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South Sudan: Embracing ICT for Faster Growth

The Republic of South Sudan gained its independence in 2011. The government is ready to use ICT to accelerate its social and economic development in both urban and rural areas. At ITU Telecom 2013, Rebecca Joshua Okwaci, minister for telecommunications and postal services in South Sudan, talked about her country's plans and progress in ICT as well as her views on social welfare.

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ZTE Provides Technical Support As Air China Launches Its First Ground-Air Broadband Test

18 April 2014, Shenzhen — ZTE is the exclusive supplier of the ground-air broadband system used by Air China to complete its first in-flight internet service and passenger experience test. ZTE also provided technical and service support, giving passengers a fast and convenient broadband service experience.

The test took place during a one-hour flight from Beijing to Chengdu, and passengers were able to access a variety of online services through WiFi, including WeChat, instant messaging, micro-blogging, e-mail, online gaming and online payments. Passengers were also able to experience real-time video and online movies.

Air China is the first airline to provide ground-air internet services in China, and the test was the world's first based on 4G technology.

ZTE leads global **GPON** growth in Q4 2013

24 April 2014, Shenzhen — ZTE was the fastest-growing global GPON equipment and systems provider in Q4 2013 according to research firm Ovum.

According to the recently-released Ovum report entitled "Market Share Spreadsheet 4Q13 and 2013 FTTx, DSL, and CMTS (Units)", ZTE's worldwide GPON shipments reached 2.42 million OLT and ONT ports in Q4 2013, representing a 27% growth over Q3 2013 and making ZTE the GPON vendor with the highest quarter-on-quarter growth rate among the major vendors.

The report shows that worldwide GPON shipments in 2013 surged 58% year-on-year to reach 30.47 million OLT and ONT ports. The strong performance of the GPON market was mainly attributed to massive FTTx rollouts in several countries, especially in the Asia Pacific region. Eighty-one percent of all GPON products were shipped to the Asia-Pacific region, with China receiving more than half of the shipments.

China maintains its momentum of FTTx construction that was initiated in 2010. In China, ZTE holds over 35% share with each of the three operators.

ZTE Wins Orders from China Mobile for Optical Network Equipment

21 April 2014, Shenzhen — ZTE won orders from China Mobile for GPON equipment in the operator's annual tender.

ZTE was one of only three successful vendors in China Mobile's tender after a stringent selection process. China Mobile's tender for more than 614,000 optical network units (ONUs) and over 3,000 optical line terminals (OLTs) was a test of each vendor's product quality and capabilities in research and development, solution customization, delivery and technical support. Apart from ZTE, Alcatel-Lucent Shanghai Bell and FiberHome were the other winning bidders.

"ZTE is committed to achieving win-win with our customers through dedicated R&D efforts and high-quality customer services," said Bei Jinsong, director of optical access products at ZTE. "Our efforts have resulted in industry-leading product performance and increasing market acceptance for ZTE's GPON equipment."

According to the latest report on the global fixed-network market by Ovum, ZTE's GPON equipment shipments in the fourth quarter rose 27% sequentially, the fastest growth rate among major vendors, benefiting from demand in the Americas, Europe and China.

ZTE First-Quarter Profit
Triples as Revenue Growth Fuels Strong Start to 2014

17 April 2014, Shenzhen — ZTE reported first-quarter profit more than tripled as the company posted increased revenue amid growth in the global 4G market. Net profit attributable to shareholders of the listed company was RMB 622 million in the first quarter, an increase of 203.5% from a year earlier. Its basic earning per share was RMB 0.18, the top-end of the forecast issued by the company. Revenue rose 5.5% to RMB 19.05 billion.

In the first half of the year, net profit attributable to shareholders of the listed company will be between RMB 800 million and RMB 1 billion, an increase of between 158.1% to 222.6% from a year earlier, according to guidance published by the company today. In the first half of the year, ZTE's financial performance will benefit from the company's focus on profitability, improved profit margins in international operations and the growth of revenue from sales of 4G infrastructure systems in China as a proportion of total revenue.

In the global telecom industry, opportunities are focused in wireless and broadband networks, as well as supporting transmission infrastructure. The continued development of mobile internet is sustaining demand for smart phones and devices, in addition to the growth of strategically important sectors such as cloud-computing, internet of things and smart city.

ZTE Achieves World First with Real-Time Coherent Optical Detection of Ultra-100G OFDM Signal

23 April 2014, Shenzhen — ZTE has demonstrated the first ever real-time transport and coherent detection of an ultra-100G OFDM signal. ZTE successfully transmitted the signal over a long distance in standard single mode fibre without optical dispersion compensation, setting a world first for the coherent detection of an OFDM optical signal, and laying a solid foundation for long-distance transmission and coherent detection of OFDM signals.

ZTE Wins Mobile Network Contract from Sotelco Ltd

5 May 2014, Shenzhen — ZTE announced the company won a major mobile network contract from Sotelco, swapping the operator's current vendor Huawei Technologies.

ZTE's industry-leading wireless solutions will be deployed in Sotelco's networks for 2G, 3G and 4G services. ZTE's solutions will displace Huawei equipment in hundreds of sites, covering Phnom Penh and core areas of other provinces. ZTE will provide Sotelco with solutions that support GSM, UMTS, and LTE technologies on the same hardware platform, avoiding the need to run multiple hardware platforms.

Sotelco is one of the largest mobile operators in Cambodia. It has been one of the fastest-growing mobile operators providing the best 2G network coverage, most attractive tariffs and best quality of services for Sotelco subscribers in 24 provinces in Cambodia.

"We are excited to set up the strategic partnership with Sotelco," said ZTE Vice President Zhang Jianpeng. "This project will deepen ZTE's understanding of the mobile market in Cambodia, helping us provide the best solution for mobile operators."

South Sudan:
Embracing ICT for Faster Growth

By Liu Yang and Zhao Rujing

Rebecca Joshua Okwaci, minister for telecommunications and postal services in South Sudan

The Republic of South Sudan gained its independence in 2011. As a nation that has to build everything from scratch, it faces many challenges but also has many opportunities. The government knows the importance of technology and is ready to use ICT to accelerate its social and economic development in both urban and rural areas. At ITU Telecom 2013, held in Bangkok, *ZTE TECHNOLOGIES* interviewed Rebecca Joshua Okwaci, minister for telecommunications and postal services in South Sudan. She talked about her country's plans and progress in ICT as well as her views on social welfare. She is a journalist by profession and an advocate for women's role in achieving peace.

Q: What are the unique characteristics of South Sudan's telecom market?

A: South Sudan is a new country. The Republic of South Sudan gained independence in 2011, after a very long period of war. After all the destruction in terms of human lives and property, it is time for us to start putting things back together and moving forward. Everybody is moving towards development, and we cannot remain behind. What we know is that we will continue to develop, but ICT will help us develop faster. South Sudan is a fertile land for ICT and telecommunications. That's a very important feature; you

can talk about other countries that have already moved ahead in terms of technology, but this is a fertile land. There are still a lot of opportunities for expansion of mobile, internet, and fiber optic technology. South Sudan's great demand for technology creates big opportunities.

Q: How have you improved efficiency in South Sudan in terms of technology?

A: Despite the fact that we have only been an independent country for a short time, we have managed to put infrastructure in place. In terms of government, we have the executive, ministerial cabinet, parliament, and institutions.

We have also moved in the area of mobile services. Today, we have four mobile operators in the country, and another is on its way. This new telecom operator will be a national, public one. We have already made a start in terms of telecom operations.

Today we have about 11 licensed ISPs in the country. They might not have expanded very well into the rural areas, but there is a good semblance of that. We need to further expand and reach the rural areas. People in the rural areas are very important: we are not only going to be in the towns. The policy of our government is to move into the rural areas and get everyone connected. We have a clear policy, the Communications Act (2012), in place.

We are now working on our regulator, the National Communications Authority (NCA), which will help us regulate our system and create a good environment for operators and those doing business in the Republic of South Sudan. We have also established an ICT institute in order to train and increase the capacity of our people. This will help in the advocacy, expansion and sensitization of the people there.

We are working on VAS, and that's why the fiber optic is very important because we are talking now about moving into broadband. If we want to benefit from technology in terms of education, health, banking system and e-commerce, we need to have better bandwidth and better spectrum. Now we have a plan for national broadband fiber; that is, a national backbone. We already have the design, and we are aware of which lines can connect us with the submarine cable. We can go through the eastern, southern, and western part of our country into neighboring countries. The submarine cable is in Kenya, which is our eastern neighbor. That is a very good opportunity. Uganda is another neighbor (to our south) that is connected to the submarine cable. We have strategic plans to run fiber optic from Juba, the capital of South Sudan, down to Uganda in order to connect to the fiber that will give us better broadband. Today, we have 3G in our mobile system, so if we have the broadband connection, then we'll move like other countries that are

going for 4G at the moment.

We also have plans for e-government, which is important because it means we improve our network and connect our institutions with computers to increase efficiency. With e-government, you can send documents with the click of a button. This helps us better manage our time. Instead of plowing through traffic to physically deliver letters, it's easier to perform this task through the e-government system. It reduces the paperwork—all the photocopying and carrying bundles of papers. E-government helps us be paperless and reduce the cost associated with using paper.

In terms of the education system, we are connected with our Ministry of Education, and there are already programs in place. I'm the former deputy minister of education. I understand what happens in education, and I know how incorporating technology into education will help us improve teacher training, reach into the classroom, and reach into rural areas. Technology will help us implement very clear programs. For example, we have a special program where we provide small grants for girls so that they don't drop out of school. By incorporating technology into this program, the girls will get their grants quicker and more efficiently.

We also want to incorporate technology into our customs system. Technology improves efficiency a lot in customs. Instead of using paper to record how much has been paid, how much has gone out, and how much is going into the national coffer, we will do all this digitally. Technology will make things a lot easier and

more efficient, not only in terms of processing but also accountability. Everything will be on the screen, and the data will be printed. This will help us move forward.

In our hospitals, we have mini-telemedicine, but we need to improve our broadband so that everyone can access it. Even in the rural areas, we would like to have community centers. A center is a hub equipped with computers and a network. It is also a place for young people to learn. It helps promote our cultures and health services. There are pregnant women in all the villages, but they may be far from a center. You can have a midwife who is connected to the center via telephone. If a woman wants to deliver a baby or she has complications, the midwife can visit her, prepared with information provided by the center. This center is connected to a wider network that includes a doctor sitting in the next center. When you have this health infrastructure, you can communicate very quickly and save lives. Our mortality rate is very high and can be reduced. In our 2030 plan, we want technology to penetrate schools, hospitals, banking, and monetary systems. We want to provide life-enhancing services to the people and pull everything and everyone together towards the future.

Q: How are your projects progressing? What are the main challenges you have faced and how have you dealt with them?

A: When you are a new country, if you start running around aimlessly without

direction, you can fall down and hit your head. As much as we want to move faster, we also want to be very careful. We started with policies and strategic plans. If we don't work very strategically, we will stumble and hit our head. We have projects, such as the e-government project, that ZTE is involved in, and we have moved with very good steps. Such projects are vetted by a government body that looks to see what steps have been taken. Implementation and sustainability are very important. The vetting body is currently looking at the strategic timing of that project to determine whether the project is suitable to the government. We don't want to rush into implementation and wake up one morning saying, "Oops, we're not connected." What comes first? Is it the fiber? Is it the electricity? Is it what? It's a holistic issue. When it's holistic, you have to have all the ingredients in one place. It's like putting the cooking pot on the fire, but you don't have any oil or onions. What are you going to fry then? Where are the vegetables? We are moving strategically with regards to the e-government project.

We already have the ICT institute; we have people, staff from the ministry, currently in the classroom being trained. We are conferencing with universities in India, which are training our staff.

We are cooperating with all of our partners, including telecom operators, ISPs, data content teams, and vendors. We are working towards good partnerships, and we are also working very hard to ensure we create a good environment for them to work in. We value our partners because

they bring services. They get their money, but they are also very keen to ensure that the services are good for the Republic of South Sudan. It's our responsibility as a government to create a good environment so that our partners can work hard and provide good services for our people and companies. However, it's important that every project is sustainable and addresses a particular need.

