal (FWT) services, as shown in Figure 2. These services bring huge profits to

BSNL, greatly improving their network competitiveness.

In order to better satisfy the requirements of end users, ZTE and BSNL jointly exploit new services such as SMS, IN and VMS/MMS. Moreover, in response to various requirements from India's Telecom Engineering Center (TEC), ZTE is actively involved in tracking the evolution of CDMA network and drafting relative standards.

Outstanding engineering competence

ZTE's engineering operations in India commenced way back in 2001. The company set up a dedicated customer support engineering center in Bangalore,

and engineering branch offices in Mumbai, Dehli and Chandigarh respectively.

ZTE has recruited and trained a great many local engineers and technicians. So far more than 500 talented engineers and technicians are engaged in the BSNL CDMA projects. Meanwhile, after serious evaluation, several local subcontractors have been selected by ZTE as its long-term cooperative partners. The company's rich experience in engineering combined with local resources lays a solid foundation for its long-term and stable presence in BSNL.

Customer first strategy

During the initial construction of CDMA WLL network, in order to make full use of the existing Local Exchange (LE) resources, ZTE adopted the BSS+LE WLL network solution based on the V5.2 interface. The network was commercially used for two years and highly recognized by BSNL. With the subscribers' growing demand for large capacity and more services, the original network needs to be upgraded. ZTE put forward the BSS+MSC CDMA2000 1x network solution based on the A interface, helping BSNL smoothly upgrade its network from IS95 to CDMA2000 1X and ensure the sustainable development.

Conclusion

Based on years of constant pursuits and outstanding performance in the field of CDMA technology, ZTE has supplied more than 6.5 million lines of CDMA equipment to BSNL. The annual shipment of ZTE CDMA BTS in 2006 reached up to 12,000 sets, ranking first in the world. To date, ZTE CDMA products have been successfully deployed in more than 70 countries for over 120 operators, with a global capacity of 110 million lines for commercial use. **ZTE TECHNOLOGIES**

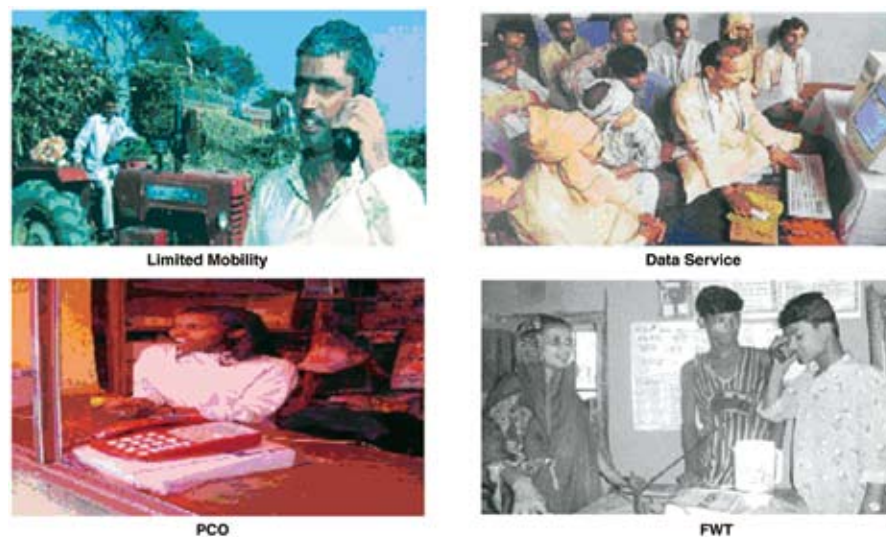


Figure 2 Services Delivered by BSNL CDMA WLL

Maximizing ROI on ZTE's DSL Products

Ye Xiaohua



According to Gartner's reports on the broadband access field, ZTE's global DSL deployment has exceeded a capacity of 25 million lines till Q2 of 2007, covering over 40 countries including China, Greece, Argentina, India, Turkey, Italy, Indonesia, and Brazil. ZTE DSLAM ranks third in terms of global sales in recent years, especially, ZTE's IP DSLAM sale has been in the TOP 3 in the world since 2005.

Why can ZTE's DSL achieve such a remarkable success? Every effort has been made to ensure the maximum return on investment (ROI), especially now when every penny counts. ZTE's DSL products assist operators to realize value for their investments by taking into account the requirements of product serialization, QoS, multicast service, application environments and operations and maintenance.

Meeting Different Capacity Requirements

As a leading supplier of broadband access equipment, ZTE has been engaged in developing and researching xDSL product series since 1999. To match various capacity requirements, the company provides a wide range of products including large/medium-capacity NG IP DSLAM FASP9800, mini NG IP DSLAM ZXDSL9806H, large/medium-capacity IP DSLAM ZXDSL 9210, small-capacity IP DSLAM ZXDSL9203/ZXDSL9806E, large-capacity ATM DSLAM ZXDSL8220, medium-capacity ATM DSLAM ZXDSL8203, and small-capacity ATM DSLAM ZXDSL9806A. For nodes with different capacity requirements, the most

suitable DSL products can be selected to ensure the lowest cost.

Designed for IPTV Services

In many situations, a service provider can leverage the existing copper infrastructure to deliver high-quality IPTV services to their customers. This strategy also minimizes the costs to deploy value-added IPTV services. Broadcast-grade IPTV services typically require significantly more bandwidth than today's standard DSL service—Internet access.

