(VIP Voices)

**Telenor Expands Network Capacity
to Enter into Digital Life**

(Tech Forum)

Big Data Service Models

**Special
Topic** **Big Data**

*Economic Feasibility of
Big Data Construction*

Ingeborg Øfsthus, CEO of Telenor Montenegro and Serbia

CONTENTS

05

10

15

18

33

35

2
APR 2016
ZTE

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

Success Stories

Solution

ZTE Wins GTI Outstanding Contribution on Innovative Solution and Application 2015

24 February 2016, Shenzhen — ZTE announced that it has won the Outstanding Contribution on Innovative Solution and Application 2015 Award. It accepted the award at the Global TD-LTE Initiative (GTI) award ceremony held in Barcelona. ZTE won the award for its innovative "Comprehensive Uplink Enhancement Solution" as well as outstanding contributions to promoting the development of TD-LTE industry.

ZTE has now won the past three consecutive GTI awards, and these accolades fully affirm ZTE's continuous innovation and industry driving force in the field of TD-LTE. Since its inception in 2011, GTI has been committed to the development of the global TD-LTE industry. With more than 122 operators and 103 partner members, GTI is at present the most influential organization within the TDD industry.

ZTE Unveils Pre5G UDN Demo at MWC 2016

25 February 2016, Shenzhen — ZTE unveiled and showcased its Pre5G ultra dense network (UDN) solution, marking a new stage of Pre5G technologies at Mobile World Congress in Barcelona.

ZTE's Pre5G UDN solution is centered on user experience and based on existing network architecture by virtue of interference management and suppression, mobility enhancement, and other key technologies. The technology provides a solution to address increasing interference between base stations with overlapping cells in dense networks. The solution achieves system frequency multiplexing and substantially increases efficiency and network capacity. Tests show that the downstream rate is increased more than 10 times in the overlap areas between cells where the technology has been implemented.

ZTE initiated the idea of Pre5G at the first 5G World Summit. Pre5G uses the most practical core 5G technologies to deliver a near 5G user experience and is compatible with commercial LTE user equipment, and will be used commercially before 2020. Massive MIMO, UDN, and MUSA are core Pre5G technologies.

ZTE and Korea Telecom Showcase Pre5G at MWC

24 February 2016, Shenzhen — ZTE announced its joint demonstration with Korea Telecom at Mobile World Congress 2016. The companies will exhibit a Pre5G MIMO base station demonstrating their latest cooperative achievements in the 5G field.

For the Pre5G Massive MIMO base station, ZTE utilizes the multi-antenna SDMA technology to improve existing 4G wireless frequency spectrum efficiency by four to six times. In a commercial network, the average single-carrier peak rate of Pre5G Massive MIMO exceeds 400 Mbps. ZTE has produced this solution to meet sharply increased capacity expansion requirements and to address the difficulty of finding site locations. Pre5G Massive MIMO uses a beam forming technology to extend coverage from 2D to 3D space to achieve seamless coverage and significantly improve the quality of the network end-to-end.

ZTE Wins Global Mobile Award for Pre5G Massive MIMO at MWC

23 February 2016, Shenzhen — ZTE won the Best Mobile Technology Breakthrough Award and Outstanding Overall Mobile Technology—The CTO's Choice 2016 for its Pre5G Massive MIMO technology at the Global Mobile Awards 2016. Mobile World Congress 2016, hosted by the GSM Association (GSMA), is the world's most influential gathering in the mobile communications industry, and the GSMA's Global Mobile Awards represent the highest honor.

As the world has ushered in the mobile internet era, existing networks are faced with the conflict between capacity demand surges and insufficient site resources. In this context, ZTE

makes innovative use of Massive MIMO technology to enhance wireless spectrum efficiency and boost network capacity. In a commercial network, the average single-carrier peak rate of Pre5G Massive MIMO exceeds 400 Mbps, increasing spectral efficiency by four to six times as compared with that of existing 4G networks.

Pre5G Massive MIMO uses beamforming technology to expand from 2D to 3D coverage, and implements intensive and extensive seamless coverage. The technology is flexible and can adapt to high-rise buildings, hotspot macro coverage, stadium coverage, and last-mile scenarios, dramatically enhancing overall network quality.

ZTE Signs 4G Patent Licensing Agreement with Teltronic

1 March 2016, Shenzhen — ZTE announced that it has signed a 4G patent licensing agreement with Spanish company Teltronic. The agreement is a further signifier of ZTE's global leadership in the field of 4G LTE technology. Under the terms of this royalty-bearing agreement, Teltronic will use ZTE patents to upgrade their mission critical communication infrastructure to support LTE functionality.

ZTE Proud to Be Launch Partner in China Mobile's 5G Joint Innovation Lab

26 February 2016, Shenzhen — ZTE announced that it is proud to be named as one of the first eleven partners in the China Mobile 5G Joint Innovation Lab (5G JIL), which officially launched at the GTI Summit held during Mobile World Congress 2016 in Barcelona.

The 5G JIL aims to draw on multiple resources from across the industry in order to facilitate 4G-to-5G evolution and create a virtuous circle for innovation. China Mobile has plans to create more opportunities for cooperation across different industries in areas rich in potential such as basic communications, internet of things (IoT), internet of vehicles (IoV), industrial internet, cloud robotics, virtual reality (VR), and augmented reality (AR).

The 5G JIL will build a central lab in Beijing, and regional labs in the China Mobile International Information Port, Qingdao, Chongqing and other places. China Mobile and its partners will actively take part in 5G tests organized by the IMT-2020 (5G) Promotion Group in China, to promote 5G candidate technology validation, standards development, and industrial chain construction. China Mobile will also cooperate with the GTI, GSMA, and NGMN to expand partners and cooperation.

Telenor
Expands Network Capacity
to Enter into Digital Life

Reporter: Zhang Ying

Ingeborg Øfsthus, CEO of Telenor Montenegro and Serbia
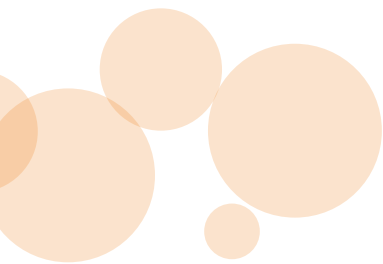
Telenor will be celebrating two important anniversaries in 2016—ten years of operations in Serbia, and 20 years in Montenegro. With broadband internet, Telenor currently covers over 92% of the Serbian population and over 97% in Montenegro, and the company is constantly working on upgrading its capacities to provide premium services to its customers. Recently, *ZTE Technologies* interviewed Ingeborg Øfsthus, CEO of Telenor Montenegro and Serbia. She talked about the characteristics of the Serbian and Montenegrin telecom markets, network capacity expansion project, and the major challenges of this project. She also talked about Telenor's growth strategy and her expectations for ZTE as well as her views on future trends.

How would you characterize the Serbian and Montenegrin telecom markets and their users' habits?

There are similarities between the two markets, due to the geographical and cultural ties, but each market also has its specifics. Both are very competitive markets with customers that have the same expectations as tech advanced users anywhere else in Europe. And they are really starting to get into data services with their demands growing dramatically. This is a trend we are also witnessing in the rest of the world.

What is specific to Montenegro is that there is still quite high proportion of prepaid customers compared to Serbia, and it is a very seasonal market. We see much more seasonal variations in Montenegro, while

in Serbia, there are less fluctuations over the year. Montenegro is a very popular tourist destination, and during the third quarter of every year, the coastline just explodes with tourists. And during those summer months, it can be a challenge to serve all the visitors in a great way, while maintaining the same service level for existing customers. In addition, we see that the population of Montenegro has tendency to move from inland to the coast areas, which creates additional pressure to capacities.

What distinguishes Telenor from other operators in Serbia and Montenegro?

We have a strong and positive brand perception in both markets with the network as our differentiator, as we are seen as a network quality provider.

In addition to that, we have the advantage of being part of the Telenor group, so we have the opportunity to use the experience from other markets and learn from each other. 4G was introduced in Montenegro relatively early, so we were one of the innovators in this technology in Telenor Group, but still there are some valuable experiences we could draw from the Telenor group in that area.

Could you brief us on your network capacity expansion in Montenegro? How will this project improve user experience?

We see a huge data growth year over year, and need to take Montenegro seasonality into account. We need to prepare for the summer during the first half of the

year. That means we have to work on the projects at very strict time lines in order to deliver services in time.

There are two ways we are preparing for the summer season. We are now improving our core network by upgrading it, and additionally, we are moving the core network physically into the new technical premises that are built in Montenegro—our state of the art data center.

Furthermore, we are carefully taking our learnings from the previous summer and forecast for the year to come. Based on that, we are creating a network capacity upgrade plan that needs to be carried out before the end of June.

What are the major challenges that you are facing during project execution?

Time is of the essence. First, we need to ensure that everything, including the equipment, is delivered on time. Second, we need to ensure all the works are carried out exactly where they should be, because we have a short window to perform. I believe this is our key challenge. In addition, we need to ensure that we have all the permits in place, for there is a lot of administrative paperwork when it comes to building

new sites.

Of course, the most important thing is to have the right people at the right place and ensure that we have experts available for the whole duration of the project.

How would you describe Telenor's growth strategy? What are your goals in 2016?

We see Telenor's growth strategy built around the three pillars across the Telenor Group—Internet for All, Loved by Customers, and Efficient Operations.

We believe that bringing data connectivity to everybody can influence the quality of life, making it better. Once you enter the digital world, you become a global citizen. There is entertainment on one side, but you also get access to information, which is a way for taking away the boundaries. We truly believe that bringing people into the digital life on one side, creates a better life and on the other, it is creating growth.

The second pillar of our strategy is that in everything we do, we need to focus on being loved by customers. Those are very strong words, but what it really means is we need to understand our customers. We use customer insight, measurements such as Net

Promoter Score, to understand what we can help the customers with, and how they perceive us. In Serbia, for example, we are extremely strong when it comes to net promoter score, and in Montenegro, we have an enormous improvement. We also see that the network is the number one reason that promotes us in Montenegro. We believe that putting customers in the center of whatever we do is driving the right priorities and the necessary growth.

And finally, in order to grow, we have to ensure that we are growing in a sustainable and efficient way. We need to be sure that our operation is working as efficiently as possible. What we have done in the region is setting up Telenor Common Operation, a common entity that is now executing planning, rollout, and operations on behalf of all the countries in this region. This is creating scale, and makes it easier for us to grow.

There is a strategy, but would you also say that innovation is a way to grow?

I believe that we need to work on innovation. Innovation can happen on many levels—both big steps, as well as small, constant changes in the way we do

our day to day business. It means never settling with the current situation, but always searching for new and better ways to serve our customers.

What we are seeing now is that everything is going digital. As a telco, we need to transform ourselves and embrace the digital future. This means paying a lot of attention to how we interact with our customers and what solutions we deploy. We also need to be bold and think what steps we should take in order to be ready for the future.

How would you assess ZTE's team and solutions? What do you expect from future cooperation with ZTE?