Q: How do you expect ZTE to contribute to ICT development in South Sudan?

A: ZTE is already there. They have been moving forward on the e-government proposal, which is currently in the hands of the vetting body. If the proposal is approved, it will be implemented; if there are any issues, the body will discuss them with ZTE. Some projects are already moving forward, and some are still in the pipeline, but the most important thing is communication, connection, discussion, and revision. This ensures that projects change lives.

Q: What are your thoughts on companies like ZTE contributing to social welfare?

A: This issue is very important. It's what we call social obligation. I appreciate ZTE for the project they planned before I came. They gave school bags to children, and are connected with a number of schools. I was happy that ZTE involved us in sending a message to the children on the school bags. However, I told ZTE

RT Hon Rebecca Joshua Okwaci
Minister of Telecommunications and Postal Services, South Sudan

> " *I appreciate ZTE for the project they planned before I came. They gave school bags to children, and are connected with a number of schools.*

not only to mention the government but to include the ZTE name because people must appreciate ZTE for what they are doing. The children must know who ZTE is. I think that is a very good deed on the part of ZTE. Zain also has a school bag project.

My style is to sit together with companies and plan projects that are not necessarily a heavy burden on the companies. However, each project must positively affect the lives of the people. For instance, a company may feel it's cheaper to give old laptops, but look at the situation of South Sudan. If you give laptops, we appreciate it, and we give them to the center, to the people in the city or town. But we also have to consider the people outside the

town. There are things that are much more valuable than a computer, which may be very novel, but if there is no power and network, what can be done with it? It will be a white elephant. In some schools, pencils are much more valuable. To me, working together on projects is very important. If you're giving me 10 laptops, how do these address the needs of the children in Western Equatoria, Eastern Equatoria, and the Upper Nile (states outside the town)? Do these children need pencils? School bags? Laptops? If you want to give something in Ghazal, I prefer we agree on something that is usable and will help them a lot.

My approach is to plan together with companies, look at what's possible within their means, and agree to move forward. This is an approach we are discussing with ZTE, Zain, and others. We also communicate with the states and tell them, "What things do you want us to do?" We then discuss these needs with the companies. Even if what they give us is small, it is valued by the people because it changes their lives. This is my approach and terms of working with companies. I really do appreciate and thank them for the concern they have for our people. There is a lot we can do together and it will be visible. I want the people in rural areas and villages to say, "Yes, we know ZTE and we appreciate them bringing us school bags, pencils, computers, and even building call centers." Those call centers will change a lot of lives. These are the projects we want to see

implemented. ZTE is already doing it and I appreciate that.

Q: What are your goals for 2014?

A: We are happy that our president is already oriented towards technology. He recently participated in the Transform Africa Summit in Rwanda as the head of state, and we were impressed by his presentation. He is also rallying us towards technology in South Sudan. We have shared a lot with him. I have just come from Kuwait, where he was leading our high-level delegation. Our first meeting was with Zain company. As an indication of the importance of this meeting to the president, it was the first meeting even before he met any other colleagues. Our head of state really values technology and its transformative potential. He has made a lot of statements about how South Sudan will be connected. That is a political way, a shining light that we are following.

The parliament is also supporting us. We have an MP in the delegation here in Bangkok, and the parliament understands how expensive infrastructure is and what funding is needed. That gives the ministry a boost; we have the parliament behind us, and the parliament knows the meaning of technology. I'm sure that they will see it, if we manage to implement our e-government project. The parliament will also be transformed.

We are working on advocating and sensitizing our youth, men and women to technology and providing them with

training and mentoring.

With all these positives, we also have to deal with cyber crime and exposure of children to these programs. One of my very important rules is not to move from the top down. The government is working on the program, but we have to bring people up from the ground. Our approach is demand-driven. Once people understand that they are important, they will be the ones coming and saying "ZTE, please give us computers through the ministry to our center." We would like the demand to come from the people at the grassroots level. This for me is top on the agenda.

Our programs include establishing a regulatory body, fiber connections, and a national telecom operator.

In terms of investment, we are open for whoever is interested in coming to us and working together so that we have the infrastructure, and people sensitized and ready to move on it. With all the technologies brought together, our people will be on the way up like in any other country in the world. Tomorrow we don't want to say we are newborn. Yes, we were born in 2011, but see the pavilion we have here at ITU Telecom 2013. You go out and ask any country that within two years of its independence whether they had a pavilion like what South Sudan has today in Bangkok. For us this is the pride of Africa, and this is an indicator that we are not going to sleep, we are not going to wait, and we are not going to complain. We are going to learn from the experiences of others and move forward. **ZTE TECHNOLOGIES**

LTE Experience at BASE Company

A Success Partnership Story

By Christian Vyncke

BASE Company is a Belgian company and the subsidiary of KPN group. In the Belgian market, BASE Company is the challenger mobile operator. BASE Company launched the network in 1999. At that time, we had only a 2G license in 1800 MHz, not 900 MHz. This required us first to roll out our network in 2G 1800 MHz, and this was indirectly a very important factor to speed up our LTE rollout.

Dr. Christian Vyncke,
head of Development Access Network, BASE Company, Belgium

Fantastic 2013 for BASE Company

Last year was fantastic for us. In April, we launched dual carrier allowing 3G downlink speeds up to 42 Mbps. In the summer, we improved our uplink performance thanks to enhanced uplink (HSUPA 2ms TTI) from ZTE allowing 3G uplink speeds up to 5.76 Mbps. In October, we launched LTE (DL speeds up to 86 Mbps) and became the second mobile operator in Belgium to launch LTE.

2013 was a fantastic year indeed, especially in terms of our 3G network performance.

Two different independent benchmarking companies, NetCheck and Commsquare, have performed benchmarking campaigns in Belgium.

NetCheck confirmed that our network remained the best voice network in Belgium. This is measured by the call success rate, which is a compound indicator for call coverage, integrity, continuity, and quality. By the way, NetCheck drove 12,000 kilometers during their benchmarking campaign. That is a lot of mileage in a small country such as Belgium.

The same NetCheck campaign confirmed that our data network performance (measured as session success rate for FTP and HTTP services) is at par with the market leader.

The Commsquare benchmarking campaign (in the big and medium cities) confirmed our leading position in Belgium in terms of 3G downlink speed (which is now about 7.9 Mbps). We overtook Proximus (the market leader), and we are still far ahead of Mobistar.

Thanks to our expansion of dual carrier, last year we really leapfrogged in 3G downlink between Q2 and Q4. This was also driven by the technology provided by ZTE.

Commsquare also confirmed that we are the leader in 3G uplink speed.

Thanks to ZTE's HSUPA technology, we tripled our uplink speed between Q2 and Q4 last year.

We launched 4G only a few months ago (on October, 1st, 2013), one year after the market leader (the first company to provide LTE in Belgium). We still have some work to do in terms of 4G downlink speed optimization. However, in terms of 4G uplink speed, we are already the leader.

We are now collaborating with ZTE, in order to improve the 4G network performance.

So, we are leading in the network, and we also lead in terms of price and service.

We have always had the best voice quality, and last year we proved that we provide also the best 3G data service.

LTE Experience at BASE

Now, let's focus on our main topic for today: LTE experience.

Thanks to ZTE's commitment, we accelerated our LTE program by 9 months. In February 2012, LTE was being deployed very slowly. At that time, LTE target launch date was planned in June 2014.

After a few months (in October 2012), the management decided to accelerate the LTE commercial launch.

We established a LTE program called "Formula One (F1)" program and the new target was to launch LTE commercially in one year; that to say by October 2013.

There were three key factors that enabled us to meet this deadline: the radio "smart" approach, ZTE's multi-standard cabinets, and re-farming our 1800 MHz spectrum. These three factors made our LTE rollout a success story.

Why did we want to take a "smart" approach for the LTE rollout? We needed it to avoid the request of building permits.

In Belgium, the building permit process is very, very time-consuming. In Brussels, for instance, it takes 450 days to get a building permit. Because we were looking for very extensive LTE 1800 MHz rollout, we just simply took out 2G 1800 MHz cabinets and left our voice on the 2G 900 MHz. We are going to push voice more and more onto the 3G network. We reused the antennas of GSM 1800 MHz for LTE 1800 MHz.

On top of this, we also increased the capacity of our microwave network step by step.

The second point is mostly linked to the multi-standard ZTE cabinets. We have always typically three slots free, and you can use those three free slots for the three LTE radio unit. In the cabinet, we have also a free slot for the LTE baseband. It was very easy to roll out LTE.
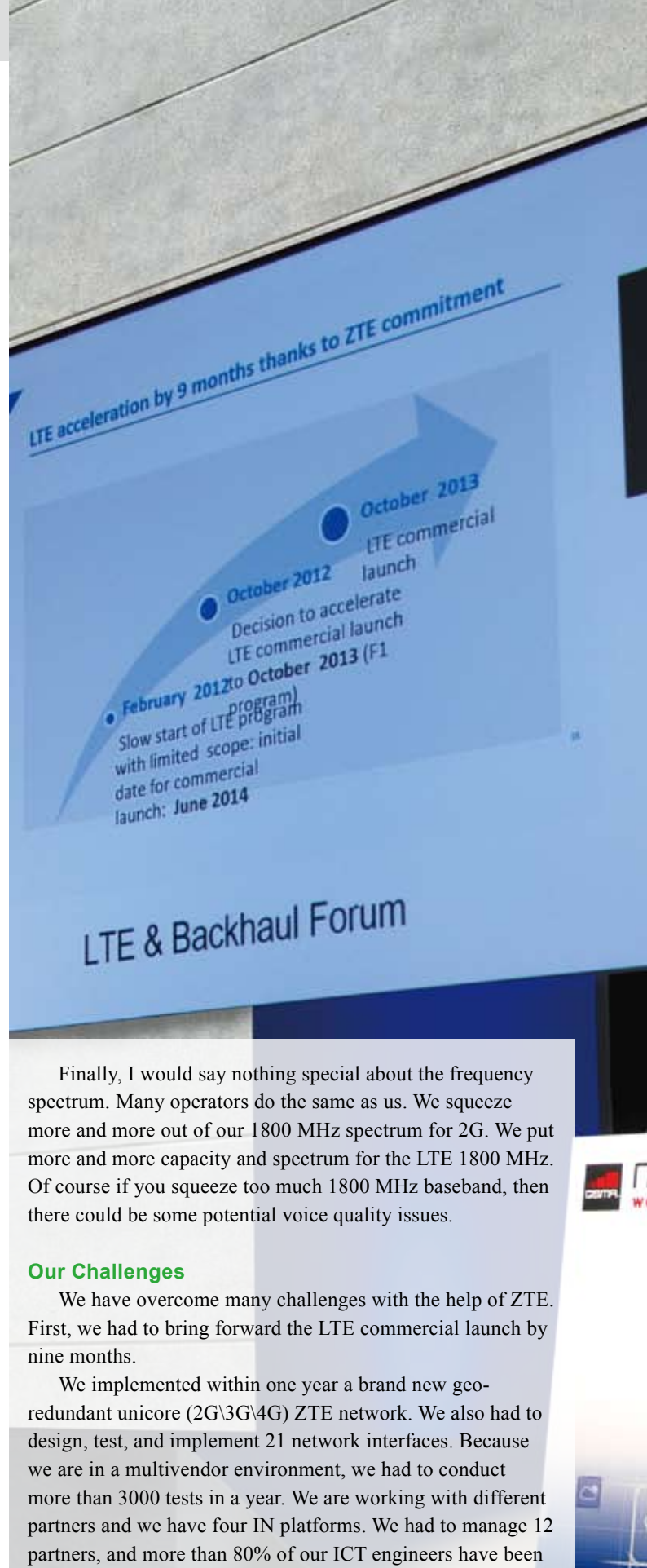
Finally, I would say nothing special about the frequency spectrum. Many operators do the same as us. We squeeze more and more out of our 1800 MHz spectrum for 2G. We put more and more capacity and spectrum for the LTE 1800 MHz. Of course if you squeeze too much 1800 MHz baseband, then there could be some potential voice quality issues.

Our Challenges

We have overcome many challenges with the help of ZTE. First, we had to bring forward the LTE commercial launch by nine months.

