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TECHNOLOGIES

VIP Voices

Telkom: Planning for
Healthy Development

Tech Forum

Service Quality Management
in PTN and IP RAN

Special
Topic

Mobile Backhaul

Any to Any MPLS for Mobile Backhaul

Joddy Hernady, senior vice president of Synergy Department at Telkom Indonesia

ZTE



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Telkom is the largest telecom services company in Indonesia. Joddy Hernady, senior vice president of Synergy Department at Telkom Indonesia, talked in the interview about Telkom's investment strategy, development priorities, smart city deployment and main challenges in Indonesia. He also shared with us his expectations for the future cooperation between Telkom and ZTE and his views on global telecom trends.



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A technical magazine that keeps up with the latest industry trends, communicates leading technologies and solutions, and shares stories of our customer success

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China to Get 'Four Times Faster' Pre-5G Internet in 2016 amid Premier's Push for Tech Development

Source: South China Morning Post

ZTE 6-Month Net Profit Rises 43.2% as 4G LTE Network Revenue Surges

26 August 2015, Shenzhen — ZTE announced that first-half net profit rose 43.2% as the company increased sales of 4G LTE network equipment to carriers.

Net profit attributable to shareholders of the listed company jumped to RMB 1.62 billion (US\$252 million) in the first six months, according to the results announcement posted by ZTE today. Basic earnings per share climbed to RMB 0.47, while revenue increased 21.8% to RMB 45.9 billion.

ZTE's industry-leading 4G network solutions including cloud radio and magic radio helped the company win increased customer orders in the 4G LTE equipment market internationally. ZTE's innovations in FDD-LTE and TD-LTE technologies

are enabling the company to strengthen partnerships with leading carriers around the world, including Telefonica, MTN Group and Bharti Airtel. In China, ZTE strengthened its leading market position in the 4G LTE network solutions market.

ZTE's strong position in the 4G market is providing a platform for the company to lead the industry in the transition to next-generation 5G technologies. ZTE is committing increased investment into the research of 5G technology, and is working with numerous carriers around the world to accelerate the deployment of the company's proprietary pre5G solutions, delivering immediate improvements to network performance and a better mobile



broadband experience to end-users before 5G is standardized in the industry.

In addition to wireless products, ZTE also posted growth in its wireline division, helped by strong orders for optical transport networks and broadband systems.

ZTE Constructs the First Communications Institute in Equatorial Guinea



4 August 2015, Shenzhen — ZTE has completed the construction of Equatorial Guinea's first communications training institute in Oyala. The institute, which will be run with ZTE's assistance, sees the Equatorial Guinean government usher in the new era of smart education, promoting the development of ICT-based education.

The excellent teaching facilities and the network-wide communications laboratory built by ZTE will provide a comprehensive environment for students to practice cutting-edge technologies.

With more than 20 years of experience in knowledge service training, more than 100 professional senior lecturers in communications technologies, and 15 successful training centres worldwide, ZTE University will provide powerful knowledge service support and extensive operations management experience for the training institute in Equatorial Guinea. After the project is completed, the institute will train communications professionals to work for the Equatorial Guinean government.



ZTE Helps Smartfren Launch 4G LTE-Advanced Service in Indonesia

26 August 2015, Jakarta — ZTE is pleased to help PT Smartfren Telecom launch 4G LTE-Advanced network in Indonesia, giving users access to the highest-performance mobile broadband services.

The new 4G LTE-Advanced, which supports both the FDD-LTE and TDD-LTE standards, was launched commercially by Smartfren in Jakarta on 19 August, and coverage areas already include the 22 major cities of Indonesia. The new network deploys ZTE's market-leading 4G LTE solutions including evolved node B (eNB), cloud radio and eHRPD to deliver the best user experience to subscribers.

"The nationwide launch of our 4G LTE-Advanced service follows

successful trials and the June launch of our Andromax range of LTE smartphone and portable WiFi devices. We believe that 4G LTE-Advanced technology will open many opportunities for our customers and further accelerate the ICT industry as a backbone for Indonesian economic growth. 4G LTE-Advanced will enable our customers to enjoy improved multimedia streaming, online games, cloud storage and video conferencing. Smartfren is committed to bringing the best of 4G LTE technology to Indonesia to deliver not only higher speeds but a more stable and reliable 4G LTE experience" said Smartfren CEO Paul Hodges.

ZTE Unveils New 4K Ultra High-Definition Set-Top Boxes at IBC Conference

11 September 2015, Amsterdam — ZTE unveiled new ultra high-definition set-top boxes (STB) supporting 4K resolution to deliver an enhanced viewing experience to homes around the world.

Products shown at the International

Broadcasting Convention 2015 in Amsterdam are ZTE B800S2, a 4K UHD STB that enables users to access IPTV and OTT applications, and ZTE B820T2-A10, a 4K UHD hybrid STB that enables users to access DVB-T2 and OTT applications.

ZTE and Telefonica Strengthen Partnership



27 August 2015, Shenzhen — ZTE signed a global cooperation agreement with Telefonica, one of the world's largest operators. The partnership will strengthen ZTE's position as primary technological partner for Telefonica.

ZTE delivers several cutting-edge network solutions for Telefonica across 2G/3G/LTE radio access networks, fixed access networks, high capacity optical transport networks, IP-RAN, IMS core network solutions, power systems, and value added services and applications such as voicemail platforms.

This agreement aims to increase ZTE's involvement in areas where it is already working with Telefonica. It also aims to deepen the partnership on next-generation network innovations such as the development of ultra-high broadband via GPON, high-resilient, high-capacity transports solutions using photonic mesh networks, clearer and richer VoLTE services, and microwave transmission.

"Telefonica is constantly exploring new technologies that will provide best-in-class user experience for our customers," said Mr. Jose Maria Alvarez-Pallete Lopez. "We see ZTE as one of our key technology partners in helping us support the ever increasing communication needs of the future. Partnering with ZTE will also support our vision of being a smart, digital telco, primed to lead the digital transformation."



Joddy Hernady, senior vice president of Synergy Department at Telkom Indonesia

Telkom:

Planning for Healthy Development

Reporters: Liu Yang and Zhang Ying

Telkom is the largest telecommunication services company in Indonesia. It provides fixed wireline and wireless connections, mobile communications, networking and interconnection services, and internet and data services. Recently, *ZTE Technologies* interviewed Joddy Hernady, senior vice president of Synergy Department at Telkom Indonesia. He talked about Telkom's investment strategy, development priorities, smart city deployment and main challenges in Indonesia. He also shared with us his expectations for the future cooperation between Telkom and ZTE and his views on global telecom trends.

We have been using ZTE's products so far mainly to support our infrastructure and some businesses for consumer services such as IPTV.

Q: What is your new role at Telkom?

A: I am currently the senior vice president of the Synergy Department at Telekom Indonesia. I ensure synergy between Telkom Group members in order to increase the overall revenue of the Group. In addition, I help reduce costs and minimize cash out by maximizing the Group's internal transactions; I resolve the conflicting portfolios in the implementation; I manage the Group's business portfolio by monitoring subsidiaries performance and giving recommendation for their improvement; and I manage post deal integration on acquisition and alliance projects.

Q: How would you characterize the Indonesian telecom market?

A: The Indonesian telecom market is basically a mobile market. Our mobile penetration is already 112% across 90% of Indonesia. Our fixed telephone penetration is less than 4%. For the broadband, currently the broadband penetration is still as low as 1.1% (fixed broadband) and 22.2% (mobile broadband).

However, for digital business, Indonesia is a potential market. There are already around 75 million internet

users, which is around 30% of the population. Accessing social media represents the highest proportion of internet activity. Indonesia has the fifth largest number of social media users in the world. From the top ten active users for example, Jakarta is the number one city for active twitter users in the world and Bandung is the sixth.

About 58% of internet users are between 12 and 34 years old, and are online for five hours by laptop or personal computer and about two hours through mobile devices. As many as 62 million people are active on social media. 52 million of them access social media through mobile devices for about three hours per day. Other activities include searching for information and emailing (48%), downloading or viewing and chatting (47%), while game playing and other activities account for less than 35%.

Q: What is Telkom's investment strategy? What are your medium-to-long term investment targets?

A: Based on market situation, the current and future business potentials are in broadband market and building digital ecosystems. These are all driven by the development of the internet. Therefore, now we are investing aggressively in broadband by deploying fiber, Wi-Fi and LTE for

mobile broadband. We will continue investing in broadband for next several years as our current broadband penetration is still low.

For the short term target, Telkom has an initiative to deploy optical transport network to 446 cities (90% of total) in Indonesia in 2015. This is true broadband capability covering 18.7 million home pass (up to 100 Mbps).

In addition, for medium and longer term, we will invest in the area of IT and Media and preparing the company to be a digital company by investing in both organic and un-organic investment such as data centre, cloud, big data, digital advertising, OTT platform, payment platform and video.

Q: What are Telkom's priorities for the next three to five years?

A: Over the next five years, our portfolio objective will consist of the following three aspects.

First, we will defend and shape the traditional legacy ecosystem by sustaining our leading position in mobile and developing broadband nationwide.

Second, we will grow our digital portfolio to build value premium over legacy business by providing digital services to enterprise, government and consumer as well as building the smart enabler "hub" platform for the

digital services.

Third, we will enter overseas markets to drive scale synergies and import digital ecosystems into Indonesia by developing major overseas digital and telecoms foothold and investing into new emerging businesses and technologies.

Q: How do you create synergy between fixed and mobile business?

A: Synergy between fixed and mobile starts with infrastructure sharing. We are driving this synergy from the planning. We plan the infrastructure together and make sure that the implementation is running smoothly; we also change our organization in both sides by adding some key functions related to the synergized areas to make coordination run smoothly and more responsive so both parties will feel the value and benefit from this synergy.

In addition, we also have the Synergy Department, which is now led by me to manage and orchestrate all synergy programs amongst Telkom Group. This is very important for us to create the belief between both parties that synergy can create values to both sides.

In addition to infrastructure we also create more synergy activities in other areas such as integrating the video platform for fixed and mobile.

Q: How will Telkom support the national broadband project?

A: Telkom initiated the Indonesia Digital Network 2020 Program to support the national broadband project. It is the extension of our previous

program called IDN 2015. The program of IDN contains three major sub-programs.

The first sub-program is Indonesia Digital Access (id Access), which involves deploying true broadband access and mobile broadband access. The goal of this program is to cover 30% of households with true fixed broadband and 200 cities with mobile broadband in 2020.

The second sub-program is Indonesia Digital Ring (id Ring), which involves achieving Indonesia Express Super Core, Always ON transport backbone and creates International Gateway & CDN enhancement. Telkom is also in a preparation of launching new Telkom Satellite 3S in upcoming 2016. The target is to cover 100% of sub-districts by broadband in 2020.

The third sub-program is Indonesia Digital Convergence (id Con), which involves building a 50,000 m² data center by 2020, and creates convergence services and meaningful services through digital ecosystem, including providing Smart City solutions. The target is to provide a nationwide cloud computing for government, business and individual use. This program also includes building a nationwide Cyber Security System by 2020.

Q: “Smart city” is a buzzword in the telecom industry now. Where is Telkom now in terms of smart city deployment? What is the importance of smart city for Telkom’s overall strategy?

A: Broadband infrastructure is the foundation to build smart city. As the biggest telecommunication provider in

Indonesia for both fixed and mobile, Telkom will provide comprehensive end-to-end solutions for smart city. Our concept is to develop an integrated city management above ICT infrastructure. The integrated city management will consist of smart government, smart citizen, smart healthcare, smart building, smart transportation, smart energy, and smart security, whilst in the ICT infrastructure will consist of smart infrastructure and smart technology as shown in the following page.

With this concept, Telkom is creating a unique smart city framework that comprises nine key components as mentioned above. We have several technology partners to support us on providing those smart city components and ZTE is one of our partners.