I believe that Telenor Montenegro has quite special relationship with ZTE. It was the first entry point into the Telenor group. ZTE did massive effort in swapping the whole Montenegro network, bringing in a service platform and even converging the billing system. I think that was a big opportunity for ZTE to fully showcase its capabilities in the Telenor group.

We have been working together for many years in Montenegro. We see that the network is performing

We believe that ZTE's solutions are strong, and we have very good experience of working with the colleagues from ZTE.
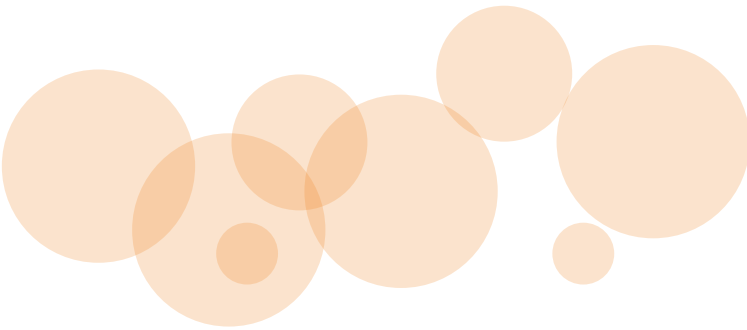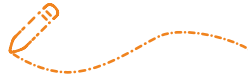
well, and we are the first in Telenor group to have converged billing in place.

We believe that ZTE's solutions are strong, and we have very good experience of working with the colleagues from ZTE. And we would like to see even closer cooperation, because even though Montenegro is a small market, the activity levels are varying and we have certain fluctuations of the people working with us. We would like to see even more continuity, but we are very impressed with the efforts and dedication of ZTE colleagues in our corporation.

It is very important to have people on the ground and working there. Being a big company, they also have to have strong support and the right prioritization from the central team. I believe that it is important to see this passion to deliver, and a certain flexibility to adapt to local conditions is also appreciated.

What do you think of the future trends in the global telecom market?

Well, there are many big thinkers around this subject, and we can see certain trends.

The first one is that we are going for customer insight by using big data. The information available about customers is huge and requires completely different ways of looking at it. But by utilizing big data,

we will get enormous opportunities to provide better services for customers in the future.

Then, everything is moving to the cloud. It is very clear that we need to challenge a decade old way of thinking of having one system as one solution in one country. We now have enormous opportunities—with good cloud solutions, we can utilize resources all over the world.

Thirdly, network revolution, driven by data and triggered by the Internet of Things. We hear about the staggering numbers of connected devices—one billion by 2020, 1.5 billion by 2023. Who knows exactly? But we can see now that it will be an enormous number. This is driving a massive need for capacity, and it will be the driver for 5G technology.

In terms of technologies such as 4G, 5G, the evolution we see that comes from bringing up the capacity, bringing up the number of simultaneous connections and bringing down the latency, just needs to continue. So, no matter what the technology is called, it is first of all the capacity that is driving the change. I believe we have just seen the tip of the iceberg when it comes to the Internet of Things.

If we talk again in five years, we will surely have a better view on how big it became. And it will be big, that is for sure. **ZTE TECHNOLOGIES**

NAMIBIA *Wishes to Connect Everyone*

Reporter: Zhang Ying

Hon. Tjekero Tweya, Minister of Information and Communication Technology in Namibia

The Republic of Namibia is a vast, sparsely populated country situated on the south Atlantic coast of Africa. The new government has encouraged the development of ICT, and now the main cities in Namibia are connected. However, the rural areas are still not connected. Recently, *ZTE Technologies* interviewed Hon. Tjekero Tweya, Minister of Information and Communication Technology in Namibia. He talked about his biggest achievement, priorities for Namibia's telecom sector, and the challenges and opportunities facing his ministry. He also shared with us his expectations for ZTE and his future prospects for Namibia's telecom sector.

What are your priorities for Namibia's telecom sector?

Now that I know what the challenges are, my first priority is to ensure there is network coverage across the whole country, including rural areas, where the majority of Namibians will have affordable access to the network. Communities must have good access to the internet.

In Namibia, we already have what we call e-police, which is to use electronic systems to track down the criminals, to record incidence that we can share with the communities, and to allow the communities to get in touch with the police. Furthermore, hospitals can also use these electronic systems. This is why a network must be available.

Moreover, new construction in the private sector needs to have network through access or through telephones. It will enable the growth of SMEs so they can have access to tender opportunities provided by the government. If they don't have access to internet, it will be very difficult for them to know these opportunities exist within the government. It literately confines the people in towns and excludes these rural communities.

If the network is available, it will open the way for public and private use. They both will have access to information through network. Furthermore, this will also grow the private sector in that we will have small telecom shops to sell computers, and open up job opportunities for the young people. Many of them are trained, but they don't have the opportunity to use their skills. With networks, they can fix small electronics, and their skills can be used.

Namibia's vision 2030 focuses on knowledge, information and technology. What role does ICT play in realizing it?

Namibia's vision 2030, clearly says that by 2030, we want to have a knowledge-based society. At that time, Namibia should be at a development level like a developed country; it will be developed by the people.

At present, people can't develop the country if they don't have the knowledge. Technology will increase knowledge across all sectors. For example, you must have the knowledge to use computer.

With the computer, you will have information about how to fix a radio, you will learn information about tourism and specific medication that you may need, and you will get information about job opportunities, studying opportunities and investment opportunities that exist in the specific areas or in the country.

You must have knowledge for manufacturing and making things happen. For example, we have a lot of minerals in Namibia. We have uranium, diamond, gold and others. What is happening now? Because we don't have the knowledge with diamond, we must export these elsewhere, where value is added to them. Then we buy a diamond through a ring, and this ring is put on the gold. We can't manufacture them by ourselves, so we must have the knowledge to make the equipment, to polish the diamond, and to form and design the ring.

When we milk a cow, we will have the knowledge to produce yoghourt, butter, cheese, and other things.
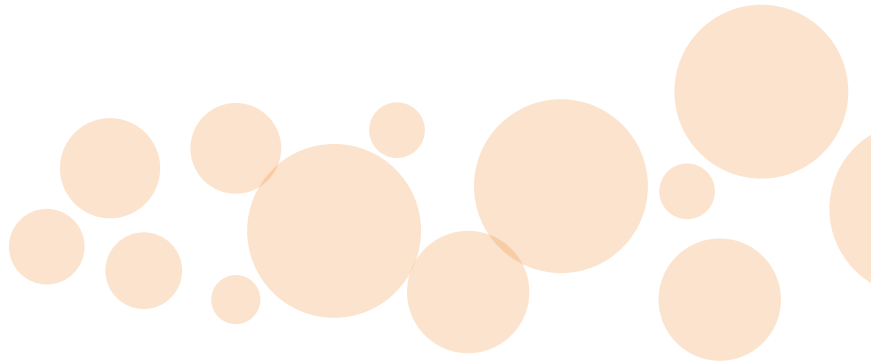
However, at this moment, we only see milk and we finish it because we lack knowledge. From milk, there are many other by-products that we can get. Entering into a knowledge-base society, it is what we want Namibia to look like by 2030.

How is the competition in Namibia's telecom market?

At the moment, we don't have many competitors, and the environment for telecommunications is still very relaxed. Network coverage is only 70 per cent of the country. It is only confined to urban areas, but the majority of the people are not in the urban areas. That's why we go to rural areas, schools and agriculture. The agriculture is a major sector of our economy. If it is excluded, what competition are we talking about? We must bring it into the mainstream, and then we can talk about competition.

Because we only got one or two operators, they are making it inaccessible to many because of the high rate. You know, it is governed by demand and supply. If there are several operators, it will bring the cost down so that the price is affordable. Consumers will then be able to choose what they can afford. For now, they are forced to accept whatever price existing operators gave them. I think the price in Namibia is unaffordable for many.

Therefore, I'm inviting players to come because this is an opportunity for investment. There is room for more investors, and the environment is not so competitive. The only challenge is the current players who may not want new players to come onboard, because they are dictating the prices. We want all Namibians to participate, but at the rate they are charging, it automatically excludes the majority from participation, so it is an economy of exclusivity.

We want to change it to be more inclusive. All the people including the poor and the unemployed have access to these facilities. For now, it is very expensive, and there are only few holding up the economy. These few are delaying the annual goals of economy, because the overall potential is not released to the full. Here is my invitation to open up the potential.

What are the greatest challenges and opportunities for Ministry of Information and Communication Technology in the next few years?

The first challenge, obviously, is to change the attitude of the people. The Ministry of Information and Communication Technology was merely doing with information, less emphasis on the communication, the development of technology, and the acquisition of new technology.

The second challenge is that it has always been confined to the government, less to the private sector.

The opportunity is that the sector should include public and private. In other words, in the public sector, all ministries at the Prime Minister through e-government should use the technology to convey information. That's how the information to be conveyed to all government ministries, and then the government ministries in all regions to inform the people in the rural areas. However, they must have access to that information.

At the same time, the private sector should contribute to the economy. Lately, Bank of Namibia has announced that it intends facing out the payment systems with normal checks, but through electronic payment. Now this is an opportunity for further investment in the ICT sector.

In Namibia, we pay pensions to anyone 60 years or older. Currently, they receive it through the post office. When it is paid, everybody must go and queue. If we use technology, all payment can be done over the internet. Old people wouldn't need to go and queue, and expose themselves to criminals, to be attacked or to be stolen. Instead, they can go anytime to withdraw any amount that they need. With internet, people's living standard

13

APR 2016

ZTE

has been improved a lot.

Now, the case is that if they have all the cash, they spend it, because business people would give them credit or sell things to them at a very high price, their money will be spent in one day, so these are opportunities.

Apart from the challenges, the opportunities are enormous. For example, doctors can use internet to dispose their medicare fully in electronic, the patients don't need to queue at the hospital to remind the doctors to do further research. With the internet, doctors will know what is happening in the country with different diseases, etc. At this moment, they do operations only at few major centers, and they can use electronic equipment to do minimally invasive surgery. So that's the investment opportunity in Namibia. We have plenty of growth opportunities for public and private.

The construction industry can also use the internet. In construction industry, people can use technology to design houses. They will know how many cement and bricks they need, and how long the construction period will take. All these can be achieved through the internet. In addition, it will need more people to work, so the ICT sector will create job opportunities for people. Many people are worried that computers will make them jobless, but the truth is that if they use technology properly, it is actually a job creator.

The ICT sector in Namibia has developed rapidly in recent years, but the rural areas are still not connected. What measures will you take to expand the network coverage in the rural areas?

Over the past nine months, it has been my priority to connect rural areas. I intend connecting the whole country by networks. It is the only way. Firstly, we have to build the infrastructure, that's why I invited the private sectors to provide network coverage.

We don't have towers, antennas or microwaves. In some areas, we don't have conventional electricity or set-lights, so people don't have access to the services, television, internet or mobile phone. That depends on technology connectivity. Now, the priority is really to

have coverage throughout the whole country; it is also a challenge.