We implemented within one year a brand new geo-redundant unicore (2G\3G\4G) ZTE network. We also had to design, test, and implement 21 network interfaces. Because we are in a multivendor environment, we had to conduct more than 3000 tests in a year. We are working with different partners and we have four IN platforms. We had to manage 12 partners, and more than 80% of our ICT engineers have been

Dr. Christian Vyncke at MWC 2014

involved or contributed to this LTE program. New HSS has also been implemented.

We have been now building up to 650 sites with ZTE and other rollout partners.

Finally we had to increase the transmission microwave links capacity previously mentioned.

In October 2013, we opened LTE in 15 cities. Brussels was not covered because at that time there was a very strict 3V/m radiation norms which is one of the strictest norms in the world.

We have a big challenge for this year. We want to have a nation-wide 4G coverage by the end of this year.

From October to January we really made a massive LTE rollout. Now 4G is available in 400 cities and communes.

The Partnership with ZTE

Over a couple of years, we have developed our partnership with ZTE. In 2010, we signed our first contract with ZTE on 3G radio. The year after, we selected ZTE for our PS Core, EPC, LTE, and voicemail. In 2012, we made the decision to keep ZTE as our sole 3G radio equipment supplier. Last year, we launched 3G dual-carrier, enhanced uplink and LTE. We also implemented the voicemail.

The experience that BASE Company has had with ZTE is fruitful. ZTE is now our key strategic partner. Without a doubt, ZTE's equipment performs very well, and they also have highly skilled engineers. ZTE is very flexible on the technical side and responds very quickly to new requests. They also look for win-win solutions on the commercial side. ZTE takes up ownership in solving issues. They have many young, highly motivated, committed engineers. They do everything they can to meet deadlines. ZTE's enthusiasm and commitment have overcome the cultural and language differences between our two companies. ZTE is proposing very innovative solutions to us. However, their documentation and communication need improvement. Together, we have a plan to improve in these areas.

In summary, the partnership is really a success story and has been more than satisfactory. We have both continually improved and moved towards greater excellence. We are always looking for more and more business with ZTE, and we go into the future with ZTE as our strong partner.

(This is a speech by Dr. Christian Vyncke, head of Development Access Network, BASE Company, at 2014 LTE & Backhaul Forum at MWC 2014.) ZTE TECHNOLOGIES

Managed Cloud TV:

A Growing Necessity for Operators and Content Providers

By Reuven Elmalem

Reuven Elmalem (MSc) *is the marketing director of ZTE European R&D Institute for Multiscreen Video Solutions. He is in charge of end-to-end solution planning, architecture design, marketing and business development. He is also the company's strategy adviser for partnerships for Cloud TV services.*

The uptake of OTT services and IPTV solutions to deploy video to a plethora of multimedia enabled devices is now widespread and their daily use is increasingly commonplace. Video in its various guises (TV, video on demand and internet) will account for over 90% of worldwide consumer internet traffic in 2014.

The combination and integration of OTT-TV with IPTV creates an offering that allows IPTV providers to expand their service to include a much wider and more diverse audience

(off-net users). This may open up the system to the possibility of increasing revenue from streams such as advertising and customer profiling.

By combining both architectures, television broadcasters will be able to provide many new services, rapidly expanding their existing geographic footprint without the need for significant capital expenditure. The key to combining the two technologies is that end users only see a single sign on service. An OTT platform integrated with subscribers who use hybrid set top boxes will allow content providers to combine existing linear television services with new on demand services, and advertise all this content using a single electronic program guide (EPG). The on demand services can be a mixture of streaming media and existing stored media. Television is mostly made up of a sequential play out of pre-existing assets with very little genuinely live content.

With increased competition from OTT players and the need to innovate at lightning speed, more and more European operators are starting to consider the role of managed Cloud TV in their video strategies for on-net and off-net subscribers.

Decreasing revenue from traditional sources, such as voice and text messaging, as well as an increasing number of smartphones in the mainstream and prevalence of 4G networks, mean that mobile operators have to offer new, compelling value-added services to their customers if they want to stay competitive. At first glance, telcos might not appear to be the obvious choice for delivering content. However, as core communication revenues decrease—both because of cable companies' bundling of voice, data and TV services and the increasing number of mobile devices—telcos have to find alternative sources of revenue. Extending fiber-to-the-home is often impractical and not cost-effective, and it still does not facilitate full mobility.

Consumers are turning away from traditional TV screens towards connected devices that provide on-demand entertainment and that may be used as secondary screens. DVB satellite and MSO cable operators therefore have to extend their offerings to satisfy consumer demands. If they do not, they face risks in terms of better-positioned competitors, "cord-cutting," or even "never-corded" consumers. New long-tail customers can also be acquired with cloud-only offerings that serve the flexible needs and pricing sensitivities of these customers on a range of mobile devices.

If operators are slow to adopt cloud infrastructure, they will miss the boat on the new market opportunities that their customers want. Missed opportunities may be hidden

> *Successful adoption of cloud-based workflows and rights management can mean increased control and visibility and reduced complexity. It is also an opportunity to attract new customers.*

and range from improper online content protection to time wasted figuring out the right Cloud TV solution. Successful adoption of cloud-based workflows and rights management can mean increased control and visibility and reduced complexity. It is also an opportunity to attract new customers and can mean that costly hardware-based bottlenecks and aging resources can be reduced without sacrificing content security or user experience.

Centralization and efficiency seemed nearly impossible a few years ago, when the multi-screen revolution was beginning. Experience has taught us that what operators are really looking for is simplification without sacrificing user experience. A cloud-based, one-stop shop is not only efficient for technology implementation but also satisfies legal requirements and core business objectives. With a trusted partner to take care of the services platform, CDN, multi-DRMs and user experience components, content owners and telcos are free to take greater ownership of the brand experience. As a multi-screen partner, ZTE ensures the required level of flexibility by introducing state-of-the-art technology providers and ensures telcos stay ahead of the curve and avoid bottlenecks.

ZTE's optimized cloud streaming is robust telco-grade infrastructure that is optimized for the absolute best streaming over the open internet and for mobile devices. The use of adaptive streaming has created a distribution method that is highly effective and easily implemented. HTTP protocol traffic can offer effortless video streaming by avoiding NAT and firewall issues while in some instances allowing the client

control over the stream.

Delivering to a variety of devices and to OTTs is complex and may be perceived as an unmanageable task by operators who are ill-prepared to meet demands. The cloud can help here, but the first hurdle is accepting that the consumer ultimately dictates what platforms (e.g. Apple, Android, Windows and Linux devices) you must support and which services (e.g. live, VOD, and catch up) you must offer. There is no one size fits all approach to delivering content in this fragmented environment. Cloud TV offers tremendous scalability and the highest level of reliability, which is needed to support OTT/TV services everywhere. For example, using OTT to deliver live sports to mobile devices is becoming increasingly popular. However, this can cause huge traffic bursts. It is difficult for any in-house solution to support this in a cost-effective way. Therefore, it is necessary to create a roadmap to evaluate which devices, platforms, and services are needed. This is the starting point in streamlining content delivery and, ultimately, advancing end-user experience through the cloud.

Content and value-added services powered from the cloud based platform are:

- lineal channels (Live TV). This is a line-up of the DTH channels, which comprise HD and SD channels; TV on-demand, which includes content classified as traditional or premium; and catch-up TV, which includes content recorded from a selection of lineal channels.
- VOD catalogue. A VOD catalogue is displayed, and content is rented.
- EPG. A program grid containing lineal channel content is displayed, and reminders, advanced recommendations, and search engine tools are defined.
- social TV. This includes real-time interactions between Facebook users (Share, Like&Tag friend per asset & liveTV event etc.).
- self service Web portal. This includes account configuration, user devices, and profiles.
- devices. These include OTT Android-based set-top boxes (pure OTT and hybrid DVBx/OTT), PC/MACs,
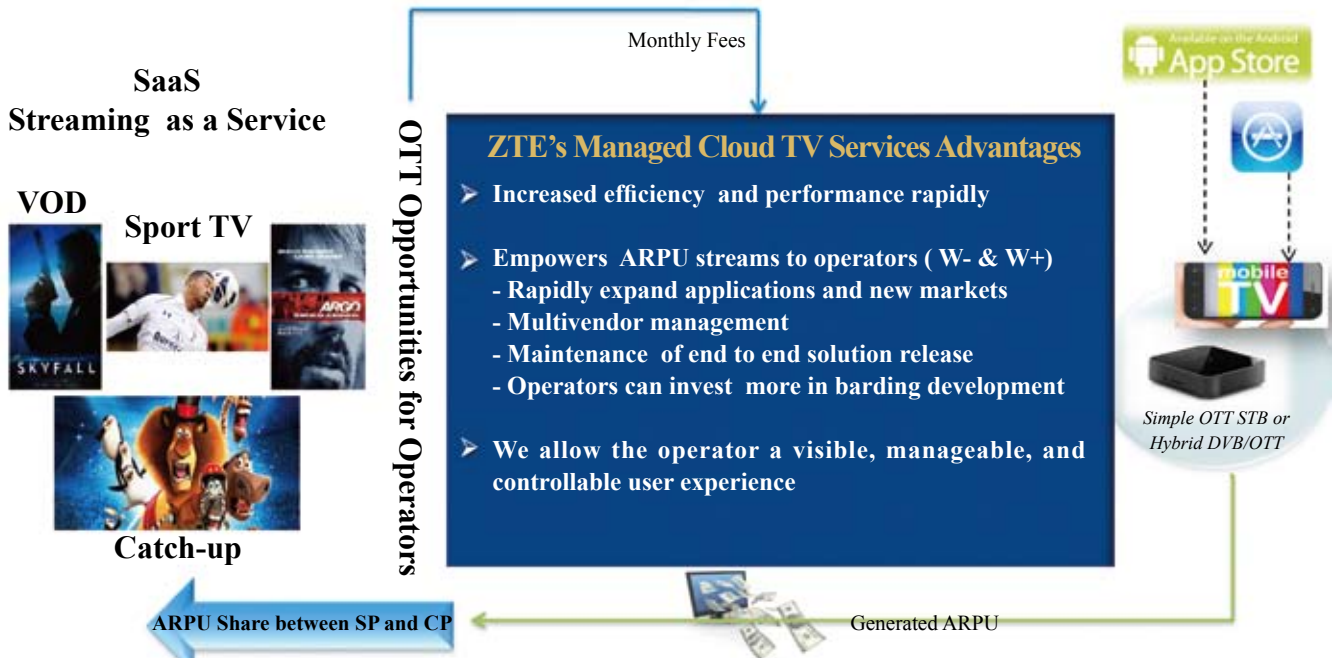
Figure 1. Managed Cloud TV services concept.

and tablets and smartphones using Android or Apple OS and more.

As a multi-screen solution provider, ZTE ensures that content is delivered in the right size, format, and bit rate. Managing content well is vitally important. A content preparation, rights, and security solution workflow needs to be agnostic, flexible, scalable, and able to create order from chaos. Content preparation should not introduce unnecessary complexity into the content-preparation workflow but should actually save time and money in both the short and long term. Ultimately, the right multi-screen partners enable better agility in the cloud. Among other things, the cloud can be a good tool for extending geographic reach and bringing new services to market quickly and cheaply. A good partner should be able to tie subscriber information to content preparation, user policies, user experience and other components seamlessly into a cloud service.

Subscribers expect to receive a PayTV services (via

satellite, cable, telco, mobile or ISP) as part of a true multi-service domain. They expect to access premium content at the time of their choice, on any screen they own and, most importantly, they want a personalized experience to match individual tastes and satisfy their lifestyle.

An operator needs an established customer base as well as reliable infrastructure. You may be a pay TV operator interested in reducing "cord cutting" by expanding your existing TV offering to multiple devices. Or you may be a multi-play operator or telco interested in generating a new revenue by creating your own TV platform. In either situation, ZTE can ensure you fully utilize your existing assets to meet your needs. This requires leveraging of the existing service backend and integrating with the right platform to manage content, offerings, and user experience for total OTT expansion. ZTE's cloud-based TV platform has a proven track record of being integrated into the existing operators OSS back-end billing, CRM, BI, and operations system in order to service subscribers in the best possible way. **ZTE** TECHNOLOGIES

OTT
Goes Mainstream

By Zhou Xueren

Smart TVs with embedded set-top boxes have become popular. The number of people using OTT video has increased in leaps and bounds. In 2013, 400 million people were using OTT video, which is more than the total number of people subscribed to IPTV. The number of people who watch long videos on mobile devices also exceeds 400 million, and these people spend more time on mobile devices than watching TV sets.