In the implementation, currently we have a pilot project with Bandung government for Bandung smart city. The cooperation with government of Bandung started in 2014. As part of this pilot, we showed some solutions that have been commercialized during the Asia Africa Commemoration in Bandung in April 2015.

Smart city is very important for Telkom. This can be one of future potential markets for Telkom since it will involve some key technologies for the future in the digital era that Telkom has already started to invest such as cloud, big data, broadband, and M2M/IoT. The market is also promising because Indonesia has around 500 cities that could potentially become smart cities.

Q: What is the biggest challenge that you are facing in smart city project? How have you overcome it?

A: The biggest challenge for smart city development is funding from local government. To create a smart city, it is very important to develop a smart government first. Unfortunately, most of local government in Indonesia has a limited budget for building a smart city.

To overcome this, we need to create several options of business model including some breakthrough public/private partnership scheme. We have developed this model and now in the discussion with the local government of Bandung as the pilot project.

Q: OTT players are having a big impact on operators. How would you describe the relationship between operators and OTT players?

A: There are three models that we can



play with OTT.

The first model is telco as a dump pipe. In this case, we only provide data connectivity while OTT players sell their OTT services on their own. Telco gets the benefit of increased data consumption and monetization (billing enabler). One of the cons is that the telco does not create customer stickiness and experience.

The second model is a hybrid model. In this case, we can create an exclusive partnership with OTT players and support the promotion to a target audience. In this model, we can get higher revenue share as an exclusive partner and promoter, but the cons is having limited monetization and dependent on OTT players to bring their services.

The third model is end-to-end or hard bundling. We create our own OTT services and hard bundles the product with its existing plans. We also own compression technologies, new device compatibility, digitization, etc., that cater to changing customer needs. This model can create customer retention and differentiation in the market, but the cons is we have to create better OTT services than services provided by OTT players, which is usually very difficult as it is not Telco's DNA.

Which one is suitable for us will really depend on our strategy, market situation and our capability to develop OTT services.

Q: Could you comment on ZTE's solutions and services? What is your outlook for future cooperation between Telkom and ZTE?

A: ZTE has a very wide range

solutions and services. It has solutions for enterprise and government as well as for retail consumers. We have been using ZTE's products so far mainly to support our infrastructure and some businesses for consumer services such as IPTV.

For enterprise and government market, especially in providing IT services, there are two ways for ZTE to enter the market.

First, ZTE can go to the market directly and compete with us as a telco head-to-head. Even though Telkom is a telco, the border between industries is blurring. Telkom has expanded its business portfolio to the adjacent industries such as IT, media, and entertainment. Therefore, our approach to enter the enterprise and government market now is not only providing telco infrastructure but also providing IT services, especially offering the connectivity bundled with IT services.

Second, ZTE supports Telkom as a technology partner to provide bundled solutions to enterprise and government. I think the second option would be better because this collaboration will benefit both of us, and we can capture a bigger market share. In term of market understanding, we have a better understanding especially for government markets as Telkom is also a state owned enterprise company.

In addition, for future cooperation, ZTE can also consider some budget to build a joint innovation and development for new enterprise and government services. I think this is very important for our future cooperation and to have a better understanding on new requirements of customers such as in smart city and to create our competitive advantages

over the competitors. By doing this, we will be able to know Indonesian subscriber's behavior better and develop products that will fit with the need of Indonesian market including finding out the right business model.

Q: How will the global telecom market develop over the next few years?

A: The biggest market of telco industry now is still traditional fixed and mobile services. However, traditional fixed and mobile business is declining everywhere. Globally, our voice and text messaging revenues have already declined by 9% with Europe and Asia being the most impacted. The next biggest market in telco industry is broadband. All telcos are entering broadband as the next frontier but in general, the broadband services are not able to compensate the decline in the legacy services.

We are living in the digital era and people's lifestyle is also now shifting to digital lifestyle. Therefore, it is very important that telcos also transform themselves into digital companies as the biggest market both in consumer and enterprise side will be based on digital. We can also enter other industry by digital services.

In terms of the telecom market, we believe that the future enterprise market will be the key market for telcos. In the consumer market, I think in general, OTT players will be more dominant than telcos. Therefore, digital enterprise market including smart city will be a key market for telcos over the next few years.

ZTE TECHNOLOGIES

Rostelecom Armenia Focuses on IPTV Services

Reporters: Liu Yang and Zhang Ying



Hayk Faramazyan, CEO of Rostelecom Armenia

Armenia's telecom market has developed rapidly in recent years. The competition is extremely tough. Rostelecom provides broadband internet access, VoIP and new generation IPTV services for customers in Armenia. The company focuses on IPTV services and is gaining more and more market share. Recently, ZTE Technologies interviewed Hayk Faramazyan, CEO of Rostelecom Armenia. He talked about Rostelecom Armenia's latest developments, most demanded services, main challenges, growth opportunities and new trends in the IPTV market. He also shared with us his expectations for ZTE and outlook for Rostelecom Armenia.

Q: What are the characteristics of Armenia's telecom market?

A: The telecom market in Armenia has been developing rapidly over the past 10 to 15 years. Armenia is considered as one of the leaders in implementation of innovative technologies in telecoms.

The market is extremely competitive. There are five major players: Vivacell-MTS, which has the largest market share in telecoms and provides 2G, 3G and LTE; Beeline, which provides 2G, 3G and ADSL/VDSL and voice services; Orange Armenia, which provides 3G+ services; UCom, which has an FTTH network and provides

broadband internet, VoIP and IPTV; and Rostelecom Armenia, which provides broadband internet, VoIP, and next-generation IPTV.

Q: What are some of the latest developments of Rostelecom Armenia?

A: From December 18, 2012, GNC-ALFA CJSC has provided telecommunication services for Armenia through a subsidiary called Rostelecom Armenia.

As one of the leading telecommunications companies, Rostelecom Armenia provides broadband internet access, VoIP and

new generation IPTV services.

From 2012 to 2013, the company made large-scale investments in network development and expansion. In particular, major investments were made in fiber-to-the-home (GPON) network in a number of cities in Armenia.

Starting from 2014, the company provides services in 20 cities of Armenia including Yerevan. The network of Rostelecom Armenia is solely based on fiber-optic cable (FOC) infrastructure covering 80% of the territory of RA and spreading for over 3000 km.

It is connected to region's main terrestrial cable networks and largest traffic exchanges. It has interconnection with Georgia.

In 2014 Rostelecom has built 40 GB/s network covering all municipalities of Yerevan and providing high-speed internet connection to all customers.

The state institutions of Armenia, international organizations, corporations, and local financial institutions are all corporate clients of Rostelecom Armenia.

Q: How is the competition in the field of IPTV?

A: Competition in this field is diverse, and there are five leading companies providing internet



services. IPTV services are provided by two of them Rostelecom and Ucom. There are also around 10 small IPTV providers in the regions of Armenia. In case of Rostelecom, the services are available in 20 cities of Armenia including capital city Yerevan.

Ucom is the leading IPTV provider, but Rostelecom is expanding its market share aggressively and is considered as one of the leaders in IPTV market as well. Some other providers have started IPTV pilot projects, but they only cover very small areas and have up to 1% market share.

Q: What major challenges do you face in the IPTV market? What is your market strategy?

A: Rostelecom's IPTV services have always been very innovative and customer oriented; that's the reason Rostelecom Armenia is considered the fastest growing telecom company in Armenia.

We face a variety of challenges related to current trends and regional specificity. Our marketing strategy is based on two main factors: customer needs and international innovation trends. These core issues are drivers of Rostelecom success in Armenia. With ZTE's new IPTV platform, we will introduce new unprecedented services and applications in the Armenian market. We aim to make the TV set an interactive smart box through which the customer can access TV live channels, VoD, Apps and internet.



Q: What Rostelecom Armenia's services are most in demand?

A: Armenian customers are very demanding, and their demands on IPTV and internet services are similar to those in developed countries.

They need high speed stable and high quality internet services and IPTV designed for advanced users. Our customers are very sensitive to IPTV quality of service. Every malfunction in the network or platform results in dissatisfaction and customer complaints. We have the highest quality IPTV service in the country in order to meet customer expectations.

Q: Where do you see the growth

opportunities in Armenia?

A: Main drivers of Rostelecom expansion in Armenia are investments in innovations, development of intelligence countrywide, and integration of society in political and economic life through smart and IP solutions.

We are sure that IPTV will have great success as the old technologies like cable TV will lose their positions thus leaving the space for new technology. We believe that within the next five years we will double IPTV users every year.

Q: You are planning to launch a new IPTV platform with ZTE. How will this new platform differ from the existing one?

A: Rostelecom's IPTV platform will be smarter than the existing platform and will have some new and trendy tools, such as apps, YouTube, TVOD, TSTV, and VOD. With all its innovative solutions, the new IPTV platform will become more accessible in Armenia, especially in regional areas.

We are sure that cooperation with ZTE Corporation will be mutually beneficial for both companies and Rostelecom's customers in Armenia will be provided the best and "smartest" IPTV in the region very soon.

Q: What new trends do you see in the IPTV market?

A: IPTV local market trends are in common with international trends and now cable changes to IP and trends go to TSTV, TVOD and other solutions. Anyway, these changes and developments will also be affected by solvency in the country and investments will be done in consideration with the local market trends.

Q: What are your expectations for the future partnership between Rostelecom Armenia and ZTE?

A: Future strategic partnership between Rostelecom and ZTE will continue in direction of IPTV expansion, implementation of additional services and core cooperation for the benefit of Armenian customers.

Q: How will Rostelecom Armenia develop over the next five years?

A: Rostelecom Armenia will expand both qualitative and quantitative key services and indicators. We will expand our presence in regional areas, develop new product lines, and continue investing in innovative technologies in local telecom market.

ZTE TECHNOLOGIES

DirecTV:

Combining Pay-TV with Internet Services to Win More Market Share

Reporters: Liu Yang and Zhang Ying



Alessandro Defilippi Elias, head of wireless network of DirecTV in Peru

DirecTV is an American direct broadcast satellite broadcaster in El Segundo, California.

It provides television and audio services to subscribers. Recently, *ZTE Technologies* interviewed Alessandro Defilippi Elias, head of wireless network of DirecTV in Peru. He talked about DirecTV's TD-LTE project, development strategies and differentiated services in Peru. He also shared with us his expectations for the future cooperation between DirecTV and ZTE.

Q: How would you describe Peru's pay-TV market?

A: Peru's TV market is still growing. Because Peru is a developing country, most of the services are still developing. So there are many opportunities for DirecTV and other companies in this particular segment in Peru.

Q: Could you tell us about the milestones of your project?

A: We are deploying our sites and hoping to put our first site into operation soon. We are hoping to have our first customer around August. Probably by the end of this year, we will have 200 sites on there. And by the end of 2016, we will have 400 in eNodeBs for service in Peru.

Q: Could you tell us your TD-LTE plan? What do you want to achieve with the current TD-LTE project?

A: Right now, we are deploying TD-LTE network over band 40 of LTE. First we have internet services for new customers and our DirecTV customers. What we want to achieve is mature networks across the country. We hope to be not only in the capital but also in the main cities of north and south Peru, probably by the end of the year. We will continue the second and the third phase next year. So we are able to offer internet and pay-TV bundles to our customers. Maybe in the near future, we will also offer voice services, telephone over the same network.

Q: What are the challenges for DirecTV to deploy TD-LTE network?

A: One of the biggest challenges is the frequency. We are only using what we have, and we don't have that much frequency in Peru. So we are trying to add more spectrums in order to provide good services. That would be the biggest challenge.

Our second challenge is infrastructure. We are trying to build networks as fast as possible. The towers will be our equipment.

So the main challenges for us right now are the spectrum and infrastructure.