ZTE's IP DSLAM adopts non-blocking full-GE architecture. The bandwidth of each data bus between main control boards and subscriber boards can reach up to 10 GE; each main control board can provide a strong switching capability of 280G.

To deliver live IPTV services, the data network is required to support multicast. ZTE's IP DSLAM is designed to perfectly deliver multicast service. It supports rich multicast protocols IGMP V1/V2, IGMP proxy and IGMP snooping, and up to 1,024 multicast groups. ZTE's IP DSLAM can provide manageable multicast features including IPTV user preview control, IPTV user viewing habits collection, IPTV channel access control and quick channel zapping.

ZTE's IP DSLAM products utilize DiffServ mechanisms to enable QoS, which include marking, SP/WRR/SP+WRR queue scheduling algorithm, congestion avoidance mechanism, traffic policing and shaping. Meanwhile, ZTE's IP DSLAM products deliver a good security performance by using user authentication, port isolation, IP/MAC/port binding, filtering, broadcast packet suppression, security log, and so on. Additionally, PPPOE intermediate agent, DHCP Option82 and stackable VLAN are used to achieve port traceability and user authentication. With the guaranteed

QoS and security, ZTE's IP DSLAM can support multi-ISP services scenarios required by high-end operators.

Smooth Evolution to FTTH

FTTH is deemed as the ultimate solution for broadband services as it promises almost unlimited bandwidth. Besides ADSL2/2+ and VDSL2 and SHDSL, ZTE's large-capacity IP DSLAM can support both GPON and EPON access services with mixed-inserts of GPON and EPON line boards. This saves and protects operators' investments as there is no need for a dedicated GPON OLT.

Fully Satisfying FTTC+MDU Network Architecture Requirements

As Telecoms consider the use of fiber in the access networks, they have a variety of fiber-to-the-x (FTTx) architectures to choose from. They can roll out fiber to the premise (FTTP), to the home (FTTH), to the curb (FTTC) or to the node (FTTN). Most operators, with the need to leverage the existing wired infrastructure while minimizing the costs of optical network deployment, would select the FTTC+ Multi Dwelling Unit (MDU) network architecture.

ZTE's mini DSLAM can provide GPON, EPON or GE uplink according to the fiber technologies on the network side. On the user side, ZTE's mini DSLAM can provide ADSL2/2+, SHDSL, and VDSL2 access, fully satisfying FTTx+MDU architecture requirements. MDUs are usually deployed in small outdoor sites, and they need stand-alone power supply systems. ZTE's mini DSLAM has lower power consumption compared to other vendors' equipment. For outdoor application, ZTE can offer diversified outdoor cabinets such as pole-hugging and sealing cabinets, for the mini DSLAM.

ZTE's DSL products help operators achieve the greatest return on investment by reducing the costs of network construction, IPTV service delivery, evolution to FTTH and operation and maintenance."

Sophisticated Broadband O&M System

With the wide deployment of DSL services, O&M has become a significant factor in Opex. ZTE is the first vendor in the industry to develop and commercialize broadband O&M system. ZTE's Broadband O&M system includes CPE remote management subsystem, broadband online test subsystem, broadband services pretreatment subsystem, and home network support subsystem on the network side; services open guide, PPPOE dial software and home network service system on the end user side. Thus, end-to-end broadband O&M solutions from the DSLAM at the central office to the home network are supported. With the unique embedded testing boards, ZTE's broadband O&M system was selected by China Telecom as the mainstream solution for its broadband network O&M. Introducing on-line testing functionalities into the existing broadband access networks is becoming more and more feasible and popular.

ZTE's DSL products help operators achieve the greatest return on investment by reducing the costs of network construction, IPTV service delivery, evolution to FTTH and operation and maintenance. **ZTE TECHNOLOGIES**



Qiao Shengren

WiMAX Network Structure

WiMAX is a wireless broadband technology defined by the IEEE 802.16 family of standards, which supports fixed, portable and eventually mobile access. It can provide the last-mile broadband connections without direct line of sight with a base station. Its network structure is shown in Figure 1.

The transmission network offers service transmission solution for the Access Service Network (ASN) and the Connectivity Service Network (CSN). The ASN is comprised of many widely dispersed Base Stations (BSs). The transmission from a base station to an access gateway (usually called backhaul) is the focus of the WiMAX transmission solution.

Basic Demands of Service Transmission

Interface types and bandwidth demand

Interfaces designed for a WiMAX base station include NxFE and GE. The base station mostly uses 5/10 MHz channel bandwidth, which would probably be 20 MHz in the future; it supports one