Will OTT video go mainstream?

Let's look at it from the perspective of network operators, content providers, and equipment manufacturers.

In 2013, Netflix expanded its user base to more than 40 million by releasing *House of Cards*. Currently, Netflix is rapidly developing more paid services. Four years ago, Google TV was struggling against pay TV because Google lacked core content. This once again proved the universal truth that "content is king." Similarly, Apple TV and Microsoft TV have both survived

by depending on pay TV services.

ESPN content has been disseminated on OTT networks; people can subscribe to watch ESPN on mobile terminals. HBO GO enables people to enjoy premium content online through OTT. Video services have broken through the limitations of traditional pay TV packages.

Netflix and other content providers are focusing on premium content, such as live channels, and this is forcing traditional pay TV operators to reform. Traditional packages are expensive

and include a variety of content, some of which may not be wanted. People usually only want to watch the content they are interested in. A customized package, comprising, say, a combination of local channels, HBO, ESPN and Netflix, are often favored.

The main issues inhibiting the development of OTT video are being addressed, and OTT will develop more rapidly with its technical advantages. But will IPTV disappear altogether?

First, let's look at the situation of operators. The number of broadband users has increased; higher bandwidth is now available; and FTTH is becoming a major access mode. In this scenario, there are three types of operators: those

with good broadband but no content, those with good broadband and content, and those with limited broadband and possibly some content.

A recent discussion with a European FTTH provider revealed that operators with good broadband but no content seek to introduce many internet HD videos into their networks through open video service platforms (e.g., Android terminals). Bandwidth is the advantage for these operators, but content holds them back. Therefore, they seek to use a dual-mode terminal to receive local channels for free and transfer the Netflix and other content to end users through their own pipes. If end users become accustomed to OTT TV, the advantages of these operators will be brought into full play.

Then there are mainstream operators

who have their own contents and networks. These operators are faced with competition from pipe and content providers. Operators in this category must prevent OTT content players from occupying the pipes. Such operators need to introduce content of their partners through the internet and transfer their own content via smart terminals and high-quality solutions. For example, these operators can provide appropriate packages that involve bundled mobile data.

The category of operator is those with poor bandwidth but possibly with their own content (or needing cooperation on content). When faced with competition in terms of bandwidth, such operators can only retain their users through value-added video services.

It is a good idea for operators to introduce internet content through an open platform and provide their own content as well. Video services can be bundled with broadband services.

Now let's look at content providers, who play a leading role in the media industry. How should such providers sell their content? Except one-way satellite broadcast, other traditional methods, such as cable TV and terrestrial TV, are all limited by network resources. Satellite TV lacks interaction and selectivity; cable TV has geographical limitations; and terrestrial TV is restricted by both. Content providers used to cooperate with broadband operators in order to provide triple play service packages

and expand service channels. However, with the development of broadband and popularity of OTT, this kind of cooperation is becoming less important for content providers. Big content providers are now acquiring broadband networks in order to provide interactive content. For example, Dish TV, Tata Sky, and Canal TV are all acquiring or building broadband networks. Will this trend be reversed by OTT? Let's wait and see.

Technology and equipment vendors are asking themselves whether OTT will ultimately be the only choice. Video service integration is the main direction operators are moving in, and solutions should move in the same direction. Many emerging technologies, such as cloud computing, cloud media CDNs, and multimode Android smart STBs align with this trend.

The development of cloud computing and broadband networks makes cloud-based service platforms possible. Cloud computing and IDCs makes video services more reliable and also ensures linear capacity. Operators can save on network OAM and provide more flexible service models. Moreover, equipment manufacturers can easily implement OAM hosting, which is a development trend.

A cloud media CDN is a must for improving media quality. It not only improves media response speed and efficiency but also provides physical support for individualized network-attached storage. In addition, the transcoding function of cloud media CDNs supports variable bit rates of mobile streaming media and greatly improves the experience of viewing video on multiple terminals.

Smart terminals enable the openness and integration required by OTT players. With the development of chip technologies, the processing capacity of quad-core and octa-core chips support various software decoding technologies, and dedicated hardware decoding chips can be replaced in order to meet more exacting open-market requirements. Android provides vast choices for pipe-based service operators because a lot of OTT content on the internet can be integrated for users. Furthermore, Android enables operator content to be reliably transmitted through customized applications. A common practice is to install an IPTV application with traditional IPTV functions. For example, DVB-T can be used to include local and free channels in a user's video services. Of course, there is still room for improvement in terms of providing high-level security.

In conclusion, OTT video will inevitably become mainstream, and IPTV will be a typical application. IPTV can only be provided by traditional operators who have both premium, customizable content and controllable bandwidth for reliable transmission. **ZTE** *TECHNOLOGIES*

Over-The-Top TV for Cord-Cutters

By Weijun Lee

"Cord-cutters" are people who have cancelled their pay TV services and have chosen to watch only online video on a PC, tablet, or big-screen TV with the help of an internet-connected box such as gaming console or over-the-top (OTT) set-top-box. According to Convergence Consulting Group, approximately 4.7 million (4.7%) households in the United States had cut the cord at the end of 2013.

A subgroup of cord-cutters are called "cord-nevers" because they, as the cyber generation, have grown up watching online content only and are unlikely to ever subscribe to any pay TV.

This article aims to analyze the factors behind cord-cutting and suggest ways for pay TV operators to win back the cord-cutters.

The Decline in Traditional TV Watching Time

According to a recent Nelson study on the amount of time Americans spend watching traditional TV, all age groups under 49 are watching less TV each week year-over-year, whereas only people over 50 are watching more. Part of the reason is that young people have so many choices and are unwilling to sit before a TV set to wait for their interested shows to appear.

Another popular behavior is binge viewing, i.e., watching multiple episodes of a show one after the other. A binge viewer may be a busy person who has just allocated some spare time to sit down and catch up on his/her favorite TV series. Or it may be someone who

Weekly Traditional TV Viewing Hours, by Age Group

Based on total population in USA

Source: Nielson
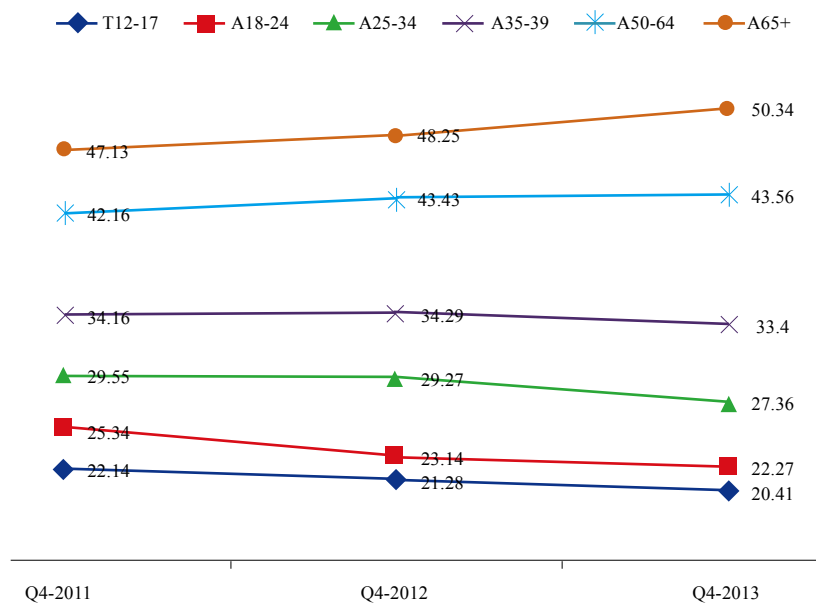
Figure 1. The amount of time Americans spend watching traditional TV each week.

becomes absorbed in the plot and can't wait to find out what happens next.

These are just some of the shortcomings of traditional pay TV that cannot meet the expectations of modern-day viewers.

Annoying TV Bundles

The typical monthly cable TV bill in the US is $90, according to market research group NPD. The cheapest monthly internet, TV, and phone bundle in Los Angeles is $80, according to the New American Foundation. Similar bundles cost $32 in Paris and $15 in Seoul.

With an expensive TV bill but less than 20% of actually interesting

channels, the subscribers become angry with the operator for no ways to opt out selectively.

However, dissatisfaction with pay TV operators is misplaced because these operators source their channels from content providers, who usually deal only in bundles.

Cablevision Networks, a US cable operator well known for challenging old rules and trying out new ideas, filed a lawsuit in February 2013 against Viacom, a content supplier, alleging that Viacom was forcing Cablevision to pay for 14 infrequently watched ancillary networks (e.g. VH1 Classic) that "its customers do not want" but that were bundled together with popular channels like MTV, Comedy Central, and Nickelodeon.

Viacom argued that the bundles were not "abuse of market power" but purely business discounts to lower the price of individual channels. In other words, buying individual channels would be more expensive.
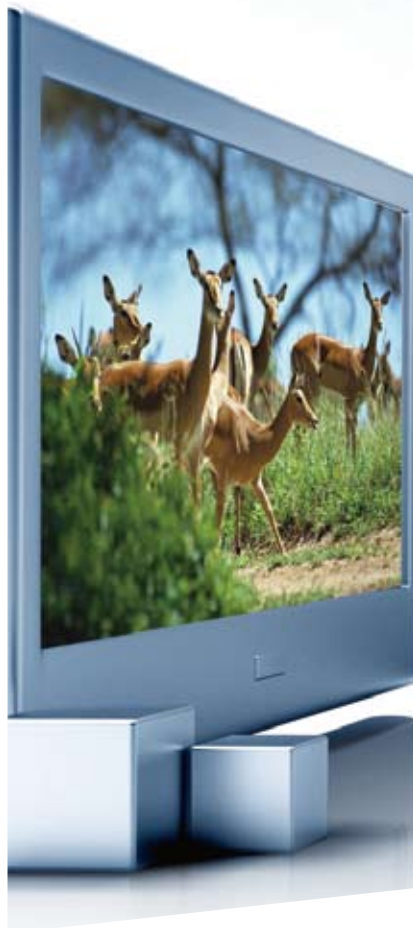
The fight over content bundles is still proceeding through different courts, and many subscribers have lost patience and decided to cut the cord completely.

Rate Hikes Despite Cord-Cutters

The most effective way of winning back cord-cutters would appear to be slashing prices; however, pay TV operators have had to do exactly the opposite due to the rising cost of retransmitting TV signals. These rate hikes have further alienated viewers and pushed them to cut the cord more quickly.

The long-term impact is a vicious circle: The fewer subscribers that service providers have, the higher the monthly fee that these subscribers have to pay. In turn, more subscribers will opt out.

To minimize the loss due to cord-cutting, the operators keep increasing the price of their internet access service. According to a report by SNL.com, the price of basic internet tier in Philadelphia and Atlanta increased 30% by the local phone company and 50% by the local cable company from 2009 to 2013.

The Attractiveness of OTT TV

In many ways, the advantages of OTT TV over traditional TV are similar to the charms of mobile phones over fixed-line phones:

● OTT TV can be personal, unlike a family-based big-screen TV, and recommendations made to the viewer are relevant.

● On a big-screen family TV, choice of TV channel, viewing history, and DVD recordings can be seen by everyone in the home. With an OTT TV, individual user behavior is private, and the viewer shares this information only when she/he wants to share.

● OTT TV can be watched anywhere within or outside the home.

● OTT TV can be watched at any time using wired internet, Wi-Fi, mobile broadband, or offline (through downloading or side loading).

The Key Technologies for OTT TV

Although attractive to end users, OTT TV does not guarantee video quality over unmanaged public internet, and this may cause viewer dissatisfaction. There are two key technologies for OTT TV: content delivery networks (CDN) and adaptive bitrate streaming (ABS).

CDN is deployed to boost OTT TV user experience by moving OTT contents to the network edge, as close to user devices as possible.