I take this as a challenge to create opportunities. I believe that as we invest more in young people, we will create a more conducive environment for learners because they will have access to internet learning. By doing that, I believe we will get an improved outcome in education to create more learners who intend to become future engineers, technicians, architect, lawyers, doctors, politicians, professors, teachers and pilots.

How would you comment on ZTE's team and solutions?

ZTE has been clear that it must be trustable in the relationship. Although I'm inviting people to come and invest in Namibia, they must have the right attitude as partners. Partner simply means partner; they must not have selfish intentions. If they do, they are not welcome.

ZTE has a clear business philosophy of respecting partners and viewing Namibia as an equal partner, so it is most welcome.

Moreover, I believe that ZTE needs to expand its business. It has the technology and the know-how. We have the raw materials; we have people who need skills; and we have the market. These are issues that we can bring together. If we work and respect each other, we can have a win-win situation. Win-win means we have our needs and ZTE has their needs too. If we work together, we can both fulfill and satisfy our needs, not the one satisfies itself at expense of the other one.

What are your expectations for ZTE in the future?

Well, my expectation is ZTE can go to see what my country is going through. It is my hope that ZTE will become a real reliable and trustable partner in the development.

ZTE will see opportunities to expand its businesses and grow. ZTE can also use my country as a springboard to a big market in Africa through South Africa Development Community (SADC). Through Namibia, ZTE's equipment can be introduced into the sub-regions.

My country has an international facility in our office base, and we can use it to ship equipment for the distribution in the region. ZTE can become a strategy partner by using Namibia to start a sampling plant. Through that, it can penetrate the continent.

My country, geographically, is huge. We are considering building a R&D center, sampling plant or training facility in the region. My country is peaceful and stable. This is an incentive for any investor, because they need a peaceful and stable politically environment to do what they need to do. Moreover, we have invested in the physical old infrastructure. Our old infrastructure is very reliable, stable and predictable. With its business philosophy, ZTE can partner with Namibia and go long; I think ZTE is the right partner to enter the continent from the savvy point of view.

In the region, Namibia is already the top four in the digital area, i.e., the digital terrestrial television (DTT). We are a leader in the region, so we already have a good record. If ZTE don't have Namibia as a partner, what better partner does it need in the region?

Could you tell us your future prospects for Namibia's telecom sector?

My prospect is that Namibia can be fully covered by networks; people can fully enjoy accessibility to all technological devices. I'm a part of Namibia, as our president said, "Let all Namibians feel at home, and no one inside the Namibia' house should feel left out." That is not only for Namibians, but also for the visitors, investors, and everybody that comes to Namibia. When you are in Namibia, we want you to feel that you are a part of Namibia.

Therefore, the policy of exclusivity can't be tolerated in Namibia. We want to give everyone a chance to access whatever information is being shared in the house, to communicate and stay together for a better future that all of us are prosperous and have decent lives. We are fighting poverty; we don't believe in poverty reduction, we say poverty eradication. No poverty is good for everyone, and we want everyone to have a prosperous life. **ZTE TECHNOLOGIES**

Broad Based Communications:
Making Real Bandwidth Penetration a Reality in Nigeria

Reporter: Temiloluwa Adeyemi

John Mercado, Chief Operating Officer of Broad Based Communications

Broad Based Communications (BBC), which is located in Lagos, Nigeria, is a fixed network company. Although Broad Based Communications is very young in telecom industry, it developed rapidly in the past five years. Its network is designed as open access, so that everyone in Nigeria can use it. Recently, *ZTE Technologies* interviewed John Mercado, Chief Operating Officer of Broad Based Communications. He talked about the main focus of Broad Based Communications as well as the company's recent projects and networking strategy. He also talked about his expectations for ZTE and visions for Broad Based Communications.

Could you introduce Broad Based Communications and its main business focus?

Broad Based Communications is a fixed metropolitan fiber optic network company. We generally focus on last mile carrier base access using optical transmission. Being a carrier's carrier of high capacity circuits, BBC has been a trusted name in the wholesale telecom market space. One differentiator of the company is that BBC is an open access company; we cater for telcos, carrier, financial institutions and ISPs in a non-competitive and non-discriminatory way.

So far, the company has deployed 1,962 Km of optical fiber, serving 20 out of 20 banks in Nigeria, 18 internet service providers, 3 out of 4 GSM companies, presenting in all Submarine Cable Landing Stations and making headway in terms of last mile access connectivity.

In Nigeria, 90% of the networks are mobile. As a fixed network operator, what are your major advantages and competitiveness?

Being a metro access company, we do several things to compensate the wireless sector because high capacity transmission network is the solution needed to effectively deliver whatever LTE technology is promising. This is what we do every day and we are the best when it comes to delivering connectivity at par with world-class standards.

Even though the majority of networks in Nigeria are wireless, the fibre business that we are running is to further make them stronger and increase the bandwidth penetration as well. The more fiber optic we install underground, the closer we are in making it possible for the bandwidth-hungry contents to become a reality and to be experienced by all Nigerians.

Nigeria is encouraging free competition in the telecom market. What opportunity does this bring to Broad Based Communications?

BBC from inception is an enabler and a differentiator. We are an open access company, and we cater more on shared infrastructure, so we encourage more competition on the ground, encourage more innovation and encourage Nigerians to develop more content in order to coagulate opportunities.

The more the competitions, the more equal level playing ground available to common Nigerians. BBC network was designed as open access; this was envisioned by our Managing Director, Prince Henry Iseghohi Okojie years ahead for the common good and the service of the many.

Could you tell us about some of Broad Based Communications' recent projects? What is the importance of these projects?

We are seriously expanding and preparing the ground works for some keys states in the country, and additional product lines will be launched by Q2 this year. These projects shall ensure flows of video contents to the market.

What is your networking strategy for the next three to five years?

Our networking strategy is to spread Broad Based Communications to other states of the federation, to duplicate the model we have done successfully in Lagos to other states and to make sure that other states in Nigeria are benefitting from the achievement we have made in Lagos.

We control most of the banks and financial institutions in terms of connectivity, so we need to expand them, the same with ISP and fibre to the base station expansion. Expansion on these projects are what we intend to do not for tomorrow but for today.

An interview

What impressed you most about ZTE's team? How will the partnership between Broad Based Communications and ZTE evolve in the future?

ZTE has been a partner of BBC for half a decade, and ZTE's presence on the ground gave us confidence. We are benefiting a lot from ZTE's portfolio of expertise and its continuous support. There are times misunderstandings and we all end up in compromise and resolve.

BBC and ZTE are partners in progress. We move along together, and I believe BBC has achieved a lot because of ZTE's innovation.

What are your expectations for Broad Based Communications in 2016?

We are very excited and optimistic about 2016. We have seen the policies are changing; we are witnessing a much more predictable environment.

One of our corporate contributions is to provide connectivity to the Nigerian Internet Exchange Point (NIXP). NIXP is the promoter of local contents in the country and is mandated by the Nigerian Communications Commission (NCC) to host the local data interconnections of all licensed operators. We have felt the need and desire of a novice user when Netflix (content provider based in the US) was first introduced in Nigeria this year. The local traffic of NIXP jumped to 3 folds a week after, and it was a tip of the iceberg in the making.

At end of the day, we will have more business and opportunities for everyone.   **ZTE TECHNOLOGIES**

Economic Feasibility of
Big Data Construction

By Wang Dezheng

Problems Faced by Big Data

Big data can increase productivity and social benefits, and its essence is to improve the accuracy of human production activities. Academician E Weinan once put it: "Big data itself brings no direct benefits, for it cannot be eaten or worn. But it can eliminate waste."

Before the appearance of big data, it was difficult to glean wisdom from machines because wisdom usually comes from experts across all industries. Currently, the input knowledge (or information) from a massive knowledge base made by big data mining can be transformed into wisdom that guides human beings to improve social and productive activities.

Each technology that produces social benefits must satisfy two prerequisites: technical feasibility and economic feasibility. The former means whether this technology provides corresponding methods for implementation, while the latter means whether the system (or product) constructed using this technology can bring benefits. Big data also needs to meet the two prerequisites before being applied on a large scale.

In the Gartner Hype Cycle 2014, big data was moving towards the trough of disillusionment after passing through a period of hype. Usually, technologies in this stage are technically feasible. Driven by the Hadoop-based open-source system, big data might already have the basic technical feasibility in most areas except a certain cutting-edge area. However, its economic feasibility is often ill-considered in project implementation, such as no clear project objective and excess initial investment. This means that the

Wang Dezheng

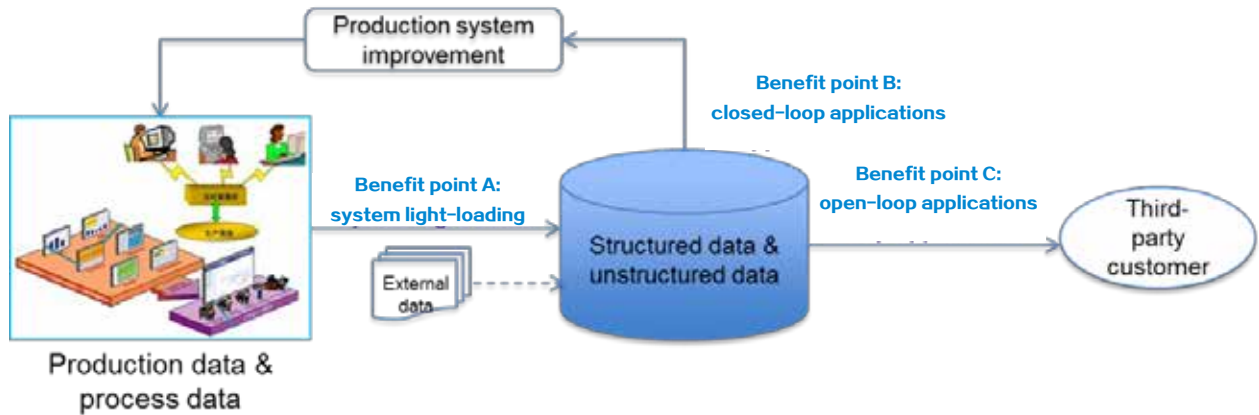Chief Engineer of
Central R&D Institute, ZTE

Figure 1. Benefit points of a big data project.

project fails to provide expected benefits. Therefore, economic feasibility is a key consideration for a big data project.

Profit Model of Big Data

A big data project is usually constructed in the following mode: first construct a big data platform then add multiple applications onto the platform. The big data platform itself does not bring any economic benefit, and all economic benefit is reflected by corresponding applications and operations. Therefore, in early project planning, much attention should be paid to services built on the platform and also on the relevant business mode for economic feasibility of the project.

There are three benefit or profit points in a big data project (Fig. 1). Benefit point A is system light-loading. Storing a lot of historical data in the production system is expensive and can also affect system stability. Therefore, the benefit point A is nearly a "rigid

Figure 2. The relationship between big data ecosystems.

demand". Enterprises such as banks and securities can greatly reduce the load of their production systems and improve system stability only by transferring historical transaction data into the big data platform.