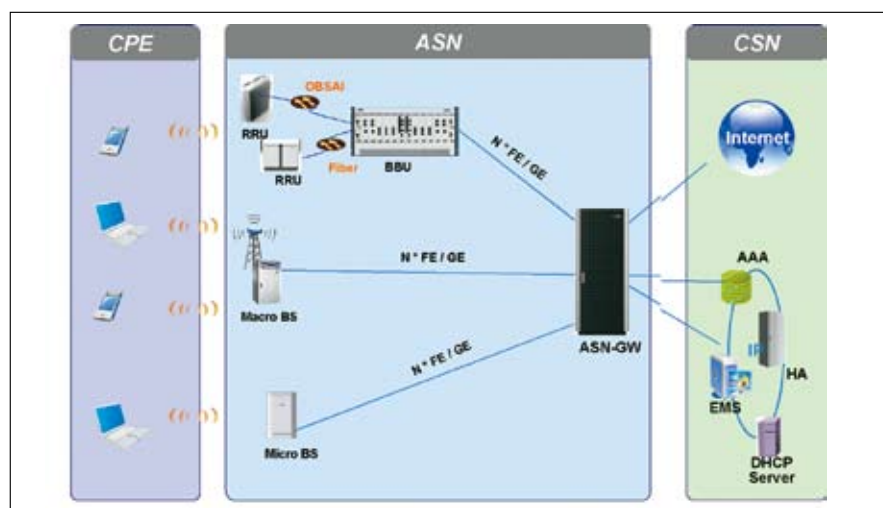


Figure 1 WiMAX network structure



to three sectors. If an omni-directional base station is configured with a 1×10MHz radio channel, the bandwidth required for transmission will usually be 30 to 40 Mbps. If a 3-sector base station is configured with a 3×10MHz radio channel, the typical bandwidth required for transmission will reach up to 120Mbps.

Basic demands of backhaul transmission

P2P transmission

WiMAX backhaul service is the point-to-point connection from the base station to the AGW. The transmission network should establish connection-oriented service to facilitate service protection and end-to-end operations, administration and maintenance (OAM).

Aggregation and statistical multiplexing

WiMAX broadband data services

have huge peak flows, and are bursty in nature. Therefore, the transmission network must have the aggregation and statistical multiplexing functions to realize the bandwidth sharing, improve the transmission efficiency and lower the cost.

Protection and reliability

WiMAX transmission network must provide the carrier-class reliability with network availability reaching 99.999%. Should a fault occur, the network can timely perform the protection switching in less than 50 milliseconds.

Differentiated services

To dispatch different service flows, the transmission network can achieve differentiated services (DiffServ) through identifying DiffServ Code Point (DSCP)/Type of Service (TOS) values of the IP packet.

Low cost

The backhaul of access network has the most concentrated distribution of nodes, the largest coverage area and the most complex scenario. It is sensitive to CAPEX, and only low-cost network will stand out from the competition.

In addition, easy network

management and maintenance, compatibility with the existing network, and investment protection during the replacement and evolution of equipment should also be considered.

Backhaul Transmission Solution

WiMAX transmission solution

The above analysis of the transmission demands shows that during WiMAX network construction, Multiservice Transport Platform (MSTP) is still the best solution to the transmission of WiMAX backhaul traffic. MSTP has found wide commercial applications across the globe, proving that it is a good backhaul solution during the evolution from 2G to 3G. MSTP-based WiMAX transmission solution is shown in Figure 2.

The solution adopts the dual structure of access and convergence layers to increase network coverage area and quantity of access points.

The access ring uses chain or small /medium-sized ring structures (no more than eight points) to improve network reliability and survivability. The edge access equipment usually operates at STM-1/4 level. The access equipment usually operates at STM-4 level and

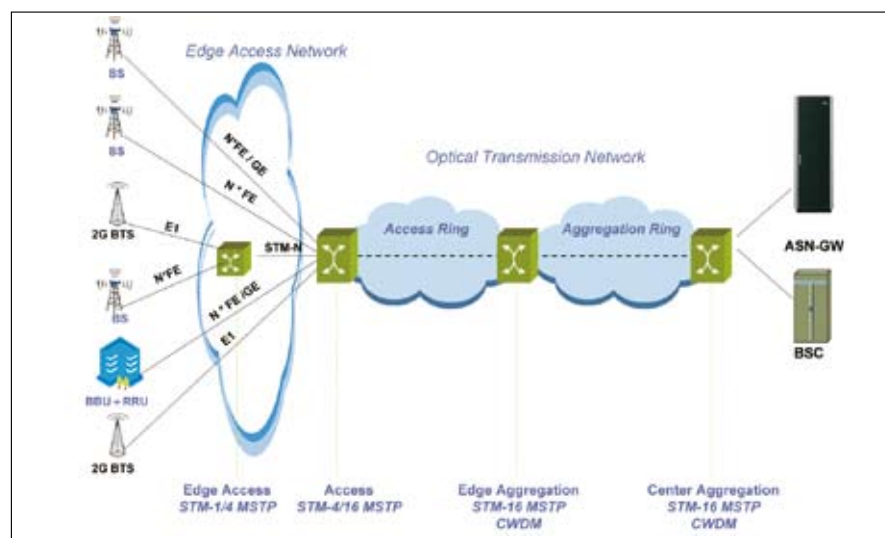


Figure 2 WiMAX transmission solution

should be upgradeable to STM-16. Access points should adopt compact and low-consumption equipment for easy installation and maintenance.

The edge aggregation point converges the traffic from the access layer, and then sends it to the central aggregation point, which directly connects to the ASN-GW. The aggregation ring can enable a clear network hierarchy, which makes the network manageable, maintainable and extendable; it can also greatly alleviate the pressure on the ASN-GW port.

The aggregation node usually employs STM-16 equipment. When traffic increases, CWDM may either be used to scale service capacity, or the equipment may be upgraded from STM-16 to STM-64.

Some transmission techniques like microwave and data network may be applied in the areas where there is no fiber. However, they are inferior to MSTP in terms of cost, bandwidth, reliability, OAM and the like; so they are just supplements to the MSTP access.

Solution Advantages

The MSTP and CWDM solutions bring the following advantages:

E2E transmission and powerful OAM

For service with a capacity below 2GE, MSTP is employed to create an end-to-end (E2E) connection; for service with a capacity above 2GE, an E2E transparent transmission is provided by adding CWDM to MSTP. The maintenance staff can inherit the

traditional maintenance habits, and easily perform network OAM.