ABS relies on a physiological and psychological finding that the

smoothness is more critical to human perception of audio/video quality than its resolution. In other words, viewers cannot tolerate frequent jitters and buffering; yet they will accept less detail for a smoother audio-visual experience.

There are many proprietary ABS formats, including Apple's HTTP live streaming (HLS), Microsoft's smooth streaming, and Adobe's HTTP dynamic streaming (HDS). MPEG-DASH (dynamic adaptive streaming over HTTP) is an international standard on ABS but, as a latecomer, it needs more time to gain acceptance.

Progress on Premium Channels

Most of the popular OTT TV services, including YouTube, Amazon Instant Video, Apple iTunes, and Xbox Gold, offer only on-demand video and music content but no live TV channels.

Some ethnic TV service providers in North America, such as KylinTV and iTalkTV (for Chinese immigrant communities) have been leaders in offering live OTT channels. A few mainstream TV service providers in Asia Pacific, including China Telecom, China Mobile, and Telekom Indonesia have started offering live TV channels to OTT set-top boxes thanks to relatively open and cooperative relationships between TV operators and local content owners.

However, premium live channels, such as ESPN, CNN, and Disney are not yet available on OTT TV services worldwide. This is effective in keeping many TV lovers, especially sports fans, from unsubscribing pay TV services, and it is often deemed the TV operator's final line of defense against cord-cutting.

A recent deal within the media industry is a step in the right direction. In March 2014, DISH Networks attained the rights from Disney to provide the Disney Channel, ABC and ESPN as OTT channels. However, one significant restriction is that DISH cannot sell these channels individually. DISH also has to agree to fair-play requests by Cable TV operators, who represent current Disney customers, and sell the same tier bundles as the cable TV operators. This means that DISH has to negotiate OTT rights with the likes of Time Warner Cable, CNN and HBO as well as Disney. It also means that OTT TV users still cannot choose the premium channels as freely as they wish.

Nevertheless, the good news is that the DISH-Disney agreement allows DISH to charge each individual viewer in a family, which is a significant change from the current cable-TV model based on one monthly fee for the entire household. This new OTT TV service will surely be cheaper and more personalized.

A Better Future

The future of OTT TV can move in two conflicting directions: "customer first" or "content is king."

Customers always look for better contents with lower fees whereas content owners and pay TV operators need to increase return on investment, i.e. attracting more subscribers and getting more profit from each subscriber.

Cord cutters can expect some premium live OTT channels eventually; however, the actual savings by cord-cutting will be partially offset by the rising cost of internet access.

Pay TV operators should offer some inexpensive a-la-carte premium channels and give customers some freedom of choices. They should also integrate popular OTT services, such as YouTube, Netflix, and Hulu, with their pay TV offerings, just like what ZTE is doing in its IPTV+OTT global deployments, and give customers the convenience of accessing both services with the same set-top boxes. This will likely reduce the need for many customers to cut the cord completely. **ZTE** TECHNOLOGIES

Second Screen
Nearing Center Stage

By Liu Jinshan

Second screen broadly refers to the usage of portable devices such as smart-phones and tablets when the end-user is watching main screen. Such usage is often related to the TV programs being watched on the primary screen, for example, looking up IMDb[1] the movie being aired.

Second-Screen Usage

People often multitask while watching TV, which doesn't necessarily require full user attention. Thirty percent of Americans say they do

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Reference: [1] *http://www.imdb.com*

something else while watching TV, and only fourteen percent say they don't do any other activity while watching TV[2].

As mobile devices become more integrated into people's lives, the number of screens per household is exploding. According to the most recent report from GfK/Mediametrie, there were 6.4 screens per household in France in 2013. This may lead to more "distraction" while watching the main TV. Various statistics give that around 70% of end-users are using mobile devices while watching TV, but only 15% of those activities are related to the main screen. This is driven by many factors, including people's desire to share the TV experience (rather than view in isolation), to access more information, and to participate in discussions about TV programs.

The activities can be categorized as[3]:

- control and access: using a mobile device as an enhanced remote control, with additional functions, such as screen-casting
- search and discovery: leveraging the handy user input associated with mobile device
- contextualized enhancement: presenting additional information related to the TV program being watched.

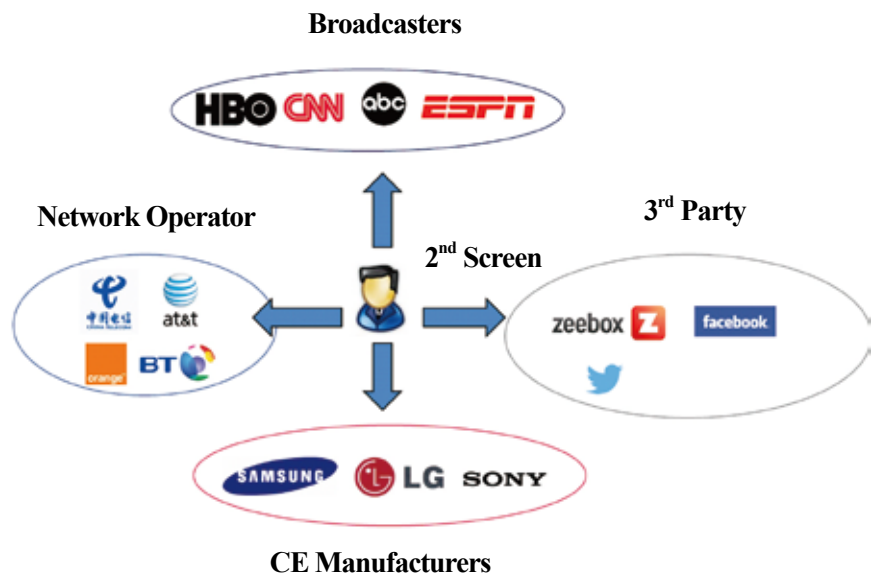Second screen service can be provided by different players:

Figure 1. Different players in the second-screen app industry.

- broadcasters. As content providers, broadcasters have full control of content and can create special apps for a TV channel or specific program (often an extremely popular program). An example of this is the TF1 app in France or American Idol app from Fox.
- pay TV operators. These operators provide a standalone application on devices along with extended functionality for controlling the STB. An example of this is the U-verse app from AT&T.
- CE manufacturers. With complete control of the hardware stack, a CE manufacturer can provide an associated application for controlling the device and exchanging content between screens

References: [2]*http://www.harrisinteractive.com/NewsRoom/HarrisPolls/tabid/447/mid/1508/articleId/818/ctl/ReadCustom%20Default/Default.aspx*

[3]*Assessing the impact of second screen, http://stakeholders.ofcom.org.uk/market-data-research/other/technology-research/2014/second-screen*

(e.g., Samsung SmartView).
- third-party apps. These apps include SNS for discussing current TV programs. For example, as many as 33% of Twitter users tweet about shows they have watched.

Others look to enhance the program metadata and social network feeds to provide a better social TV experience or to provide certain unique features, such as content recognition (e.g., Shazam for TV).

Average Time Spent per Day with Major Media by US Adults, 2010-2013

hrs: mins

	2010	2011	2012	2013
Digital	**3:11**	**3:49**	4:33	5:16
—Online*	2:22	2:33	2:27	2:19
—Mobile (nonvoice)	0:24	0:48	1:35	2:21
—Other	0:26	0:28	0:31	0:36
TV	**4:24**	**4:38**	**4:38**	**4:31**
Radio	**1:36**	**1:34**	**1:32**	**1:26**
Print**	**0:50**	**0:44**	**0:38**	**0:32**
—Newspapers	0:30	0:26	0:22	0:18
—Magazines	0:20	0:18	0:16	0:14
Other	**0:45**	**0:37**	**0:28**	**0:20**
Total	**10:46**	**11:18**	**11:49**	**12:05**

*Note: ages 18+; time spent with each medium includes all time spent with that medium, regardless of multitasking; for example, 1hour of multitasking online while watching TV is counted as 1 hour for TV and 1 hour for online; *includes all internet activities on desktop and laptop computers; ** offline reading only.*

Figure 2. Average spent time per day with major media.
(Source: eMarketer, Jul 2013)

Second-Screen Technologies

One of the main building blocks of second-screen service is linking and interoperation of the main screen and second screen. This interconnection can be either direct, via a home network, or indirect, via a back end.

The link is direct when both the main and second screens are in the same home network and are linked either via Ethernet, WiFi or Powerline Communication. The second screen can then discover and use services offered by the main screen through UPnP, DLNA, Airplay, Mircast, DIAL, or proprietary protocols.

The link is indirect when a back-end entity relays commands from the second screen to the main screen. This is used in out-of-home scenarios, e.g., scheduling DVR on the go.

The Impact of Second-Screen

Second-screen is a new way of interacting with TV programs and engaging the audience. The impact of second-screen on viewer engagement with TV programs is evidenced by the increase in SNS activity during TV programs. During the 86th Academy Awards in 2014, Ellen Degeneres tweeted a selfie which was re-tweeted a record 3.4 million times. It is widely believed that Twitter has helped the Oscars net the highest TV ratings since 2000.

The amount of time that the average American viewer spends watching TV every day has remained constant

since 2010 (Fig. 2). However, the use of mobile devices is consuming a significantly larger amount of our time every day. This has come at the expense of print media. Second screens provide precious opportunities to engage audiences and draw attention to the main screen.

TV still has the lion's share of U.S. advertising revenue, bringing in $74.5 billion in 2013. In the same year, the internet brought in $42.8 billion (Fig. 3).

Second-Screen in Perspective

Despite the large number of second-screen services and the battle for the viewer's attention, the main screen still dominates in terms of reach, impact and accountability. The Voice (TF1 France) may attract an audience of 7 million on a Saturday night, but only a fraction of those viewers are downloading and using the related app. Eyeballs are still focused on the main screen.

Also, the second-screen business model is still nascent: Twitter's partnership program allows brands to send promotional tweets when you begin tweeting about a TV show. If TF1 knows you're tweeting about The Voice, it can insert a promotional tweet into your feeds. Facebook and Nielson have partnered to provide a privacy-aware way of measuring video viewing on mobile devices.

However, with the increasing penetration and usage of mobile devices in households, viewers will increasingly shift their attention to second screens.

Advertising Revenue Market Share by Media - 2013($ billion)

- Internet — $42.8
- Broadcast Television* — $40.1
- Cable Television** — $34.4
- Newspaper — $18.0
- Radio — $16.7
- Magazine(Consumer) — $13.4
- Out of Home — $7.9
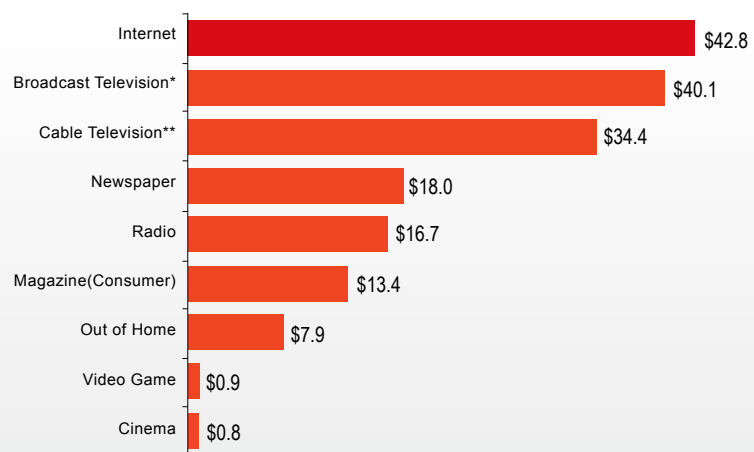- Video Game — $0.9
- Cinema — $0.8

Figure 3. Advertising revenue market share by media for 2013. (Source: IAB/PwC Internet Ad Revenue Report, 2013, PwC)

Increasingly, people are spending more time on mobile devices, and the amount of time they spend watching TV is stagnating. The marketing potential of innovative interaction, i.e., much more engaging, personalized, contextualized viewing and interaction, is enormous. ZTE believes that the continually improved, unified experience created by second-screen will bolster advertising revenues generated by these screens, and one day they may no longer be referred to as "second" screens.

We are witnessing unprecedented technological changes that are impacting consumer behavior, content form, and business models. Second-screen usage should be so effortless and intuitive that it becomes part of a seamless multiscreen TV experience, as hinted by the embrace of Chromecast in the market. Second screen will likely be a disruptive force in the years ahead. **ZTE TECHNOLOGIES**

TV is Changing:
Evolution or Revolution?

