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**Keeping a
close eye on AI**

**Trust and
transparency the
Indosat way**

**Connect
where it counts**

**Stacking up the gains
with OpenStack**

**L-shaped telcos
in an evolving
digital world**



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HUAWEI CONNECT 2016

Shape the Cloud

August 31 – September 2, 2016
Expo Centre, Shanghai, China



WinWin

Hear what operators want to share in person, see how peers succeed in a fierce marketplace, and delve into their secrets to success. At *WinWin*, it's all about success.

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Clouds, intelligence, and the future

Despite the global economic downturn, new sources of global economic momentum are emerging. The Fourth Industrial Revolution – digitization, Internetization, and autonomous AI – is already underway. The integrated circuit is transitioning from silicon to graphene, 4G is underpinning mobile communications and the shift to 5G will happen soon, and the sharing economy based on mobile Internet is flourishing.

WEF Executive Chairman Klaus Schwab asserts that the Fourth Industrial Revolution is far more profound than the previous three, because it's fusing emerging technologies. This is blurring the boundary between the physical, digital, and biological worlds and transforming production, management, and governance systems in nearly every industry in every country.

For enterprises, the acceleration of innovation and pace of disruption are difficult to comprehend, and are having a major impact on customer expectations, product optimization, collaborative innovation, and organizational structures.

Huawei's Global Connectivity Index shows how a strong digital infrastructure is a major driver of strong economic growth. Huawei believes that all businesses are looking to become agile, smart, and digitized. To go digital, operators and enterprises will need to transform their IT systems from internal- and employee-facing to customer- and partner-facing systems that provide customers with a ROADS experience (Real-time, On-demand, All-online, DIY, Social).

The full cloudification of networks, operations systems, and services are the most effective path to digitization. Under the theme *Shape the Cloud*, Huawei will hold the first Huawei Connect conference in Shanghai from August 31 to September 2. We will be welcoming more than 80 industry partners and 15,000 industry leaders to jointly shape the future of the cloud ecosystem, which requires the concerted efforts of all. Domains to be covered include cloud computing, big data, the Internet of Things, and SDN.

Huawei Connect will accelerate digital transformation in nine verticals, including telecommunications, finance, transportation, power, government, and public utilities. Come and join us in the intelligent cloud of the future and let's move one step closer to a Better Connected World.

Sally Gao, Editor-in-Chief



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Enabling digital transformation through ALL CLOUD



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The global trend for digital transformation is driving enterprises to become fully digitized and digitally operated, and Huawei must pinpoint where it fits in all this. To truly enable digital transformation and digital operations for carriers and enterprises, we must cloudify our products and solutions.

By Eric Xu, Huawei Rotating CEO

What is digital transformation and ALL CLOUD?

First, I'd like to talk a bit about how I see digital transformation. At the moment, many carriers have set out on the path to become digital telcos, and this is not new. To help them, we have to be clear on what the goal of digital transformation is: to provide carriers' enterprise and consumer customers with a ROADS experience. ROADS, which means real-time, on-demand, all-online, DIY, and social, was a concept I brought up at the Global Analyst Summit in 2014. Over the next two years, it's been extensively communicated, and today the term is widely accepted in the industry.

Enterprises are also talking about digital transformation. Then what does digitization mean for an enterprise? It first means full connectivity for people and things within the enterprise environment, before production activities can become automated and intelligent. Enterprise digitization also concerns the evolving role of enterprise IT systems, which in the past have only been for internal staff. Now they

need to be connected to customers and partners to extract the most value.

To digitize operations and digitally transform, both carriers and enterprises should transform IT systems from purely internal facing to an externally oriented platform, connecting with its customers and partners to deliver a ROADS experience as they buy or use what the enterprise has to offer.

ALL CLOUD, or the full cloudification of networks, operations systems, and services, sets the stage for digital transformation, and it's the most effective technical enabler that's currently available to bring the digital vision into reality. As for cloud, different people have different understandings. As I see it, it has three core features.

First, all hardware resources, including networking and IT, are pooled to maximize resource sharing. The traditional siloed architecture, where one application has a dedicated hardware to go with it, is gone.

Second, the software architecture has to be

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fully distributed, like the technology architecture of Internet companies. Being fully distributed is intrinsic to large systems. Through policy-based management, it allows scalability and flexibility in fault handling and resource scheduling.

The third core feature is the full automation of service provisioning, resource scheduling, and fault handling. No human intervention would be needed.

Cloud is much more than virtualization – it involves comprehensive architectural changes through which structural efficiency gains are made possible in R&D, service provisioning, and operations.

Huawei's strategy for ALL CLOUD: Corporate and by customer segment

Huawei's strategy has always been very clear. We focus on what we call the pipe, or ICT infrastructure, and smart devices. To support carriers and other enterprises as they move towards full-fledged digital transformation and digital operations, our strategy is to fully cloudify all Huawei's products and solutions.



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For more than ten years, carriers have invested hugely in building applications, but with little success. Carriers' biggest strength is their ability to provide services in real time.

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Huawei aims to become an advocate, a driver, and ultimately a leader of ALL CLOUD. Through the full cloudification of our products and solutions, we hope to enable our carrier and enterprise customers to achieve digital transformation and digital operations.

Just as we did with ALL IP, we're committed to fully cloudifying all our products and solutions over the next few years. We will use the ideas and technologies of cloud computing to fully transform our telecom equipment; build dynamic, agile networks; and ultimately support the digital operations of our carrier and enterprise customers.

In the three customer segments of carriers, enterprises, and consumers, we have outlined different sets of strategies and measures.

In the carrier business, our overall strategy is to deliver a ROADS experience and accelerate the cloudification of all carrier products and solutions.

First of all, I'd like to talk about user experience, which can be split into two aspects for a given service. One is the features and functions the service has to offer, and the other is how users feel at every touch point across the customer journey, as captured in ROADS. I've spoken a lot about the ROADS user experience, so I want to talk more about services here. More

specifically, what services should carriers focus on in the future? For years, carriers have been trying to find a killer application to compete with OTT providers. In the end, many have come to realize that, between carriers and OTT providers, it's not just about competition – it's a relationship between both competition and cooperation.

For more than ten years, carriers have invested hugely in building applications, but with little success. Looking back on this part of history, a natural question is: What kind of services and applications are carriers best positioned to offer? In my opinion, carriers' biggest strength is their ability to provide services in real time.

We believe there are four types of real-time services that deserve more attention. One is the Internet of Things (IoT), and building ubiquitous networks to connect more people and more things. This is carriers' most basic offering. It also largely explains why we've seen so much recent momentum in IoT.

Second, the voice service has been there for decades, without much change, and the experience has left much to be desired. At the moment, we're quite far from high-fidelity, music-grade voice services.

Third, video should be positioned as a basic service.

Carriers have built extensive broadband and 4G networks, but if they don't carry traffic, they can hardly be of value. It's been widely agreed in the industry that the most effective way to fill networks is through video services. Video has been positioned as a value-added service, a proposition which we believe should be changed. Video should become a basic service for carriers. Networks, organizational structures, operating models, and employees' skill sets need to be revisited to see if they're sufficient to support the new positioning of video services.

The fourth one is enterprise cloud services. Carriers have extensive networks and facilities. They also have strong brand equity in local communities and customer relationships with enterprises. With these assets combined, carriers have a good chance to succeed in providing cloud services for enterprises. Over the past two years, Huawei has partnered with carriers on research and trials; for example, we're working with Deutsche Telekom on enterprise cloud services. As for our global strategy, we choose to work with a number of carriers from around the world that have the willingness, enterprise customer base, and a dedicated internal team for business customers to explore the cloud service market and drive new revenue streams and business growth for carriers.

Next, I'd like to talk about how carriers can create new services and provide new experiences. I believe full cloudification in four layers is the fundamental answer.

The first is equipment cloudification. Network Functions Virtualization (NFV) has been a buzzword for the past few years, but I believe NFV is not enough. With NFV, hardware becomes standardized and virtualized, but the traditional box-type of approach is still followed when it comes to software architecture and the operating model. I think we should use NFC,

Network Functions Cloudification, instead of NFV, going beyond virtualization and turning network functions into fully distributed, fully automated applications.

The second layer is network cloudification. Network equipment is distributed in different locations. While they are interconnected, resource scheduling at the network level isn't done particularly well. This is particularly true for IP networks, where traffic loads can vary significantly from node to node, and the overall utilization is quite low. That's where software-defined networking (SDN) comes in. The idea is to allow global scheduling across the network through an SDN controller to ensure user experience and enhance network utilization. Essentially this is the same as cloud computing, except that cloud computing schedules computing and storage while SDN orchestrates networking resources.

The third layer is service cloudification. Generally the telecom industry isn't doing well on services, with traditional voice and messaging services on the decline. These legacy services can be cloudified. More importantly, new services such as VoLTE, video, public cloud services, and IoT, should be made cloud-native from day one, with the ability to support a massive number of users.

The fourth layer is the cloudification of operations. Online is becoming part of the new paradigm for consumers and businesses. Take a look at Amazon. Everything carriers are selling or want to sell has already been offered by Amazon online. Amazon is able to sell all its products and services, including cloud services, all-online. Why can't carriers do the same? To do that, carriers need to transform their IT systems, which are currently set up as internal operations support systems, into customer-oriented production systems. In addition, the IT systems must adopt cloud architecture as they will have to support hundreds of millions of users and millions of partners.

With ALL CLOUD, we'll come to find that network architecture will be data center-centric, as all the network functions and service applications will sit in data centers. Network architecture will go through major transformation.

As carriers move to ALL CLOUD and ROADS, they need to choose and focus on the services and applications where they have an advantage, position video as a basic service, and embark on a journey to transform their operations systems and networks. These are key initiatives that may help them regain a strong position in the value chain. The earlier they start to make the changes, the greater the benefits will be.

In the enterprise segment, our strategy is to leverage cloud computing, SDN, and big data to help enterprise customers navigate the digital transition towards agility and intelligence.

The IT department is probably the most painful division in any company. Internal customer satisfaction with IT service capabilities and response times are low due to outdated IT architecture. The key to transforming traditional enterprise IT into the IT systems that everyone wants is migration into cloud architecture. An IT system with cloud architecture is able to engage with internal staff, as well as customers and partners. It also helps to deliver a consistent customer experience, online or offline, across all the products and solutions.

A full-cloud architecture may free CIOs from the distress of being constantly blamed.

First, we will facilitate the migration of enterprise IT to cloud architecture. Why do enterprises need to adopt cloud architecture? To answer the question, we need to go back to business needs and the inherent advantages of cloud architecture. What will future business needs

be? The agility and intelligence to quickly identify and satisfy customer needs, particularly their personalized needs. This will be the core to the competitiveness of any enterprise in the future.

Agility and intelligence are built on big data and massive storage and processing capacity. Only cloud architecture can provide a combination of massive processing power, cost advantages, and full resource utilization. Take Huawei's R&D as an example. There are 200,000 virtual machines to support large-scale collaboration in research and development. Productivity has increased in great leaps, with software compilation taking just 10 minutes and testing and verification only one to two days. At Huawei, the value of IT goes far beyond automating business processes – it has penetrated all aspects of business. Since Huawei entered the IT market in 2008, our aim has been to build large-scale distributed systems. Today, our cloud operating system FusionSphere and OceanStor distributed storage systems lead the market.

Second, we'll work to accelerate the transition of enterprise networking to SDN Agile IT systems that depend on agile networks. SDN needs to be introduced faster into data centers, campus networks, and the enterprise backbone to allow network agility and cloudified IT systems.

Moreover, as the digital transformation of enterprises goes deeper, data volumes will keep growing, yet remain unevenly distributed. Therefore, it may not be cost effective to build a private cloud to carry all workloads, so using carriers' public clouds for certain applications would be the logical option. This means that enterprises will trend towards a hybrid cloud model that will require the coordination and harmonization of enterprise networks and carrier networks.

Huawei is one of the few vendors with both carrier and enterprise networking in its portfolio. Back in the beginning when we were designing SDN controllers, we were committed to a single architecture that supports multiple scenarios, so that carrier networks, enterprise networks, and data center networks can be orchestrated end-to-end to allow full agility.

Third, we will leverage the power of big data to enable smart enterprises. Big data is among the top buzzwords of the year, but data only has value when its put in context, coming together with applications and business scenarios. Therefore, big data presents itself to users not in the form of massive amounts of data, but as smart applications and services like search, precise marketing, and smart manufacturing.

It is the enterprises and application developers in different industries that are able to fully extract the value of big data. In light of this, Huawei focuses on its FusionInsight big data platform. We don't develop applications ourselves, but embrace open collaboration with the ecosystem. Our role is to provide a developer-friendly, high-performance, and leading platform at scale. This builds on Huawei's technological strengths to support enterprises or industry partners as they develop industry-specific applications and services to enable smart enterprises.