High reliability and protection

The common boards of MSTP equipment provide 1+1 hot backup and the service boards provide N+1 protection. The network offers several mature and standard protection modes, with a protection switching time of less than 50ms and network reliability of up to 99.999%.

Aggregation, statistical multiplexing and bandwidth sharing

ZTE's MSTP products provide Ethernet over SDH (EOS) and Resilient Packet Ring (RPR) functions. EOS traffic aggregation rate can reach up to 48:1 (i.e., 48FE to a GE), fully meeting the aggregation requirements of WiMAX service. Meanwhile, logical isolation of different service flows and bandwidth sharing can be realized through mechanisms such as VLAN and QinQ. Logical isolation ensures service security, and bandwidth sharing increases transmission efficiency while saving transmission cost. In addition, RPR dual rings may work at the same time to perform a powerful statistical multiplexing function, greatly improving bandwidth utilization and finally saving on cost.

QoS and DiffServ

ZTE has refined RPR technology so that the embedded RPR can process high priority DSCP and TOS at the IP layer. According to the priorities of accessed services, the equipment can automatically configure them to four RPR traffic classes: Class A, A0, B and C.

Large-capacity and transparent CWDM transmission

CWDM features low cost, large capacity, transparency and easy

scalability; it can supply a maximum transmission capacity of 45Gbps (18 wavelengths×2.5Gbps) over a pair of fibers. CWDM equipment will play a great role in accommodating the increase of WiMAX traffic.

Uniform transmission network lowers CAPEX

MSTP supports a wide range of services including data and TDM services. During the construction of the WiMAX network, if there already exists a self-built transmission network, the WiMAX network can share site resources such as equipment room, transmission resource and power supply with the GSM network. This not only protects the equipment investment, but also saves expansion and maintenance costs.

Complying with WiMAX development trend

With the progress of WiMAX and the growing subscriber number, there will be a steady increase in bandwidth demand; therefore, bandwidth reservation and equipment upgrade should be considered to ensure the sustainable development of WiMAX transmission network.

Conclusion

WiMAX network is an all-IP architecture and its base station interfaces are mostly FE and GE. The transmission of WiMAX service requires the differentiation of services to ensure QoS, and the implementation of service aggregation and statistical multiplexing to improve transmission efficiency. Moreover, the transmission network should provide high reliability and carrier-class protection. The combination of CWDM and MSTP, which can bring multiple benefits while ensuring a low cost of network, is the best solution for WiMAX transmission.

ZTE TECHNOLOGIES



An abstract graphic at the top of the page features several stylized, glowing figures of runners in motion, overlaid with a network of nodes and connecting lines, suggesting speed and connectivity. The background is a warm, golden-yellow gradient with light rays.

Embracing IP-Based GSM Solutions

Zhang Weiqi

Overview

Demands for IP services drive the IP transformation of networks. Today, more and more customers are getting used to instant communication through QQ, MSN and Skype; online shopping through eBay; online searching through Google; and downloading music through iTunes or other means. As GSM and 3G networks grow at explosive rates, it is unavoidable for mobile terminals to support IP applications. IP applications need to be deployed in mobile networks while mobile networks need to evolve to IP.

To date, the contents delivered to mobile networks are moving from text to multimedia formats such as pictures and videos. This poses increasing requirements on bandwidth. Both fixed and mobile broadband networks are required to provide higher bandwidth for users. With the advent of the all-IP era, the prevalence of IP services

will drive the evolution towards IP-based networks. IP-based services like Enhanced Data rates for GSM Evolution (EDGE) and 3G require operators to offer a high-bandwidth, high-efficiency and low-cost network infrastructure suitable for carrying IP services. As GSM is the dominant wireless technology, the IP-based GSM network is definitely the trend for future network development.

When most of the GSM core networks have been transformed to IP, IP-based GSM networks will mainly evolve around the IP transformation of BSS.

Benefits of IP-Based GSM Networks

- Improving voice quality while saving transcoder resources

For an IP-based core network providing TDM-based A interface, a single 2G-2G call is completed by using four transcoding procedures; however, voice quality degrades when a

transcoding procedure is added. On the other hand, when the A interface goes IP, the 2G-2G call is completed through the Transcoder Free Operation (TrFO) without any transcoding process, which can significantly enhance voice quality and save transcoder costs. Moreover, less interface boards are needed between the MGW and the BSC, thus greatly reducing equipment investment.

- Flexible networking

Since the E1 transmission link is too complicated when the A/Gb interfaces are based on TDM, it is hard to implement MSC and SGSN in pools. However, the IP-based BSS makes it possible to implement the MSC and SGSN in pools, or the Flex-A networking and Flex-Gb networking. This not only reduces investment on the core network, but also improves network reliability.

- Sharing transmission resources

Today both the network expansion and new network deployments still



use TDM-based architecture. When both 2G and 3G networks evolve to IP in the future, it is inevitable that the network infrastructure adopt the universal IP transmission technologies, which will allow 2G and 3G networks to share transmission facilities, avoiding duplication and waste of resources.

■ Saving transmission costs

The IP-based GSM networks use codecs with high compression ratios to compress IP header, voice and data. The compression and multiplexing technologies adopted will considerably reduce bandwidth occupation and improve transmission efficiency.

■ Flexible last mile access solutions

IP-based transmission can find the most economical way to adapt to the local situations. The last mile access can be solved by using wireless communications such as microwave and WiMAX, or by fixed connections such as optical fiber, copper wire and DSL.