By Li Yiqun

The game is changing in the TV industry, from professionally produced content to consumer-generated media, from linear to online. The way we consume content is evolving, and user experience is not the same as before. Your future TV may know you more than yourself; it will know your viewing behaviors and preferences, and it will be able to recommend things you may

> " *Whoever is closest to the end consumer will secure a position in the upstream TV chain.*

like. Several recent changes may revolutionize TV.

Content is King

Whoever is closest to the end consumer will secure a position in the upstream TV chain. Everyone realizes how essential content is.

The most talked about TV series in 2013 was *House of Cards*, a political drama produced by Netflix. The series re-wrote history by getting nine Emmy Award nominations. Why *House of Cards* such a success? Netflix knew what their subscribers liked: political dramas, other series directed by David Fincher, and played by Kevin Spacey. Netflix could therefore accurately predict what kind of production would do well. "We have an immense amount of data and can see everything our subscribers are watching," says Cindy Holland, head of original content at Netflix. "We can identify subscriber populations that gravitate around certain genres, such as horror, thriller and supernatural. That allows us to project a threshold audience size to see if it makes for a viable project for us." All Netflix decisions are based on a meticulous analysis of the viewing habits of its 44 million subscribers worldwide. With this precious user behavior data, we could make a series according to audience tastes. Netflix was almost sure that *House of Cards* would be popular.

Netflix is just like HBO twenty years ago. At the beginning, HBO started as a cable television operator. Since the early 1990s, HBO has been showing original programming and has enjoyed increasing success with original series.

Another example is Amazon, which is considered the principal rival of Netflix. Amazon launched Amazon Studio in late 2010 and announced that it would be investing in original programming. Amazon Studio develops comics, movies and television shows from online submissions and crowd-sourced feedback rather than from existing scripts. It goes even further than Netflix in terms of consumer oriented production by enabling greater consumer expression.

We can't bypass YouTube, the OTT ancestor. YouTube also realized the importance of content and launched several initiatives to attract more eyeballs and ad dollars. They have launched YouTube Original Channels initiative, and provided YouTube Live for concerts, conferences, and other live events.

Those who don't produce content often choose to form close relationships

with content providers. Orange announced that French audiences will be able to enjoy Game of Thrones only 24 hours after its release in the US. The war between Canal+ and BeIn sports to show live football matches reflects the fight for content in France. All these fights are about content.

Social is Queen

The popularity of SNS-based TV is due to proliferation of smart phones, tablets, and laptop. Social TV is not only a concept but a reality. Social TV enables people to have different social experiences through TV. Such TV can be used to facilitate real-time discussions or other interactive activities based on a TV program.

Shazam is a music identification application that has expanded its territory into TV. A TV program can be recognized, and related information such as actor/actress information, celebrity buzz, song lyrics, official program website, and sharing opinions on Facebook and Twitter will be given. The audience doesn't need to look for information anywhere else; all the information comes automatically from recognition. The advertizing department of French TV station TF1 has identified the potential business opportunity in

House of Cards produced by Netflix (Netflix courtesy)

this and wants to work with Shazam on advertisement recognition. When the advertisement is recognized, the viewer gets a coupon to make a future purchase. This will benefit both buyers and sellers. By offering a coupon, the viewer is encouraged to buy offline.

Interactive TV programs are becoming a new trend. Whether a TV show keeps its audience depends partly on social networks. People listen to what their friends say about the last episode, and discussion always increases the size of the audience.

Producers have quickly realized the value of integrating social media into their communication strategies and have engaged audiences by connecting TV to the Web and social media. Twitter has become a new place to discuss TV programs. There are many arguments about whether Twitter saves TV or TV saves Twitter; in fact, the situation is win-win.

Evolution to Television 3.0

The broadcast-only era can be dubbed "television 1.0." Even if there is diversity in content and distribution channels, if there is only one means of diffusion, then it's always TV 1.0.

The arrival of connect TV and smart TV (or set-top box) ushers in "television 2.0." The focus has moved from producer to consumer. Nowadays, the television consumer has instant access to hundreds of television channels as well as a large selection of both live and on-demand (i.e. replay, time-shift, personally recorded) content via the internet and mobile devices. Consumers have complete freedom to choose when, where and what to watch.

What will next-generation TV look like? The balance continues to tilt towards the consumer. TV 3.0 will reshape the way we consume TV. People will not only be consumers; they will also be producers. The concept is similar to YouTube, which changed the game several years ago. Professional-quality original programming has made

Shazam for TV program recognition (from Shazam official website)

its way onto the internet, and the same thing will happen with television. After production, the consumer composes the recipe. Content is programmed intelligently according to consumer behavior analysis. Different timeslots are planned for different programs (live, VOD, replay, latest video in YouTube). There is also a recommendation engine to propose programs, shows, or series that may interest the viewer. Of course, consumers can alter the composition of this content. TV is an aggregation point that gathers all the information, not only from TV channels and internet but also from peripheral devices. With social media overlays on TV programs, the TV screen is not an entire block any more: it is divided into several parts and becomes an information and

entertainment hub in the living room. Consumers are always at the center.

The marriage between new technologies makes things even easier. A TV show may be showing in the center of the TV screen while on the right side, there is a Twitter or Facebook feed. The left side of the screen may have related video in YouTube, bottom side is a bar with rolling news. One can buy a movie with his mobile phone and offer the movie to his friends via a simple QR code; one can recommend a TV show to his friends and then watch it together by using Skype with a camera so that they can see each other and share their comments in real time.

All these evolutions can make a TV more participatory, more intelligent and more contextual comprehensive. **ZTE** *TECHNOLOGIES*

Packet Core Evolution From 2G/3G Toward 4G

By Ji Wei

Most mobile operators have witnessed huge changes in the telecommunications markets, and voice services have been neglected as operators set their sights on more profitable data services. Voice services will probably be superseded by another telecom service in the near future. The development of mobile broadband, wide deployment of 3G networks, and popularity of 3.5G networks are driving this transformation. End users want permanent connection, higher bandwidth, faster access, seamless mobility, and lower prices. These will be realized as 4G LTE matures.

Although LTE and EPC can support both voice and data, there are problems with reusing existing 2G and 3G networks and having these networks coexist with 4G networks. Operators have to consider technologies, market, cost, and engineering issues, and their ultimate goal is to build an independent, efficient LTE and EPC network.

Evolution Analysis

2G/3G PS and 4G EPC are defined differently in 3GPP. In the 2G and 3G eras, a core network is divided into CS and PS domains that provide voice and data services, respectively. In a 2G network, the control and user planes are combined in order to achieve a download rate of up to 460 kbps. Since the 3G era, the control plane has been gradually split from the user plane in order to make a flat network in which direct tunnels can be deployed. With HSDPA, a download rate of more than 10 Mbps can be achieved. Now in the
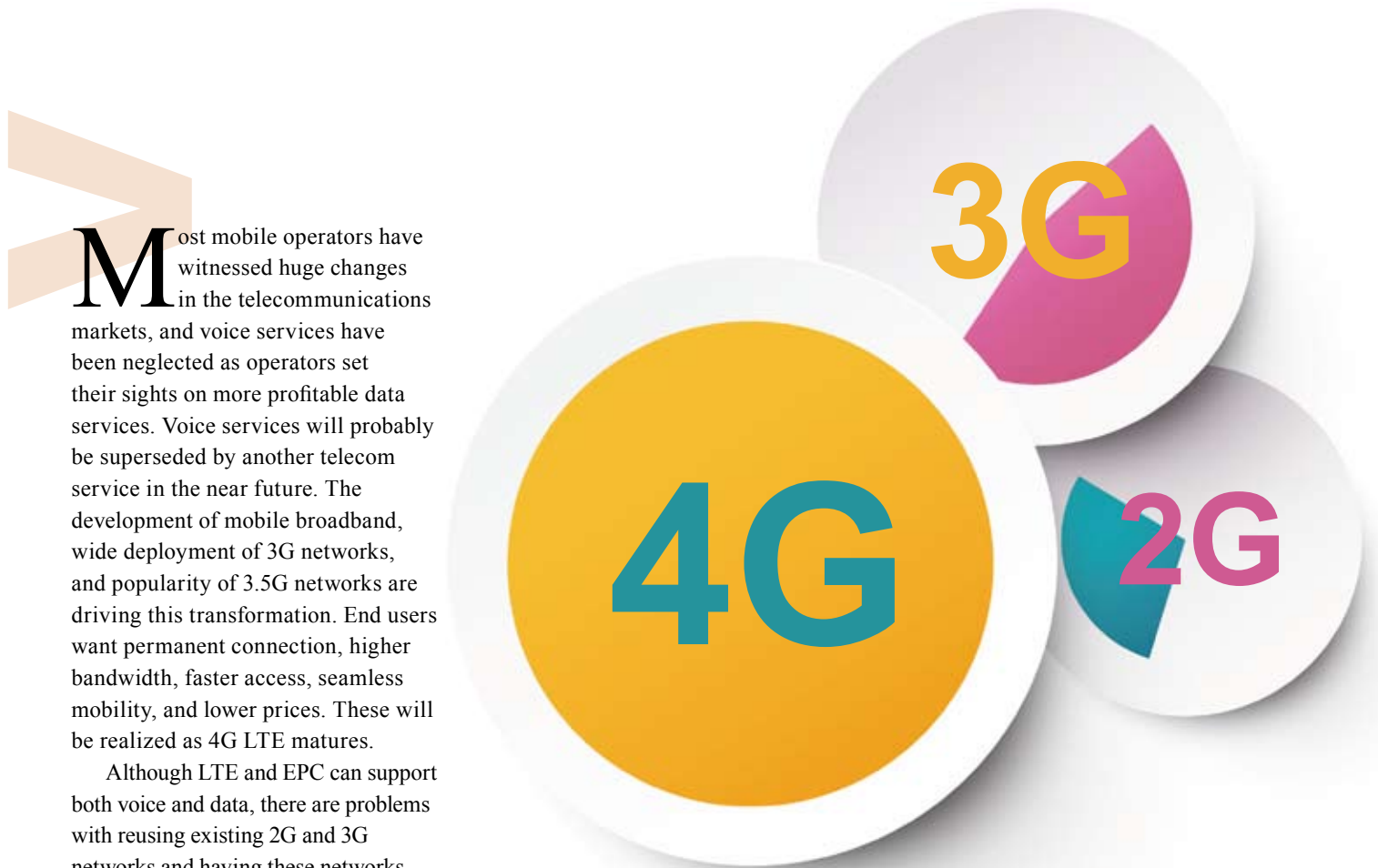
4G era, the CS domain is gone, and EPC can provide all telecom services with an optimum download rate of more than 100 Mbps and support both 3GPP and non-3GPP access.

LTE networks will have the following impact on 2G/3G networks:

- An independent NE will have to carry two to five million users.
- As data throughput at the interface increases from 1 Gbps to 10 Gbps, adjacent switches, routers, and firewalls of the GPRS network will need to be upgraded to support 10 GE.
- With an increase in user numbers and smart terminals, and with frequent handover from 2G/3G to LTE, network signaling storms should be avoided.

In the early stage of LTE deployment, an existing core network should be upgraded to an EPC, or a new EPC should be constructed. In the broadband data service stage, the EPC should guarantee continuity of data services coming out of the new LTE network. The cost of maintaining multiple networks should also be reduced as much as possible. Once LTE/EPC has been put into service, operators should introduce voice services, QoS guarantee, and service control for LTE users and consider reconstructing or swapping over their old networks.

According to the 3GPP standard, the overall goal of LTE/EPC is to increase data rate, decrease latency, and optimize packet transmission. Another goal at the EPC side of a core network is support for different wireless access technologies, including traditional GSM/UMTS access and non-3GPP access (such as WiFi). This helps create a seamless experience for users moving between different access networks.