In a nutshell, our core strategy in the enterprise segment is to facilitate the migration of enterprise IT towards cloud architecture and enterprise networks towards SDN, and to provide a big data platform to monetize the growing data assets.

In the consumer business, brand, quality, user experience, and the ecosystem matter most. These sit at the core of Huawei's strategy.

Building a mid-to-high-end brand: We hope to

leverage decades of technical expertise to build a truly global high-end brand and realize large-scale sales globally at reasonable margins. Our experience in the Chinese market has shown that creating a mid-range to high-end brand can boost overall sales and help us become a premium brand. In the future, Huawei wants to become one of the brands consumers around the world consider when they want to purchase a premium-brand device.

Winning with quality and services: In times of scarcity, one can make a lot of money just by building enough production capacity to meet demand. But today is a time of surplus and the old way of winning on cost or value for money, is doomed to fail. Competition in the end will be a competition of quality. Winning companies are those that can build an image of high quality in the minds of customers.

In the era of smart devices, services are another key differentiator – not only after-sales services, but services across the entire customer journey from the time of purchase. In China, we've become a leader in customer satisfaction, and we're now focusing on building our global service network and core service capabilities to turn services into Huawei's unique advantage in the device market.

Building a consumer experience-centered ecosystem: For the device business, ecosystem is key. But an ecosystem isn't a random assembly of resources. Rather, it starts from consumer experience, and pools the best of what the industry has to offer through partnerships. The best resources include global and local applications and content, as well as joint innovations in technology and key components. The aim is to increase consumer loyalty, and ultimately turn Huawei into a brand that consumers value and trust. 

Editor: Gary gary.marcus.maidment@huawei.com

Stacking up the gains with OpenStack



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With 37,000 global members and 80 user groups spanning 165 countries and 800 organizations, OpenStack is proving that there's strength in numbers – it's dominating markets and big-name participants are promoting its offering: open-source cloud management technology. What's the secret behind the enthusiasm? Alan Clark, the Chairman of OpenStack Foundation, tells us.

By Linda Xu & Carol Chen



Reasons to believe

The four business drivers of OpenStack...

First and foremost is scalability. OpenStack wants to produce a ubiquitous open source cloud computing platform that makes public and private clouds easy to implement and massively scalable, regardless of size. BMW, for example, uses OpenStack on its private cloud platform to raise the scalability and flexibility of its IT infrastructure.

The second is modularity. We've designed OpenStack to be adaptable to several markets and scenarios, so it forms a diverse and vital ecosystem with add-ons and plug-ins.

Next comes interoperability. Users like choice – they don't want to be locked into a single solution. Many users and operators state that interoperability between OpenStack clouds and hybrid cloud scenarios is an important part of the value they're after. OpenStack is most useful when it provides a common platform that splits workloads between clouds without making resource-intensive changes

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OpenStack wants to produce a ubiquitous open source cloud computing platform that makes public and private clouds easy to implement and massively scalable, regardless of size.

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to tools and processes. Development tools and applications unlock value when they have a common target in public and private OpenStack clouds.

The fourth main driver is manageability. OpenStack lets users converge IT services so they're more manageable and autonomous, meaning employees are freed up to work on innovating.

A federated future

How Openstack benefits verticals...

Healthcare, finance, manufacturing, R&D – all receive benefits. But how each vertical uses OpenStack varies quite a bit. For example, film and media users like Digital Film Tree, which specializes in designing post and IT workflows for the media and entertainment industry, want a more federated cloud. By federated I mean a cloud environment that uses multiple vendors' solutions. This allows these companies to transfer media and data between clouds smoothly, from creation and editing to production. Cloud – particularly when federated – facilitates geographically dispersed content.

Other users are trying this out on private cloud. The European nuclear research agency CERN embraced cloud computing with help from OpenStack, and now its multiple clouds can run collision reconstructions on OpenStack. Cloud tech makes CERN much more responsive to its user community, so it can do continue with research without waiting for hardware to be delivered and configured.

What's in store for 2020...

I don't believe there'll be a single cloud – instead, many federated clouds will allow us to tailor clouds for the services customers want to deploy and use. The way vertical markets use clouds varies with the types of services they deploy.

Rackspace and CERN's open lab have collaborated on linking multiple clouds to form a cloud federation where users can use computing resources from multiple cloud providers. For example, a CERN OpenStack user cloud can spin up an image and migrate it to Rackspace's public cloud using CERN credentials. Rackspace will continue to work with CERN open lab on improving federated capabilities for using resources, authorization models, and

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We're no longer satisfied with static web pages or static documents. We want real-time interaction. OpenStack happens to be very good at that.

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service catalogues in multiple public and private cloud environments.

On Docker as competitor or collaborator...

We're already cooperating. Many people believe Docker and cloud are different, but they're actually used in conjunction. We need one platform for bare metal, virtual machines, and containers, and an integration engine for every cloud technology that matters over the next decade and beyond. We're standardizing APIs to power a global network of public and private clouds.

Docker manages Linux containers with a high-grade API in a lightweight solution that runs processes in isolation and automates software deployment in a secure and replicable environment. A Docker container includes a software component alongside dependencies like binaries, libraries, configuration files, scripts, jars, gems, and tarballs. Docker can run on any x64 Linux kernel that supports cgroups [Control Groups] and aufs.

Docker can also manage multiple containers on a single machine. It's used behind Nova, making it much more powerful as it can manage several hosts, which in turn manage hundreds of

containers. The current Docker project is aiming for full OpenStack compatibility. We need to recognize the additional role and services provided by cloud, which include networking, policy, security, and orchestration.

Jockeying for virtualization

On SDN, NFV, and what's in it for telcos...

SDN and NFV are key paradigms for future telecom networks, with network agility and programmability as the transformation drivers. OpenStack provides many of the capabilities needed in any NFV environment, having worked on this area since 2012. NFV is a game-changer for operators because they can develop and deploy services twice as fast, reduce reliance on proprietary networking hardware, and free up data center capacity.

Telcos want to automate their resources, and OpenStack is supporting them by giving them use cases and looking at how to implement the solutions.

On Openstack, video, and IoT...

People now expect a real-time response. We're

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OpenStack provides many of the capabilities needed in any NFV environment, having worked on this area since 2012.

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no longer satisfied with static web pages or static documents. We want real-time interaction. OpenStack happens to be very good at that. Part of the impetus from cloud is the ability to respond rapidly to the needs of services through orchestration, policy management, real-time analytics, and real-time data response.

Going for gold

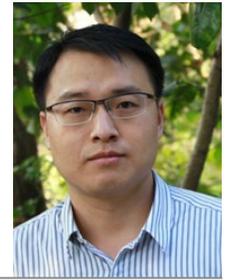
On Huawei...

Huawei is helping to build the OpenStack industry ecosystem, and is a Gold Member Board Director

on the OpenStack 2016 Board. By October 2015, Huawei had completed 60 complete blueprints, resolved more than 350 bugs, and finished nearly 8,000 reviews for the release of OpenStack Liberty, ranking sixth overall out of all contributors.

In 2015, Huawei held two OpenStack Hackathons China, where top OpenStack development engineers from eight companies fixed more than 150 bugs. These events have also given Chinese open-source technology developers a bigger voice in the OpenStack Community and showed that China has powerful open-source technologies. [www](#)

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Keeping a close eye on AI



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In January 2015, dozens of scientists joined physicist Stephen Hawking and business magnate Elon Musk in signing an open letter concerning AI. The letter stated that, "It is important to research how to reap its benefits while avoiding potential pitfalls". But, there's still some way to go before AI becomes sentient. And when it does, we'll be the ones in control.

By Liu Maozheng

The rise of big data coupled with breakthroughs in machine learning has fueled an interest in AI and raised expectations. In the area of robotics, we're at once fascinated and threatened by i-Robot and Terminator type scenarios. Though robot overlords are unlikely, safety and security issues and threats are relative, and we must approach them realistically.

I think, therefore I am

Two basic questions need to be considered when it comes to AI: The first concerns scientific capability: Can we build AI to become self-aware? The second is ethical: If we can build consciousness into AI, should we?

AI technology is in essence computer technology determined by integrated circuit chips based on



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Many believe that when the number of transistors in a chip exceeds the neurons in the human brain, computers will be the more powerful system.

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silicon transistors and hardware and software technologies. Building AI with consciousness requires much greater research on the brain and bio-tech, and we're not there yet.

Moore's Law holds that the number of transistors in a densely integrated circuit doubles every two years. Many believe that when the number of transistors in a chip exceeds the neurons in the human brain, computers will be the more powerful system. Nevertheless, just like a billion ants are no match for a person in terms of brain power, quantity doesn't necessarily equal quality.

When we consider the current state of play, super computers like China's Tianhe computers have petabyte speeds, but they don't possess intelligence. Equally, the Google engine is able to access all of the content on the Internet, but it doesn't represent a significant improvement in AI.

Today's computers can barely comprehend human language or see and detect objects with accuracy. While it's likely that the development of bio and quantum technologies will result in computing breakthroughs that will benefit society, we're perhaps being too paranoid about fearing AI.

Doing some good

In the next few decades, service robots that

perform all sorts of mundane tasks in the forms of intelligent machines will continue to improve life and free us from repetitive and onerous tasks.

Self-driving vehicles are currently the most far-reaching pilot involving robots, but are we paying enough attention to the potential risks? We're basically putting our lives in the hands of a car that we're not controlling. What happens if it malfunctions or is hacked? Examples of the destruction wrought by machines in disasters like plane crashes are well documented.

There's still a long way to go before self-driving cars become mature enough to appear on roads, meaning there's enough time for issues to be discovered and solved.

Stephen Hawking's concerns mainly focus on the misuse of technology. AI tech applied to weaponry, for example, could prove devastating. There are two take home messages here: First, as tech matures we will gradually learn how to use and control self-driving automobiles, service bots, and other AI applications for the betterment of society. In this sense, we have little to fear. Two, we must use tech in a controllable and responsible way, especially in the weaponry, bio-tech, and transgenesis fields.

We need to keep a close eye on new AI to ensure it's controlled and not misused. Then, the rewards will continue to vastly outweigh the risks. **win**

L-shaped telcos in an evolving digital world



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For an industry that's in real need of change, digital transformation is no longer just a sound bite. Operators are looking for ways not only to survive, but to also thrive in this ever evolving digital world. Peter Sany, President and CEO of TM Forum, shared with us the way out.

By Kyra Mi

As instant gratification becomes the norm, technological advances follow Moore's law, driving down the cost of communication, storage, and computing technologies. Moreover, OTT players like Netflix, Skype, and Google are encroaching on the telecom industry, so traditional telcos have to jump on the bandwagon of digital transformation or be caught on the wrong side of history.

Sany believes, "We have to think of Darwinism. It's not big versus small. It's not strong versus weak. It's not fast versus slow either. It's the adaptive and agile versus those who are stable and static."

Traditional versus digital

However, to successfully transform into digital telcos, the incumbents face problems as digitization can be very disruptive. It can disrupt existing business models, operating models, the talent pool, and performance measurements. How, then, should

telcos balance traditional and digital business? Are they willing to digitize and innovate at the risk of cannibalizing existing profits? This is likely to be a hard choice for many. Statistics from a Gartner survey show that more than 80 percent of business leaders expect their company to become a digital enterprise by 2019. Yet another report published in 2015 found that only a quarter of the companies surveyed said they would be willing to disrupt themselves to digitize and thus compete more effectively.

According to Sany, the future will be purely digital: "I believe that traditional and digital business will not merge per se. There will only be digital businesses, or digital business models and digital ecosystems left. There truly is no 'digital strategy' anymore...just strategy in a digital world." For sure, there are many ways to get there. But to get there in time, telcos need to make radical changes. Radical does not mean big bang – they cannot just change everything in an instant. They need

“ I believe that traditional and digital business will not merge per se. There will only be digital businesses, or digital business models and digital ecosystems left. ”

— Peter Sany, President and CEO of TTM Forum



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Traditional telcos need to learn from digital native companies that are much more efficient, open, and customer friendly.

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to tread with caution and plan transformation carefully, which gives rise to the innovator’s dilemma that incumbents will encounter during digital transformation. “The innovator’s task is to ensure that this innovation – the disruptive technology that doesn’t make sense – is taken seriously within the company without putting at risk the needs of present customers who provide profit and growth.”

Still, traditional telcos need to learn from digital native companies that are much more efficient, open, and customer friendly. This means being agile in everything they do. Forget the sequential waterfall model – put ideas in the incubator, grow them, and measure the results. Fail fast, succeed even faster. Otherwise, by the time you get there, the world has left you behind.

L-shaped telcos

As for what telcos will look like after they’ve transformed, different people predict different things. For Sany, telcos will be L-shaped. “On the vertical axis of the L, there will be a digital business on its own,” he says. “On the horizontal axis will sit the digital backbone of other industries and ecosystems that have digitally transformed, such

as smart cities, smart health, and so on.”