■ Easy management and maintenance

Both GSM core and access networks support the unified all-IP networking, which facilitates the network planning. The IP transformation of Abis, A and Gb interfaces simplify the network maintenance and management.

ZTE's IP-Based GSM Solutions

ZTE leads the industry in developing IP-based BSS. The company, which always pays close attention to cutting edge technologies, has been participating in the standardization of relative 3GPP standards; it has also been tracking the evolution of GSM/EDGE Radio Access Network (GERAN). It is active in making proposals for the user plane on A interface that is yet to be specified.

ZTE boasts an R&D team specialized in IP-based BSS, which have now finished the design of various IP-based BSS interfaces. Currently, IP-based BSS products are available for commercial use. For example, iBSC, the new generation IP-based BSS product, can support 3072 TRXs; the IP-based S8001 can provide FE interfaces while supporting EGRPS functions.

ZTE's IP-based BSS technology has the following advantages:

- The interfaces of the iBSC are based on a dual stack mode of TDM and IP, which can support the evolution from GSM BSS to all-IP BSS while ensuring compatibility with the existing TDM interfaces.
- The iBSC based on the unified all-IP hardware platform fully supports the IP transformation. It can implement both the IP-based switching and interfaces.

■ Abis compression technique helps operators to greatly improve transmission efficiency and resources utilization ratio.

■ To address different situations, diversified clock solutions including E1/T1 clock extraction, clock over IP, GPS, and air interface clock technology are provided. ZTE owns the patent on air interface clock technology.

■ TrFO is implemented, which improves voice quality, and saves transcoder resources and network costs.

■ Flexible networking is supported. It is possible to implement MSC in pool (also called Flex-A networking) and SGSN in pool (also called Flex-Gb networking).

■ Management and maintenance is simplified.

■ Unified transmission network planning allows 2G and 3G networks to share transmission facilities

■ The last mile access can use various methods including FE/GE, IP over E1, IP over ATM and xDSL.

Conclusion

It is generally agreed that telecom networks will be built around all-IP. IP is no longer a simple technology but a technical system corresponding to TDM, and it involves multiple layers of the network hierarchy such as service, bearer, control, access and terminal. The trend towards IP-based services drives the IP network transformation. On the one hand, the IP-based BSS can meet the requirement for future network evolution, and it is of strategic importance to network investments protection; on the other hand, it can save transcoder and transmission resources, enable reliable and flexible networking, and improve voice quality and resource utilization, bringing huge profits to operators.

ZTE TECHNOLOGIES

ZTE's New-Generation V3+ NodeB Series: The Path to 3G Profitability

Xiao Weidan, Zhao Ying

Customer-Oriented Innovation

With the maturity and extensive deployment of HSPA technologies, the WCDMA market has seen unprecedented high-speed growth, achieving 70% market share of all commercial 3G networks. Operators worldwide are actively deploying WCDMA/HSPA in an attempt to attract more subscribers through advanced services.

However, the evolution of communication technologies also brings higher costs for network upgrade and operation. Cost-effectively building a profitable and expandable network has become a major criterion for operators in choosing the proper telecommunication vendor.

To meet the customers' requirements, ZTE rolls out its new-generation WCDMA V3+ NodeB series (see Figure 1), which features better performance, higher reliability, more advanced technologies and more flexible scalability, resulting in CAPEX and OPEX savings for operators.

ZTE's New-Generation WCDMA V3+ NodeB Series

ZTE's new-generation WCDMA V3+ NodeB series can help operators build a quality and profitable 3G network at a

lower Total Cost of Ownership (TCO). The series has the following advantages:

- Varieties of NodeB series: the new-generation V3+ NodeB series includes macro NodeB, micro NodeB, home NodeB and a series of distributed NodeBs (BBUs+RRUs). They are all based on an all-IP hardware platform, and feature high integration, large capacity, good scalability and high reliability, which can satisfy network construction requirements in various scenarios and environments.
- High sensitivity receiver: based on rich accumulation in the R&D of RF technology, ZTE introduced the design concept of an integrated RF

module including the PA, receiver and DDL into its new-generation V3+ NodeB series. It effectively decreases the RF loss and improves reliability and maintainability of the base stations. Moreover, a single antenna can achieve -126.5dBm receive sensitivity, easily enabling quality and flexible network coverage.

- Flexible networking: the new-generation V3+ NodeB series adopts the ATM/IP dual-protocol stack, and supports rich interfaces including E1, STM-1 and FE, enabling compatibility with the traditional TDM/ATM transmission while supporting a smooth evolution to hybrid UTRAN and all-IP UTRAN.