Q: Network optimization is a key part of TD-LTE network construction. What steps are you taking to enable network optimization?

A: For network optimization, the first step is having a basic configuration over the defined clusters. Once we have the defined clusters, maybe we can use some features to control interference. Our main problem is that we don't have much spectrum, so our capabilities of frequency reuse and configuration are limited. Since resisting interference is a big issue for us, we have to be very sure about the sector configuration, carrier configuration and inter-cell distance of our sites, and we are trying to accomplish optimization through some features that can help us mainly control the interference.

Q: The pay-TV market is highly untapped in the Latin American region. What are DirecTV's development strategies for market penetration?

A: Actually, the idea is to combine pay-TV and internet services; that's why we have LTE network deployment. By giving a bundle to customers, offering both internet and TV as one service, we can still keep growing without any problems. Now, all the tendencies are directed towards having both services, instead of only one service of either pay-TV or the internet.

As you say, the TV market is still untapped in Latin America, so we have a lot of room to grow. The penetration is still in the low end of services, but we think the way to

monetary gain is combine services, in this case, TV and internet.

Q: Could you elaborate on DirecTV's differentiated services for both high-end and low-end customers in Peru?

A: DirecTV in Peru is more considered a high-end service. However, we also have low-end customers. For the high-end customers, we have a really good quality service with really good equipment for HD DVR to record HD programs, so our high definition TV is the main difference between us and other companies. High-end usually entails higher cost, but our equipment and services are of much higher quality than those of the competition.

For low-end customers, we are focusing on the pre-paid services. Low-end customers are pre-paid while the high-end customers are post-paid. Both of them have good channel quality and a good service quality. However, the payment method is the big difference between high-end and low-end customers.

Q: What differentiates your TV service from other operators' TV services?

A: I think the difference is the quality of HD signals, the standardization of signals, and the DVR equipment we use. Our products and services are really high-end.



Q: DirecTV has its own audience network and sports networks. How can these networks help to increase the number of subscribers?

A: As I mentioned before, the sports network is a huge benefit for DirecTV customers. We will grow not by having more channels or different quality programs but through our services. The main service is not only quality (HD TV) but a combination of this and internet. We will try to have an OTT service for online streaming channel.

Q: What do you think about the relationship between pay-TV operators and mobile operators?

A: Actually, I don't know the way how mobile operators operate, but for internet services, it is a really good cooperation between both services, because DirecTV is a major pay-TV company, right? All the content for programs, shows and sports, we are ready to have them. We are able to deploy quality transfer network by internet or only assign intranet services. We will be able to connect our customers to our database or core networks, where we have all the program information. Therefore, our customers can stream the information or video-on-demand service whenever they want. I think it is a really good opportunity to bundle TV content using the internet connection.

Q: How would you assess ZTE's solutions and services? What are your expectations for future cooperation between DirecTV and ZTE?

A: ZTE right now is our major partner. ZTE has 100% of our access network and 100% of our microwave network. ZTE is a really important partner for us. We hope to have a long-term relationship because up to now, we have been working pretty well on this. We hope that ZTE's experience can help us have an optimized network. We are sure that we can partner in the future while ZTE keeps developing new products to help us build our network the way we need and to give quality services for our customers.

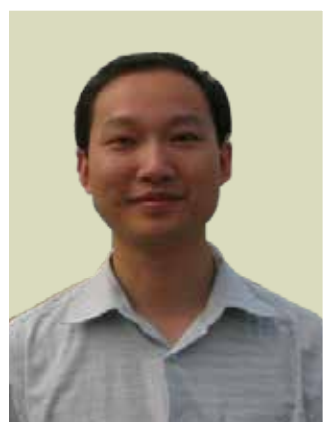
Q: What is your vision for DirecTV over the next few years?

A: The main objective of DirecTV now is getting more market share in Peru for pay-TV services and for internet. We are focusing on growth to have more customers in the next few years by giving both TV quality services and quality internet service.

ZTE TECHNOLOGIES

Service Quality Management in PTN and IP RAN

By Liu Aihua



Liu Aihua, chief engineer of ZTE wireline products

Service quality is key to operators remaining competitive. The effect of service bearer networks on service quality is the first issue an operator needs to consider in network O&M. As LTE services develop rapidly, service bearer networks have undergone great changes. Mobile

backhaul networks have evolved from traditional TDM to packet-switched L2 VPN and then to hybrid L2-L3 VPNs. The mainstream technologies include PTN and IP RAN. With the evolution of network architecture, end-to-end service bearer paths have often been divided between multiple VPNs. This creates new challenges for network O&M (Fig. 1). First, an operator bearer network lacks end-to-end service quality monitoring and related visual O&M. Second, existing O&M techniques can hardly reflect the real service quality. Third, the division of bearer services between multiple VPNs seriously affects fault detection and location. All this gives rise to the development of service quality management (SQM).

Major operators are viewing SQM with increasing importance and are attempting to improve service quality and O&M. As early as in 2014, China Mobile started researching SQM and focused on an index system and monitoring solutions for LTE service quality. China Telecom also raised SQM requirements for key accounts in 2014 that would support service performance measurement. With the rapid growth of pan-IP based services and the demands for network convergence, SQM is expected to be the basic requirement for service quality monitoring and O&M on operator networks in the future.

Considering IP-based service requirements and hybrid L2/L3 VPN architecture, an SQM solution can select monitoring technologies at L3 or above. The monitoring technologies at L3 are preferred for bearer networks.

Standard technologies include L3 Ping (RFC 792/RFC 4443), BFD (RFC 5880), OWAMP/TWAMP (RFC 4656/RFC 5357), RFC 2544/Y.1564, and service performance sampling statistics. The L3 Ping provides simple connectivity detection; BFD provides universal connectivity detection; OWAMP/TWAMP provides connectivity, delay and jitter, and packet loss detection; RFC 2544/Y.1564 provides throughput, delay and jitter, and packet loss detection; and service performance sampling statistics provides statistical analysis of traffic flow and even business content.

Technically, SQM can be divided into three categories: active monitoring, passive monitoring, and combined active and passive monitoring. Now most monitoring technologies are active, including Ping, BFD, OWAMP/TWAMP and RFC 2544/Y.1564. Service performance sampling statistics belongs to passive monitoring. Active monitoring technologies are independent of traffic flow and can simulate traffic flow for quality monitoring. However, there may be a deviation between the monitored results and actual traffic. Passive monitoring technologies depend on traffic flow, and test results are reasonably accurate except that they are restricted by traffic flow. Combined active and passive monitoring technologies can integrate active and passive monitoring but lack a standard. From the technical

perspective, active monitoring is most applicable to widespread standard deployments, while passive monitoring is used as a supplement for specific application scenarios.

An SQM solution can be deployed inside or outside the bearer devices. Deploying SQM functions inside the bearer devices means service quality monitoring technologies at L3 are built in the bearer equipment to comprehensively monitor the quality of both the bearer network and services. For external SQM functions, an additional SQM monitoring device needs to be deployed outside the bearer network. Although this simplifies the requirements for bearer devices, the deployment is complicated and costly, and integrated quality monitoring of both bearer networks and services is not possible. Therefore, deploying SQM functions inside the bearer devices is preferred by operators.

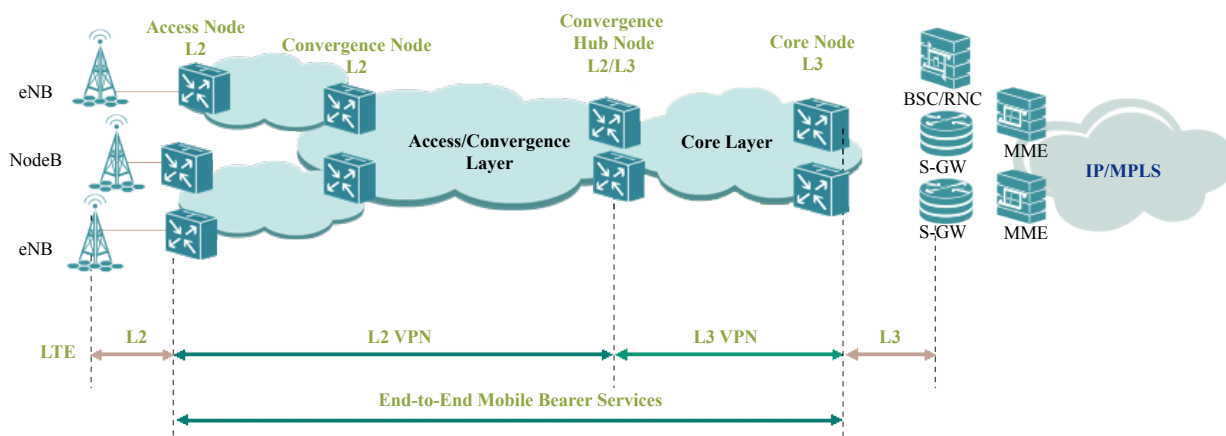


Figure 1. Hybrid L2/L3 VPN for mobile backhaul.

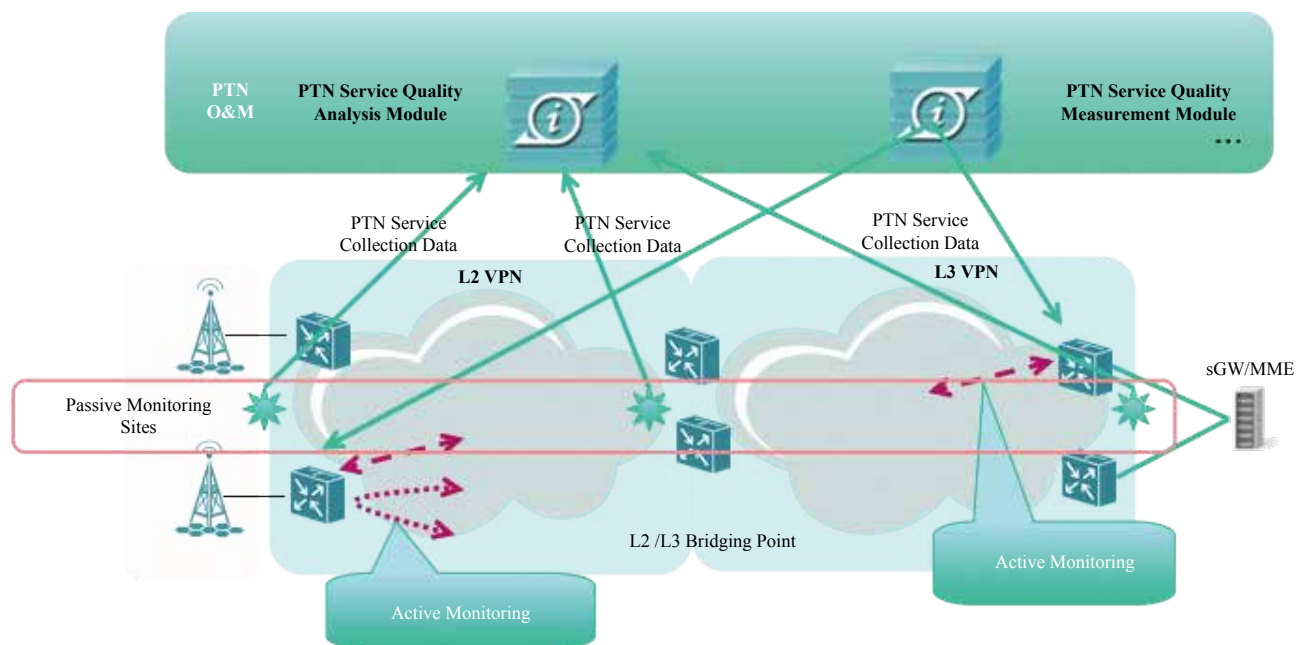


Figure 2. ZTE's integrated SQM solution.