Ideally, operators will build out a portfolio of new (horizontal) business offerings to provide an integrated and original user experience across all platforms and catering to the unique requirements of their customers from consumers to enterprises. Core (vertical) offerings will be, for example, video in all its shapes – person-to-person video, movies, business video services, surveillance, and public safety. Pervasive integrated video will be one of the main products of the future.

Telcos will play a critical role, providing the digital backbone for other industries and serving as the intelligent pipe used by other smart and digitizing ecosystems. In these smart-X ecosystems, telcos will either wrap or provide natives services. To quote Esmeralda Swartz, former CMO of MetraTech, “In smart cities, telcos have the ability to integrate technology into the heart of the city’s strategy. The build-out of infrastructure and machine-to-machine technologies delivered over ubiquitous communication platforms provides an unparalleled opportunity for a service renaissance. The data generated by smart meters, smart urban lighting, smart water, traffic surveillance, smart

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The build-out of infrastructure and machine-to-machine technologies delivered over ubiquitous communication platforms provides an unparalleled opportunity for a service renaissance.

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transport, smart waste management and other smart things creates an unparalleled opportunity across verticals to create tailored applications. Across almost every vertical, there are untapped service opportunities.”

Spaghetti, lasagna, and cake

In the L-shaped model, telcos have to co-create and co-compete. Besides provisioning their own products and services, telcos also have to integrate the physical and virtual services of other companies, including those from their competitors. They will become a vendor and a provider of services in many different and fast-evolving services. As Sany puts it, “From that point of view, it’s a collaborative approach for creating the basic infrastructure to create the technology. At the higher level, it’s the creation of business models...at the ultimate level, facing customers, it’s the creation of composite services, be it composite digital services, or composite digital and physical services.”

This requires telcos to think in terms of ecosystems and how they partner effectively within and across ecosystems. They need to move beyond the spaghetti model, in which everything points

to everything else, to lasagna, a nicely-layered architecture, or even to a cake in which services are put together across traditional silos and existing industry boundaries. That’s why when asked is the glass half full or half empty, Sany said, “It’s not a glass. It’s a pond that’s actually enlarging. The digital economy is a completely different thing. There are vast opportunities out there.”

Transformation enabler

In the digital ecosystem, vendors will definitely have a key role to play. Regarding how they can help telcos transform, Sany contends that, “They need to be thought leaders. They need to work openly in the ecosystems, and collaborate with their customers, competitors and partners. In an evolving ecosystem, everybody works with everybody else in an intermeshed way to create the value fabric. Also throughout the entire hierarchy, you will not only deal with technical people, but you will deal with CEOs where you have to come together and understand the pressures of today and how you transform from your existing business into a future-oriented, future-proof business.” [www](#)

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Getting up close and personal

Trust and transparency the Indosat way



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“Customers are increasingly skeptical about what they buy, about what operators promise,” laments Indosat CMO Andreas Gregori. But it’s not just trust that’s an issue in this unique archipelago of 18,307 islands. Indosat is embarking on an ambitious network modernization scheme that gets closer to customers, builds trust, and delivers the right services at the right time.

By Gary Maidment



Where’s all the trust gone?

With 278 million mobile subscriptions, the Indonesian telecom market is the fourth largest in the world. It’s also a tricky place of business for operators due to a slew of unique features. Hardly anyone has a bank account, almost all subscriptions are prepaid, and micro-transactions comprising daily top ups for voice and data services are the common modus operandi in this culturally diverse nation.

According to Gregori, the ingredients are perfect for “a very disloyal market that offers operators very little control [in terms of] selling and brand experience.” Promotion shopping is the norm, churn is high, and retaining high-value customers the same way carriers do in post-paid developed markets is virtually non-existent.

So, how can the telco create a competitive brand experience based on loyalty? First, Gregori is adamant that service packages must be simple and free of designed-in, hidden costs that confuse

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People have more questions now – how to use this, how to install that. We are a trusted point of contact.

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people: “This is something that’s been built on purpose – or half on purpose. People are very unclear about what they’re being charged for.” He explains that this opacity is why distrust is endemic in the Indonesian market.

Second, Gregori believes that the daily top-up culture and contact with subscribers – in Indosat’s case 55 million of them – offers a huge opportunity to boost the company’s brand equity, “Digital savvy staff in our physical stores and call centers can help people with installation and anything technical,” he says.

In this regard, Indosat has a literal way of getting closer to its customers on a daily basis. With the constant stream of new device and service offerings flooding the market, Gregori has observed that, “People have more questions now – how to use this, how to install that. We are a trusted point of contact.”

The third way to build trust is to incorporate technical network solutions that create value for both customers and the telco by, for example, providing “the right offers at the right time” using insights gleaned from big data and the

responsiveness of a business enablement suite.

Telling it like it is with 4Gplus

Indosat’s transparent business strategy has helped add 14 million connections over the past two years, and contributed to the doubling of data consumption in 2015. Now that 4G is on the table for the nation’s big three telcos after refarming 1.8 GHz, data and user numbers can only go skyward.

In response, Indosat’s 4Gplus product offers affordable handsets, low latency, and high speeds for the same price as 3G. Alongside metrics that are meaningful for users, trust and transparency are big parts of Indosat’s move closer to customers: “The ‘plus’ is the extra we provide for the customer”, says Gregori. It’s also about removing tricks and gray areas: “What we promise is what they get.” In the case of 4Gplus, this includes a free trial period of 10 gigabytes so people can experience the new speeds and feel of video streaming and mobile gaming without any bill shocks.

While some specifics of Indonesia’s communications scene are characteristic of an emerging economy,

user habits reveal a nation of keen communicators and tech adopters. Indonesia is home to the world's fourth most Facebook users, its tweeters are the planet's fifth most prolific, and "YouTube use is staggering," says Gregori.

For these digital natives, 4Gplus is hitting home runs with latency and speed. Music and HD videos can be streamed up to 10 times faster than on 3G, and buffering has been eliminated on the video front. Moreover, a 20 MB game can be downloaded in less than 25 seconds, compared to 3G's leisurely 3 minutes.

To get closer to customers, Indosat is big on partnerships. On the content side, hot names like Spotify are consumer magnets. To some extent this reflects the indirect consumption model in Indonesia where, according to Gregori, "Operators don't have their own retail space." Therefore, partnerships are essential to strengthening brand experience and engendering consumer confidence.

Networking for success

Gregori is clear that the industry is at a crossroads, with a future that's not cut and dried and where strong technical solutions are not enough. Strategic partnerships must therefore run deeper than ever before.

In a time of subscriber gain, 4G, and the rise of video, network modernization under a business partnership with Huawei is a natural step forward. Solutions for big data and Huawei's Business Enablement Suite (BES) are central to Indosat's ongoing network modernization project.

Gregori believes that big data is essential for both generating revenue and retaining customers in Indonesia's instinctively disloyal market. Big data analytics will help Indosat react faster, and

offer the right offer at the right time to prepaid customers to reduce churn.

At the same time, the management and billing capabilities of the online-centric BES will do what a network-centric BSS cannot do. In an increasingly long-tailed market, the BES is more like a neurodynamic tree, where each of its many leaves act as customer touch point for things like queries, subscriptions, billing, payments, delivery, and cataloging. By cutting time-to-market, the BES unleashes relevant solutions that people need – here Gregori gives the example of mobile insurance from third-party enterprises.

Mind the gap

A look at Indosat's colorful website reflects the youthful demographic of Indonesia, where the median age is under 30 and usage patterns reflect a nation that's young at heart.

However, Indosat is not all about targeting the young urban hip, with the company having recently publicized its commitment to bridging the digital divide: "This is at the heart of our repositioning, which we announced on October 20 [2015]," states Gregori. As part of this, Indosat aims to offer the nation's widest 4G coverage in 2016, including remote areas.

In uncertain times that require the telco's 3,000 plus staff – and carriers worldwide – to adapt to digital transformation, Indosat is still clear where it's heading: upgrade its network, expand coverage, kickstart economic activity with CSR, and – in Gregori's words – provide services that are "accessible, affordable, and fun to explore."

Transparency and simplicity can then bring the trust back. 

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TDC Giga speed zips into play



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TDC Group is Denmark's biggest telco and the world's leading multi system operator (MSO). The Danish tech innovator has begun revving up its networks to launch DOCSIS 3.1 in 2016 and hit 1 Gbps speeds to meet ultra-broadband service demands. TDC Group CTO Carsten Bryder told us why things are looking rosy for the Giga era.

By Linda Hu



Key to Giga speed

WinWin: TDC has stated that around 50 percent of Danish households will enjoy Giga speeds by 2018. How are you going to make this happen?

Carsten Bryder: TDC is in quite a unique position, because we deliver broadband services on a mix of copper, coaxial, and fiber access networks. But, increasing customer demand and competition from fiber companies means we need to improve the services we offer and upgrade our network infrastructure.

We're aiming to utilize our cable TV assets to do battle against the fiber players. It's a very cost-efficient way of building the same – or better – broadband capabilities for 10 to 12 percent less than building fiber. We can also offer customers better services. That's basically our rationale for connecting our cable TV customers to the broadband coax network that we're building with Huawei.



WinWin: How do you plan to reach this ambitious goal?

Carsten Bryder: We chose to work with Huawei and DOCSIS 3.1 technology. DOCSIS 3.1 boosts data transmission efficiency by 50 percent over OFDM modulation (Orthogonal Frequency Division Multiplexing) to hit speeds of 2 Gbps upstream and 10 Gbps downstream. It also saves up to 30 percent in per bit cost.

In June 2015, we field-tested a DOCSIS 3.1 compliant head-end device from the Huawei's D-CCAP (Distributed-Converged Cable Access Platform) solution, a test platform for Customer Premises Equipment launched at AngaCom 2015. We ran the test on our coaxial broadband network in Copenhagen.

This early field test used DOCSIS 3.1 OFDM modulation, with extra line signal gains supported by distributed access architecture. This gave us downstream traffic rates of up

to 840 Mbps on 96 MHz, reaching to 3.5 Gbps (downlink speed) and 1.5 Gbps (uplink speed) during test in February 2016. The Huawei D-CCAP solution digitizes Cable Modem Termination System (CMTS) networks, which reduces analog equipment and investment in fiber. D-CCAP can coexist with FTTH in unified platforms, greatly increasing the flexibility of existing Hybrid Fiber Coaxial (HFC) architectures.

We plan to swapover around 50 percent of our customers at the end of this year, and finish network transformation in 2017. So, that's our basic roadmap.

Rich offerings

WinWin: Do you see any offerings as vital for superfast broadband uptake?

Carsten Bryder: We'll see plenty of different services like 4KTU and 8KTU, and even virtual reality. People are watching more video, which

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We want to make sure that customers have all the bandwidth that they need now and over the next decade. That's why we plan to upgrade our cable network to DOCSIS 3.1 early – so we can future-proof our network.

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increases the demand for bandwidth. We want to make sure that customers have all the bandwidth that they need now and over the next decade. That's why we plan to upgrade our cable network to DOCSIS 3.1 early – so we can future-proof our network.

Initially, we'll launch a TV set-top box (STB) in a month or so that will include 4KTU content, and later in the year we'll consider big sports events on 4KTU like the Olympics.

WinWin: What else has TDC got up its sleeve for competing with OTT players?

Carsten Bryder: Actually, we don't see OTT players as competitors. TDC is a cable operator with an STB, so we're the only place that can aggregate content. People don't want one TV channel from an OTT player — they want several TV channels from several OTT players and cable companies. We aim to aggregate what our customers want in one simple STB with a simple

UI. OTT players are in fact driving demand for really fast broadband services, which is also our core business.

Strong partnership

WinWin: Huawei is relatively new in the MSO market. What do you expect from Huawei, especially in this market?

Carsten Bryder: TDC has a special story with Huawei. We're one of Huawei's first customers in Europe and the Nordic area on DWDM – we were also probably the first full-fledged managed service customer in the Nordic area.

Just recently, we completed mobile network transformation. We're looking forward to the DOCSIS 3.1 era, and have a lot of confidence in Huawei. [www](#)

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What should we do before 5G



By Guo Ping, Huawei Rotating CEO

The theme of this year's Mobile World Congress (MWC) is "Mobile is everything". Mobile connectivity will be a very important part of a Better Connected World.

In our future digital society, connections will be like oxygen. We cannot live without connections, just as we cannot live without oxygen.

When our mobile phones have no signal, the shortest distance will feel like the longest in the world.

At last year's MWC, we talked a lot about 5G. No doubt 5G has become the direction of future technological evolution. Huawei has heavily invested in that area, and we will continue to invest.

However, even for the most innovative carriers, 5G will not be commercially deployed before 2020; it might take even longer to roll out 5G networks on a large scale.

As management guru Peter Drucker once said, the best way to predict the future is to create it.