Benefit point B is closed-loop applications. The big data platform collects business process data generated by the production system and models the data. It also suggests improvements and provides analysis reports. It can remove or improve unreasonable processes to increase system production efficiency and reduce costs. For example, coverage information of a wireless network can be collected to guide network planning and optimization. This dramatically reduces capital and time costs compared with traditional network planning and optimization based on a drive test. Another example is the e-commerce recommendation system, which analyzes user attributes and labels from the data generated by an e-commerce website and then gives a recommendation to the e-commerce website for sales promotion. This is a closed loop feedback.

Benefit point C is open-loop applications. Data values are achieved chiefly by third parties. Data from telecom operators can be used for road planning and traffic density prediction. Related benefits are generated through data operation and exchange. Because it is difficult to obtain stable revenue from open loop applications, and it is also difficult to measure the ultimate value generated by the data because of the lack of feedback, a relevant closed loop is difficult to form.

In the early stage of project construction, business targets at the benefit points A and B are easy to be focused on, from which economic benefits can be easily produced. Although in the early stage it is difficult to generate economic benefits, in the long term the benefit
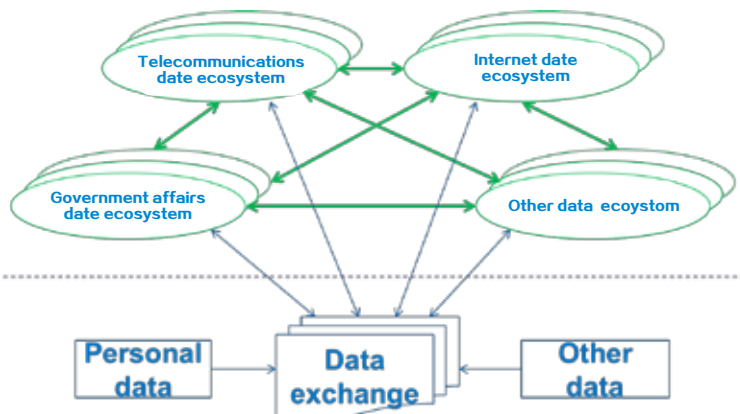
point C can bring more benefit than the points A and B. Therefore, the sequence of business construction, i.e., when to deploy a business, is crucial to a big data project and can even determine whether a project is a success or failure.

In the initial project construction, closed-loop applications that easily generate economic benefits are often first considered, so that the project can sustain itself economically. Based on the data accumulated in the initial stage, open-loop applications are then expanded. Such construction sequence can help increase success rate of the project.

Big Data Ecosystems

A system based on the big data platform can obtain and accumulate core data through closed-loop applications and build an application ecosystem using these open-loop applications. A healthy application ecosystem must be able to solve the economic feasibility issue within the ecosystem, which means

that applications in the ecosystem, such as system light-loading, closed-loop applications, and open-loop applications can create reasonable benefits and are commercially feasible.

There are many data ecosystems being constructed in all fields. As market competition intensifies, ecosystems that are not economically feasible will gradually be phased out or integrated. A few powerful ecosystems will dominate in certain fields. These powerful ecosystems solve the economic feasibility issue, and mine and monetize valuable data within their own ecological fields.

The relationship between big data ecosystems is shown in Fig. 2. To achieve collaboration and common prosperity between powerful ecosystems, data is transmitted and exchanged according to the principle of equality and mutual benefit. A small amount of data that is not involved in the ecosystems can be freely traded to maximize its social value through the data exchange.

In this era of explosive big-data growth, big data is becoming economically feasible in all fields, and big data services are becoming available everywhere. ZTE's DAP big data platform provides data encapsulation, capability openness, and a quick and easy environment for application development that can help customers plan and construct their big data ecosystems in stages, reduce initial investment, and lower their project risks.

ZTE *TECHNOLOGIES*

VMAX for Optimal
Network Operation

By Huang Peiyong

The evolution of mobile communication technology is complicating mobile networks. Nowadays, rapidly developing mobile data services are creating huge benefits as well as challenges for operators.

- Network optimization and O&M costs are going up. The hybrid 2G/3G/4G networking, enhanced network complexity, and increased service types raise higher requirements on network O&M. Therefore, network optimization and O&M costs are rising.

- Services are increasing while revenues are decreasing. Some low-value services occupy considerable bandwidth. If operators expand network capacity without optimizing or controlling network traffic, the benefits cannot match the costs.

- Complaints are rising. With the explosive growth of data services, the complaints continuously increase, and the need to rapidly locate a fault and handle data service complaints becomes increasingly urgent.

- Network content is invisible. Without the visualization of service contents, data service quality or user experience cannot be truly reflected. Operators are lack of valid and end-to-end methods to evaluate service quality and user.

- Operators are being relegated to dumb pipes. In the mobile internet era, operators are challenged by OTT providers. They need to optimal operate the data services to improve network values.

To attain a dominant position in the full-service operation era, operators must transit from extensive management to optimal management, optimize service quality, offer targeted and differentiated products, and improve user experience.

Huang Peiyong

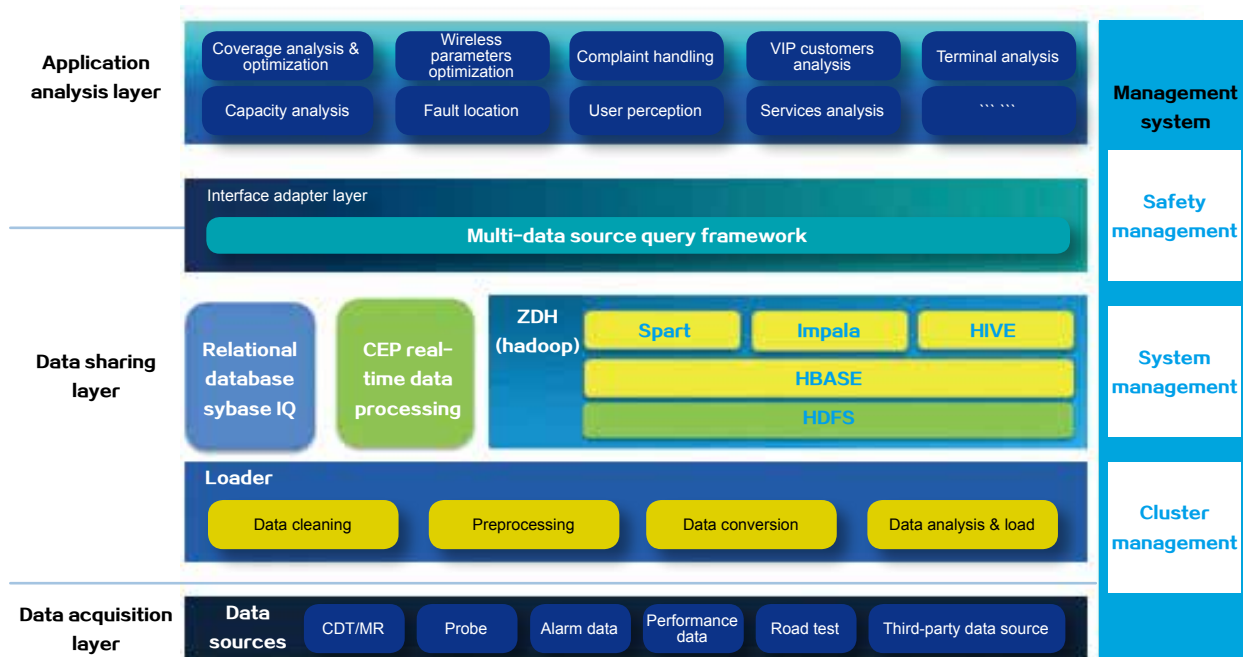Manager of Wireless Big Data
Product Planning, ZTE

Figure 1. VMAX layered architecture.

With deep understanding of the telecom industry and innovative thinking, ZTE launched value MAX (VMAX), which is a wireless big data solution. VMAX is a network O&M product based on big data technology. VMAX perceives and analyzes network and service information from the perspective of users. It visualizes network quality, service traffic, service quality, user experience, user behavior, and terminal application through mass data mining and analysis. It also supports end-to-end customer complaint handling and QoS analysis. In addition, it can quickly identify the causes that affect network quality and user perception, and build visual, manageable and controllable service pipes to achieve full-service optimal operation.

ZTE's VMAX is used in various network O&M scenarios:

- Intelligent handling of customer complaints. VMAX transits from "separate", "passive", and "inefficient" complaint handling to "associated", "active", and "efficient" complaint handling. The

end-to-end associated CDR data can be diagnosed one by one from the control plane, media plane, associated cells, and associated network elements in order to identify the path and the cause of a fault. VMAX, together with the troubleshooting experience database and fault decision tree, allows customer service staff to handle complaints timely and efficient.

- End-to-end data service network optimization. With end-to-end network optimization analysis, VMAX can quickly discover the source and location of a problem. Moreover, it has a quality indicator system for mainstream services to support end-to-end analysis and real-time monitoring, and to understand the availability, time delay, traffic, bandwidth and packet loss of services, and the coverage and interference of the air interface. It enables data mining and analysis from top to bottom and from entire network to specific areas.

- User experience management. VMAX enables an operator to perceive users' feelings, pay closer attention to users, and improve customer

satisfaction. It has an end-to-end user perception system that involves analyzing QoS of specific users. In addition, it monitors user experience in real time, provides special care for VIP users, explores potential VAP users, and reminds operators to take measures to avoid customer churn.

- Support marketing. By building visual multi-dimensional pipes and mining data value, VMAX helps an operator with accurate marketing and network investment. It acquires popular services and applications in mobile networks to increase operating revenues and improve service experience. It also acquires user consumption habits, service preferences, and activity scenarios, providing a reference for precise terminal

marketing. What's more, it identifies valuable networks and makes suggestions for network development.

- Intelligent closed-loop control. VMAX can be connected with the PCC system to build a controllable service pipe that reduces network pressure, promotes traffic value, improves user experience and maximizes return on investment. In peak hours, VMAX ensures bandwidth for high-value services and VIP users. In idle hours, it increases user bandwidth and improve user experience.

