

Digital Transformation Stories in the New ICT Era



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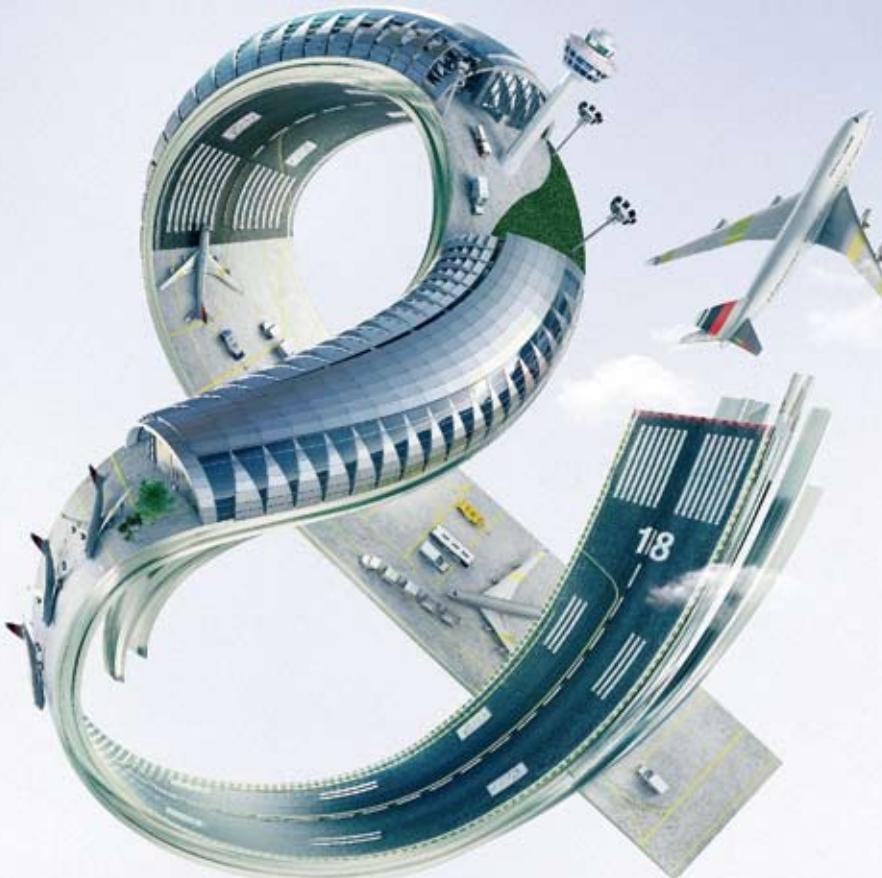
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[Comment]

From Impossible Dreams to Infinite Possibilities

By Yan Lida, President, Huawei Enterprise Business Group

Building an ecosystem is not a one-man show and cannot be completed by a single player. Instead, all stakeholders are expected to work together to create a richly diverse ecosystem shared by everyone. Huawei will continue to invest in building more powerful platforms, helping partners achieve more business success. An ecosystem cannot go without powerful platforms, and platforms become richer and more vibrant thanks to the ecosystem.



Emerging technologies, such as cloud computing, the Internet of Things (IoT), and Artificial Intelligence (AI), are driving humankind into a new Age of Intelligence. The most distinct characteristic of this new age is that the physical and digital worlds are becoming more intertwined, which will greatly change humankind's production and lifestyles and spur digital transformation of various industries.

If someone should ask what period in history would have similar far-reaching significance as the Age of Intelligence we're entering, I believe that the Age of Sail, which started five hundred years ago, is undoubtedly the one. Back in those days many era-defining events took place; for example, Leif Erikson and Christopher Columbus separately discovered a new continent and Ferdinand Magellan completed the first circumnavigation of the world. The Age of Sail connected all five continents and altered the course of human civilization.

Two years ago, many still doubted whether we needed to embrace digital transformation. But today, we all know that digital transformation is inevitable, and actions must be taken as quickly as possible. The question, now, is more about when and how. Before answering this question, however, I would like to share with you a successful case of how Huawei helped Longgang, Shenzhen, China, build a Smart City.