Through monitoring technologies at the L3 or above, the SQM solution directly monitors service quality and establishes a service-based quality indicator monitoring system. For IP-based services between LTE eNBs and xGWs, the solution monitors connectivity, delay, jitter, and packet loss of IP traffic flow in real time, and analyzes content of the IP traffic at the application layer, including the SCTP protocol and eNB traffic. By monitoring these service-based quality indicators, the solution can display service quality visually on the network management system in real time. When a fault occurs or performance deteriorates, an alarm is immediately generated and sent to maintenance personnel for troubleshooting.

The SQM solution can work with the traditional network O&M system to provide a highly efficient, integrated O&M. SQM monitors service-based

quality indicators, while the traditional O&M monitors network-based quality indicators. In other words, SQM provides service-based KPIs whereas traditional O&M provides quality indicators based on network operation. The relationship between service quality indicators and operation quality indicators can be built gradually to optimize network quality according to service quality requirements. This facilitates O&M and optimizes network for better services.

In ZTE's integrated SQM solution, SQM functions are embedded in bearer devices for comprehensive quality management within the network management system. The SQM functions can also be combined with an advanced traffic analysis platform to provide integrated service-based traffic analysis tools. Both the bearer network management system and traffic analysis platform provide multi-layer, multi-domain hierarchical quality management and analysis to help operators build advanced networks. ZTE's bearer devices support a wealth of SQM functions, including active Ping, TWAMP, RFC 2544/Y.1564, and HTTP/TCP/UDP/FTP connectivity measurement, as well as passive service performance statistics and SCTP protocol analysis. ZTE has been working with China Mobile to trial the SQM solution.



Any to Any MPLS

for Mobile Backhaul

By Cui Yanyun

With the wide application of mobile data services and the emergence of new services, especially mobile video services, mobile network traffic has increased dramatically.

Major operators worldwide have been upgrading their wireless telecom networks over the past decade from 2G to 3G to LTE, to meet the demand of higher bandwidths. While continuous

network upgrades are providing users with improved network performance and QoS, they are also creating many challenges in mobile backhaul networks.

Key Requirements for a Mobile Backhaul Network in the LTE Era

To accommodate LTE, the next-generation mobile backhaul network must meet the following requirements:

- Smart network architecture. The evolution of mobile networks toward 4G makes a different LTE network architecture from 2G/3G one. Specifically, part of the control and routing functions previously implemented by the BSC/RNC are integrated into the eNodeB to make a flatter network capable of smart routing. Higher network bandwidths will also be provided with both

uplink and downlink bit rate at above 150 Mbps. 1 GE and even 10 GE access devices will become common.

- Super-large scale with densely-deployed LTE eNodeBs. Either the rapid development of LTE technologies, urgent demand for higher user bandwidths, or exponentially growing number of eNodeBs requires operators to deploy more access nodes on the transport network to handle huge accesses to eNodeBs and carry large service traffic.
- Smooth and seamless service migration to the LTE network.

A well-established LTE network requires a long-term process and will not come overnight. Usually, there is only a small number of users at the early stage, and the LTE EPC core network is deployed in one region and shared by users in this and other regions through transport networks. However, the increasing number of users and rising demand for user capacity urge operators to consider deploying the EPC to be closer to users, which means from a centralized EPC to distributed EPCs in multiple regions.

- Low transmission delays. LTE services require lower delay than legacy 2G and 3G services. According to 3GPP2 and NGMN, the end-to-end delay of S1 interface in LTE should be less than 25 ms, with an ideal value of less than 5 ms, and the end-to-end delay of X2 interface in LTE should be between 50 ms and 100 ms, with an ideal value of less than 10 ms.
- Compatible and converged transport capability. Many operators have to deploy and operate mobile networks with different network systems during LTE evolution. Therefore,

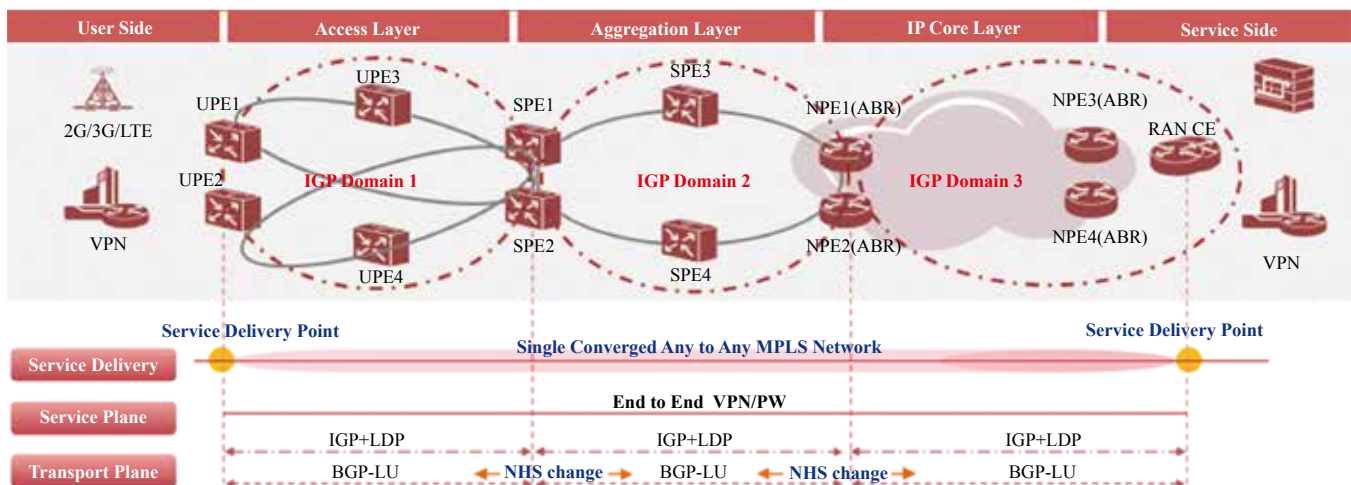


Figure 1. Any to Any MPLS architecture.

a next-generation mobile backhaul network must support multiple types of existing transport links, such as copper, fiber, and radio (mainly MW). Not only should it provide TDM/ATM access for all legacy 2G/3G services to preserve investments in the existing backhaul networks, it must also be highly scalable for future use.

- Intelligent O&M In the traditional "black box" O&M mode, network performance is separated from QoS. The network management system focuses on network performance and is not aware of QoS and how network resources are allocated. An evolved backhaul will allow the network to carry more diversified 3G and LTE services and make network O&M more complex as well. Therefore,

an intelligent O&M system with clear service paths, visual service resources, and abundant real-time and smart QoS monitoring methods will be indispensable to a future mobile backhaul network.

ZTE's Any to Any MPLS Solution

After years of studying the mobile backhaul network, ZTE proposed the

ZTE's Any to Any MPLS IPRAN solution represents industry-leading technical strengths. We are convinced that it will help global operators create a strong future in the LTE era.

Any to Any MPLS solution for the next-generation mobile backhaul network. This solution relies on a seamless MPLS architecture to support all applications on the existing mobile backhaul network. It has the following features:

- Any media. Supports all access media including fiber, cable, and microwave.
- Any topology. Applies to all network topologies, such as a circular, horseshoe-shaped, or dual-uplink network.
- Any service. Supports all 2G, 3G, and 4G services; satisfies FMC evolution requirements; and provides access in special scenarios, such as triple play users in the fixed network, wholesale, and carrier of carrier.
- Any location. Allows users to access the network from any location and communicate with other users in any location.
- Any scale. Carries services on all small, medium, and large networks.
- Any environment. Applies in all harsh environments such as thunderstorms, lightning, strong wind, sandstorms, and snowstorms. Unlike previous solutions, Any to Any MPLS solution (Fig.1) separates the transport plane from the service plane. It uses the BGP-LU (based

on FRC3107) function so that the network can process services only on the end nodes at the network border and make the rest of the network a transport tunnel without control over and exchange with the service plane. It is based on the following ideas:

- Routing domain division. The network is divided into multiple small routing domains to accelerate route convergence and reduce the workload of devices within each routing domain.
- Layered route reflector (RR) design. On the service layer and transport layer, the existing devices can be used as inline RRs or special devices can be used as external RRs to reduce the number of BGP sessions in the network and provide step-by-step reflection and an end-to-end VPN/PW service. When a service accesses the network, configurations need to be done only on two end nodes at the border.
- Hierarchical LSP design. An LDP-based LSP is configured for each routing domain for internal use, and services within the routing domain are distributed directly through IGP+LDP. Services involving multiple routing domains are distributed through hierarchical

LSPs. Specifically, BGP-LU and the corresponding next-hop-self are modified to learn the loopback address of the remote end.

- Route filtering. The UPE receives many BGP VPN routes advertised by the SPE and other remote nodes. It also receives labeled BGP unicast IPv4 routes as well. Therefore, the SPE and NPE can be configured with the prefix filtering function to filter unnecessary BGP VPN routes and labeled BGP IPv4 routes in order to avoid needless route diffusion and lower the routing workload of the UPE.

Advantages of Any to Any MPLS Solution

Any to Any MPLS solution has the following advantages:

- Complete decoupling of the transport plane and service plane. The previous node paste, connection and label switching among intermediate nodes are not used any more. Service nodes at the network edge are configured to provide end-to-end services with the rest of the network serving as a transport tunnel.
- Flexible service deployment. The Any to Any MPLS solution uses



prefix filtering to eradicate the defects of the previous solutions and carry multiple services through a unified technology.

- Rapid convergence and protection. This solution uses routing domain division and rides on IGP FC, LDP FRR, BGP-PIC, and other technologies to provide rapid switchover and protection within

50 ms.

- High scalability. Routing domain division is used to logically divide a large, single MPLS-based network into smaller isolated networks. This is more suitable for scale-out scenarios and theoretically can support super-large networks in the future.
- Easy O&M. This solution supports a full range of O&M tools and specialized ZXDNA traffic analysis tools, to provide network planning,

design, commissioning, diagnosis, troubleshooting, and optimization, achieve one-click distribution, locate faults rapidly, identify services intelligently, and analyze and control traffic automatically.

Summary

With the evolution of LTE, new backhaul networks will be built and old ones will be replaced all over the world. ZTE's Any to Any MPLS solution represents industry-leading technical strengths. We are convinced that it will help global operators create a brilliant future in the LTE era. [ZTE TECHNOLOGIES](#)



Introducing SDN into IP RAN

By Feng Zhijian

Since all three major Chinese operators obtained their 4G licenses in 2015, mobile internet has grown rapidly in China. Data-oriented wireless services and IP-based mobile bearer networks are irreversible trends. IP RAN, which is a combination of IP and transport network technologies, is an important direction for 4G LTE mobile backhaul.

Challenges for IP RAN Development

IP RAN has been deployed for many years, but with the vigorous development of 4G networks, it is facing new challenges:

- An IP RAN uses IP/MPLS. This makes the network more flexible but may increase complexity.
- An IP RAN is large and has numerous protocols. This may put stress on network deployment, service provisioning, O&M, and fault handling.
- An IP RAN requires network equipment to calculate routing, discover topology, and generate the path. The same requirements even apply to access routers. The high cost of software and hardware development leads to a high network construction cost. Therefore, it is necessary to introduce a new technical solution to cope with the challenges faced by IP RAN.

SDN-Based IP RAN Solution

With separate control and forwarding, central control logic, and network virtualization, SDN has become a crucial technology to solve the problems associated with IP RAN.

With the separate control and forwarding architecture of SDN, IP RAN can strip complicated protocol processing and routing calculation from the forwarding layer into an SDN controller. This reduces network O&M complexity and shortens the fault handling time as well.

A centrally deployed SDN controller can provide IP RAN with an end-to-end view of services for unified control. This simplifies network deployment, service provisioning, and fault monitoring and handling, and improves operation efficiency. The SDN controller also controls the forwarding behavior of IP RAN in a centralized manner in order to realize highly flexible networking and optimally control traffic flow. This helps standardize network equipment and can effectively lower network capex.