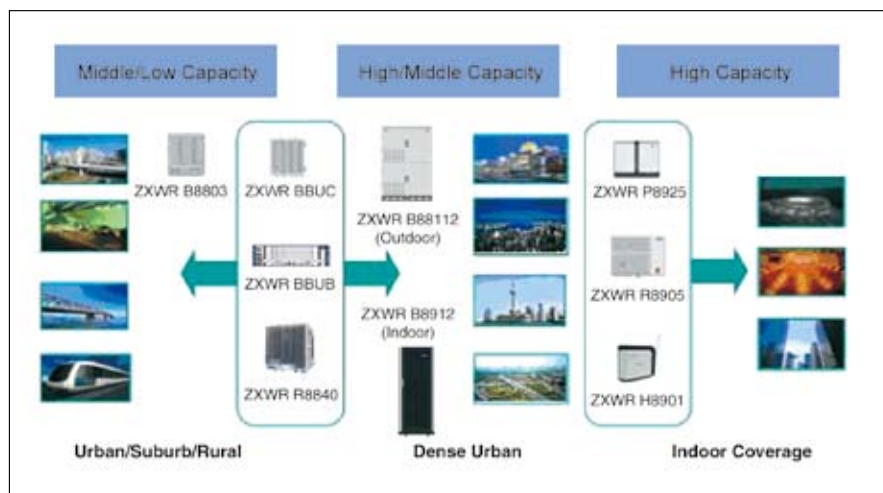


Figure 1 ZTE's new-generation V3 NodeB series

■ **Smooth evolution:** the future evolution of network technology has been taken into full consideration in the R&D of the V3+ NodeB series. The high performance Baseband Processing (BP) board independently developed by ZTE can support Multimedia Broadcast/Multicast Service (MBMS) in addition to full capabilities of HSDPA and HSUPA. Moreover, the V3+ NodeB series can smoothly evolve to HSPA+ with only a software upgrade, thus maximally lowering the evolution cost.

Fast network deployment

During the initial phase of 3G network construction, the biggest problem most operators face is the availability of equipment rooms, which restricts a fast network roll-out. The wide application of outdoor NodeBs and the distributed BBU+RRU solution can greatly speed up the network construction.

The ZXWR BBUB, the smallest BBU with the largest capacity in the industry, is 3U in height and 19 inches in width, and has a baseband capacity of 768CEs. The BBUB can be mounted onto a wall, deployed in a 2G/3G transmission rack, a 2G/3G BTS rack or even in the basement of a building.

Enhancing network profitability

It is inevitable that data services will dominate the future mobile market. ZTE's new-generation V3+ NodeB

series supports high performance HSDPA with a maximum throughput of 14.4 Mbps in one cell, R6 HSUPA with a maximum throughput of 5.76 Mbps in one cell and MBMS for data services. The evolution from R5 HSDPA to R6 HSUPA and MBMS only needs a software upgrade without the need to add any hardware, thus driving sustainable profitability for operators.

Achieving quality indoor coverage

Since more than 70% of mobile data services originate indoors, the key to the success of 3G is to cost-effectively offer flexible, convenient and quality indoor coverage. ZTE's new-generation V3+ NodeB series includes base station series for indoor coverage. The R8905 is a micro RRU with a volume of only 9 liters, and weighs only 8.5 kilograms. The "BBU+R8905+Indoor Distribution System" solution can be used to cover indoor areas of small and medium-sized buildings. The P8925 is a pico RRU that can cover indoor areas of medium and large-sized buildings with high traffic. The H8901, especially designed for home coverage, can provide HSDPA-based home wireless broadband access while improving the indoor signal quality.

Effectively lowering Opex

Based on the Digital Pre-distortion (DPD) and Doherty technologies, ZTE successfully launched the 20W/40W/

60W series of High Power Amplifiers (HPAs) whose efficiency reaches as high as 33%. The HPAs reduce not only the size and weight, but also the cost and power consumption of the V3+ NodeB series.

With respect to the costs of accessory facilities, the outdoor integrated NodeB and distributed NodeB series are designed for greater environment adaptability, minimizing the requirements for equipment room and related infrastructure.

Conclusion

As China's largest listed telecommunications equipment and solution supplier, ZTE has always been committed to providing customers with sophisticated technologies and products. The successful launch of WCDMA new-generation V3+ NodeB series proves that the company accurately understands customers' needs and the mobile network's development trend.

To date, ZTE WCDMA/HSPA commercial networks have been widely applied in over 20 countries such as Libya, Estonia, Ethiopia, Nepal and Tajikistan. The V3+ NodeB series enables cost effective network solutions such as BBU+RRU and pico access indoor coverage, delivering new network construction experience to customers. ZTE keeps track of the 3GPP standards, and has already started research into the 3GPP Long Term Evolution (LTE) standard.

The company plans to roll out its next-generation Soft Defined Radio (SDR) NodeB series based on the advanced MicroTCA platform, which will provide an HPA efficiency of over 50% and therefore help operators boost their network scalability and profitability. **ZTE TECHNOLOGIES**

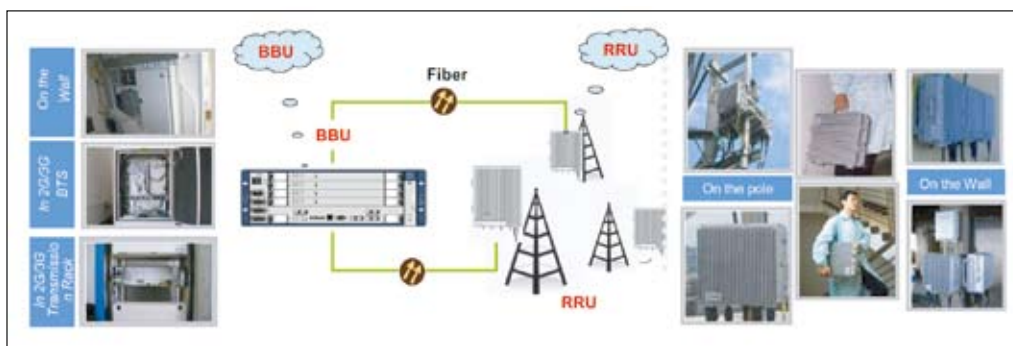


Figure 2 BBU+RRU solution

ZTE's xPON+VDSL2 Solution

Wang Xinsheng

End users' demands are constantly changing from voice to multi-play service combining voice, video, data and image together. The emergence of new value-added service (VAS) such as Internet Protocol Television (IPTV) and video phone imposes higher requirements on bandwidth, QoS and security guarantee. These services also put a new challenge on the network construction model of operators' networks, especially the access networks, when increasing the penetration of fiber-based network to the home has become the development trend of the access layer. Introducing new technologies to meet end users' diversified and customized requirements is the common concern for both operators and vendors.