Before 5G arrives, what should we do to address the uncertainties brought about by new technologies and new business models?

There are three things that we can do.

The first thing we should do is increase connectivity.

Huawei has published the Global Connectivity

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However, even for the most innovative carriers, 5G will not be commercially deployed before 2020; it might take even longer to roll out 5G networks on a large scale.

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Index (GCI) since 2014. We estimate that by 2025, there will be 100 billion connections globally. Among these, 55 percent will come from the business world, such as smart manufacturing and smart cities. The value of connections lies in improving productivity and delivering better financial results.

The other 45 percent will come from consumer areas such as smart homes, the Internet of Vehicles (IoV), and wearables, which will greatly improve our quality of life.

The connections among 7 billion people will only account for 10 percent of the total. The majority of connections will be between people and things, and between things and things.

Today, 99 percent of equipment is not connected to the Internet. So the first thing we should do is increase connectivity.

We've officially established our global NB-IoT Forum. This will help carriers support the huge market for IoT applications.

Now I would like to share a case from the marine transportation industry.

Customs clearance for long-distance logistics is a major factor that impacts the industry's efficiency. In marine transportation, people have added a special type of lock to some containers, and even small parcels.

This lock integrates GPRS, GPS, and RFID technologies, which can monitor the shipping process. If it can be proven that the lock has not been opened during the shipping, customs officers will allow these containers and parcels to pass quickly without opening them. This has greatly increased customs clearance efficiency.

Such tracking and communications require very low power consumption, wide coverage, strong signals, and high-density connections in specific areas.

NB-IoT is the key technology that satisfies these needs. This technology not only applies to long-haul shipping, but also to scenarios such as urban logistics, supermarkets, and asset transfers within companies.

After 4G, 4.5G will be the basic enabling technology for digital transformation.

4.5G will provide three basic features:

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Before 5G arrives, we need to get started. We need to better understand the needs of verticals, and create new business models and new business value via new connections.

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1. A data rate higher than 1 Gbps.
2. An HD voice and video experience anytime, anywhere.
3. Large-scale IoT capabilities supported by NB-IoT.

These will also be the basic features of mobile networks over the next five years.

The second thing we should do is shift from being supply-driven to being demand-driven so as to enable vertical industries.

According to a UN report released in 2010, many strategies of the ICT industry have long been supply- rather than demand-driven.

Frankly speaking, we used to provide services based on the technologies we had. And verticals didn't really demand the telecom industry to change.

However, things have changed. We have already seen a shift from a supply-driven to a demand-driven business model.

As various smart city applications emerge from areas such as power grids and transportation,

people will demand more from networks. This will mean more challenges for us, in terms of numbers of connections, bandwidth, and latency.

Now I'd like to use Safe City to illustrate how demand drives industry change.

I believe recent public security incidents are still fresh in our minds. When building safe cities, governments need to quickly increase their capabilities to prevent crises, respond to emergencies, and make decisions quickly.

To realize Safe City, we need to address specific challenges: Onsite situations are often not visible, information silos exist among municipal departments, and a uniform command is difficult.

Therefore, a good video experience is key, though this will exert great pressure on bandwidth. As we know, uploading one HD video often requires a bandwidth of 8 Mbps. It is extremely difficult for mobile carriers to transmit huge amounts of video data via their existing public wireless networks.

Let's look at a case in Kenya. Huawei helped local carrier Safaricom deploy a private Safe City network. It integrates broadband trunking to

realize visualized end-to-end command. After the network was put into use, the crime rate in the covered areas decreased by about 46 percent.

In this project, Safaricom actually played the role of a System Integrator (SI) for private networks.

For future mobile networks, should we integrate high bandwidth requirements into public networks? Can we use virtual private networks (VPN) to provide services? If public networks are capable enough, will industries still want to have their own networks? These are the questions we need to answer and discuss with industries.

The third thing we should do before 5G arrives is redefine network capabilities. Carriers need to establish software-defined architecture, achieve agile operations, and develop Big Data operation capabilities.

Huawei has launched the SoftCOM architecture. This architecture has enabled carriers to deploy software-defined networking, develop virtualized networks, and move networks to clouds. SoftCOM will truly enable ICT convergence.

Carriers need to choose a strategic partner that has integration capabilities. In addition, they should also develop their own integration capabilities and build a more open and innovative ecosystem.

Next, I would like to give an example about Huawei and China Unicom-Shanghai, and share what we have done to shift towards a next-generation Telco OS.

Compared with Internet services, it takes a much longer time to launch telecom services. This has been a big headache for us over the years.

Last year, Huawei helped China Unicom-Shanghai upgrade its business support system. As a result, its international bank clients can subscribe to private lines and cloud services within 10 minutes.

China Unicom also integrated big data analytics with its new service promotions, and developed targeted campaigns to increase its promotion success rate from 0.7% percent to 16 percent while greatly reducing complaints.

China Unicom-Shanghai has also conducted some trials in the application of Big Data in verticals, thus monetizing the value of Big Data. The company supplies anonymized data to marketing and advertising companies. This particular trial has generated around US\$4.5 million in the past two years.

I believe this is only a small part of a long journey. However, it's important to act, rather than waiting for new technologies to arrive and resolve all our problems.

Based on one forecast, the total digital transformation market will reach US\$15 trillion by 2025.

Before 5G arrives, we need to get started. We need to better understand the needs of verticals, and create new business models and new business value via new connections. We need to support verticals during their integration, and enable the digitization of traditional industries, thus driving forward a digital revolution.

Carriers will be at the core of a Better Connected World. We would like to work together with them to create a better network environment, so everyone can enjoy the convenience of connections. 

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Now's the time for telco central offices to offer cloud business



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Are telecom operators late to the cloud service sales party? How will telecom services look once they migrate to the cloud, and what implications does this have for the enterprise domain and communications industry.

By Ronald Chung, Senior Marketing Officer



The future of cloud services and the role of telcos

“AT&T will virtualize 75 percent of its network functions by 2020, and to do that, we need to move to a model of sophisticated software running on commodity hardware,” says Andre Fuetsch, senior

VP of Architecture and Design at AT&T. “We’re becoming a software and networking company. As a result, our central offices are going to look a lot more like data centers as we evolve our networking infrastructure.”

Telco central offices can look forward to second lives as cloud data centers. After AT&T and other major telecom operators like Verizon, DT, and

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In Europe, 65 percent of IT decision makers believe that IoT, Industry 4.0, and mobile digitization like self-driving cars will be the big demand drivers for data center services over the next few years.

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China Unicom upend their sprawling network infrastructures to make them more agile with software, most will eventually look less like typical central offices and more like cloud data centers.

Data center IP traffic will grow at a CAGR of 25 percent from 2014 to 2019 to reach 10.4 zetabytes (ZB) per year by the end of 2019, up from 3.4 ZB per year in 2014. In the same time frame, global IP traffic in data centers will grow threefold over the next 5 years.

More business than ever is happening online and data centers are feeling the effects. The data center market saw tremendous growth in 2015, with independent providers in the US alone earning revenues of US\$115.3 billion and experiencing growth of 6.1 percent. This trend was driven by the increased dependence of both private industry and government on outsourced data hosting and processing. For example, content providers like Netflix and Comcast are demanding more data center space as data-driven entertainment consumption becomes the norm.

In Europe, 65 percent of IT decision makers believe that IoT, Industry 4.0, and mobile digitization like

self-driving cars will be the big demand drivers for data center services over the next few years.

Alongside the fast growth in traffic sits a corresponding increase in the number of data centers. Supply is growing to meet demand, but improvements in workload efficiency and server density are also contributing to the increase. Around 200,000 data centers of all sizes are running today, offering a combined installed capacity of 64 million square meters of server space. Capacity is expected to grow by about 10 percent annually to reach 93 million square meters by 2017.

Facebook is currently the world's most popular website, with more than 4.75 billion content items shared each day. These include status updates, wall posts, photos, videos, comments, and more than 20.1 billion friend connections, 6 billion likes, and 7.8 trillion messages. More than 400 billion photos have been uploaded to the site, with another 350 million added each day. Facebook's data center in Sweden is expected to generate 9 billion Swedish kronor (US\$1.1billion) in full economic impact.

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In Europe, 65 percent of IT decision makers believe that IoT, Industry 4.0, and mobile digitization like self-driving cars will be the big demand drivers for data center services over the next few years.

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By turning legacy PSTNs and telco's central offices into a competitive advantage, Huawei unlocks new revenue opportunities for carriers by migrating PSTN and telco central offices onto efficient, ultra-broadband IP network architecture along with Huawei's SDN/NFV solutions and cloud strategies.

Carriers are shifting from an old PSTN world to a new IP era to become software-defined operators. The network architecture of the future will be based on data centers that transform existing mobile, fixed, and telecom service silos into a unified cloud business for carriers.

The sun's out with Huawei cloud

Carriers now know that running mobile VAS on silo systems that don't fully utilize IT resources cripples new service rollout due to high OPEX and CAPEX. Mobile VAS in the cloud includes various types of communications, content, commerce, and applications. Leading carriers are aiming to benefit from cost improvements, better functionality, service integration, and convergence across service types when unconstrained by device type, network type, and vendors.

The Huawei VAS cloud reconstructs traditional VAS architecture based on a cloud platform by integrating telco VAS, supporting service innovation, helping operators improve TUV, decreasing TCO, and increasing efficiency.

The shift to off-premises cloud services continues to drive changes to North America's enterprise IT strategy and new cloud architecture for data centers, with companies planning to spend a third of their IT budgets on off-premises cloud services in 2016. By 2020, investment in data centers will hit US\$110 billion, of which the government will be the big individual spender with an investment of US\$21 billion. Moreover, Gartner's 2015 Magic Quadrant for Cloud-Enabled Managed Hosting in Asia Pacific reports that 6 out of 15 cloud service providers are carriers.

The Cloud-Enabled Managed Hosting service uses multiple delivery models:

Multitenant on the provider's premises: Most commonly, compute, storage and networking hardware are shared by many customers, housed in the service provider's facilities, and fully managed by the provider. This scenario encompasses cloud

Infrastructure as a Service (IaaS) offerings for which the provider offers management of guest OS instances.

Single-tenant on the provider’s premises:

Compute and storage hardware is dedicated to one customer and housed in the service provider’s facilities.

Single-tenant on the customer’s premises:

Compute, storage, and networking hardware is dedicated to one customer and housed in that customer’s data center facilities; however, it’s owned and managed by the service provider in basically the same way as the other two approaches.

The Huawei Carrier B2B Hosting Cloud solution suites cover these three delivery models to enable carriers to provide both multitenant and single-tenant solutions on carrier premises with IaaS and managed services.

For large enterprises and governments, carriers can take one step forward to solving large enterprise and government pain points in data center management and operations. By consolidating the number of data centers, unifying IT resources, and cloudifying data center infrastructure, carriers can use the competitive advantages their brand carries. They can also benefit from understanding national regulations, excellent local support services, advance network performance, and secure IT services. They can then provide cloud applications, e-business hosting, general business applications, enterprise applications, development environments, and batch computing.

Gartner’s view

The global revenue of public cloud services will

soon reach US\$200 billion, with 6 percent of this – US\$12 billion – going to carriers. In the business market, carriers are particularly well-positioned to deliver cloud services because they already own the networks and enjoy trusted customer relationships.

Carriers can offer business cloud services under a simple pricing structure that includes connectivity, QoS, self-service provisioning, and on-demand ICT infrastructure. Carriers can also provide IaaS like analytics and reporting, predictive capacity planning, and managed services, all of which are welcomed by enterprise CIOs. In carrier ICT services, carriers deliver cloud-based capabilities supported by SDN/NFV to guarantee SLAs. This approach can take advantage of their cloud infrastructures, including data centers and networks.

Seen as a trusted partner, carriers with cloud offerings are the natural choice for enterprises to take advantage of the tech. B2B cloud services are thus a new blue ocean market where carriers can increase revenue and climb the market ladder.

For carriers to be successful in the cloud by 2020, we see four foundation pillars. First, a C-level cloud business vision and strategy must be defined and implemented. The most important is the second pillar, which provides the carrier cloud business with a dedicated organization and team to drive to the market. The third pillar involves carriers segmenting their enterprise customer base. The fourth pillar is making use of carrier network and bandwidth to create differentiation and competitive advantages. [www](#)

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The four faces of B2B2C

Telco+enterprise makes business personal



Scan for mobile reading

In China's Internet Plus era, convergence sits at the heart of enterprise business models, with some of the nation's biggest hitters embracing the plus trend to implement digitization: advertising + Internet = Baidu; e-commerce + Internet = Taobao; and payment + Internet = Alipay.