The following need to be ensured when smoothly evolving from 2G/3G to 4G networks:

- improved voice QoS, which helps operators cement their market position
- large-capacity intelligent network with DPI technology
- target network that supports flexible policy charging control (PCC)
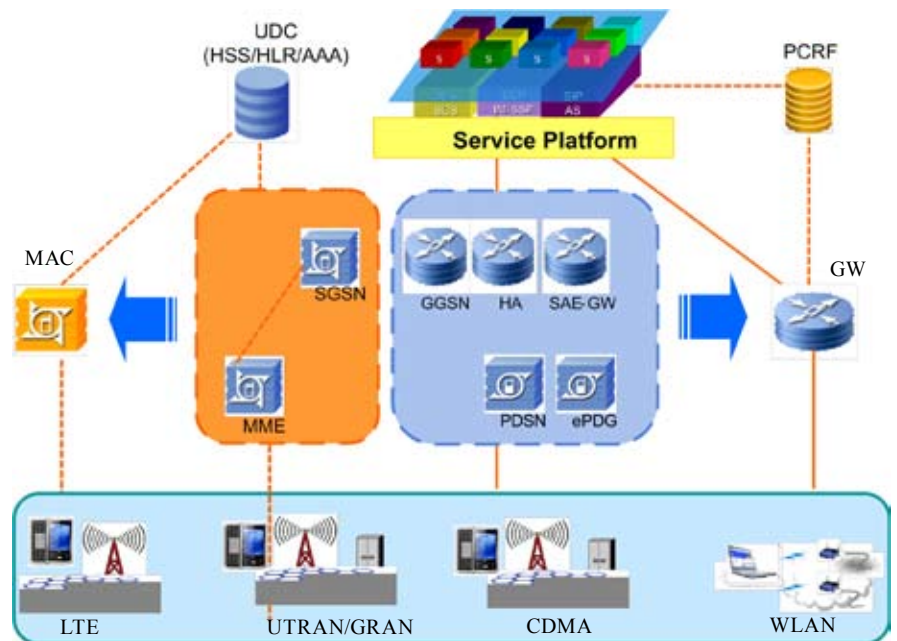- network convergence that supports

Figure 1. Target architecture of a converged core network.

2G, 3G and 4G networks and can save investment and opex
- support for more internet services and improved service management and control
- future-proof networks that can easily be expanded and upgraded.

Implementation Mode

There are two ways to introduce an EPC: upgrade the existing PS domain or build a new EPC that can be incorporated into existing PS services at a later stage.

In order to upgrade a traditional PS to make it serve as an EPC, the traditional GSN needs to support LTE access and provide a large space for LTE services. All-IP networking should also be supported. This implementation mode requires low initial investment but high maintenance cost and may affect existing services.

A new EPC needs to have large capacity for LTE access, all-IP networking, and 2G/3G access. With this implementation mode, initial investment is high but maintenance cost is low, and the new EPC network does not affect existing services.

No matter which mode an operator adopts, the core network will become a converged SGSN/MME or GGSN/SGW/PGW network that supports 2G, 3G, and 4G access.

Target Network

In a converged core network solution, a core network in the PS domain contains an intelligent mobile access controller (MAC), which converges SGSN and MME, and a converged gateway (GW), which converges GGSN, PWG, and SGW (Fig. 1). The two nodes split the control plane from the user plane in order to simplify the network and enable a high degree of NE integration.

MAC is an NE at the control plane and is responsible for controlling the access and mobility of 2G, 3G, and LTE users. The converged GW is responsible for packet transmission at the user plane and guarantees that there is only one node in the core network that processes the user plane of every access type. This ensures that the core network can be further flattened to lower opex, save backbone transmission bandwidth, and provide better QoS and lower latency for users.

In the EPC, a user data convergence (UDC) solution is a data-management layer in the network architecture that converges data and guarantees data consistency. This helps lower TCO. The UDC solution supports convergence of applications such as GSM HLR, UMTS HLR, CDMA HLRe, FNR, MNP, EIR, IMS HSS, and EPC HSS. UDC also enables
- sharing of unified user information. This helps in the unified control and management of UMTS/CDMA/LTE/IMS user data.
- service integration, such as automatic roaming between UMTS and CDMA networks, binding of a terminal and its SIM card, sharing of user state between HLR and HSS, and simplifying MNP process.
- providing a unified data management platform for MTOs. This helps implement region-based management.

As more and more multimode terminals appear in the market and users demand seamless roaming, the number of users in a 2G/3G network or an LTE network may change dynamically, even if the total user base of an operator remains unchanged. For this reason, in a network architecture where 2G/3G network is separated from LTE, each network needs the maximum capacity, and the cost of meeting the need for seamless roaming is higher. A converged core network solution promises maximum capacity at low cost by sharing software and hardware between 2G/3G and LTE networks. As 2G/3G users become LTE users, 2G/3G operational costs will gradually be reduced. When all 2G/3G users become LTE users, the converged core network will completely change its role as a real EPC.

EPS networks are becoming more sophisticated as more and more LTE terminals are released. Smooth network upgrade can save operator investment and bring about better user experience. **ZTE** *TECHNOLOGIES*

MNC:
Choice of IPTV/OTT

By Liu Shizhou

Indonesia is the largest economy in Southeast Asia and one of the founding members of the Association of Southeast Asian Nations. It is also a member of the Group of Twenty Finance Ministers and Central Bank Governors. With a population of more than 238 million, Indonesia is the fourth most populous country in the world.

MNC is a subsidiary of Southeast Asia's largest media group, Global Mediacom. As the largest media company in Indonesia, MNC has three national free-to-air channels: RCTI, MNC TV, and Global TV. Together, these channels account for 36% of the FTA market in Indonesia. Because of its strong content-development capabilities, MNC can create content for its 12 channels.

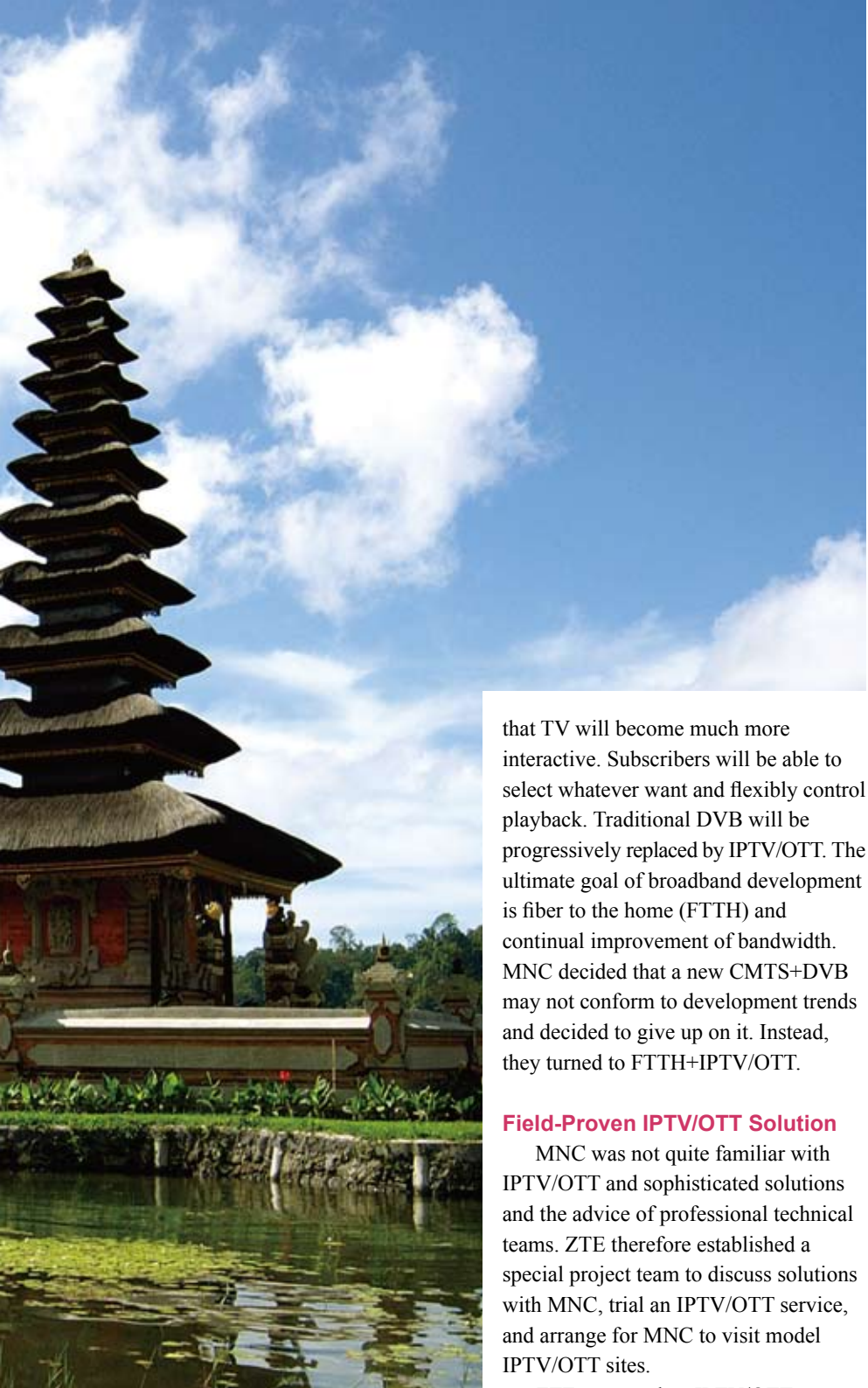MNC Sky Vision, the largest pay TV operator in Indonesia, offers pay TV services through direct-to-home (DTH) systems to about 1.72 million subscribers. MNC Sky Vision has a 70% share of the pay TV market in Indonesia. Indovision and Top TV are MNC Sky Vision's two main brands. The former targets the high-end market and the latter targets the mid-range and low-end markets. Okevision is another of Global Mediacom's pay TV brands that targets the mid-range market. In its transition from media group to triple-play company, Global Mediacom has established MNC to construct FTTH, IPTV, VoIP, and IP-NGN systems. MNC plans to deploy FTTH, IPTV, VOIP, backbone networks, and BOSS in 11 first-tier and second-tier cities in Indonesia within the next three to four years. IPTV/OTT construction is a key element in MNC's platform planning.

MNC's Challenges and Opportunities

The rapid development of broadband

that TV will become much more interactive. Subscribers will be able to select whatever want and flexibly control playback. Traditional DVB will be progressively replaced by IPTV/OTT. The ultimate goal of broadband development is fiber to the home (FTTH) and continual improvement of bandwidth. MNC decided that a new CMTS+DVB may not conform to development trends and decided to give up on it. Instead, they turned to FTTH+IPTV/OTT.

Field-Proven IPTV/OTT Solution

MNC was not quite familiar with IPTV/OTT and sophisticated solutions and the advice of professional technical teams. ZTE therefore established a special project team to discuss solutions with MNC, trial an IPTV/OTT service, and arrange for MNC to visit model IPTV/OTT sites.

ZTE proposed an IPTV/OTT convergence solution in which IPTV and OTT services are oriented towards different user groups. IPTV provides high-quality TV to average and high-end users of MNC broadband. OTT is designed for those who do not use MNC broadband. OTT provides a variety of internet-based media services for average and low-end users of mobile

phones and PCs. IPTV and OTT systems are converged into a platform for unified management. This reduces MNC's capex and opex. After four months of in-depth discussion with ZTE, MNC became familiar with IPTV/OTT products and thought highly of ZTE's end-to-end IPTV/OTT solution.

Live IPTV/OTT demonstrations enabled MNC to come into close contact with ZTE's IPTV/OTT products and experience real services. MNC gained a deeper understanding of IPTV/OTT. Visits to model IPTV/OTT sites and meet-ups with other successful operators made MNC more comfortable in choosing IPTV/OTT. In the final POC test, ZTE outperformed other vendors. This also indicated that MNC had made an excellent choice to work with ZTE.