Three Core Concepts Derived from the 'Smart Longgang' Projects

Longgang is the largest district in Shenzhen and has 4.25 million permanent residents. Three years ago, the Longgang District Government embarked on the Smart Longgang project and chose Huawei as its strategic partner. At present, the project has delivered tangible benefits to Longgang residents and greatly improved citizen satisfaction. The Smart Government initiative has made unified offline and online approvals a reality. Citizens can now carry out transactions using their mobile phones or computers without leaving their homes. At the government service center, citizens' service requests are centrally received at the front-end counters and then collaboratively handled by the back-end departments – a best-case example of 'Let online information run errands for people.' Following the roll-out of Smart Policing last year, the average time taken to solve major cases in Longgang has been reduced to within 24 hours. After Smart Firefighting was launched, the number of fires fell by 40 percent in the first half of 2017.

Unlike other Smart City initiatives, which are challenging to implement or reap the benefits, how did Smart Longgang achieve such positive results in just two to three years? The success of the project would be impossible

In this new era of digital transformation, we believe it is more important to grow the industry than to gain a bigger share of the market. By leveraging our strengths in technical innovation, Huawei is actively engaged in the promotion of international industry standards that reduce the costs of digital transformation. >>

A handwritten signature in black ink, appearing to read "Zhang" followed by a surname, is written over a horizontal line.

Huawei's Rotating CEO Guo Ping said, "Huawei has chosen a business model that relies on the monetization of technology and services; it does not monetize user data. This is the biggest difference between Huawei and traditional Internet companies." >>

without the Longgang District Government's commitment to change. The Longgang District Government prioritized this project and was highly engaged to work closely with Huawei throughout the entire process. At the beginning of the project, a leadership team, led by the Secretary of the Longgang District Party Committee of the Communist Party of China (CPC) and the District Leader, was set up. In addition, a special District Data Coordination Office was established to unify data standards and ensure strong collaboration across departments. With Huawei's support, 215 service systems within more than 50 departments were integrated, gathering data exceeding 1.1 billion records. There is no shortcut for digital transformation, and a commitment to embracing change and quick action is the key to final success.

Huawei was responsible for top-level design and ICT infrastructure design of the entire Smart Longgang project. In this project, Huawei provided '1 cloud, 2 networks, 3 platforms,' which comprised the following:

- Cloud data center
- City communication network and city IoT network
- Big Data services platform
- Service application enablement platform
- ICT capability exposure platform

More important, Huawei also brought in many partners to respond to the specific requirements of government affairs, police, education, healthcare, and other departments. By combining their respective strengths, Huawei and partners implemented agile innovations and developed diverse applications. Our concerted effort has proven very beneficial. Specifically, ICT infrastructures and service applications were integrated to the largest extent, creating a powerful solution to drive digital transformation for Longgang.

In addition to the Smart Longgang project, Huawei has engaged in many joint innovation projects with leading companies of various industries around the world and has accumulated extensive experience in

best practices over the past few years. All these have inspired me to develop three core concepts for digital transformation of industries.

• **Core concept 1: Digital transformation is an 'Iron Triangle' project**

The first premise is that digital transformation is an Iron Triangle project and must be led by top leadership. Digital transformation is fundamentally about using digital technologies to reshape services, processes, and organizational structures. For this reason, the participation of the customer's senior leadership forms the first corner of the triangle because they are most familiar with their own business. ICT vendors such as Huawei must also engage to facilitate digital transformation, and they constitute the second corner of the triangle. The third corner of the triangle is also significant, referring to industrial application developers. This is because digital transformation must depend on agile and iterative innovation for industrial scenarios; if there are no industrial applications, every digital transformation effort is useless. This Iron Triangle concept is a joint innovation model advocated by Huawei for digital transformation of industries.