By Lu Wei & Fang Lei

Traditional verticals like finance, logistics, education, healthcare, printing, F&B, and the transportation industry are going digital fast. But, Internet Plus is not just about e-commerce – it is in fact the complete transformation of business models. Internet Plus offers a new way of growth by promoting economic digitization. A digital economy is hugely beneficial: It optimally allocates the factors of production and maximizes the integration effect, binds the online world with socioeconomics, and puts in place workable business and economic models with the Internet serving as the infrastructure and providing the tools.

Internet Plus for telcos

There are two types of telco models when it comes to convergence: B2B and B2B2C. B2B regards business users as end users, with telcos providing products such as cloud, big data, industry applications, and networks. However, traditional IT enterprises have been owning the competition due to their clear advantages, meaning that telcos need to get more involved in IT infrastructure like cloud and networks to grow

in stature.

The B2B2C model in many ways offers the business nutrients for growth. Telcos can import the Internet gene in the form of cloud computing, e-commerce, and big data, and enable businesses to serve the end user with something approaching a ROADS experience.

The B2B2C model in an O2O (online-to-offline) format can really make the opportunities for telcos limitless.

The four faces of B2B2C

In the B2B2C business model, end users exist in the B and C domains as current or incremental users. Four sub-models exist under the main model.

Type I: End users are current users of both the vertical and telco

Let's imagine Thomas walking to the office one day when he smells coffee and, at that exact moment, his cell phone beeps with an e-coupon from Starbucks, persuading him in a nanosecond



to drop in for a brew. The real-world Starbucks-telco cooperation model sees the telco sharing data on customers' spending habits, including time, place, and beverage preference. When the network senses a customer in the vicinity of a Starbucks, it sends the subscriber coffee coupons based on what he or she likes to drink. Likewise, NTT DoCoMo and McDonald's have established a joint venture to mine user behavior data and send e-coupons to encourage users to keep on buying their preferred choices from the fast-food giant.

In this model, the telco (B) and traditional vertical (2B) share current users' data to categorize users and provide them with personalized O2O services whereby the telco uses its network to promote repeat purchase habits. The business helps the telco provide VAS, increasing the value and loyalty of current customers to both businesses.

Type 2: End users are telco subscribers and incremental users of the vertical

With 33 percent of its population over 60, around

12 percent under the age of 14, and a fertility rate of just 1.26, Japan's aging problem is a huge issue for the nation. One infrastructural problem that's happening is the strain on healthcare facilities, leading to a stark choice for providers: maintain medical quality or expand capacity.

NTT DoCoMo and Omron's joint venture DoCoMo Healthcare seeks to ameliorate this problem with a mobile medical care solution for families that provides Omron equipment on phones, including blood pressure and sleep monitoring apps. With 1 million DoCoMo users jumping on board for the service at the get-go, the partnership makes it easier to collect and collate patient information and remotely monitor patients, while cloud computing improves information management. Using big data analytics, users' health reports can be sent to hospitals, and – for the telco – fees can be charged in the form of different service packages.

In neighboring China, the BFSI industry is benefiting from this model, with China Unicom importing its first customers to take advantage of the Shanghai Bank-

Unicom joint credit card.

Habitual Internet users want increasingly personalized services for things like health and adult education, and telco-enterprise collaboration is an effective way of going about this. Telcos also benefit the vertical by enhancing enterprises' service portfolios and reach, importing users to the enterprise and rapidly expanding the user base. In turn, the vertical enables the telco to provide VAS that users want, thus increasing user value.

Type 3: End users are incremental telco subscribers and current users of the vertical

In Europe, the US and Japan, the competitive nature of the automotive insurance industry has prompted some insurance companies to introduce UBI (Usage Based Insurance), which makes fees dependent on measuring the type of vehicle against time, location, distance, and behavior. UBI saves users more than 20 percent on insurance premiums and can cut claims on the most common accidents by 12 percent. Back in 2011, the largest insurance company in the US, State Farm, began cooperating with Verizon to offer UBI services, including data analysis, diagnosis, roadside assistance, and anti-theft. Under the partnership, Verizon provides the big data analytics platform and network access services for UBI.

Fiercely competitive verticals want to introduce e-commerce, big data, social networking, and other Internet elements into their business models to reduce OPEX, boost current users' value, and reduce churn. In this model, the telco imports online capabilities and develops incremental users from the vertical.

Type 4: End users are the incremental users of both the telco and vertical

In May 2015, Cudoon and the Industrial Bank

jointly brought out Hing Dong, the first wearable mobile payment solution in the form of a smart bracelet, as well as other favorite functions like a pedometer and heart rate monitor. The partnership complemented this with a credit card.

For mainstream customers, the telco and vertical jointly innovate Internet products and provide rewards like points and coupons for incremental users to subsequently make purchases. This model can quickly attract new users.

When to apply the four models

The four B2B2C Internet Plus innovation models can be used in different stages of the development market.

The first model is mainly used when telcos transform from demographic dividends to traffic dividends. By providing end users with an easier way of buying things, telcos can increase current user stickiness and boost their value. The second and third models are mainly used in the transition period from traffic dividends to data dividends. Giving end users personalized services lets telcos maintain and increase user traffic and usage.

The fourth model is mainly used in the transition period from data dividends to information dividends. Combining end users' online features offered by the telco with the offline demand trends stimulated by traditional verticals lets both innovate online products and services, and thus expand the market.

The B2B2C model helps verticals provide more personalized products and services. In this space, telcos need to establish an Internet operating platform to import Internet genes into traditional verticals and provide a ROADS experience for end users. www.road5.com

Editor: Gary gary.marcus.maidment@huawei.com

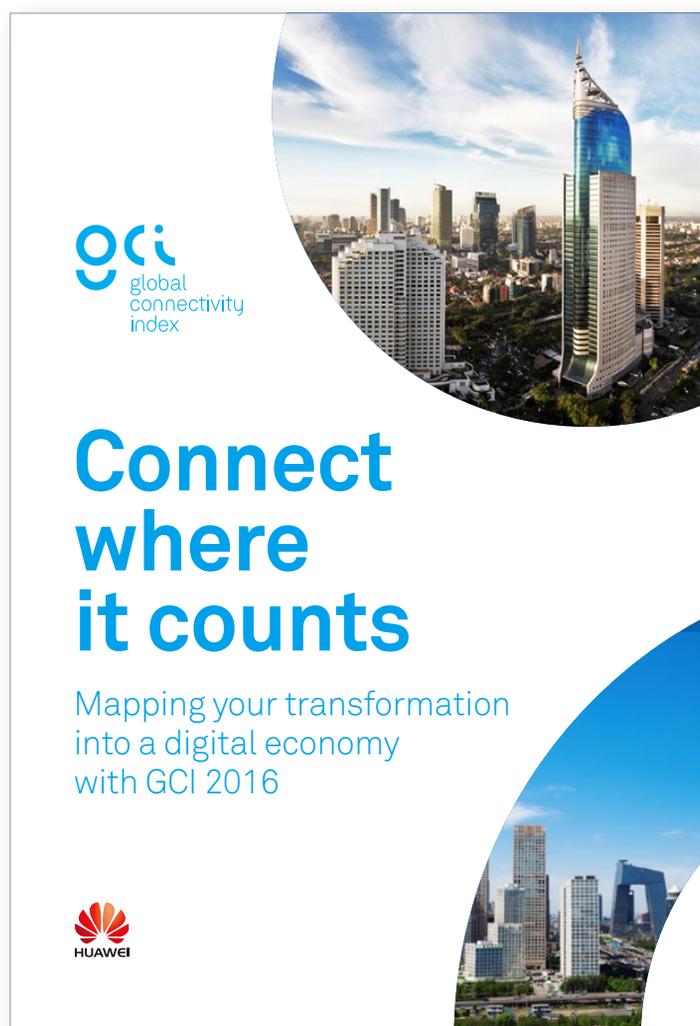
Connect where it counts

Mapping your transformation into a digital economy with GCI 2016



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Huawei is proud to present Global Connectivity Index 2016. In its third year, the report measures the progress 50 nations are making in ICT to achieve economic digitization. Combined, these nations make up 90 percent of global GDP and 78 percent of the world's population.



As you're reading this, a revolutionary shift is happening in the way the world works, with economies across the planet going digital fast.

So, what were the major digital transformation trends in 2015? The main investment target of all nations was broadband, both speed and coverage, and as a result overall connectivity levels are 5 percent higher than in 2015.

Developed economies concentrated on accelerating downloads and cutting latency. They also made headway in deploying cloud services, big data analytics, and the Internet of Things (IoT) – but not to the extent that can prevent economic stagnancy right now. Data is simply not creating the value it could.

Emerging economies are focusing on broadband coverage, but they're weak in cloud, big data, and IoT. This is hindering the productivity and scaling benefits of digitization. Individually, some countries like the UK, Malaysia, and Indonesia played a great

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Investing in these five ICT tech enablers – especially broadband – lays a muscular infrastructure for digital transformation and long-term economic health, competitiveness, innovation, and productivity.

”

game over the past year, making gains and jumping in rank. Not all countries are reaping the benefits of the digital whirlwind, though – the rate of increase is uneven, and some countries are falling behind.

But there's a way out.

Balancing four economic pillars can form the necessary foundation for ICT to thrive. These pillars are supply, demand, experience, and potential. Technology needs to be available or governments, industry, and people can't use it; it needs to deliver a good experience or people won't use it; it needs to sow the seeds for a better future or its potential is wasted.

While everyone instinctively knows that technology is good, investment in ICT is invisible – it isn't as obvious as police on the streets, a new school, or more nurses. However, here's what we've found: a one-point increase in your national GCI rating correlates with the following:

- A 2.1 percent increase in competitiveness
- A 2.2 percent rise in innovation
- A 2.3 percent jump in productivity

And it can help drive up your GDP per capita – the pulse of economic health.

How much your GCI score ramps up GDP depends

on which stage your country is in when it comes to innovation. We've identified four stages of digital maturity: Foundation, Internet, Data, and the stage no country has reached yet – Augmented – where we will see machine-enhanced innovation based on big data analytics and IoT.

Let's get back to ICT. It encompasses many things, but in this white paper we talk about five key technologies that enable economic digitization: broadband, data centers, cloud services, big data, and IoT.

Investing in these five ICT tech enablers – especially broadband – lays a muscular infrastructure for digital transformation and long-term economic health, competitiveness, innovation, and productivity. Nations in the early stages of economic digitization should develop long-term technology plans that include broadband and data centers to reap the benefits of enhanced growth. Developed economies wanting to capitalize on their frontrunner status in ICT should invest more in cloud, big data, and IoT technologies and solutions to experience the full benefits of a digital economy.

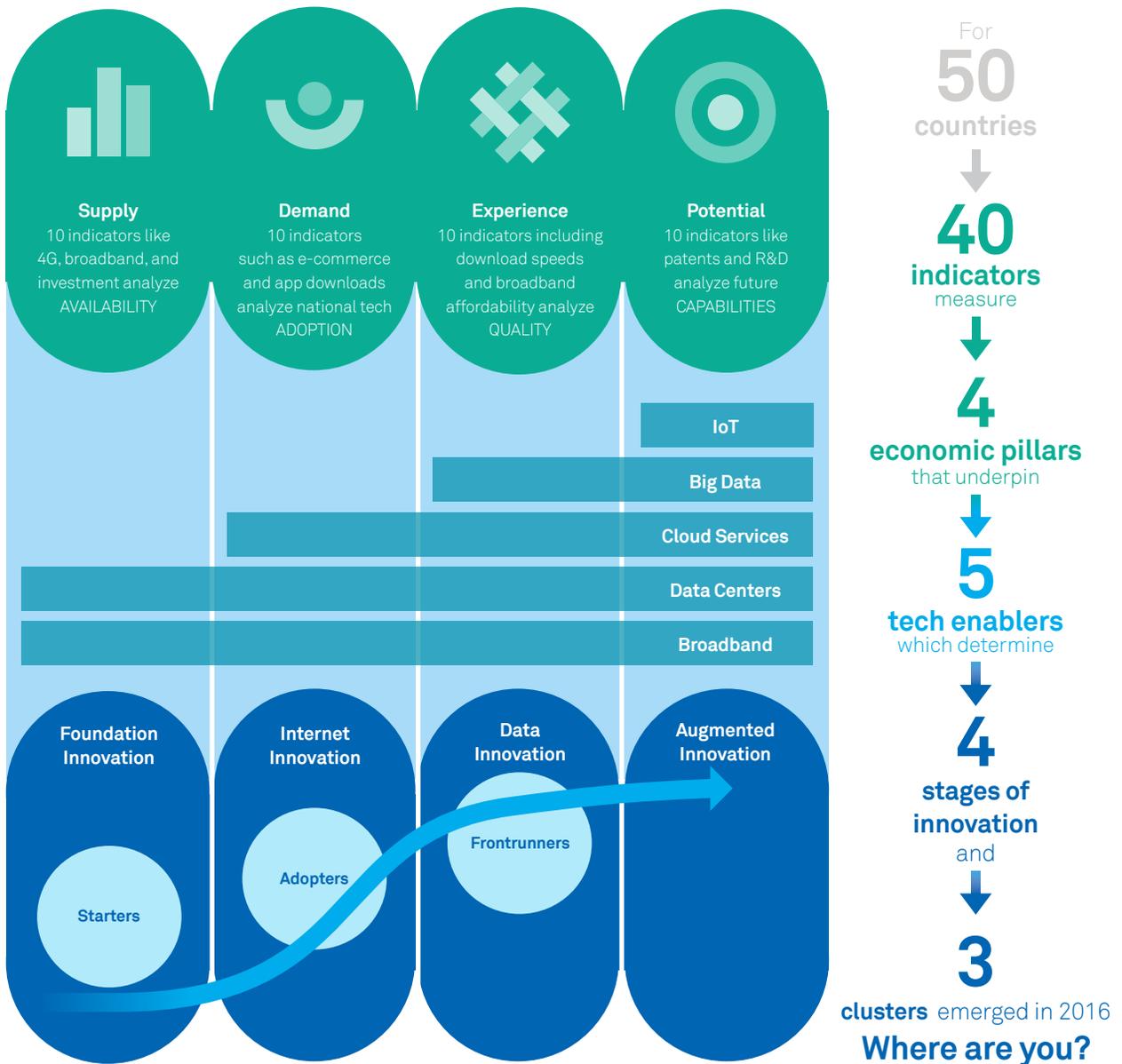
There are no shortcuts on the journey to digital transformation. Find out where you are and where you can go by connecting where it counts. [IBM](#)

Read the full report at huawei.com/gci

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While everyone instinctively knows that technology is good, investment in ICT is invisible – it isn't as obvious as police on the streets, a new school, or more nurses.