ZTE provides rich Passive Optical Network (xPON) solutions to build fiber-to-the-x (FTTx) network. It produces optical network terminals (OLTs) of different capacities, and a series of optical network units (ONUs) or optical network terminals (ONTs) to meet the requirements of fiber-to-the-home (FTTH), fiber-to-the-building/curb (FTTB/C), fiber-to-the-office (FTTO), and fiber-to-the-cabinet (FTTCab). As a part of ZXA10 xPON solution, ZTE's GPON+VDSL2 solution

targets the FTTB/FTTC and FTTCab application scenarios, and utilizes the existing copper cable resources to provide high bandwidth multi-play service access.

In the FTTB mode (as presented in Figure 1), ZXDSL 9806H, as a multi-dwelling unit (MDU), is connected to OLT via optical splitter. ZXDSL 9806H can be placed in a basement, in a corridor or in an outdoor cabinet. The existing twisted-pair cable in the building can be kept and reutilized; for high buildings, a junction box may be mounted to make wiring and

engineering more convenient.

In the FTTC/FTTCab mode (illustrated in Figure 2), ZXDSL 9806H provides differentiated coverage for different users. Users within different radius are provided with different bandwidths; the distance between OLT and MDU can reach up to 20 km. ZXDSL 9806H can be installed outdoors; it can be placed in a district greenbelt or hung on a pole to save network construction costs.

In the GPON+VDSL2 solution, ZXA10 C220/C200, as the end office equipment OLT, connects to different

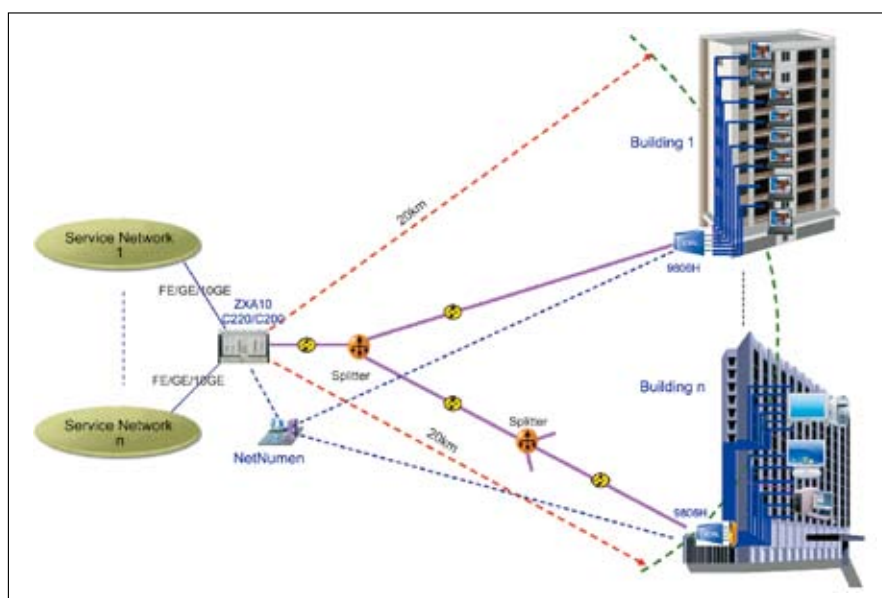


Figure 1 FTTB mode

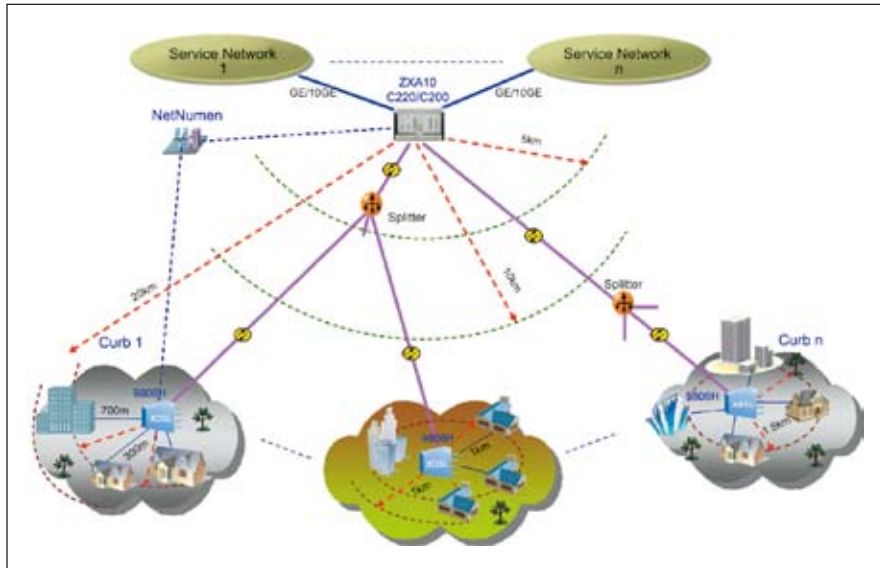


Figure 2 FTTC/FTTCab mode

service networks through $n \times$ GE or 10GE interfaces, supports mixed-plug of EPON and GPON boards in one platform, and serves up to 1280/2560 ONTs/ONUs per OLT shelf. ZXDSL 9806H, as the user-end MDU equipment, supports 96-line ADSL/ADSL2+/SHDSL or 64-line VDSL2, delivering high bandwidth multi-play services to end users.