The SDN architecture enables a virtual IP RAN that can virtualize all network elements controlled by the same SDN controller into a single logic device. This significantly reduces the number of network elements in the

logical network and simplifies IP RAN structure.

IP RAN SDN Architecture

In an IP RAN, most devices are at the access and convergence layers that have wide coverage areas including complex optical routes and fibers. The O&M workload is greatest in these areas and involves network adjustment and service cutover. An SDN can first be introduced in these areas to ease O&M pressure (Fig. 1). An SDN control plane may coexist with the existing network management plane for a certain period of time. The hierarchical relationships and differences among the forwarding plane, the SDN control plane, and the management plane are as follows:

- The forwarding devices are released from IP signaling attachment, and an SDN agent module is added for interacting with the SDN controller. The forwarding plane no longer cares about how forwarding paths are generated between network devices, but only cares about hard effects such as traffic forwarding, port efficiency, fast switching, and clock transfer.
- The SDN control plane is used for service control based on an OpenFlow extension. It discovers topology, delivers service configuration, and



calculates the PW/LSP path.

- The management plane will exist for a long time and focus on modular functions such as NE management and flow detection. It interacts with the forwarding plane through the southbound interface, and interacts with the NMS and third-party applications through the northbound interface.

Deploying a Separate SDN Controller in IP RAN

With an hierarchical SDN architecture, it is necessary to set up a separate SDN controller outside the IP RAN for unified management and control of IP RAN convergence and access routers. Using a single PC server

to build a separate SDN controller has the following advantages:

- The SDN controller decouples the forwarding equipment. Network devices primarily focus on flow forwarding, while the controller only focuses on network topology calculation and resource scheduling. The SDN controller issues commands through its southbound interface, and the forwarding equipment analyzes the commands and executes the forwarding behaviors.
- The separate SDN controller provides network programming and service capabilities through its northbound interface. It can open IP RAN capabilities to boost network value.
- The separately deployed SDN controller

helps standardize its southbound and northbound interfaces and also drives the long-term evolution of IP RAN.

- The external SDN controller fully utilizes servers and has strong service processing capability. With the cloud-based IT system, the controller can also be deployed on a virtualized cloud platform. This makes possible low cost deployment, elastic resource provision, and wide area network coverage.

ZTE's IP RAN SDN Solution

Responding to needs and challenges of IP RAN in the 4G LTE era, ZTE has launched its IP RAN SDN solution. This solution uses SDN virtualization in which massive remote devices are virtualized into one router for better management. This concentrates the access layer of IP RAN into a single device, simplifies IP RAN configuration, and improves automatic network deployment, operation and management.

The IP RAN SDN solution uses OpenFlow-based southbound interfaces as well as an external, separate PC server as its SDN controller. The solution fully considers the need of smooth evolution from existing IP RAN equipment to SDN forwarding equipment, and manages to fulfill the need at the lowest possible cost.

As the development of SDN is not long, adaptation to existing services is the key to SDN commercialization. ZTE has cooperated with domestic operators in developing the IP RAN SDN solution and has invited their network O&M and planning experts to research related applications and improve availability of the solution. ZTE is a market leader in IP RAN and will work with both upstream and downstream enterprises to help operators evolve their IP RANs towards SDN. **ZTE TECHNOLOGIES**

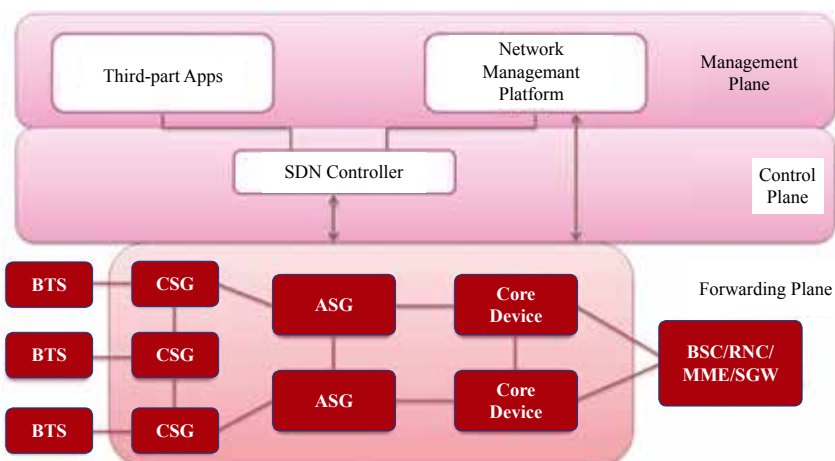


Figure 1. IP RAN SDN architecture.

Intelligent Backhaul Management and Optimization

By Zheng Pan

As mobile data services develop, operator networks are carrying 2G, 3G, LTE, WLAN, private line, and enterprise services. These services demand more in terms of network QoS and protection mechanism. They also create new challenges for network resource monitoring, analysis and optimization. Therefore, maintaining, managing and optimizing networks in an intelligent manner have become a pressing concern of operators.

ZTE has launched NetNumen™ U31 (BN), a network management system, to improve network management. This product features a distributed, multi-process, and modular design and can manage bearer devices such as SDH, MSTP, CTN, WDM/OTN, IP routers, and IP switches in a centralized way. These bearer devices cover the core, convergence, and access layers of a bearer network. NetNumen™ U31 (BN) is used to manage configuration, faults, performance, maintenance, paths, security, system, and reports to meet operational needs. It also has management functions at both the NE and network layers to greatly enhance system security and reliability as well as network service capabilities. In a TMN structure, NetNumen™ U31 (BN) lies at the NE management layer and network management layer.

ZTE has also launched a series of service tools to assist NetNumen™ U31 (BN) to intelligently manage service deployment, monitor traffic, and inspect engineering projects. These tools include PTN automatic service activation system, ZXTIM400 and ZXDNA. With these tools, bearer services can be deployed efficiently, hidden network risks can be detected, and the network can be optimized to guarantee safe operation. These tools help NetNumen™ U31 (BN) implement intelligent network management ranging from service deployment to network O&M and optimization.

PTN Automatic Service Activation System

The PTN automatic service activation system intelligently resolves service worksheets distributed by the integrated resource management system to generate configuration data for related services. The data is then delivered via NetNumen™ U31 (BN) to PTN devices for automatic service configuration. The PTN automatic service activation system greatly improves service deployment and lowers labor costs.

Covering All Service Scenarios

The PTN automatic service activation system fully supports 2G, TD, TD-LTE, and private line services. It resolves

worksheets, schedules services, and generates related service configuration data. The data is then transported to the PTN for service configuration via the configuration interface between the PTN automatic service activation system and the NetNumen™ U31 server.

Flexible Scalability

The PTN automatic service activation system comprises service worksheet resolution, start-up/execution, input/output, field description/worksheet inspection rules, system management, and pre-configured service generation. Through resolution by these modules, service configuration data can be generated for a service worksheet. This modular structure makes it easy for system functions to be improved and upgraded in the future.

Complete Security Management Mechanism

When a service worksheet distributed by the integrated resource management system fails, the PTN automatic service activation system can handle the failed worksheet. It records information about the failed worksheet and is automatically activated to support rollback handling. When the service activation fails, the system can automatically roll back to the configured service and ensure its correctness.

ZXTIM 400

ZXTIM 400, an intelligent inspection tool, can automatically inspect, evaluate, and optimize MSTP/PTN/IPRAN networks. It analyzes network running status, static data, and hidden network risks, and provides expert advice to handle network exceptions. This helps operators implement regular network inspection and optimization. ZXTIM 400 greatly simplifies the inspection process, improves inspection efficiency, and reduces labor costs.

Thorough and Intelligent Evaluation

ZXTIM 400 can thoroughly inspect more than 40 MSTP network functions and 130 PTN/IPRAN network functions covering all MSTP/PTN/IPRAN hardware statuses, protection, clock synchronization, optical power and service configuration correctness. More than 20 PTN functional items are used to optimize network resource, security, QoS, and O&M.

Fast and Efficient Inspection

It costs about 0.3 to 0.5 second to inspect one item of a network element. If there are 1000 network elements each with 50 test items, the total inspection duration may be as short as four to seven hours, depending on a computer's hardware. ZXTIM 400 can truly improve network inspection efficiency.

Diverse Test Result Outputs

ZXTIM 400 supports test result outputs in various formats such as HTML and EXCEL. The outputs are rich in content and can be easily viewed. Overall network conditions

can be evaluated intuitively by scoring and rating the test results. ZXTIM 400 can provide suggestions and solutions to address network anomalies and hidden risks. Its high-quality intelligent inspection and network optimization can also help operators find and eliminate hidden network threats and improve the operation security and efficiency.

ZXDNA

ZXDNA is used for deep network analysis that can comprehensively monitor network traffic by recording the bandwidth, delay, jitter, and packet loss of ports, ring networks, links, tunnels, pseudo-lines, and services. After analyzing the records, ZXDNA determines network running status and the trend for development, discovers bandwidth bottlenecks, overloaded devices, and resource deterioration, plans network expansion, and takes appropriate measures to eliminate potential risks. It provides data for network resource optimization and structural adjustment.

Powerful Data Analysis Capability

ZXDNA uses independent data collectors and calculators to bring data together by different granularities based on the time axis for long-term storage and fast retrieval. ZXDNA analyzes traffic flow, hot spots, rankings and trends for almost all network resources and outputs complete indicators and rich graphics for expansion configuration as required.

Real-Time Network Alarming

ZXDNA provides special alarm analysis. Operators can customize an



alarm event and set an alarm analysis policy for the specific KPIs of a resource. ZXDNA can also provide an appropriate graphic for the alarm to help an operator find network problems, determine the cause of the problem, prevent network congestion, and provide the basis for bandwidth optimization. Alarm levels and thresholds can be defined with different colors. When an alarm occurs, it can be reported via short messages or email.

Rich Graphics

ZXDNA comes with rich graphics such as trend graph, pie graph, sky chart, and bar chart. It also has complete resource indicators, such as traffic flow, flow velocity and bandwidth utilization. The graphics can be customized or configured.

When combined with service tools, NetNumen™ U31 (BN) provides a brand-new intelligent management and optimization solution for bearer networks. The solution covers the whole process of service deployment, project O&M, network optimization for bearer networks, and greatly increases the efficiency of service provision and O&M. It also provides data for network expansion and optimization. All this offers a reliable guarantee for business growth in the new situation. **ZTE TECHNOLOGIES**

Packet-Based Backhaul for Small Cells

By Zhang Yongjian, Zou Kaipu, and Ma Xin

In the internet era, the wireless and backhaul networks of operators must have large bandwidth, be quickly deployed, be capable of fast service provisioning, and have convenient O&M in order to provide good experience for end users on mobile applications.

Traditional macro eNodeBs have large capacity and wide coverage but are not suitable for deploying LTE services. Especially in populous urban areas, the installation environment is complex, the cost is high and the maintenance is difficult. To address these issues, small cells have been introduced to operators and have developed rapidly in recent years. Statistics from Mobile Experts indicate that the global shipments of small cells are about two million in 2014. It is estimated that this figure will quadruple, reaching eight million by 2019.

Small cells are compact, functional, and cost-effective. They can be easily deployed and maintained. They are classified as microcells, picocells, and

femtocells according to their coverage.

Small cells can be used both indoors and outdoors. Indoors, small cells serve households, offices, and enterprises using EPON or GPON (mainstream access technologies) and packet-based backhaul technologies (supplementary technologies). Outdoors, small cells serve populous urban areas by connecting to the backhaul and microwave networks of macro eNodeBs through optical fibers or cables.