Joint Planning for Development

There are great opportunities in the Indonesian broadband market. In a country of more than 200 million, less than 5 million use fixed broadband, and a broadband penetration is lower than 10%. IPTV/OTT services are now booming in Indonesia. With the rapid development of fixed broadband and mobile internet, Indonesia has a huge potential demand for IPTV/OTT services. With field-proven end-to-end solutions, ZTE assists MNC in developing IPTV/OTT services and building a reliable IPTV/OTT platform. MNC's advantages in terms of content, channel resources, and abundant VOD sources can inject new vitality into the IPTV/OTT platform. ZTE and MNC are working together for a promising future. **ZTE** TECHNOLOGIES

networks and the emergence of mobile internet have created unprecedented challenges but also valuable opportunities for MNC. In May 2011, MNC bid for CMTS+DVB, hoping to develop broadband services based on MNC's competitive DVB services. After analyzing development trends in the pay TV market for MNC, ZTE determined

ZTE Builds Commercial OTT Sites for China Mobile

By Xu Xiangkai

OTT TV Becomes Essential for Operator Development

OTT TV integrates IP video transmitted through TV sets, PCs, and mobile terminals with internet applications. OTT TV is designed for interactive audio-visual services and incorporates the internet, multimedia communications, and other technologies. OTT TV provides video, information, and gaming on any terminal at any time and at any place.

A benefit of OTT TV is that providers do not necessarily have their own networks but can provide services through the physical networks of other operators. With continuous investment in video by internet providers, telecom operators are under great pressure to develop services. Operators are investing heavily in bearer networks, FTTX and LTE, and broadband services are being continually upgraded. However, operators are discovering that despite these improvements, ROI is decreasing. Incremental development of services has failed to bring the expected profits. Improved network bandwidth and content has actually compounded the problem by increasing demand for video, but rapid changes in the market development also create opportunities for operators.

ARPU can be increased by improving bundled voice and broadband through multi-screen OTT video services. This increases profit from video traffic.

The ultimate goal of multi-screen video is to acquire user entry points. Operators grasp mobile phone entry points and TV entry points by dominating in terms of pipe resources and video products and also by using bundles. With the advantage of an existing user and domination of transmission pipes, operators can then strengthen their cooperation with the video industry chain and ensure their video services are given the highest priority.

ZTE OTT Video Products

After more than ten years of development, ZTE's multimedia products are widely used by operators all over the world. According to *IPTV Market Leader Report 2013* by Multimedia Research Group, ZTE IPTV was ranked number one in the middleware, VOD, and STB fields. ZTE has gained extensive experience in video system construction. ZTE's video system uses an efficient, open architecture and has a high capacity. It covers all aspects of IP multimedia and provides end-to-end all-service solutions.

ZTE was one of the first manufacturers to develop OTT products and formulate relevant OTT specifications in China. ZTE has been cooperating closely with many licensers and content providers, including BesTV, CCTV, WASU TV, and China International Broadcasting Network. ZTE's OTT video system has been used commercially by many operators. The system integrates all the functions of basic OTT video and provides customers with multiscreen interaction. Together with smart terminals, this system can be used to explore popular internet applications and provide an all-round service experience.

According to the commercial OTT sites launched in China over the past year, ZTE's OTT video systems have outstanding advantages in terms of openness, compatibility, and stability.

The stability of ZTE's OTT systems during Spring Festival boosted the confidence of customers. ZTE has built many commercial OTT sites over a short period of time.

Rapid Delivery and Stable Operation

ZTE started building an OTT video system for China Mobile Sichuan Company (Sichuan Mobile) in the second half of 2013. The OTT system was installed, tested, and put into commercial operation only half a month after the equipment arrived. The OTT system is the only one that supports two licensers in the current network. After quick cutover of users from the former licenser's platform, this system now serves 80,000 users in 13 regions and cities.

During Spring Festival, the four VOD nodes and one live node in the Sichuan Mobile video system all performed well. There were no faults, even when the peak concurrent value reached 80% of the design capacity.

ZTE proved its strength at this critical moment. ZTE's systems provide ultrahigh-speed commercial interconnection, and ZTE's platforms provide the advantage of differentiation. Besides VOD and live broadcasting, ZTE's OTT systems are capable of live TV playback, and multicast solutions for live OTT content will be available in the near future.

Because of the excellent performance of ZTE's CDNs, Sichuan Mobile needed to add 14 CDN nodes recently. This will lay a solid foundation for large-scale development in the future.

Meeting Pressing Customer Needs

In the second half of 2013, a provincial branch of China Mobile started developing OTT video services. As OTT video became widely used throughout the province, service capacity and stability of equipment failed to meet customer needs. There were frequent jitters in live video services, which failed to run properly even after two emergency expansions.

After learning about ZTE's excellent performance with Sichuan Mobile, the customer urgently requested the ZTE help them deal with their services in peak hours during Spring Festival. ZTE gives customer demands the highest priority. After an immediate on-site assessment, staff from ZTE's representative office and technical experts from the product line proposed to build a commercial platform within two weeks. This platform would guarantee that the customer's OTT video services would run smoothly.

Everything was implemented as planned. An engineering survey was conducted, and a progress schedule was formulated immediately after the meeting. The main equipment arrived on time despite logistics difficulties before the Spring Festival. The commercial platform was released on time, and communication with partners was thorough. Thanks to the efforts of all parties involved in the project, the system was cut over and put into commercial use on January 22. This was a significant feat that demonstrated ZTE's technical strength and capacity to rapidly deliver OTT video products. The live broadcasting node on ZTE's platform performed very well on Spring Festival Eve. With increased loading of CCTV-1 HD, the actual peak load of ZTE's platform reached 110% of capacity, and this proved the high capacity of the main equipment. **ZTE TECHNOLOGIES**

MRG IPTV Market Leader Report

End 2013 Summary

January 2014, from Multimedia Research Group MRG

MRG's IPTV Market Leader Report (MLR) identifies which IPTV systems and software companies are leading each of the six IPTV market segments: access systems, video headend (encoder) systems (VHE), video-on-demand server software (VOD), set-top boxes (STB), middleware (MW), and content protection/digital rights management (CP/DRM).

Among the global leaders, the big winner was ZTE taking the top position in VOD, STB and middleware. Alcatel-Lucent continues to lead in access, while Verimatrix continues to lead in the CP/DRM segment and Harmonic leads in video headends. ZTE has been successful in working with many Asian IPTV operators.

Among the major changes in this report are acquisitions that have closed recently. Ericsson acquired the assets of Microsoft's Mediaroom technology so all Mediaroom customers are now under Ericsson in this report. In addition, ARRIS completed its acquisition of Motorola's assets from Google so ARRIS now appears in new product categories. Interestingly, ZTE has taken the lead in middleware in this report, replacing Microsoft's Mediaroom (now Ericsson) which led for about five years in a row.
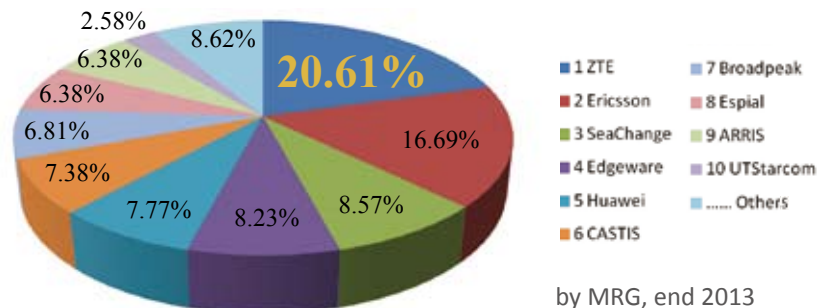
Video-on-Demand Server Software

The VOD segment is the most competitive, with 14 out of the 15 VOD companies reporting over 1 million subscribers each. The leader in VOD is now ZTE with 20.6% of the market, while the previous leader Microsoft (whose Mediaroom technology is now with Ericsson) is now number two at 16.7%. SeaChange is next but it only has an 8.6% market share and customers mostly in North America. Edgeware is at number four (8.2%) while Huawei is number five (7.8%) with these top five vendors accounting for just 62% of the global market.

Rank	VOD Subscribers	Total	Percent
1	ZTE	17,187,536	20.61%
2	Ericsson	13,917,068	16.69%
3	SeaChange	7,144,201	8.57%
4	Edgeware	6,866,378	8.23%
5	Huawei	6,480,485	7.77%
6	CASTIS	6,152,424	7.38%
7	Broadpeak	5,684,150	6.81%
8	Espial	5,319,613	6.38%
9	ARRIS	5,319,259	6.38%
10	UTStarcom	2,150,000	2.58%
......	Others	7,187,464	8.62%
	Total Subs	83,408,578	

VOD Global Market Share

by MRG, end 2013

Rank	STB Subscribers	Total	Percent
1	ZTE	17,685,011	22.92%
2	ARRIS	15,205,092	19.70%
3	Huawei	6,025,100	7.81%
4	Sagemcom	5,720,443	7.41%
5	Cisco	5,130,719	6.65%
6	Dasan	4,713,492	6.11%
7	Amino	4,004,926	5.19%
8	Netgem	3,763,885	4.88%
9	Celrun	2,898,932	3.76%
10	ADB	2,247,239	2.91%
......	Others	9,777,116	12.67%
	Total Subs	77,171,955	

STB Global Market Share

by MRG, end 2013
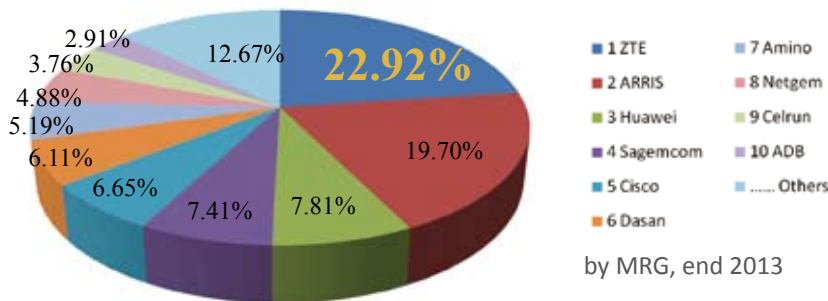
Rank	Middleware Subscribers	Total	Percent
1	ZTE	18,064,372	22.68%
2	Huawei	17,103,398	21.47%
3	Ericsson	15,710,382	19.73%
4	Alticast	4,713,492	5.92%
5	Netgem	3,648,905	4.58%
6	Viacess-Orca	3,575,825	4.49%
7	Accenture	3,170,033	3.98%
8	Alcatel-Lucent	2,816,550	3.54%
9	SmartLabs	2,260,308	2.84%
10	Technicolor	1,828,950	2.30%
......	Others	6,753,152	8.48%
	Total Subs	79,645,367	

Middleware Global Market Share

by MRG, end 2013

> *Among the global leaders, the big winner was ZTE taking the top position in VOD, STB and middleware.*

Set-top Boxes

The STB segment is the most crowded with 27 vendors tracked. Once again, ZTE has taken the number one spot globally to reach 22.9%, while ARRIS has dropped to 19.7%. These two companies have the largest market share with number three Huawei only at 7.8%. It seems that ZTE has been able to capitalize on the growing IPTV market in China, where it has most of its business. The top five STB vendors account for almost 65% of the global market.

Middleware

The MW segment has also been competitive of late, but once again Microsoft's Mediaroom (now under Ericsson) has dropped from the top spot. The number one middleware vendor is now ZTE at 22.7%, while Huawei is next at 21.5%. Again, both companies have benefitted from the strong growth in China, forcing Ericsson down to number three at 19.7%. Overall, there are 23 vendors, making it one of the most crowded segments, after STBs. The top five vendors account for 74% of the global middleware market. **ZTE TECHNOLOGIES**
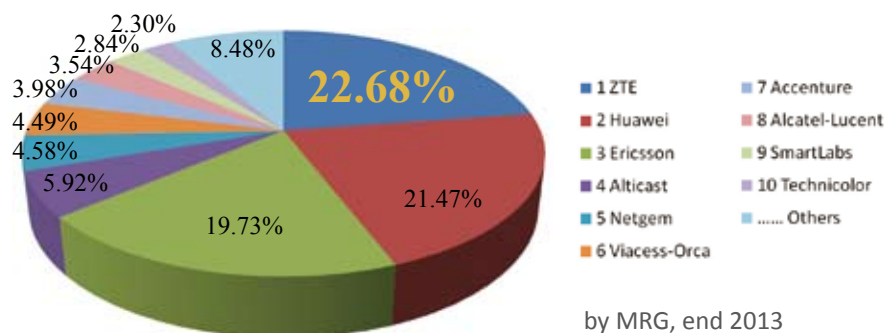
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