- Industry-leading big data platform. By adopting multiple key technologies, the VMAX big-data platform is fast, accurate, and easy to use.
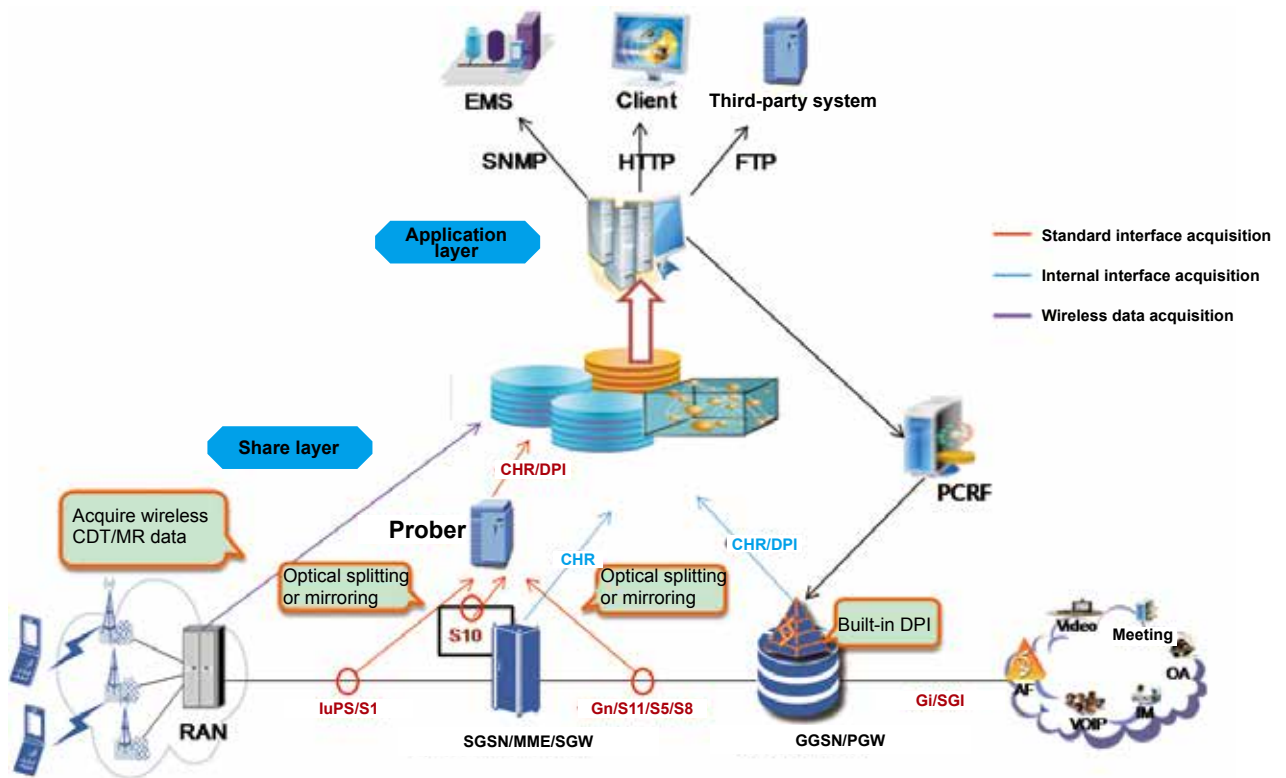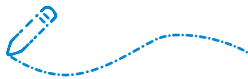

Figure 2. VMAX network architecture.

VMAX allows internal interfaces to obtain control-plane and media-plane data from ZTE's core network elements and to obtain MR/CDT data from the wireless side.

Applications are decoupled from data, which avoids a situation where applications can access bottom-layer data. With a hybrid architecture, the big-data platform is technically open and divided into multiple layers and domains. MPP + Hadoop is used for platform construction, and multiple Hadoop 2.0 components are introduced. The real-time service capability realizes real-time data acquisition, real-time analysis, real-time service delivery, and self-adaptive learning of models and labels. The platform incorporates big data security into the unified security management system.

ZTE's VMAX contains three layers: prober acquisition layer, data sharing layer, and analysis application layer. Each layer has open interface adapters to integrate multiple data sources, platforms, and applications.

VMAX allows internal interfaces to obtain control-plane and media-plane data from ZTE's core network elements and to obtain MR/CDT data from the wireless side. By deploying probes and using optical splitters,

external interfaces can acquire control-plane and media-plane data for the VMAX system from standard interfaces, such as Gn/IuPS/Gi/S1/S10/S11/S5/S8/SGi. The VMAX system can acquire, extract, associate, and analyze data from modules in the network to support network O&M.

Based on ZTE's big-data technology, VMAX not only has powerful processing capacity but also flexible convergence ability. It can help operators build an optimal operation platform, which has already been deployed by many mainstream operators. For example, the VMAX big-data analysis system that was put into operation by Sichuan Telecom in March 2014 has done what it was designed to do in terms of user care, user behavior analysis, and user terminal analysis. It supports network construction planning by optimizing the networks and improving complaint handling efficiency. This system has been stably running for more than one year, bringing significant economic and social benefits. It also helps a lot to Sichuan Telecom's optimal operation of province-wide wireless networks.

ZTE TECHNOLOGIES

ZXDNA: Building Smart Pipes for
Optimal Traffic Operations

By Lv Haibing

In today's burgeoning mobile internet market, internet giants have launched hundreds of thousands of mobile apps, allowing them to get substantial returns from terminal sales, app downloads, traffic-based profit-sharing, and advertising. However, mobile operators have to spend much more on network deployment and capacity expansion to provide a higher network bandwidth for these video, audio, and gaming apps, leaving themselves an increasingly unsatisfactory return on investment. Operators are now in a dilemma of increased traffic but low ARPU and are gradually becoming pipe providers.

What can operators do to break through this barrier? They can create smart pipes that optimize traffic. Specifically, operators need to strengthen their own operation capabilities, manage traffic flow, accommodate their network architecture and resources to market needs, and expand network capacity at the right time. In this

way, they can fully use networks and avoid becoming pipe providers.

ZTE has rolled out ZXDNA, a deep network analysis system to help operators guarantee optimal traffic operations. The following work flow (Fig. 1) illustrates how ZXDNA works.

The hexagonal block 1 in Fig.1 shows the procedure for big data collection. Traffic data is collected and pre-processed in U31NMS and then classified and allocated to the relevant database. The hexagonal block 2 shows the procedure of big data processing and analysis, which is based on ZTE's big data platform DAP2.0. Traffic data is analyzed and predicted, and the result is displayed to operators.

ZXDNA features powerful data statistics and analysis, abundant graph and table views, and flexible deployment. It can be used for typical traffic operations.

- Powerful data statistics and analysis. ZXDNA enables data statistics at multiple levels from different dimensions, for example, traffic and bandwidth usage by region, service, and time. Through innovative calculations, valuable indicators are derived from basic KPIs to explore the value of traffic data. ZXDNA itself provides default indicators that are extensible and tailors a number of practical report templates for mobile

Lv Haibing

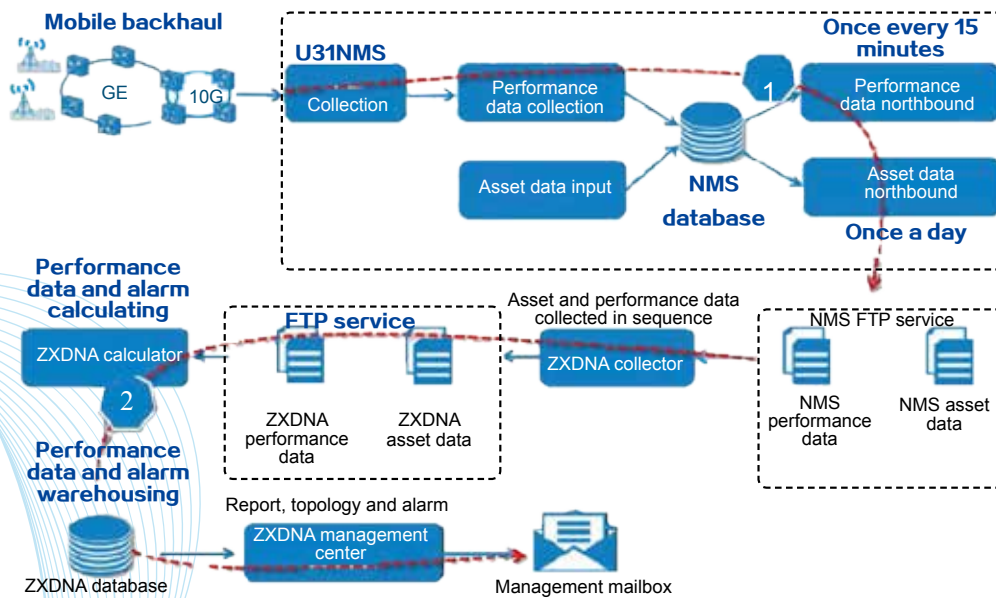Director of
Big Data Architecture, ZTE

Figure 1. Work flow of ZXDNA.

transport networks. Operators can use these templates to generate and export reports rapidly and conveniently. The hierarchical drill-down function allows operators to explore multidimensional data in flexible and diverse ways.

- Big data processing. ZXDNA uses big-data technologies for intelligent data analysis and traffic prediction. Data can be aggregated by the hour, day, month, and year for efficient statistics and analysis, and all aggregated data can be stored for a long time and is quickly retrievable.
- Visible traffic flow. ZXDNA provides multiple graph and table views, such as trend charts, pie charts, star charts, topological graphs, dashboard figures, overviews, TopN views, and event presence. All these views can be customized or combined as required.
- Flexible deployment and hierarchical data processing. In a one-level deployment, a ZXDNA system is built in each prefectural city for data collection, aggregation, analysis, and presentation. In a two-level deployment, a ZXDNA system is set in each prefectural city for local traffic monitoring, and another ZXDNA system is deployed at the provincial level to collect, summarize, and analyze data from each city. This system outputs a network view and report for the whole province. ZXDNA systems in different provinces are managed independently.

ZXDNA enables traffic-based closed-loop

operations by deeply analyzing operational data and network. The smart pipe, a critical execution point for traffic operations, enforces bandwidth guarantee, access control, traffic offload, and control policies. The operational support platform is a core control point for traffic operations. It can provide traffic operational policies to ensure enhanced user experience and profitable traffic value.

The current traffic operational policies for mobile operators is to keep up the strength of smart pipes and transit gradually from forward traffic operations to backward traffic operations. ZXDNA helps operators put these policies into service by optimizing smart pipes and facilitating cooperation with OTT service providers.

ZXDNA optimizes smart pipes based on big data aggregation, over-segmented market, and microservices policies. This helps operators increase efficiency, lower costs, and increase revenue from traffic. ZXDNA has been purchased and deployed by China Mobile in 26 provinces and cities around China, becoming the benchmark for successful big-data applications. ZXDNA also uses big-data for deep user behavior data mining and analysis, helping operators and vendors push personalized marketing strategies. Operators can make different marketing schemes for different OTT service providers, and gradually move towards backward traffic operations. **ZTE** TECHNOLOGIES

DAP Facilitates
Commercial Big Data Applications

By Zhu Kezhi

I n a less technological era, most information was not recorded, such as the surface color, temperature, and bearing pressure of objects. Even now, only little information can be collected, which chiefly includes data generated by computers and some data selectively received by sensors. Gartner predicts that the global data will reach 40 zettabytes (ZB) by 2020. The rise of big data technologies has brought solutions for data processing, and can allow people to get desirable information and knowledge from the data that they used to discard.