Challenges Brought by Small Cells to Backhaul Networks

The large-scale deployment of small cells has created significant challenges to operators in constructing corresponding backhaul networks. Although small cells resemble traditional macro eNodeBs in backhaul requirements, they still bring many new challenges to backhaul networks.

- Large scale of small cells. Small Cell Forum predicts that a small cell has a four to seven times larger scale than a macro eNodeB. The consequential larger investment on backhaul networks

pressurizes operators in the total cost of ownership (TCO).

- High dependence on environment. Small cells can be used at various application scenarios. Outdoors, they are mostly deployed on streets, light poles, and walls. It is complex to install and maintain the required backhaul devices. Moreover, citizens advocate green life; they are unlikely to accept noise and radiation of nearby telecom devices.

An outdoor environment is complex and changing. The adaptability of backhaul devices to adverse environments and power shortage affects operation stability and deployment convenience of networks. Therefore, environmental factors, such as the power source, temperature and humidity, must be considered when installing backhaul devices. In addition, small cells deployment is even more difficult and expensive due to issues of site selection and leasing.

- Diversified access services. Indoor small cells carry frequent services. The service carrying quality affects user satisfaction. A solution will have its hard power tested by deploying backhaul networks outdoors, and likewise, will have its soft power tested by deploying

backhaul networks indoors.

An indoor backhaul solution handles not only small cell services but also internet, video and key account services. Therefore, it demands large bandwidth on the backhaul device interfaces. Diversified interfaces need to carry different services at the same time. It is fundamental to prioritize services and ensure key indexes of delay variation.

- Clock synchronization difficulty. Great challenges will be brought to time signal transmission for small cell services. In indoor scenarios, signals will be interfered by walls, it is impossible to synchronize time signals by GPS. Small cells backhaul solutions

need to ensure precise, reliable time signal transmission.

- Service vulnerability. In most cases, deployed in public environments, such as office buildings, stadiums, shopping malls, airports, and hotels, small cells carry services more vulnerable to be intercepted, wiretapped, and tampered compared with macro eNodeBs. Therefore, backhaul solutions are required to ensure high security and reliability in service transmission.

Packet-Based Backhaul Solution for Small Cells

To help operators to overcome the above challenges, ZTE has proposed a

packet-based backhaul solution for small cells.

This solution interconnects ZTE’s specific small access devices to small cell base stations to meet all requirements of small cells on backhaul networks. In the aggregation and core layers, ZTE’s packet-based devices are used to build integral, capacious, flexible and reliable end-to-end backhaul networks for customers.

ZTE’s packet-based backhaul solution has the following advantages (Fig. 1):

- Easy installation and maintenance. Small cell base stations do not take up much space and connect to the access devices with width of 320 mm and

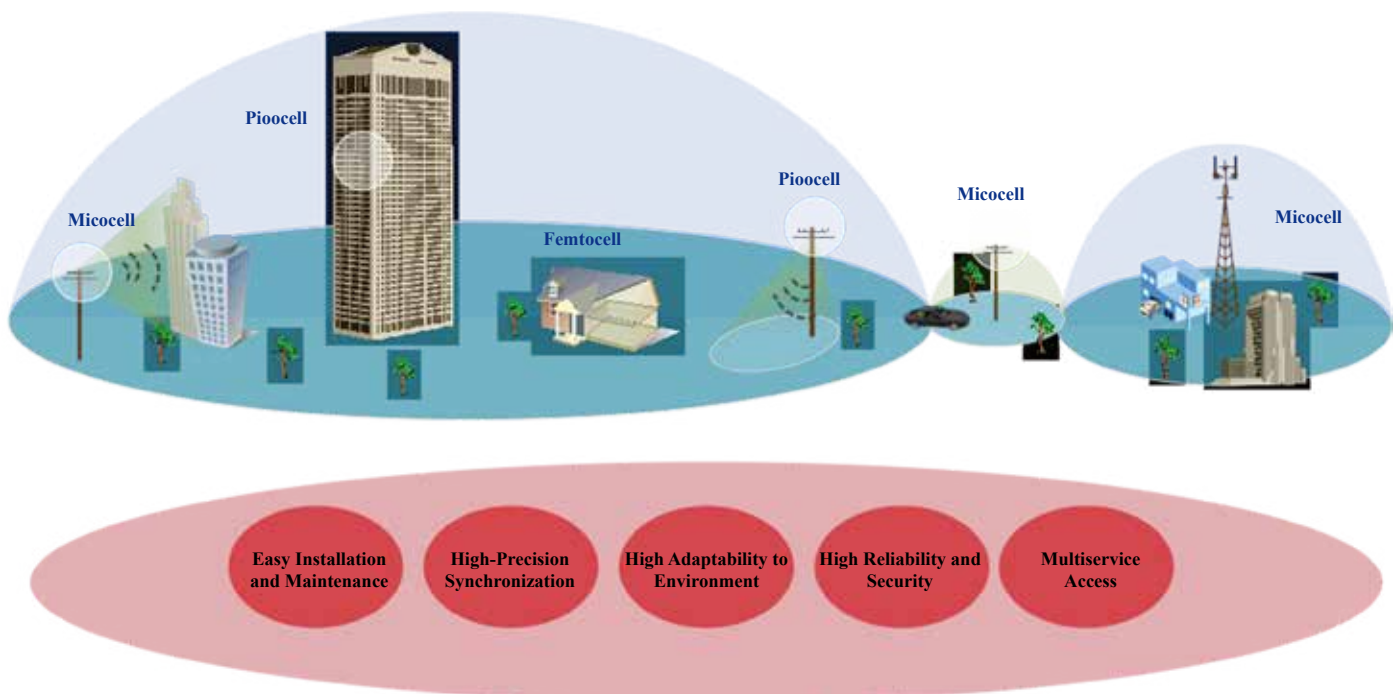


Figure 1. Packet-based backhaul for small cells.

The packet-based backhaul solution for small cells ensures security and reliability for user services, simplifies implementation, and achieves unified management for end-to-end services.

height of 1 U.

The devices support IP/MPLS and MPLS-TP carrier technologies.

The compact devices with smart configurations are easily installed and minimize space occupation.

All backhaul devices are managed by ZTE NetNumen U31. This backhaul solution provides graphical end-to-end management over service configurations, alarms, and performance monitoring. It also simplifies service subscription and O&M.

- High adaptability to environment. Access devices of small cell backhaul networks need to meet all the requirements of indoor and outdoor environments to minimize onsite restrictions. In this solution, access devices can be mounted on poles and walls, installed in light boxes and cabinets, or fixed on platforms. IP65 protection adapts the interfaces to all extreme environment conditions. The POE function enables the devices to supply power for small cells if necessary.
- Multiservice access. Carrying mobile services of small cells, the backhaul networks need to meet the requirements of mobile eNodeB FE/GE interfaces, and may provide E1/STM-N interfaces to meet fixed network access and key

account requirements.

The ZXCTN 6000 provides not only FE/GE and E1 interfaces but also STM-N, microwave, and xDSL interfaces to carry Ethernet, TDM, and ATM services. Moreover, as the first outdoor device that supports 10GE interfaces, the ZXCTN 6000 adapts the packet-based backhaul solution to more scenarios and creates a potential platform for bandwidth upgrades of customer networks.

- High-precision synchronization. ZXCTN 6000 supports in-band synchronous Ethernet (SyncE) and 1588v2 technologies as well as out-band 2 Mbits/Hz and 1PPS+PoD technologies to synchronize network frequencies and phases for most customers. In addition, ZTE developed the SyncE+1588v2 solution with an industry-leading precision of time synchronization. This provides a comprehensive synchronization solution for traversing third-party networks.
- High reliability and security. The packet-based backhaul solution isolates services using the VPN to guarantee confidentiality for customer services and supports service-based QoS mechanisms, such as traffic classification, priority mapping,

congestion control, and access rate control, to ensure QoS for users of different levels.

The solution provides protection technologies based on services, networks, interfaces, boards, and devices to ensure service stability between small cell base stations and aGWs.

- Future-oriented smooth evolution. In the future, networks will evolve toward intelligent networking, virtualized network resources, simplified management and maintenance, and open application interfaces. SDN technology is the key to achieve the above goals. ZTE has designed the ZXCTN products based on the SDN architecture to build end-to-end SDN standard networks for customers.

Summary

The packet-based backhaul solution for small cells ensures security and reliability for user services, simplifies implementation, and achieves unified management for end-to-end services to ease network deployment and improve service performance. This solution is compatible with backhaul solutions of macro eNodeBs, and reduces investment and maintenance costs for customers. In addition, the prospective product design based on the SDN architecture builds a future-oriented network platform for customers. [ZTE TECHNOLOGIES](#)

POTN: Making a More Intelligent and Flexible Network

By Li Lin and Deng Feifei

A packet optical transport network (POTN) is a future-proof, integrated transmission technology combining packet and OTN technologies. It enhances the performance of legacy networks, breaks down the barriers between multi-layer networks, reduces network construction and O&M costs, and provides intelligent and flexible integrated service bearers. With the boom in data services, POTN is entering large-scale commercialization.

Challenges Faced by Legacy Networks

With the advent of 4G, Ethernet private line and home broadband services have been ushered into the age of big data. Operators are now facing the following challenges: bandwidth deficiency, network layer optimization, and resource shortage.

Bandwidth Deficiency

The bandwidth required for 3G base stations is tens of megabytes per second, and that for 4G base stations is can be hundreds of megabytes per second. The bandwidth of VIP customer private lines has been upgraded from two to ten megabytes to hundreds or thousands of

megabytes per second. Moreover, OLT uplink requires high bandwidth bearers. The bandwidth of the access layer (GE/10GE) and the core convergence layer (10GE/40GE) of the original PTN network in developed cities cannot meet requirements in the big data era. Operators are urgent to upgrade or reform their transport networks in order to provide higher bandwidth.

Network Layer Optimization

The existing packet + OTN architecture is restricted in terms of fast service provisioning, network protection, and O&M. Therefore, POTN has become the focus of the industry, as it aims to simplify network layers and

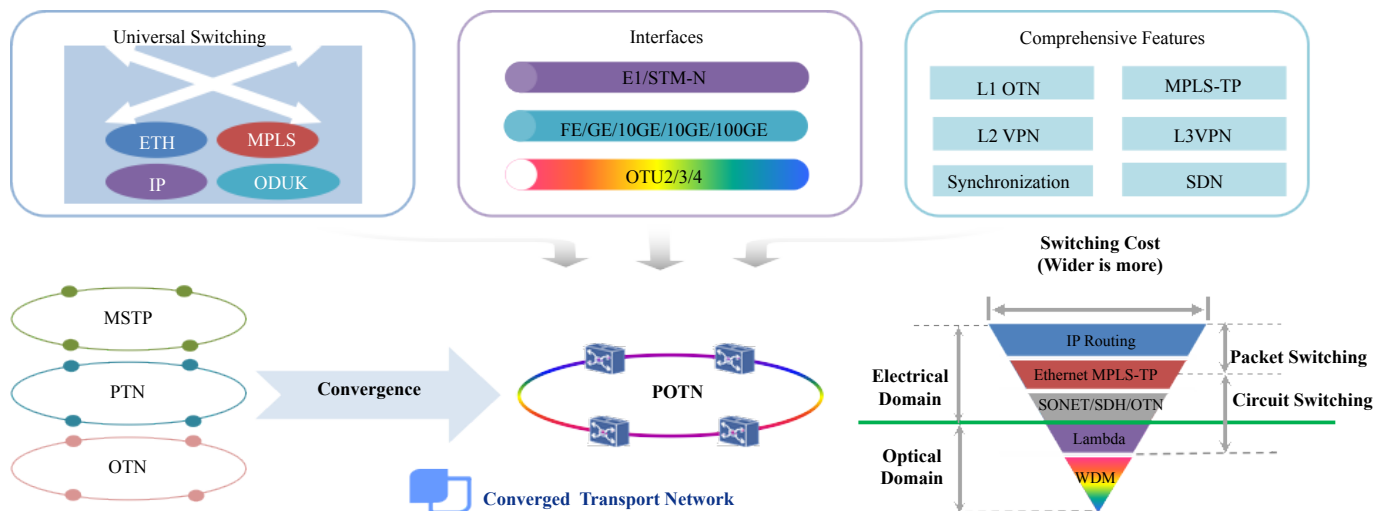


Figure 1. POTN architecture.

develop convergent products.