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LG Uplus

Catalyzing success with HD voice and video



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The Korean Telco LG Uplus has enjoyed good fortune since it built its LTE network in Seoul with Huawei back in 2013, recognized by award wins at the 2014 LTE World Summit in the Netherlands and the 2014 GTB Innovation Awards in London.

By Wang Qi

Editor: Gary gary.marcus.maidment@huawei.com





HD VoLTE for diversity and loyalty

LG Uplus is positioning ubiquitous HD voice and video at the heart of its competitiveness in Seoul, one of the most densely populated cities in the world with more than 10.5 million people spread over 11,704 square kilometers. Currently, the 4G VoLTE services offered by the Korean telco include HD voice with reduced call setup delay. Unlike most 4G subscribers in Korea who need to switch to 3G to make a call, LG Uplus subscribers enjoy high-speed data services when they use its voice service. LG Uplus optimizes LTE network coverage with low-frequency 850 MHz and CoMP alongside other cutting-edge tech to deliver an optimal VoLTE service experience.

The 2015 Open Signal report indicates that LG Uplus' LTE network coverage leads the competition at 99 percent, which LG Uplus

complements with its improved VoLTE MOS, hitting above 4.0 in about 90 percent of its covered areas to realize ubiquitous HD voice.

As part of its diverse service range, LG Uplus launched its VoLTE rich interactive media service UWA, letting subscribers access video, music, web pages, picture, location, and other real-time services during phone calls – the average call by UWA subscribers is twice as long as that of non-UWA subscribers, and data traffic 2.5 times as high.

By April 2015, LG Uplus had successfully attracted 7 million VoLTE subscribers, 77 percent of its total 4G subscribers. According to the Investor Presentation it released in May 2015, the telco's churn rate is at a record low, and the lowest of all three major local operators, testifying to VoLTE's power to give a better user experience, richer services, and higher subscriber loyalty.

“Unlike most 4G subscribers in Korea who need to switch to 3G to make a call, LG Uplus subscribers enjoy high-speed data services when they use its voice service.”

Forging ahead with HD video

Statistics from the Ministry of Science, ICT, and Future Planning (MSIP) show that each LTE subscriber in Korea was using on average 3.4 GB at the end of Q1 2015. This rises to 4 GB for LG Uplus subscribers, and doubles to 8 GB for the telco's U+HDTV subscribers. Revenues have risen in tandem, with ARPU increasing by 4.5 percent year-on-year since Q1 2012 to become the highest of all operators' by the end of 2014. Mobile HD video services are the main driving force behind such tremendous growth.

Mobile video is a basic LTE service, and the cornerstone of big hitters like Vodafone, Verizon, and China Mobile. LG Uplus is undoubtedly one of the most successful operators in this regard, having developed video apps with some pre-installed on devices, acquired content sources, and cultivated subscriber habits. The LG Uplus

service Uflix Movie offers 18,000-plus HD movies for a truly private and mighty mobile cinematic experience. Its IPTV offering U+HDTV leads the field with over 7.4 million subscribers – 14.6 percent of the nation's 50.6 million people.

LG Uplus ensures that its network is sufficiently robust to support HD video services. Tests on its LG Uplus network showed a download rate of 118 Mbps and initial buffering of an HD 1080P video of less than a quarter of a second – exactly the type of experience LG Uplus wants to give its subscribers. And that's why LG Uplus is working with Huawei to formulate vMOS standards that can precisely evaluate video service experience.

In reward, LG Uplus has increased subscriber numbers, ARPU, and awards. Providing subscribers with a superior HD voice and video service experience is at the core of the telco's strategy, and is paving its evolution to 4.5G. [www.lguplus.com](#)

Painting ICT green with Spain's Telefónica



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With the strategic aim of becoming a green telecom leader, Telefónica set and initiated its green ICT plan back in 2007. In that year, the carrier started to focus on using less energy and reducing CO₂ emissions to engender sustainable services and urban environments.

By Cui Yangyang

Editor: Linda Hu hushenglan@huawei.com



“The rapid emergence of MBB and FBB has seen global traffic soar, a phenomenon that’s put pressure on networks, jeopardized service quality, and increased the energy used by equipment.”

Energy efficiency is the green key

As a global leader in the fixed-line and mobile domains, Telefónica’s network covers 21 countries across Europe and Latin America, and serves more than 300 million users both directly and also through its subsidiaries, which include O2, Movistar, and Manx Telecom.

The rapid emergence of MBB and FBB has seen global traffic soar, a phenomenon that’s put pressure on networks, jeopardized service quality, and increased the energy used by equipment. To address these issues, Telefónica had to boost its scattering abilities and the power capacity of its communication sites and equipment shelters.

The carrier’s existing network was suffering huge power losses from legacy power systems running at sub-90 percent efficiency. Limits caused by geography and electricity supply meant that some regions were devouring fuel and ravaging the environment by resorting to diesel generators (D.G.) as the primary power source.

Telefónica was tasked with balancing service development, reducing damage to the

environment, and cutting OPEX. Ganriel Bonilha, Telefónica’s Energy and Infrastructure Deputy Director, made the pledge to modernize its power solutions so as to “no longer allow these legacy systems to waste resources,” and asserted the “company’s commitment to cutting expenditure on power and oil.”

Telefónica’s 2007 plan aimed to use 30 percent less energy by 2015, save €50 million in power costs by 2017, and cut CO₂ emissions by 30 percent by 2020. However, Telefónica’s 21-nation network was running different voltage standards and operating environments, and was facing increasing difficulty acquiring sites.

Moreover, sites were affected by excessive complexity, space limits, weight restrictions on features like rooftops and poles, and multiple energy infrastructure suppliers. In combination, these issues threatened future network capacity expansion and development. Telefónica required a network-wide overhaul that would simplify and centralize the management of all its sites and equipment shelters.

To solve legacy problems and achieve its green plan, Telefónica partnered with Huawei to develop solutions for different types

of sites, equipment shelters of varying capacities, and complex and changeable usage environments.

Green is simple

In 2010, the Telefónica Group began upgrading its network power supply framework and incorporating Huawei's power systems, opening the door to collaboration on infrastructure projects. A series of successful trials gave Telefónica a clear understanding of the power supply framework it needed, which it then shared with its subsidiary networks. By 2011, Huawei had provided various kinds of customized power systems tailored to each of Telefónica's subsidiary networks.

Then, in 2012, Telefónica inspected Huawei's factories, and lab tested its high efficiency outdoor power system. The tests set an industry record of 96 percent system efficiency, 6 percent higher than traditional solutions, giving the green light for the mass deployment of 20,000 sets across Telefónica's subsidiary networks. Assuming a single site consumes 3,000 watts on average, the Huawei solution saves a staggering 3.65 million watts of electricity per year.

In 2014, the two parties jointly launched a pilot office at Telefónica's headquarters in Spain to research and test reducing the energy used by D.G.s. Compared to a conventional D.G. running for 24 hours, Huawei's hybrid electric-oil diesel generators used 60 percent less oil running 8 hours a day.

In 2013, Telefónica's Peru subnet agreed to help the Peruvian government improve rural communications by building a public mobile



network comprising a high number of base stations. However, Peru's rural areas are primarily in mountainous or forested areas, and over 50 percent of villages were not connected to the power grid. This meant that access to electricity was difficult: villages were generally located between 7 and 10 km from the grid, so access costs were extremely high, averaging US\$30,000 per kilometer.

Because one-third of Peru receives enough sun for solar power, Telefónica selected Huawei's hybrid solar power solution for the entire network of around 2,000 sites. When deployed, the scheme delivered a solar conversion efficiency of 98.5 percent and resulted in a slew of benefits: It resolved coverage problems in remote areas, slashed CAPEX and O&M costs, required no oil, and established a model for green mobile solutions in a rural setting.

By 2014, Telefónica had made great progress in accomplishing its green ICT plan. Then, Telefónica's Director of Operations, Juan Manuel Caro, announced the group's new goal of saving €50 million in energy costs by 2017 at the 5th Energy and Climate Change Summit.

In response, the group's Mexican subsidiary has spearheaded energy conservation work by formulating a plan to upgrade its small, crowded indoor power systems. Telefónica wanted to

“Telefónica’s 2007 plan aimed to use 30 percent less energy by 2015, save €50 million in power costs by 2017, and cut CO₂ emissions by 30 percent by 2020.

reuse its existing assets as far as possible, control project fees, and greatly increase power efficiency without adding new cabinets.

The carrier opted for Huawei’s sub-rack power relocation and upgrade plan, which used existing power cabinets and backup batteries to reduce costs. Post-upgrade power efficiency increased from 85 percent to above 96 percent and, remarkably, the payback period for almost 800 sites is estimated to be less than three years.

Collaboration forges a green leader

Years of cooperation have seen Telefónica and Huawei jointly deploy many power supply solutions in telecom sites and equipment shelters. Examples include systems and solutions for rooftop-stacked power, pole power schemes, power sharing, hybrid D.G.-grid power, and indoor sites. Running on Telefónica’s existing networks, Huawei’s power equipment can support MIMO multiple energy source input and output such as HVDC and remote DC supply. It also provides intelligent NMS access to deliver visible, controlled, and manageable network O&M.

Telefónica expressed its appreciation for Huawei in 2014, bestowing on it the group’s award for Best Partner. Hou Jinlong, president of Huawei Network Energy, described the successes the two have enjoyed together: “We are very happy to have helped Telefónica resolve problems such as site acquisition, construction, and O&M in complex environments, and assist Telefónica maximize energy efficiency and reduce energy use, emissions, and OPEX.” He went on to express the value Huawei places on the partnership, “I’d like to thank Telefónica for its sustained faith in Huawei, and for choosing our all-scenario, full-series, and customized telecom energy solutions.”

Hou believes that the evolution of network architecture, power supply frameworks, and network energy efficiency are long-term processes that require the two industry leaders to continue walking a long road together. Expressing Huawei’s intentions for the future, Hou concluded that: “We sincerely hope that Telefónica and Huawei will maintain a long and strong partnership that continues in the spirit of innovation. Huawei is committed to helping Telefónica become a leader in green ICT services.” [www](#)

TeliaSonera

scores another first with 4.5G



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On December 14, 2015, Norwegian telco TeliaSonera teamed up with Huawei to unleash the world's first 4.5G network in Oslo. The network – LTE-Advanced Pro – is the world's fastest, reaching outdoor peak rates of 1 Gbps. The leap from 100 Mbps to 1 Gbps seven years later is an impressive technological breakthrough that testifies to the telco's commitment to customer experience.

By Zhou Dongfei

Editor: Linda Hu hushenglan@huawei.com



VoLTE deployment also helps TeliaSonera provide voice services on the 4G/4.5G network instead of on 2G and 3G networks. GSM KPIs, and guarantee basic voice services.

Why 4.5G?

With full coverage and a peak data rate of 300 Mbps thanks to LTE-Advanced technologies, TeliaSonera's 4G network was already impressive – so, why did they take the plunge with 4.5G? The answer can be found by a closer look at traffic jumps, user experience, the Internet of Things (IoT), and network evolution to 5G.