What is big data? Big data features 4Vs: volume, variety, value, and velocity. Big data storage, mining, and monetization are all difficult technical issues that need to be addressed with appropriate solutions. With the development of parallel computing and reduction of hardware costs, parallel computing has been widely used to solve big data issues. Multiple low-cost PC servers can constitute a distributed underlying physical infrastructure, where a distributed file system manages all file systems in a fragmented way and provides standard POSIX file interfaces.

There are different types of big data computing engines for different data and applications. HBase implements rapid query of big data in simple logic; MapReduce provides a variety of distributed service logic through flexible programming; and Spark offers a portfolio of solutions including batch programs. Streaming, Spark SQL, Storm and distributed

By Zhu Kezhi

Chief Engineer of
ZTE Central R&D Institute

search engines all support big data applications. These computing engines combined with different analysis and mining algorithms analyze data and uncover value in different scenarios.

To address application needs for big data in various scenarios, ZTE has launched an integrated data application platform (DAP). Open-source DAP includes ZTE's self-developed manageable, controllable, and highly reliable commercial big data platform. This platform includes data extract-transform-load (ETL) layer, storage and computing layer, open data service layer, mining and analysis layer, and unified management (Fig. 1).

The ETL layer obtains big data for analysis, and it consists of ETL data processing engine, web crawler, sqoop (for database import and export), and FLUME (for distributed log collection).

The storage and computing layer provides engines for data storage, analysis and calculation. This layer contains the underlying HDFS for data storage, YARN for unified management and scheduling of cluster resources, MR for offline tasks handling, HBase for semi-structured data query, CEP for Storm-based complex events handling, and HIVE and Impala for SQL query.

The basic big data platform solves the problems of big data storage and mining. However, the greatest challenge for current big data systems is how to monetize big data. This is also a major concern for enterprises in building big data systems.

To monetize big data systems, it is necessary to build an open transaction platform. An open data processing platform (ODPP) is specially developed on ZTE's DAP for this purpose. ODPP is the middleware based on universal open source components and developed for data opening and transactions. ODPP consists of multi-tenant
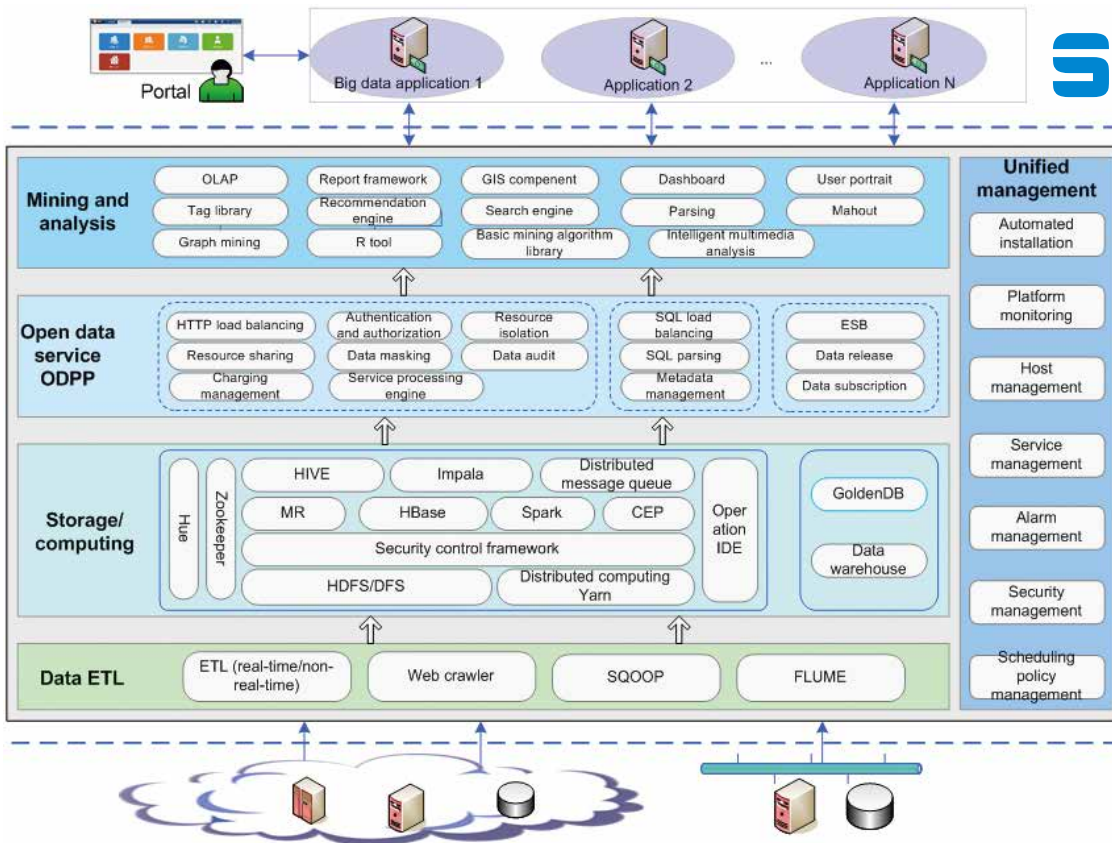
Figure 1. ZTE's DAP architecture.

management and support, unified SQL, and data exchange and sharing. The multi-tenant component isolates resources and balances the routing load for multiple tenants. It opens data capabilities for each tenant through APIs as required. The unified SQL function allows users not to care the specific engine (whether it is a relational OLAP database or a big-data platform component) for data storage, for ODPP can help them automatically identify data through metadata management and direct SQL statements to a proper storage engine. The data exchange and sharing component enables data transactions by sharing data between tenants. During data sharing, data is transacted, recorded and saved, and transaction CDRs are generated. With these features and a variety of technical means, data application systems can be designed for different business models.

The mining and analysis layer provides mining algorithms and toolkits for developing big data applications, which include OLAP, reports component, basic algorithm library, graph algorithm library, R tools, search engine, recommendation engine, generic text analysis and tag library tools, GIS component, and common visual dashboards.

Unified management ensures consistent management within the framework, involving automatic installation, platform monitoring, host management, service management, alarm management, security management, and scheduling policy management. All this ensures consistent user experience on the manageable, controllable, and operable big data platform.

ZTE's DAP provides a complete set of big data solutions and has the following features:

- Simplified O&M. The integration and O&M of open-source components is a complex issue. ZTE's DAP provides automatic batch installation, rich service status display, real-time event alarm, and log trace and audit for easy operation and maintenance.
- Enhanced security management. ZTE's DAP provides role-based rights management. It supports data masking and remote active-active disaster recovery within a city, so that user data can be fully protected.
- Enhanced open-source components. ZTE's DAP optimizes configuration parameters on the basis of open sources to enhance performance.
- Open data processing platform (ODPP). Based on open sources, ZTE's DAP supports unified data opening and multi-tenancy for data sharing and exchange. ODPP provides a basic platform for data transactions.

The acceptance of a big data system by enterprise or government mainly depends on its sustainable liquidity and adaption to changing business models. ZTE's DAP is a universal big data platform where application systems can be deployed for different business models. It provides technical support for customers to achieve business success. ZTE TECHNOLOGIES

Big Data Service Models

By Huang Ke, Fan Wanpeng

> To overcome big data challenges, the key is to find an applicable big data service model that converts potential value into benefits.
>
> —**Huang Ke**, Chief Engineer of Big Data Solution Planning, ZTE

The 18th National Congress of the CPC proposed a national big data strategy, ever since big data gained enormous application value on a very big scale. Telecom operators, who have been pioneers in developing big data applications, have deployed big data platforms and implemented them in various ways. However, operators are challenged by the following issues:

- Large-scale investment but uncertain outcome. Most big data applications have low cost performance.
- The gains of big data applications are limited, because operators can provide only a few types of data subject to technical, political and legal restrictions.
- Operators are pipelined and marginalized in the emerging

big data chain.

To overcome these challenges, the key is to find an applicable big data service model that converts potential value into benefits. The following will brief on four big data service models that can be adopted.

Internal Application Model

The internal application model means that operators collect and analyze various kinds of equipment data and data generated during O&M,

including network management data, equipment logs, signaling, DPI records, user bills, and complaint records. This model is designed to serve customers of an operator, improve service efficiency, and reduce operating costs. As the internal application model adopted, the value of the data collected can be maximized. Typical application scenarios of the internal application model are:

- Customer experience-oriented network planning, maintenance, and optimization.
- Telecom service-oriented precise marketing.

For example, Orange applies big data to enhance user experience. The internal application model is the basis for operators to carry out big data operations designed for external markets. It can help operators optimize operations, reduce costs, and increase efficiency.

Data Sales Model

The data sales model, namely, external cooperation, is a model where operators sell data products or services, which are formed by the valuable data of operators, to make profits. The sold data products or services may be consultation reports, traffic inquiries, advertising services, and credit services.

Because operators can collect only a few types of data, the value generated is limited for a third party. The income from a single service is so small that huge investments in platform construction do not provide adequate return. Therefore, to benefit from the data sales model, operators must have a professional team to delve in-depth on the data and associate it with external industry data to enhance the data value. Generally, to ensure scalability and safety, response speed, and service development, one unit will be responsible for unified and intensive management. This can save construction costs and improve efficiency.

For instance, Dynamic Insights, a specialized department of Telefónica, operates global data assets. Its SmartStep service, after collecting and analyzing users' location information, delivers location-based services for transportation and retail industries. A typical case is Morrisons, the UK's fourth largest food retailer. The SmartStep service, by analyzing historical
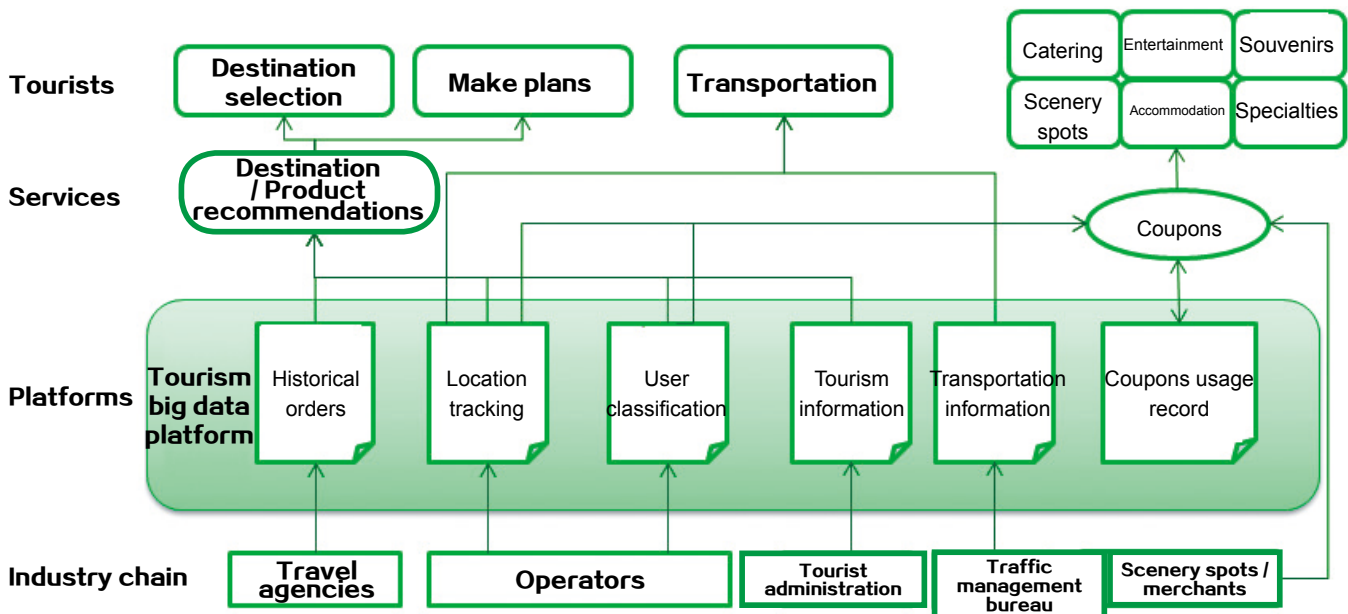
30
APR 2016
ZTE

Figure 1. Smart tourism service model.

tracks of people in different areas, instructed Morrisons to deliver coupons to areas where repeat customers can be caught with the highest speed at the lowest costs. By partnering with Dynamic Insights, Morrisons saw a 150 percent increase in the number of new customers and repeat customers.