Resource Shortage

As the traditional packet + OTN architecture has been extended to the lower layer, various problems have emerged, including high investment cost, large equipment room space, fast resource consumption, and difficult service scheduling. POTN, which simplifies network layers and optimizes transport network resources, is therefore introduced. To address the problem of fiber resource shortage that operators are facing, POTN combines packet and OTN technologies, which leverages the large capacity of OTN and saves fiber resource.

Intelligent and Flexible POTNs

ICT enterprises, including ZTE, are promoting transport and bearer network technologies. POTN is a new packet transmission technology developed in recent years. By combining packet and OTN technologies, POTN increases the ability to bear multiple services, enhances interface capacity and

transmission performance on the line side, simplifies the network structure, and saves network construction and O&M costs. Thereby, POTN has become a hot transport network technology in the big data era (Fig. 1).

POTN has the following advantages.

High Bandwidth

With the large-scale deployment of 4G, access bandwidth is being increased, and data traffic is growing exponentially. Operators have strong demands for high bandwidth. Currently, the capacity of POTN on the line side has reached 100 GB, and can be expanded to 400 GB with specific technologies. In the future, with technology innovation, POTN will have greater interface abilities to improve network bearing capabilities and meet demands for high bandwidth.

Unified Intersected Scheduling

The unified cell switching matrix is the kernel of the forwarding plane for the POTN. The matrix:

- provides various service interfaces, such

as packet and OTUk

- completes unified cell exchanges of all packet and ODUk sub-wavelength services
- implements unblocked intersection of services between line cards
- supports hybrid transmission of any proportion of packet and OTUk services.

The hybrid board on the line side of the POTN, which transmits colored NxOTUk optical interface signals, combines packet and OTN technologies. Packet services access the universal switch through a packet interface board, and CBR data and traditional STM services implement ODU mapping directly before they are transmitted to the universal switch. Packet services and ODUk sub-wavelength services can be dispatched at the line card on the same hybrid line side, which enables exchanges of any proportion of packet and OTU services (Fig. 2). The PIC module multiplexes signals to OTUk colored optical signals and then outputs the signals. Different services can be transmitted by different ODUflexes so that the ODUflexes are isolated from each other. With the POTN technology,

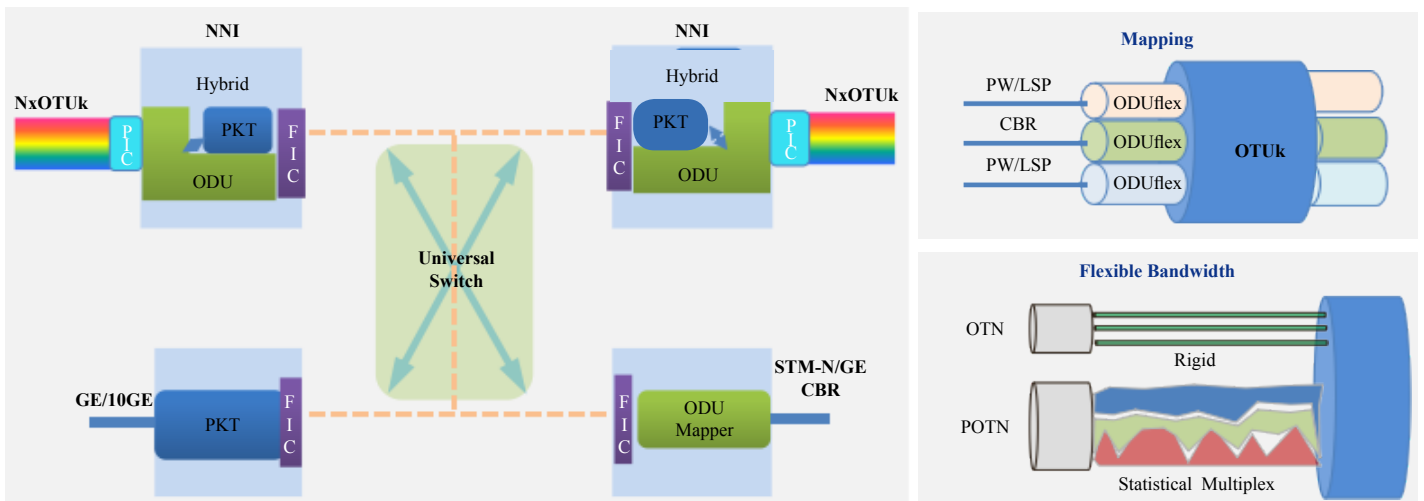


Figure 2. Unified switching matrix and hybrid line card.



CBR and STM services can be directly mapped to rigid pipelines of the OTN and statistical multiplexing elastic pipelines that are based on packet services.

By combining packet transmission and OTN channel scheduling capabilities, POTN achieves a three-dimensional transport pipeline scheduling system. This can reduce network congestion and improve multi-service bearing capacity and service quality.

Multi-layer Network Architecture Convergence

By using the SDN-oriented control architecture, POTN achieves separation of control, forwarding and application. It also:

- provides open northbound interfaces to the external devices
- enhances network intelligence with the centralized network management system and controller
- simplifies multi-layer network O&M
- solves problems with devices docking and coordination between multiple vendors.

For hundreds of thousands of pieces of PTN equipment, the evolution can be implemented through centralized network management and control. For newly built equipment, controllers are added for centralized control over standard interfaces. At the upper layer of the centralized network management

system and controller, a collaborative layer is added for unified collaboration, therefore achieving the SDN evolution of the entire PTN network.

With the centralized control, the SDN controller can gain the global network topology and status, which facilitates global optimization, and provide end-to-end network deployment, security, and detection. Moreover, the SDN controller can centralize control in multi-layer networks, and implement collaboration and optimization of multi-layer and multi-domain networks. In addition, after being managed and integrated by the centralized SDN controller, network resources can be virtualized. That is, the coarse granularity POTN resources are virtualized into on-demand network fragmentations, so as to provide services to upper-layer applications through standardized interfaces.

Network Positioning and Application Scenarios

POTN is an end-to-end solution for the entire network. It can be widely used in the core, aggregation, and access layers of bearer networks. With increasingly high bandwidth of the aggregation layer and inadequate equipment room, POTN will be first used in the metropolitan aggregation layer. For cities without a metropolitan

OTN, it will be implemented in the core aggregation layer.

POTN interprets a virtualized transport network solution in the SDN era. POTN can be used for trunk bearer, metropolitan mobile backhaul services, metropolitan OLT uplink home broadband services, and metropolitan private line and network services.

In December 2013, ZTE officially launched the first POTN smooth evolution solution. In August 2014, the POTN-based ZXCTN 6500 completed tests during the concentrated purchase of China Mobile and was commercially trialed by Jiangsu Mobile, Shanxi Mobile, Hunan Mobile, and Jiangxi Mobile. In December 2014, POTN was put into commercial use by Suzhou Mobile. In 2014, the POTN-based ZXONE 9700 ranked first in the concentrated purchase of China Telecom for national backbone networks, accounting for 40% of the market share. Major operators have begun the scale deployments of POTN, marking maturity of the POTN technology. During the 2015 Mobile World Congress Shanghai, POTN has gained widespread concern in the industry, and has become an inevitable trend of the transport network evolution. **ZTE TECHNOLOGIES**



AIS SELECTS HYBRID IP RAN FOR FULL-SERVICE DEVELOPMENT

By Hu Junjie

AIS, the largest mobile operator in Thailand, has built 15,400 base stations and has a subscriber base of 29.3 million (52% of the market). Formerly controlled by Shin Corporation, AIS started operating the first analog network in Thailand in 1990. Since it was listed on the Thai Stock Exchange in 1991, AIS has undergone 20 years of development. After Singapore Telecom International (STI) Pte Ltd., the parent company of SingTel acquired the shares of AIS from Thaksin's family, SingTel has become the largest shareholder of AIS, and the business operations of AIS have become more international.

Challenges

In the 2G era, AIS had to lease frequency bands from state-owned operators for wireless services. When upgrading from traditional 2G to 3G services, the original underlying SDH devices could not adapt to new 3G service models because of rigid pipes, narrow bandwidth, and low forwarding rates. During the network upgrade, AIS was even forced to roll out time-based 2G access charges and traffic-based 3G access charges to make up for defects in the 3G mobile backhaul. However, with the exponential increase in 3G subscribers, AIS has had to build a large-capacity mobile backhaul network that is easy to maintain in order to secure its leading position and first-class user experience in Thailand. In response to this need, AIS has been busy preparing a technical team.

Requirements

According to its market positioning and future development trends, AIS is seeking a way out for mobile backhaul networks and finally focuses on the following points:

- multiservice bearer capabilities. As an emerging mobile operator in Thailand, AIS lacks rich fixed line resources. However, the transition from mobile operator to full-service operator is inevitable for AIS. In the future, IP RAN will carry high-value, multiservice voice and data traffic.
- highly reliable networks. AIS is a leader in Thailand's mobile market, and its network quality is the first priority in terms of improving the company's reputation. Therefore, AIS must try to improve network KPIs, ensure high priority services for key accounts, and meet the carrier-class switching requirements in the event of any bearer network failure.
- smooth evolution. Opex saving, spare parts inventory reduction, and

equipment investment protection are the common goals for operators, who need to adapt to rapid technological development.

- efficient time transfer capabilities. There are clear requirements for clock performance. Although GPS is a primary choice, GPS coverage has not yet available in some scenarios such as subways and skyscrapers because labor costs and equipment room rentals are rising. Therefore, operators are pressing for clock transfer over mobile backhaul networks.

Proposals

Considering the real needs of AIS, ZTE has established a bearer network team to come up with innovative bearer products and solutions. Innovations cover the original pure PTN architecture, IP RAN service product, and finally the world's first hybrid IP RAN bearer solution. This solution combines PTN's stability, easy maintenance, and closeness to traditional transmission and O&M with IP RAN's flexibility, efficiency and self-healing capabilities and can protect AIS's continued investment in multiservice networks. AIS chose ZTE's hybrid IP RAN solution for its flexible deployment and reliable, field-proven commercial multiservice core devices.

Since the IP technology has been introduced into mobile backhaul networks, major global operators have been concerned with the choice of PTN and IP RAN: whether to choose static PTN management that focuses

on transmission or dynamic IP/MPLS that is compatible with MAN. ZTE's innovative hybrid IP RAN solution incorporates MPLS-TP's static tunnels and PW stability as well as IP/MPLS's dynamic BGP flexibility. This represents a new era for future mobile backhaul evolution. The solution has the following advantages:

- field-proven L2VPN and L3VPN (HoVPN). The popular L2VPN + L3VPN solution has been deployed for IP RAN worldwide, and nearly 100,000 HoVPN devices have been deployed on global mobile backhaul networks. These can meet the needs of mainstream customers for both narrowband and broadband access. The solution helps AIS not only learn mature O&M experience from overseas but also transform itself to a full-service operator.
- flexible MS-PW and DNI-PW. The solution is optimal for L2VPN services required by key accounts. It allows traditional SDH TDM services to be smoothly swapped to IP RAN. The solution has distinct advantages in terms of fault isolation because it can differentiate intra-net faults from inter-net faults. This makes bearer networks more channelized and simplified.
- stable fault protection. The solution has the stability of static MPLS-TP tunnels and creates a unique MPLS-TP fault propagation for dynamic BGP convergence failure. It uses a detection technology to ensure carrier-class switching protection for each service in the network.
- unified network management. ZTE's

NetNumen™ U31 uses SDH-like service management, which helps AIS transmission team smoothly upgrade its MSTP to IP RAN. The IP RAN NMS allows AIS to easily manage 2G, 3G, LTE, and Wi-Fi traffic and monitor the traffic on a real-time basis. It also supports warehouse operations for easy data query, collection and analysis.