The global increase in data traffic is no secret. With the commercialization of its 4G network, TeliaSonera provided subscribers with layered tariff packages, fueling a 40 percent annual surge in network traffic, with video accounting for 40 percent of the total volume. Way above and beyond 4G, evolution to 4.5G provides a peak rate of over 1 Gbps. Moreover, tech like massive MIMO, massive CA, and 256 QAM vastly improves spectral efficiency and raises network capacity multiple times, satisfying user needs for the next three years and making 4.5G an attractive choice.

TeliaSonera was also attracted by the improvement 4.5G visited on VoLTE, which is

gaining in popularity. Compared with 2G and 3G voice services, VoLTE is great for users thanks to a call setup time of 1 to 2 seconds – down from 6 to 7 previously – coupled with HD voice quality enabled by the broadband voice codec.

Keep talking and keep watching

VoLTE deployment also helps TeliaSonera provide voice services on the 4G/4.5G network instead of on 2G and 3G networks. Refarming all spectrum resources to the 4G/4.5G network prevents costly maintenance on multiple networks; however, coverage enhancement and interference coordination technologies are needed to guarantee the availability of VoLTE services and voice quality consistency, and to meet the challenges caused by areas of weak coverage and at cell edges.

With 4.5G, TeliaSonera can distinguish itself in the full-HD space. Superior voice codecs such as enhanced voice service (EVS) can expedite evolution from HD to full-HD voice services to achieve real-time applications like face-to-face



conferencing.

4.5G also improves video services, which relies heavily on video source resolution, initial buffering time, and stalling times. This is important because the nascent popularity of HD and 2K videos on mobile terminals poses new challenges, especially at cell edges. The data rate of a moderately loaded 4G network is 5 Mbps, which doesn't fulfill the requirements of 2K and 4K video. 4.5G can improve the data rate at cell edges to give an unrivaled video experience.

Keeping an eye on things

4.5G is also an obvious choice for IoT as well as network evolution. TeliaSonera and other competing global telcos are looking for a competitive advantage in the machine-to-machine (M2M) era. Using advanced IoT technologies, the number of M2M connections in Northern Europe is in fact higher than the region's population, and the connection growth rate is twice the global average. But, existing cellular technologies will fail to meet the massive M2M connection requirements predicted for the future.

The incorporation of Narrow Band Internet of Things (NB-IoT) in 4.5G allows TeliaSonera to step confidently up to the plate. Easy to deploy, NB-IoT is based on existing cellular networks. Each cell can provide up to 100,000 connections, and the technology's embedded energy-saving mechanism extends battery life to a decade. Efficient, energy-lite, and cost effective, a single module is expected to cost 30 percent less than a GSM module.

Hello 5G

Unlike 5G and its need for a technological revolution over air interface, 4.5G is an all-around smooth, transition from 4G that can be realized with minimal software upgrades and new hardware. Deployment and service rollout are fast, and investment is protected.

4.5G also looks five years into the future by considering new terminals, services, and experience demands. It aims to support larger bandwidth, lower latency, and massive connections, paving the way for 5G commercialization. As 4G and 5G are expected to coexist for a long time, 4.5G technology can keep telcos an innovative force in the

marketplace – exactly at the time they need to be.

How's Huawei helping?

Huawei pioneered the 4.5G concept back in September 2014 from three angles: Gbps, Experience 4.0, and Connection+. From the dimensions of data rate, Experience 4.0, and number of connections, Huawei has fully tailored 4.5G to the needs and pain points of TeliaSonera.

By the end of 2015, more than 10 leading telecom operators had conducted pre-commercial tests and deployment of Gbps, NB-IoT, and LTE-based broadband trunking services. Huawei believes that 2016 will be a big year for 4.5G commercialization, opening the door to the next era of mobile telecom with telcos around the world deploying 4.5G on a large scale, with Huawei at the vanguard.

With industry-leading and proven key tech, Huawei helped TeliaSonera remove barriers to 4.5G commercialization. Huawei is the first enterprise to commercialize 2CC/3CC CA and launch relaxed-backhaul-based inter-eNodeB CA, significantly increasing the number of UEs using CA.

Huawei is also a leader in performing joint tests and verification of 4CC/5CC CA with telcos. Test results indicate that core 4.5G technology is mature and ready for commercialization. In the area of multi-antenna technologies, Huawei has developed integrated 4T4R blade RRU (Remote Radio Unit) and active antenna units (AAUs). Tests have been completed in Canada, Mexico, Saudi Arabia, and Turkey, all demonstrating big gains from multi-antenna technologies.

Huawei is pushing hard for the E2E maturity of the 4.5G industry chain. It's moving forward with partners in various verticals, and is thus able to provide E2E assurance for TeliaSonera's 4.5G commercialization scheme.

Huawei's HiSilicon and Consumer Business Group are promoting 4CC and four RR channels in the 4.5G commercial plans of mainstream chip vendors. Huawei is scheduled to launch 4.5G smartphones in the first half of 2016, with a lead time that will be much shorter than it was for 4G smartphones. To facilitate the growth of the NB-IoT terminal industry chain, Huawei has acquired the IoT networking firm Neul, and has already manufactured an inventory of HiSilicon chips ready for rapid distribution. Each of these milestones aims at accelerating the commercialization of NB-IoT.

4.5G represents the next step in the evolution of the entire wireless industry. NB-IoT in particular, will bring new business opportunities. But, it requires the concerted involvement of telcos, device vendors, chip and module vendors in terminals, and service vendors in verticals. Huawei is leading the charge to formulate NB-IoT standards, working with GSA and other international institutions to establish an industry alliance. It's also working with telcos to try out IoT pre-commercialization in all sectors. Examples include smart parking with China Unicom and smart metering with Vodafone.

Huawei's pioneering efforts with 4.5G will serve as a reference point to all global telcos as they digitally transform and seek to stay innovative in an increasingly cut-throat market. [www.huawei.com](#)

Wi2 On the virtualization journey



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Established in 2007 under the KDDI umbrella, Acca Wireless was the precursor to Wire and Wireless (Wi2), a Wi-LAN network service provider that now runs more than 200,000 hotspots in Japan. Wi2 CTO Naoto Komatsu shared the secrets of his company's virtualization journey, complete with background, benefits, and the way forward.

By Naoto Komatsu, Chief Technology Officer, Wi2

Editor: Gary gary.marcus.maidment@huawei.com



“Wi2 has already started to use public cloud, noting that NFV gives the company more agility in terms of cost- and time-efficiency.”

— Naoto Komatsu, Wi2 CTO

Why NFV and SDN?

Wi2 recently teamed up with Huawei to deploy a virtualization system and network that incorporates NFV and SDN. In 2014, three major factors brought Wi2 to NFV's door.

First, compared with mobile tech like 3G and LTE, Wi-Fi's lack of standardization has slowed business speeds and investment levels. Wi2 believes that NFV and SDN will bring openness and standardization into play.

The second reason is that Wi2 needs to raise its agility and cut the time spent on tasks such as rolling out networks and dealing with network incidents. The third point in favor of NFV is the benefits it gives in relation to cloud computing – benefits that Wi2 wants to exploit.

Wi2 has already started to use public cloud, noting that NFV gives the company more agility in terms of cost- and time-efficiency. It also creates valuable business drivers that it expects to start generating new revenue streams soon.

Wi2 on virtualization

In 2014, Wi2 started using a public cloud

service commercially in its free Wi-Fi systems for enterprise customers. Understanding the value that virtualization adds to TCO and the speed and ease of operations, we felt it natural to extend it to on-premises systems and the network domain.

Initially, Wi2's target technology was NFV alone, but after conducting proof-of-concept with Huawei, we added SDN into the mix in 2015 to widen the orchestration scope between existing network assets and virtualized network functions.

In Wi2 and with the support of CEO Koji Otsuka, we combined the CTO and CIO roles, making it easier and quicker to move ahead with virtualization projects by eliminating differences in opinion on technological development, operations, and vendor relationships.

NFV and SDN: The good

Practical network benefits from NFV and SDN include capabilities for a flexible and scalable resource pool on cloud. The benefits for internal and external stakeholders include better KPIs, optimized operations, and increased organizational skills.

Better network quality



In 2015, Wi2 was busy deploying networks and systems, but at the same time experienced unexpected traffic peaks and heavy loads. After implementing NFV and SDN, Wi2 expects to cut deployment time by 50 percent and improve user experience, with the virtualized resource pool mitigating issues like overloading and shortages. Moreover, by removing network configuration and operation policy siloes and automatically allocating resources in a flexible way, engineers are free to spend time on higher-value activities.

Lower TTM

It currently takes between two and three months to deploy a new W-LAN network, because of the procurement and rollout process involved and the huge amount of work required for configuration and testing. However, Wi2 expects NFV and SDN to slash network deployment to two to three days and for resource utilization to greatly improve.

Simple and scalable operations

By transforming its architecture from an appliance-based silo on the Public Access Controller (PAC) to a seamless resource pool enabled by a virtualized platform and orchestration, Wi2 expects two major outcomes: one, significantly better performance on the PAC system due to seamless authentication across the resource pool; and two, much lower investment in PAC.

Wi2 has identified several ways to reduce CAPEX and OPEX after ROI analysis. We also evaluated NFV-SDN as a technology shift that the market needs to follow. In the short term, we expect NFV and SDN to improve

how we deploy our people, moving them away from complex, onerous tasks and applying them to roles that create value, or developing new skills that improve their position in the professional market.

A bright future

Wi2 plans to figure out the additional value – both in terms of operating excellence and increased revenues – that can be derived from a combination of public cloud, NFV, SDN, and automation.

Automation enabled by NFV and SDN is a key function that utilizes the capability to shorten network rollout and fault recovery.

Another option for creating revenue is through big data analytics. With NFV and SDN, Wi2 will have the capability to connect to the public cloud easily, so we can generate value from data analysis. Wi2 has already provided analytic data about user mobility in given areas of Japan and for travelers from overseas who use Wi2's Travel Japan Wi-Fi service, and we will be able to quickly and easily try out many real-time analytics methods with hybrid cloud technology.

Alongside SDN and NFV, Wi2 expects big data to open up new business opportunities, thus creating a vibrant future for us and partners like Huawei. [www.wi2.jp](#)

UNIFY: Transforming infrastructure with NFV for Ooredoo Qatar



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Like many operators, Ooredoo is going next-gen with its network architecture. In the Qatar operator's case, UNIFY is the strategy driving ICT transformation on the road to delivering a digital customer experience through simple and agile IT. As part of this strategy, the company is working to transform service delivery via a series of tech initiatives, including NFV.

By Richard Wong & Tim Skinner, Telecoms.com

Editor: Julia Yao julia.yaohaifei@huawei.com



Ooredoo wants to be able to give any service to any consumer or business customer anywhere. What's different is the operator wants to do so in days instead of months, and at a disruptive and unheard of price point. As well as network-based applications, the company expects its network to be able to manage new, advanced services, including HD VoLTE and the Internet of Things (IoT).

Ooredoo set its sights on leading-edge NFV technology to move past the limitations of legacy systems and deliver on the promise of scalability, agility, flexibility, and reduced costs for operators looking to virtualize their network infrastructure and deliver specific functions. To shift to NFV as part of its broader multi-vendor strategy, Ooredoo worked with Huawei to deliver key components and integrate and deploy the overall solution for its NFV cloud.

Integrating a variety of services and solutions from different industry vendors brings with it inherent complexity and a unique set of challenges. Ooredoo selected a multi-vendor approach comprising Huawei, VMware, HP, and Cisco for projects across Qatar and Kuwait. The operator also selected Huawei as Prime System Integrator (PSI) to orchestrate and integrate multiple vendors' systems into one functional and cohesive NFV infrastructure.

The virtual IMS (vIMS) project based on NFV was deployed in two countries – Qatar and Kuwait. Both applied Huawei's telecom application IMS, but both followed different approaches. In Kuwait, the existing IT infrastructure was reused; in Qatar, Huawei's PSI role involved delivering an E2E solution consisting of third-party infrastructure, Cloud OS, and Huawei's IMS. The two deployment scenarios were based on the same design blueprint

of converged ICT infrastructure; shared elastic IT resources; and a multi-tenant, multi-domain system with a single management platform.

The partnership between Ooredoo and Huawei for the projects across Kuwait and Qatar comprised four core steps. One, strategize and clarify the requirements of each project. In Qatar, Huawei served as PSI over a horizontal multi-vendor architecture, coordinating UNFs and NFVIs (network functions virtualization infrastructure) from both VMware and HP for E2E delivery. In Kuwait, Huawei worked as part of a broader Ooredoo-led systems integration project supported by other vendors, where it contributed to UNFs on the application layer alongside VMware.

Ooredoo developed its UNIFY ICT architecture based on leading IT technology and industry best practice, enabling Ooredoo to host IT, NFV, and public cloud. This approach differs from others in the industry because it's fully ICT convergent, using the same platform for all domains and services as opposed to different IT and NFV siloes. The company believes that true ICT deployment is the only way to optimize its cost structure, maximize synergies, and implement the required agility.