Service Operating Model

Most operators participate in smart city construction and are involved in industries such as digital home, intelligent car, healthcare, tourism, and education. If operators become involved in service operation by establishing an industry operating platform based on big data, collect service-related data and combine it with telecom data, and provide data to industry services, they can increase the value of data and generate more revenue.

Take smart tourism as an example. Travel agencies can obtain historical data about tourists and target customers' classification information from operators, and combine it with their own historical order data to find out potential customers and recommend destinations and products to them. On the one hand, travel agencies can store historical order data to the big data tourism platform and associate it with location and user classification data provided by operators. On the other hand, operators can get revenue from travel agencies for data usage and share the data association result, which enrich destination

selection and product preference data.

Operators can also cooperate with merchants to provide tourism product coupons to target customers, associate the coupon usage with location and user classification data in order to understand their consumption habits to certain tourism products, increasing recommendation accuracy and further increase revenue.

Smart tourism helps operators integrate various kinds of tourism-related data, including public government information, merchandise catalogue, consumption records, trips, and internet public opinions on the big data tourism platform. These data are associated and add value to each other, bringing more profits for all participants in the tourism industry chain.

Data Operating Model

Operators can operate open big data platforms to become big data operators. By establishing and operating an open
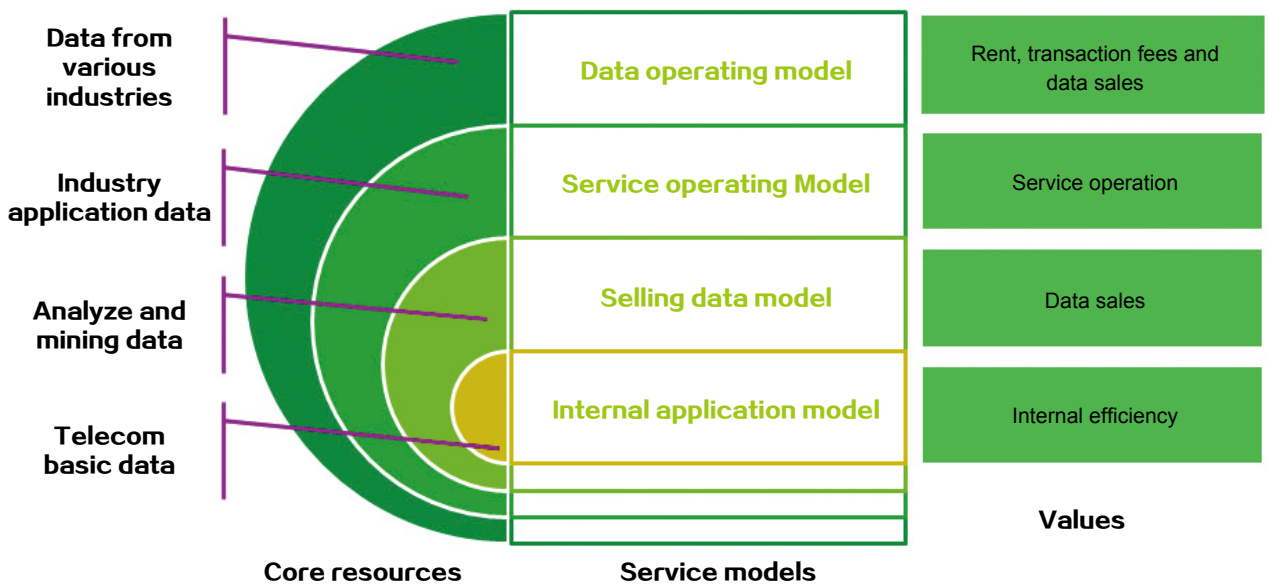

Figure 2. Big data service model.

> The data operating model enables telecom operators to transit to big data operators, integrating data from various industries, raising status in the industry chain, and creating new values.
>
> —**Fan Wanpeng,** Chief Engineer of Big Data Solution Planning, ZTE

big data platform, operators can provide big data storage, computing services, big data exchange and sharing, and data transaction services. In addition, operators can open valued data to the big data platform after desensitization in order to attract customers and monetize the data.

By operating the big data platform, operators can raise their status in the big data industry chain and generate new revenue, such as data storage and computing rent, data transaction fees, and revenue from monetization of data. What's more, operators can obtain data from other industries by sharing the big data exchange platform and through data transactions, so as to serve their self-owned services, and create innovative services.

China's national big data strategy creates opportunities for the data operating model. With the development of big data applications in various industries, big data infrastructure, especially common big data platforms are required. Operators have high social credibility and strong technical and operating capabilities, which enable them

to become big data operators.

Summary

In most cases, the preceding four models coexist and support each other.

The internal application model is the basis of big data operation. In at least one or two years, it will still be the main revenue source for big data services. Data acquisition, processing, and analysis will apply mainly to the internal application model. However, with in-depth optimization, the marginal revenues from this model decrease gradually.

Revenues from the other three models rise as data requirements from the external environment increase, so they become the future revenue growth points. Moreover, the three external models help operators obtain data from other industries and increase data value.

The data sales model is clear and generates profits quickly, so it is widely used by operators. However, the costs in this model are quite high, and small-scale operating services cannot make a profit.

The service operating model has been adopted in the wave of smart city and internet+ construction. By operating the industry big data platform, operators can monetize service-based data and promote intelligent operation as well.

The data operating model enables telecom operators to transit to big data operators, integrating data from various industries, raising status in the industry chain, and creating new values. **ZTE TECHNOLOGIES**

PTCL: BUILDING A SUSTAINABLE OPTICAL NETWORK

By Liu Junjuan

Liu Junjuan

Marketing Manager of
BN Product Team, ZTE

Pakistan Telecommunication Company Limited (PTCL), which is a subsidiary of Etisalat, is Pakistan's largest fixed-line network and broadband operator. With over 30 million users, its core businesses include the fixed-line network, CDMA WLL, data, and value-added services. Its fixed-line network share accounts for 97 per cent, ranking first in Pakistan and its subsidiary (UFone) occupies a large share in Pakistan's mobile market. In recent years, due to the deployment of LTE/EV-DO and the expansion of nationwide broadband services, the bandwidth demand for PTCL's bearer network is sharply increasing, causing a heavy stress on network bandwidth.

PTCL's backbone DWDM network has dual planes. One of the planes was constructed in 2007, and the network capacity is a 40-wavelength 10G system. However, the increased bandwidth saturated the network capacity. On the premise of protecting the investment of the existing network, improve the network capacity and complete the project efficiently are PTCL's priorities for network reconstruction in 2014.

Already Prepared for Our Customer

The competition in Pakistan is fierce. PTCL's DWDM network involves two planes. Early in 2013, when PTCL had no specific project requirements, ZTE already predicted that PTCL would require large bearer bandwidth in 2014 as the 4G network, IDC network, and smart IPTV services evolved rapidly. ZTE then organized a network optimization team and proposed two upgrade solutions. In Solution 1, the existing network was upgraded to 80-wavelength 10G/100G

system, and 10G channels were added (in the future, 100G channels can be added as required). In Solution 2, 100G-wavelength was added to the 10G network directly. Therefore, when PTCL explicitly required upgrading its bearer network in 2014, ZTE's professional solutions satisfied PTCL very much.

Solution Optimization to Reduce CAPEX and OPEX

Considering the investment and sustainable development, PTCL preferred Solution 1, so ZTE optimized solution 1 to reduce CAPEX and OPEX, and build a green network.

For the old DWDM devices in more than 100 sites of the existing network, some magnified boards were replaced to enhance the network OSNR performance. After the system is upgraded to 80-wavelength, the minimum number of trunk boards was used to guarantee a low CAPEX of the entire network.

New ZXONE 8000 devices were connected to old ones of the existing network, and the new service boards were added to the new devices. In the wave-division project, most of investment was put in service boards. Compared with the 10G service boards in the existing network, the new 10G service boards of ZXONE 8000 boasted a low cost and better performance, thus greatly reducing the CAPEX of capacity expansion.

In addition, the newly introduced 10G board was half size of the original board, and the number of service slots in a new subrack was larger than that of the original one. These reduced the equipment room space and OPEX as well.

Furthermore, a new compatible service board was introduced to improve the flexibility of wavelength scheduling and reduced OPEX.

The optimized network could be smoothly upgraded to 100G and even beyond 100G for sustainable development.

Fast and Highly Efficient System Delivery

Due to a rather short construction period, before the devices arrived, ZTE's engineering team had deployed U31 network management servers in the Pakistan site to upgrade the network management system (NMS). After the devices arrived, all hardware components were installed, some old OA boards were replaced, the capacity for new services was expanded, and trunk boards were added. Most of services adopted OP multi-path protection, which ensured the fastest project commissioning and the least interference to provisioned services.

During PTCL's backbone DWDM network capacity expansion project, it took only two months to complete contract sending, scheduling, and device delivery, and took six months to fulfill the upgrade, reconstruction and service provisioning. The network has been commercialized at the end of 2014, which guarantees PTCL's bandwidth demands for smart TV and 4G services. ZTE also won high praise from PTCL.

Smoothly Upgraded Green Bearer Network

With 30 years of experience in the telecom industry, ZTE successfully upgraded PTCL's network from 40-wavelength to 80-wavelength, and achieved fast network commissioning. This not only protected PTCL's investments, but also reduced the CAPEX and OPEX of its network. In the future, the advanced 100G technology, beyond 100G technology, and OTN electrical cross platform can be introduced to build a sustainable network.

- Smooth upgrade. ZXONE 8000 platform is introduced to smoothly upgrade to 100G or beyond 100G capacity. The transponder or muxponder services can be implemented through adding service boards. While the OTN cross platform can be implemented through adding proper OTN cross platforms and service boards. The introduction of new services does not affect provisioned services.