- smooth evolution to LTE. The hybrid IP RAN has a flat architecture and takes into account in the initial 3G network design the evolution to LTE. It also uses seamless migration to protect services from damage. AIS obtained an LTE license in 2015, and the evolution of its bearer network only involves a basic bandwidth upgrade, in other words, easy upgrade and reconstruction at the wireless side.

With the efficient engineering of after-sales teams and rapid deployment of equipment and services, ZTE has quickly launched the hybrid IP RAN solution for AIS in Thailand. The solution has brought superior user experience and high-speed service processing capabilities, laying a solid foundation for booming development of mobile apps. AIS has attached more importance to service development opportunities created by the solution and has established a wholly owned subsidiary to develop key accounts, urban Wi-Fi, and dedicated line services. With the help of ZTE, AIS is making solid steps towards being a full-service operator. [ZTE TECHNOLOGIES](#)



SLK BUILDS INFORMATION HIGHWAY

By Yuan Zhibing

Sri Lanka Telecom (SLT) is the national ICT solutions provider and leading broadband and backbone infrastructure services provider in Sri Lanka. SLT has a user base of more than six million and has a 90% share of the fixed line market in Sri Lanka. By the end of 2014, SLT had attracted nearly 1.15 million fixed line users. SLT began developing CDMA WLL users in 2006, and its WLL user base grew to 550,000 at the end of 2014. SLT has also expanded its broadband market and so far has about 500,000 ADSL broadband users. Since its acquisition of Mobitel (SLT's wholly

owned subsidiary, a mobile service player operating both GSM and WCDMA networks), SLT has become an all-service operator in Sri Lanka that provides fixed, mobile, and data services.

As early as 2011, SLT started a national network modernization project called i-Sri Lanka which was designed to provide high-speed broadband services to the whole country, improve national informatization construction, and contribute to the country's economic growth.

In July 2011, STL and ZTE signed an exclusive contract for a 600,000-line MSAN Phase-4 project,

covering more than 2000 indoor and outdoor sites and over two and a half years of construction. Of all SLT's landmark projects for fixed broadband construction, this one has the highest contract amount, the largest number of devices and sites, and the largest number of fixed broadband access users. It is also a milestone project for the Sri Lankan government to achieve its national broadband plan.

SLT had to weed out many aging PSTN devices in service for more than 10 years that had high maintenance costs and failed to offer higher bandwidth. Therefore, SLT invited bids for MSAN Phase-5 construction (650,000 lines in

total) in June 2013. ZTE secured a 2/3 share of the bid in January 2014.

During the year of project implementation, ZTE impressed SLT for its fast delivery, excellent equipment performance, and rapid response and again won 70% share of the MSAN Phase-5 bid for capacity expansion.

As emerging IP internet services have developed rapidly, cheap IP phones have penetrated traditional TDM. The convenient mobility of 2G and 3G networks and their great varieties of services are also posing huge challenges for traditional fixed line services. It costs much to maintain aging traditional TDM switches and several service access platforms, and new services are difficult to be implemented on the traditional TDM platforms. However, users are increasingly demanding high-speed internet access. All this is giving rise to a revolution in the traditional fixed-line telecom industry and many operators are turning to IP-based integrated bearer access and high-speed broadband services. SLT is no exception. SLT has to have an integrated service access platform that can carry both traditional and high-speed broadband services.

ZTE’s multiservice access node (MSAN) solution oriented to PSTN/NGN/IMS can meet operator demands for integrated broadband and narrowband network construction. The solution incorporates advanced IP, voice, xDSL and xPON technologies and can help SLT build an integrated service access platform that provides a variety of broadband and narrowband access modes, such as ADSL, ADSL2, ADSL2+, VDSL2, SHDSL, POTS, ISDN, DDN, xPON and Ethernet.

Integrated Fiber and Copper Access Platform for Smooth Evolution to FTTx

ZTE’s MSAN solution provides an integrated fiber and copper access platform that allows smooth evolution to FTTx so that SLT can deploy MSAN in its next-generation optical network. This complies with SLT’s need for smooth network evolution and also protects existing network investment.

Tailor-Made Outdoor Closures for Special Climate

Sri Lanka is an island located

in the northern Indian Ocean and separated from India by the Palk Strait. The climate of Sri Lanka is typically tropical. Its hot, humid, and rainy environment poses great challenges to the deployment of the MSAN access platform. ZTE has customized moisture and waterproof, heat-resistant outdoor closures to help SLT successfully deploy MSAN outdoors.

Reducing O&M Costs

ZTE’s MSAN solution not only provides an integrated fiber and copper access platform but also enables effective NE management via a unified NMS. Its line detection system can accurately locate network faults and reduce O&M costs.

Green and Energy Efficient Innovations

ZTE’s MSAN solution uses various green innovations, including smart feeder, higher density ASIC chips, and speed adjustable fans. These innovations make each port consume 30% less power on average than others in the industry. The SLT annual report for 2014 showed that the power consumption of its MSAN project continued to decrease year by year.

The report also showed that SLT’s operating profit for 2014 rose by 8.5% year on year, and its broadband user base grew by 15.7% year on year to reach 500,000 (Fig. 1). ZTE has been highly praised by SLT for its efficient demand response, stable equipment operation, prompt logistical delivery, fast networking capability, and satisfactory after-sales service. During the MSAN project, ZTE has become SLT’s most valuable and trusted partner for integrated service access solutions.

ZTE TECHNOLOGIES

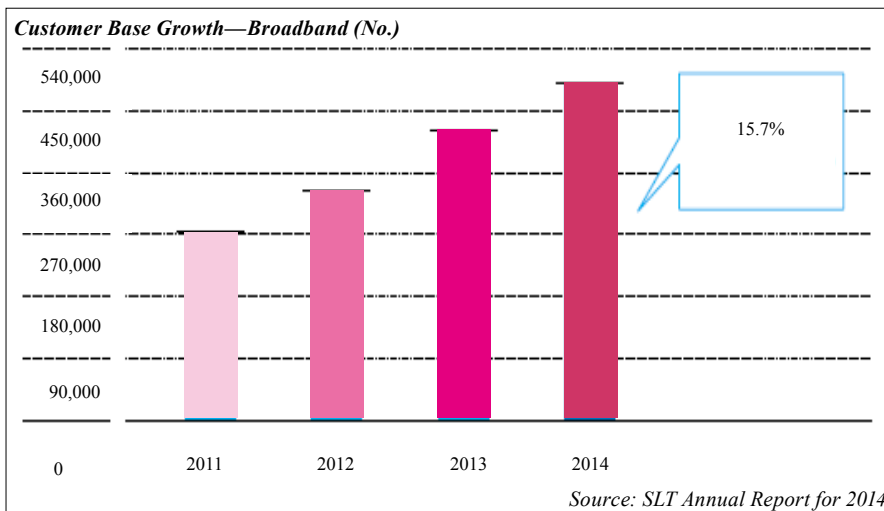


Figure 1. SLT customer base growth in 2014.

China to Get

'Four Times Faster' Pre5G Internet

in 2016 amid Premier's Push for Tech Development

16 July, 2015

Source: South China Morning Post



Maggie Cui, vice president in charge of wireless operation at ZTE

Hundreds of millions of Chinese mobile phone users will have access to much faster internet as soon as the first half of next year, thanks to a key technology development with strong support from the central government to significantly improve internet speeds.

Maggie Cui, vice president in charge of wireless operation at ZTE, told the *South China Morning Post* that ZTE has been working with China Mobile, the world's largest mobile phone operator, to test so-called "pre5G" connections, which could be more than four times faster than current 4G mobile internet.

"There is still some way to go before we can have a global recognized 5G standard but I think we can apply some mature advanced technology to existing 4G network before we officially enter the 5G era," Cui said on the sidelines of the Mobile World Congress (MWC) Shanghai.

If successful, China could take the lead in pre5G and later 5G technology development as top Chinese leaders including premier Li Keqiang have shown their frustration over slow internet speeds that they believe could hurt national economic growth and

ZTE is also working with telecoms firms in Germany and Australia to jointly push for “pre5G” and eventually 5G technology development.

industrial restructuring.

“China is the world’s biggest mobile phone market, but internet speeds are ranked worse than 80th in the world. Our information infrastructure is backward,” Li said during a cabinet meeting in May, according to the official Xinhua news agency.

Li said state-owned mobile network service providers should aim to increase speeds for urban users by 40%.

Following Li’s complaints, the nation’s big three state-owned mobile network operators—China Mobile, China Unicom and China Telecom—all announced new plans to cut mobile data fees and to increase mobile internet speed. However, local internet users have raised concerns about whether the telecoms giants were really taking the government’s push for faster internet speed seriously.

“Clearly, many users feel their demand for faster internet has gone beyond what the existing 4G network can offer. In many top-tier cities where you have far more users gathering in one specific location and they all get on the internet, our existing 4G network could easily meet its peak,” Cui explained.

ZTE has touted its “pre5G” technology as providing faster speeds on 4G networks. It sees this as an intermediate step between 4G and 5G, which the global wireless industry is hoping to have up and running by 2020. The company has said it will spend around US\$220 million globally on 5G and other mobile communication technologies between 2015 and 2018.

This week, ZTE signed a deal with South Korean telecoms provider KT Corp to form a strategic partnership to jointly research the commercialization of 5G technology. This deal followed ZTE’s agreement last week with Japanese firm SoftBank to bring its “pre5G” technology to Japan.

Domestically, ZTE and China Mobile have completed their first test-run for “pre5G” network and China Mobile could choose some top-tier cities where demand for faster internet speed is high to launch the “pre5G” service first, said Cui.

“For example, in Shanghai’s Lujiazui area, demand of users there for fast mobile internet must be much higher than in other second-tier or third-tier cities,” she said.

Internationally, ZTE is also working

with telecoms firms in Germany and Australia to jointly push for “pre5G” and eventually 5G technology development.

ZTE’s tie-up with China Mobile on “pre5G” technology is an exclusive deal for now but Cui said the firm will not rule out the possibility of working with the other two major state-owned mobile network operators in the future.

Such a joint effort between ZTE and China Mobile has won support from the government, said Cui, partly because it meets premier Li’s “Internet Plus” strategy to push for faster integration of traditional sectors and new digital services so that the government can meet its goal for industrial upgrade and economic restructuring.

“In the long run, if China can master the ‘pre5G’ technology well, it also lays the foundation in the future for China to stay on top of 5G technology on the world stage,” said Cui.

Mobile phone users will not need to do anything to take advantage of the new “pre5G” network once it is implemented, she said, adding that China Mobile could also expect higher data traffic from the upgrade.

China Mobile chairman Xi Guohua agreed. “The faster the network is, the more traffic users will use,” he said during a keynote speech at MWC Shanghai.

Users of 3G and 4G smartphones in China are on pace to make up two-thirds of the country’s mobile connections by the end of this year, according to a recent industry study.

Smartphones will account for 913 million, or 68 per cent, of the estimated 1.3 billion mobile connections in mainland China, industry association GSMA said this week.

In June, China Mobile said it expected to reach 300 million 4G subscribers by the end of this year.

ZTE TECHNOLOGIES

The background of the image is a blurred office space. It features a wall with a repeating geometric pattern, a window on the left, and a red chair in the foreground. The overall tone is bright and professional.

ZTE

Tomorrow never waits