ZTE ZXA10 C220+ ZXDSL 9806H system won the InfoVision Award at the Broadband World Forum Europe 2007"

This solution has the following features:

- Maximally reusing the existing copper cable resources in residential districts or buildings: there is no need to rebuild cables, thus reducing CAPEX;
- Requiring little maintenance: it implements the point-to-multipoint (P2MP) technique to realize the

passive transmission of data via the optical distribution network, decreasing OPEX;

- The lowest power consumption: ZXDSL 9806H has the lowest power consumption compared to similar products in the industry, alleviating operators' pressure on power supply and shrinking their OPEX;
- Uniform network management system: both the ZXA10 C220/C200 and ZXDSL 9806H are managed by the NetNumen system, saving human resources;
- Addresses different network installation requirements: ZXDSL 9806H can be installed indoors, mounted on poles, or placed in outdoor cabinets, saving equipment construction costs;
- Based on GPON and VDSL2 technology features, this solution provides different bandwidth coverage according to user densities, facilitating differentiated marketing strategies. 50Mbps bandwidth can be enabled over the copper cables;

- Flexible ISP access: ZTE GPON system is connected to multiple ISPs via different interfaces to provide rich services to users;
- Perfect QoS and security guarantee: it adopts DBA, AES-128 encryption and three "churning" functions to meet different subscriber needs.

ZTE actively participates in the testing of xPON system organized by operators and international standard bodies. From 2004 to 2007, ZTE has taken part in many EPON and GPON tests organized by China's Ministry of Information Industry (MII), China Telecom and China Netcom. Meanwhile, the company has carried out numerous GPON and EPON products and interoperability tests held by British Telecom, France Telecom, Etisalat, Telefonica, Telecom Italia, Telekom Malaysia, Telmex, PCCW, etc.

On the other hand, ZTE keeps up with the latest xPON standard development and is involved in the development of various standards. As a member of Full Service Access Network (FSAN) group, ZTE has attended FSAN-sponsored GPON interoperability tests, including one held at the ITU Telecom World 2006 last December, one held in Lannion, France this May, and another one held at the NXT Comm 2007 in Chicago, USA this June.

In October 2007, ZTE ZXA10 C220+ ZXDSL 9806H system won the InfoVision Award at the Broadband World Forum Europe 2007 in Berlin, Germany.

Since launched at the end of 2004, ZXA10 xPON system have been widely used by China Telecom and China Netcom's branches, ITESS (Holland), Free Internet (Thailand), PCCW (Hong Kong), Algeria Telecom (Algeria), and TIME dotCOM (Malaysia), covering applications of FTTH, FTTO, FTTB, FTTC, FTTCab and mixed-inserts in MSAN/MSAG.

ZTE TECHNOLOGIES

ZTE Delivers a Record 10 Million Handsets in India

India becomes the 2nd largest market of ZTE handsets

ZTE, a leading global provider of telecommunications equipment and network solutions, announced that it has achieved another company milestone by delivering a record 10 million handsets in India.

“ZTE has successfully penetrated and taken advantage of the enormous business opportunities in India, the fastest growing telecom market in the world today,” says He Shiyong, Senior Vice President of ZTE Corporation. “ZTE has been significantly investing in handset R&D for almost a decade now. Today, ZTE handset is one of the few with the capability of researching and developing all series of terminal products like 3G, GSM, CDMA, PHS, FWT, wireless data card, etc.”

ZTE’s diversified business strategy focusing on integrating IP-based mobility and broadband has positioned the company as a leading handset manufacturer and supplier globally. In India, the company has also forged solid collaborations with several prominent telecom service providers including Reliance Communications, Tata Teleservices, Bharti Airtel, supplying them with terminals and handsets of various levels.

ZTE’s achievement in handset market in India follows the momentum from its leading position in the China market as a result of its pioneering technology

from R&D and patent applications. According to China’s CCID Consulting firm, ZTE ranks first among companies with the most number of handset patents in China. In the first half of 2007, ZTE also tops the ranking among the Chinese manufacturers and is in 5th position in the world with sales volume of 15 million units.

To date, ZTE has sold 60 million handsets in over 70 countries and regions. It is one of the mainstream suppliers of many leading and large global telecom operators including Vodafone, Hutchison, Telefonica.



C332



VDF225



VDF125





3G

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Only ZTE can deliver end-to-end equipment for all 3G standards — WCDMA, CDMA2000, TD-SCDMA and WiMAX.

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Our TD-SCDMA products have gained 50% market share of the China mobile market.

Moreover, we have become the main WiMAX terminal provider of Sprint.

Our 3G terminals are sold in more than 20 countries and regions over the world in partnership with British Telecom, Hutchison Whampoa, Spanish Telecom, Vodafone, and other international operators.

Now, we are ready to serve you.

ZTE is China's largest listed telecom vendor, providing comprehensive tele-communications equipment and network solutions all over the world.

We deliver innovative, custom-made products and services to customers in more than 120 countries, helping them achieve continued revenue growth and shape the future of the world's communications.

Visit www.zte.com.cn or contact your local ZTE office to know more.

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