- Superior performance. The OTN platform has the largest cross capacity and the maximum number of slots, supporting an upgrade to 100G or 400G. It adopted the most advanced SD-FEC technology, and has the most powerful 100G transmission capability. For 100G, which adopted the leading DSP technology, the dispersion tolerance is ±70000 ps/nm, and the PMD tolerance is 60 ps. In addition, 100G supports the trunk long-distance transmission without electrical regeneration (more than 5000 kms), the mixed convergence of STM-N/GE/10G/40G services in any granularity, and ODU0/1/2/2e/3/4/flex crossing, meeting different application scenario requirements of operators.

- Environmental protection. As the advanced 28 nm processing AISC chip is applied, the 100G board significantly reduces heat dissipation and power consumption of the PCB. The advanced mechanical and electrical management mechanism is introduced to allow circuits and optical modules to enter dormancy mode, which reduces the power consumption of idle modules. The super high-precision temperature measurement and intelligent heat dissipation system can adjust the fan speed in real time according to the measured temperature. In this way, the system operating temperature can be reduced maximally while the energy consumption of fans can be controlled. **ZTE TECHNOLOGIES**

CANTV: EVOLVING TOWARD AN ALL-IP NETWORK

By Zhao ZhiQing

Zhao ZhiQing
Solution Manager of
BN Product Team, ZTE

CNTV is the largest state-owned telecom operator in Venezuela with 3.5 million fixed-line subscribers and 14 million mobile subscribers. It pretty much dominates the fixed-line and mobile markets in Venezuela.

Now, nearly all major MANs and national IP backbone networks in Venezuela are monopolized by western telecom vendors and rely on leased lines, SDH and microwave. Due to the particular political and economic conditions in this country, the construction and expansion of the

existing IP backbone network owned by CANTV's mobile service company Movilnet has ground to a halt.

As demand for services increases, network bandwidth is in short supply. Worse still, Movilnet has no high-performance bearer network of its own, so it has to spend much more on network infrastructure leases and O&M, causing its OPEX to increase every year. In recent years, Movilnet has also witnessed an explosive growth in its 3G/4G mobile subscribers and traffic volume. Given all these challenges, CANTV is in urgent need of network transformation

and upgrade. To increase network bandwidth, lower OPEX, and become more competitive in the market, CANTV has started evolving its network toward all-IP and 100G.

ZTE's IP network solutions have been widely used in China and abroad. ZTE's R&D team has a precise understanding of the market demands for installation engineering; O&M, network and service evolution; and continuous optimization of solutions. After several exchanges with CANTV, ZTE tailored an optimal IP network solution and persuaded CANTV to build a new IP backbone network based on a 200G platform rather than expanding its existing IP backbone. The solution provides a network that is extensible and boasts E2E L3-to-edge capability, freeing CANTV from the bandwidth and L3-to-edge pressures in the evolution to mobile broadband and IP private line services.

ZTE's high-end routers are applicable to the edge of an IP backbone network, an IP MAN, and other large-scale IP networks, delivering a variety of services and reliable QoS. These products simplify network architecture and help with the evolution of the IP/MPLS bearer network to an intelligent, broadband, multiservice network. Based on its full-service, evolvable, and integrated telecom-class platform, ZTE is able to customize a complete and efficient IP network solution for CANTV to meet the challenges of differentiated user needs, new services, and fast-growing bandwidth needs. The solution has the following attractions:

- Service convergence to build an

intelligent, full-service bearer network. The high-end routers provide a terabit hardware structure, distributed parallel processing mechanism, non-blocking CLOS switching architecture, and high-density 10 GE/40 GE/100 GE interfaces for smooth capacity expansion. The routers also have a flexible dual-card structure that supports different types of interface cards for diverse networking modes. Extensive access modes, including IPoE, PPPoE, IP private lines, enterprise VPDN, ATM and TDM, allow CANTV to build hybrid MPLS L2/L3 VPN networks as required. Modular, fully-distributed, and highly-reliable software and hardware system supports BRAS/CGN hot redundancy and NSR/ISSU to guarantee service continuity.

- Deep network analysis to consolidate information security. The solution provides three-dimensional equipment security mechanisms and complete access control policies. On the control plane, a high-performance multi-core CPU is used for independent multi-process scheduling. On the data plane, there is a special separate TM traffic engine for high-speed packet parsing and filtering. On the management plane, unified RADIUS/TACACS+ is adopted for hierarchical authentication and authorization.

- Intelligent resource scheduling to create an energy efficient network. The solution provides intelligent process dormancy so that idle processes and devices can be shut down. It provides intelligent

service adaptation to automatically balance system loads, evenly dissipate system heat, and greatly reduce average system power. It also provides intelligent line card activation to automatically activate and deactivate line card resources according to actual service loads and improve line card usage. Moreover, intelligent fan speed control with precise fine-tuning and seamless speed adjustment reduces noise pollution and power consumption, and intelligent power supply with independent power monitoring plane and automatic power control module enables real-time monitoring and on-demand supply.

In April 2015, ZTE won CANTV's bid for the new Metro-E project and Movilnet's bid for the IPBB project. ZTE became the only contractor across all 85 sites in the Metro-E project and all 17 sites in the IPBB project.

By working with ZTE, CANTV will rebuild its IP network into a powerful underlying network with higher quality and lower information security risks and resistant to network attacks. This efficient, integrated, and sustainable bearer network platform will reduce networking costs, provide secure and reliable service-carrying capabilities, improve user experience, and increase the network value. ZTE is poised to partner with CANTV in responding to the increasingly rapid service growth and heavy network loads in the competitive telecom market, and to empower CANTV with its state-of-the-art technical solutions and excellent project delivery quality.

ZTE TECHNOLOGIES

Magic Radio:

The Killer Solution to Spectrum Efficiency

By Zheng Lingxia

Zheng Lingxia

Senior Solution Manager of
FDD Product Team, ZTE

Challenges

Because mobile broadband develops, LTE networks are being widely deployed at 900 MHz and 1800 MHz. This means that more GSM spectrums are being refarmed for LTE.

Traditionally, GSM spectrums are statically re-allocated to LTE. However, as traffic load changes dynamically, and busy hours for voice and data traffic do not overlap completely, the conventional static spectrum allocation fails to meet LTE needs for on-demand and dynamic bandwidth allocation.

1800 MHz band has become the core band for LTE and also the bearer frequency for GSM; so many operators need to refarm their GSM spectrums when deploying LTE networks. Because LTE voice is not yet mature, GSM at 1800 MHz is still being used to bear voice service in a short term. Therefore, a major challenge for multi-network operators is to implement GSM/LTE collaborative spectrum scheduling to offer both voice and data services to users.

Introduction of Magic Radio

ZTE has rolled out its innovative Magic Radio, which can refarm spectrum, adapt to traffic changes, and flexibly schedule GSM/LTE and UMTS/LTE spectrum. Magic Radio helps multi-network operators enhance spectrum efficiency and improve user experience as well.

Magic Radio is designed for flexible spectrum sharing and scheduling between GSM and LTE. It features GSM dynamic frequency allocation, GSM/LTE band-in spectrum overlay, GSM/LTE dynamic bandwidth extension, and GSM/LTE collaborative spectrum scheduling.

GSM dynamic frequency allocation is a unique feature that has been commercially deployed. It brings GSM spectrum gain by allocating and releasing frequency resources according to traffic tide (except some higher-priority TRX, such as BCCH TRX). The same network capacity can be achieved with less bandwidth and no performance loss. Normally, a 200 KHz guard band is required to mitigate inter-system interference. GSM/LTE band-in spectrum overlay has an innovative filter algorithm and unique bandwidth compression technique that maintains zero or even negative GSM/LTE guard bandwidth and improves spectrum efficiency. For the configuration of 20M LTE bandwidth, GSM can use 1.4 MHz of the 2 MHz reserved bandwidth. GSM/LTE dynamic bandwidth extension supports dynamic spectrum re-farming at LTE narrow bands. It dynamically extends LTE bandwidth when there is low GSM traffic load and can balance GSM and LTE spectrum utilization based on regional GSM traffic statistics. When the GSM traffic load falls below a given threshold, certain GSM spectrum resources are released for LTE. With GSM/LTE collaborative spectrum scheduling, GSM and LTE spectrums are dynamically scheduled in a granularity of 200 KHz according to the traffic load. This improves LTE throughput and user experience.

Application and Benefits

All features of Magic Radio have been field proven and result in good network performance and enhanced user experience. Dynamic frequency allocation has been implemented by China Mobile in traffic-tide areas, and spectrum gain has reached as high as 35%. In other words, only 65% of spectrum resources are used, and the remaining spectrum is saved for LTE network. ZTE helps China Mobile achieve the same network capacity without performance degradation.

GSM/LTE band-in spectrum overlay, GSM/LTE dynamic bandwidth extension, and GSM/LTE collaborative spectrum scheduling have also been verified by China Unicom. In the GSM/LTE co-sited scenario, GSM/LTE band-in spectrum overlay enables GSM to obtain more available spectrum from the LTE reserved bandwidth while keeping LTE download rates stable. Moreover, KPIs of the GSM network fluctuate within a

normal range, and carriers between 10 MHz and 20 MHz can be aggregated. With GSM/LTE dynamic bandwidth extension, ZTE's Magic Radio also supports dynamic spectrum re-farming at LTE narrow bands. This helps China Unicom improve spectrum efficiency by more than 50% and double LTE download rates regardless of user location. As a result, both GSM CS and PS services run normally, and user satisfaction is significantly enhanced. The GSM/LTE coordinated spectrum scheduling feature has also been applied in China Unicom's GSM/LTE network based on user behavior and traffic distribution. When GSM traffic load is above a given threshold, GSM can use free LTE radio bearer for its services. When LTE traffic load is above a given threshold, LTE can use free GSM time slots for its services. This enables real-time GSM and LTE spectrum sharing with a granularity of 200 KHz. Both GSM and LTE networks operate well and their performance KPIs are kept stable. Magic Radio helps China Unicom improve its network bandwidth and throughput and increases spectrum efficiency by more than 40%.

Future-Proof

The innovative Magic Radio has been a great success for operators around the world. ZTE has evolved the Magic Radio to accommodate LTE flexible bandwidth configuration and UMTS/LTE dynamic carrier extension. Spectrum efficiency can be further enhanced when Magic Radio is combined with other technologies such as CA.

LTE flexible bandwidth configuration makes possible non-standard bandwidth configuration for both single and multiple carriers. For example, a 4.8 MHz bandwidth can be used as a 5 MHz LTE single carrier without performance loss and a 12.5 MHz bandwidth can be configured as a 10 MHz LTE carrier and a 3 MHz LTE carrier without performance loss. UMTS/LTE dynamic carrier extension enables dynamic UMTS/LTE spectrum sharing based on UMTS traffic load. When UMTS traffic load is lower than a given threshold, UMTS will release some spectrum resources for LTE, and vice versa. In this way, spectrum efficiency can be significantly improved.