Recognizing the challenges Ooredoo and its vendors faced to take on these ambitious projects, especially in the early days of Ooredoo's transformation journey, close partnerships between Ooredoo and the vendor community was supremely important to pilot UNIFY in Qatar and Kuwait. Huawei flexed its system integration capabilities in Qatar by coordinating with other vendors' infrastructure and cloud OS, leading to the successful demonstration of the solution to Ooredoo's Group Technology Leadership (GLT) team.

Ooredoo now boasts two live deployment cases

of the first instantiation of UNIFY architecture that can run IT and NFV services on the same platform. In addition to VoLTE and VoBB, Ooredoo has a roadmap for migrating other services such as data and legacy voice to NFV. It also plans to proliferate the UNIFY architecture across the Ooredoo footprint.

The two parties also agreed to utilize Huawei's open NFV lab in Xi'an to test solutions, while at the same time focusing on overcoming on-site integration and testing issues.

The main challenges Huawei faced during the project were the end-to-end integration and delivery of these third-party NFV-infrastructures, including installation and testing. A high level of customization in software from VMware provided an additional challenge: the entire E2E NFV solution included new versions of VMware with previously unseen features and functionality.

To help manage these challenges, Huawei applied PSI to integrate the complete system, covering data center design and delivery, and the management and orchestration of third-party NFV services.

Huawei leaned heavily on the NFV open lab in Xi'an to develop the solution for Qatar, verifying telco-over-cloud architecture feasibility and performing tests in a simulated live environment. Lab tests also verified the availability of functions and features like disaster recovery and the integration capability and feasibility of new features from VMware such as its distributed logical router (DLR) and edge service gateway (ESG)

The benefits to Ooredoo of this extensive

testing was the ability to manage a multi-tenant environment that shares the UNIFY infrastructure. UNIFY features a heavily secured NFV environment that protects virtual functions, a unified IT cloud management portal capable of managing multiple data centers in isolated sites, and a full NFV solution to meet the requirements of existing IT and telecoms applications.

Huawei also provided virtualized network functions (VNFs) to bolster service delivery, including a virtualized IP Multimedia Subsystem (vIMS) for providing IP-based services over LTE. Ooredoo could then deliver one of the Middle East's first VoLTE services on a virtualized infrastructure.

After deploying UNIFY, Ooredoo could construct cloud data centers in less than two months, including the capability to share data center resources when required. In practice, this meant complete vIMS deployment in just three hours, thus ensuring extremely quick VoLTE deployment.

The Deputy CEO for Ooredoo Group Waleed Al Sayed explained the significance of VoLTE as an enabler for operators to take advantage of existing infrastructure. "The successful deployment of Voice over LTE is another compelling indication of the strength and superiority of our network," he said. "We have designed our infrastructure to evolve and grow with the latest cutting-edge technology, which enables Ooredoo to be the first to introduce these important new services for our customers. The success of this project contributes to Ooredoo's leadership on the global innovation path towards fully-converged Information Communication Technology (ICT)." 

China Mobile

Buzzing from efficiency with drone site surveys



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In January 2016, Huawei and China Mobile Guangxi (CMG) teamed up to launch a drone for RF survey of base stations on the operator's LTE network. Drones have resolved issues like access and safety in CMG's many mountainous sites, which require technicians to make some dangerous climbs. The solution automates key tasks, creating a boon for optimization and network planning.

By Gao Yanhui

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“Drones remove the need for engineers to visit sites and climb towers, instead automatically acquiring and performing backhaul on survey data with high accuracy.”

Unique geography, unique surveys

Noted for the “thousand pinnacles” that frame Li River around the city, Guilin in Guangxi thrills millions of tourist with its impressive but treacherous mountain terrain, the result of unique geological conditions and climate. While Guangxi’s natural environment is a major pull for those who want to mix beauty and adventure, the same isn’t true for site surveyors who want to build robust communication networks – dense forest, steep terrain, inclement weather, and risks like snake bites mean that surveys are no walk in the park, nor are they cheap or quick.

But, sitting at the summit of CMG’s priorities is the lofty goal of providing users with wide, high-quality network coverage, a feat that requires engineering parameters that act as information sources and conduits for efficient network planning and optimization. However, CMG’s mountain-spanning network features many types of base stations, street light sites, and tower and mast sites. In fact, coordinated sites make up 62.8 percent of the operator’s network.

Drone surveys take flight

CMG and Huawei began working on an LTE Experience PLUS Network in 2014. Since then, CMG has seen rapid user and data traffic growth, and has been able to refine user experience on an ongoing basis. Precise network planning, scenario-focused construction, meticulous optimization, and theme-led innovation have enabled the operator to drive up network quality and user experience, establishing a benchmark for LTE networks.

The 2016 drone project with Huawei was part of CMG’s joint drive for innovative MBB network applications. Traditional manual surveys involve pre-coordinating site visits, ensuring safety when access is difficult, and frequently chaotic post-survey data management, with data regularly lost.

But, the drones remove the need for engineers to visit sites and climb towers, instead automatically acquiring and performing backhaul on survey data with high accuracy.

Huawei combines its eSurvey cloud platform

and app for drones. Smart task assignment, smart aerial photographic surveys of antenna RF parameters including whole sites and cell coverage, data backhaul, and the automatic output of survey reports are some of the benefits that shorten completion time and cut out costs like crane rental.

Efficiency is higher because work surveys and antenna altitude indicator surveys can be performed together, and data can be uploaded in real time. RF parameter surveys on existing sites enable CMG to optimize its network, while surveys on new sites provide a reference for site planning, helping increase efficiency and network-building precision.

Drones to the rescue

Drones have clear advantages in different site survey scenarios. In mountainous areas, base stations are typically placed at heights of roughly 100 m, representing a difficult climb for a surveyor. Using a drone to survey the Wutangzhou village base station, for example, saves nearly an hour on coordinating the visit and getting up and down the mast. The drone takes 360-degree photographs at the site summit and quickly acquires the surrounding wireless environment. It ensures a clear sector survey, boosting survey efficiency by an average of 37 percent.

When incorporated into street lights, base stations are up to 8 m high. There are fewer safety measures and greater risk involved in surveys, with cranes frequently required. At the Liusha Farm base station, using a drone saves 15 minutes of climbing to the tower and enhances survey efficiency 21 percent.



Mast or tower base stations are riskier and more time consuming. Usually located at heights of 30 m and above, surveyors need to arrange safety fencing, collect keys, and get to the site. At the Chendongjiang-HLH site, drones save the 23 minutes required to climb the tower and automatically output survey reports, boosting average efficiency by 41 percent.

Coordinated base stations are also normally around 30 m in height, and tend to be located in residential areas in company or organization's premises. Coordinating site visits is difficult, and requires site documentation and site keys. Because drone surveys require neither documentation nor the owner to be present, surveys at the Kuangchan Building-HLH base station are 30 minutes quicker, representing a doubling of efficiency.

Flying high

Thanks to drones, CMG has made coordinating site visits and ascending and descending masts more efficient and has improved worker safety. With Huawei's eSurvey cloud platform, CMG saw a significant improvement in survey data management and management efficiency. Using the eSurvey app, survey engineers receive survey tasks and download survey templates. Weather permitting, they can use

“Thanks to drones, CMG has made coordinating site visits and ascending and descending masts more efficient and has improved worker safety.”

the drone and app to check site latitude and longitude; log basic site, project, and property contact information; measure antenna height, azimuth, and down-tilt; and take photographs, including shots of the entire site, the antenna platform, and a 360-degree shot of the locale.

Once the survey is complete, the drone returns survey data to the eSurvey cloud platform, which automatically outputs a survey report that usually needs less than 10 minutes work for the engineer to finalize.

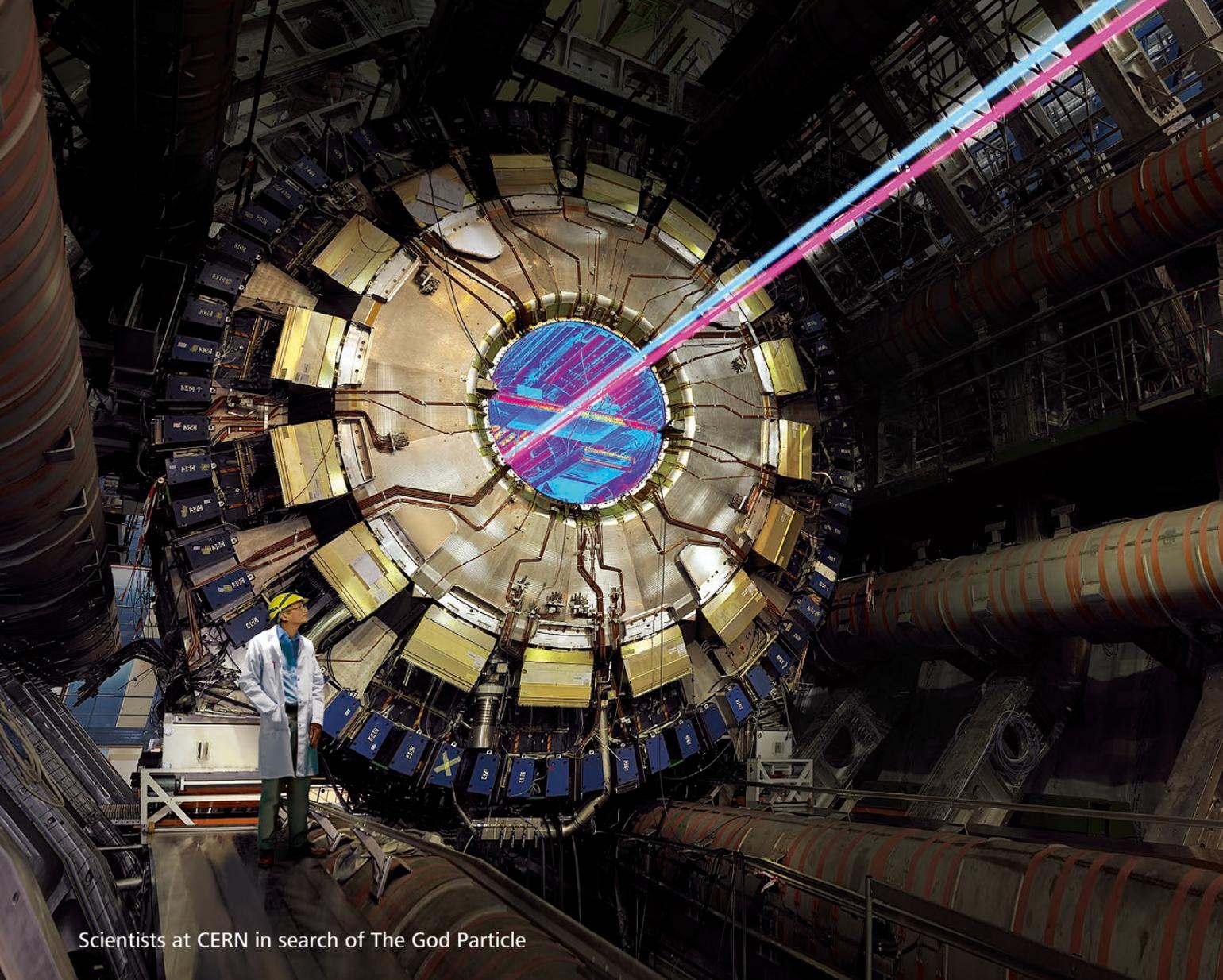
Survey data can be saved and managed on the eSurvey cloud platform for better data management and security. The eSurvey cloud platform can create a database of site information to systematically store information on base station sites across the whole network, facilitating data queries, sharing, and maintenance. Data and photographs collected by the eSurvey app can be imported at the press of a button, data standardization and accuracy in survey reports is ensured, and reports and data can be quickly customized according to project requirements.

The eSurvey app can increase survey and document production efficiency, reduce

labor, and improve report quality.

Drones have also proven to be a very useful tool for CMG to construct its LTE Experience PLUS Network. Yuan Bing, general manager of CMG's wireless network optimization center and company vice president Huang Tao heaped praise on the benefits of drones, with Huang commenting, "UAU RF base station surveys represents a new survey method that provides an excellent solution to the problems of visiting sites that are hard to access. They greatly increase the efficiency of maintenance and optimization work." Commenting on future plans, he says that, "We will expand the use of UAUs to work such as network optimization testing and transmission line patrols, which will help further boost automation. I think UAUs will prove very useful in these and a number of other areas."

Where CMG has led, others are sure to follow – and CMG will prove a useful reference for them to do so. As drone performance and modeling algorithms continue to improve, drone base station surveys will become more accurate and efficient, and we can expect to see drones used in more and more scenarios. [www](#)



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