• **Core concept 2: Digital transformation requires a platform to converge the physical and digital worlds**

The second premise is that digital transformation needs an ICT platform that can connect the physical and digital worlds. We often say that a world where everything can sense, everything is connected, and everything is intelligent, is the foundation for digital transformation; however, no single technology can support the transformation by itself. Instead, the collaboration between cloud computing, IoT, Big Data, AI, wireless, optical, and other technologies is crucial to achieving a successful digital transformation. The ICT platform mentioned earlier enables such collaboration.

• **Core concept 3: Ecosystem partners can make full use of the platform to create unlimited possibilities**

The platform underpins digital transformation and becomes the foundation for data flowing and collaboration. Application partners can



fully combine industrial expertise and ICT capabilities together on the platform, delivering unimaginable creativity and diverse applications to the entire industry. This is an ecosystem that Huawei is dedicated to building.

With this mind, we believe that digital transformation is a journey that has a beginning but no end. The journey holds promise as increased creativity and implementation flourish.

What Differentiates the Huawei Ecosystem from Other Vendors?

How do Huawei's platforms and ecosystems stand out when compared with our competitors?

- **Becoming our customers' most-trusted partner**

Huawei's Rotating CEO Guo Ping said, "Huawei has chosen a business model that relies on the monetization of technology and services; it does not monetize user data. This is the biggest difference between Huawei and traditional Internet companies." We are dedicated to being our customers' most-trusted partner.

- Promoting business-driven innovation and focusing on value creation: Huawei has an important concept for innovation – that is, to focus on business-driven innovation that addresses our customers' core business challenges to help them achieve business success. Customers are turning to Huawei because they recognize that our company is their most trustworthy partner for service innovation.

For example, Guangdong Rural Credit Union, China's largest rural credit bank, needed to overcome bottlenecks in the fast deployment of its financial payment services. Huawei worked with Beijing Advanced Digital Technology, a software company, to create an intermediary services cloud to tackle the customer's challenges. The time taken for service development, testing, deployment, and rollout was shortened from 3-6 months to 1-2 weeks. As such, Guangdong Rural Credit Union got a head start in the market to achieve business success.

- Capitalizing on global OpenLabs to better respond to the unique needs of industries: Huawei has deployed OpenLabs globally to collaborate more closely with partners and customers for joint innovation and gain a better understanding of industry challenges

[Comment]

**Looking ahead,
Huawei will
maximally open up
its own technical,
marketing, and
training and services
platforms. Huawei
plans to support
100 partners, each
gaining revenues
of more than USD
15 million, form a
pool of over 1,200
solution partners,
and dedicate USD
150.3 million as
special incentives for
cloud partners. >>**

and needs. The solutions incubated through OpenLabs have covered sectors such as public safety, finance, electric power, manufacturing, and transportation. Over the next three years, Huawei will continue to invest USD 200 million (CNY 3 billion) to build and operate OpenLabs, increasing the total number from today's 13 to 20 and extending coverage to Asia, Europe, the Middle East, and the Americas. Where there are customers and partners, there is innovation by Huawei.

- **Providing a platform for platforms**

Another differentiator of Huawei's ecosystem is that Huawei remains within its own business boundaries that is committed to providing a platform for customer and partner platforms. Many companies have transformed their own experiences and expertise in a specific industry into an enabler platform best suited for that industry. Huawei positions itself to create

an open, secure, and reliable ICT infrastructure platform within its own business boundaries and to provide such a platform for customer and partner platforms.

Huawei's platform is a full-stack solution with cloud-pipe-device collaboration which provides one-stop ICT services for customers and partners. Huawei's platform allows customers and partners to focus on their own service optimization and innovation without the need to struggle with the underlying complex software and hardware systems. Huawei is one of the few companies that can provide cloud-pipe-device, full-stack ICT capabilities. A notable example can be seen in a project where Huawei and Honeywell worked together to create a smart building solution. Built on Huawei's Edge Computing-IoT (EC-IoT) platform and Honeywell's smart building management system, this solution has fully integrated

Global OpenLab: Unearthing industry needs

Manufacturing



- Connected cars
- Smart factories
- CAD emulation
-

Public Safety & Security



- Emergency command
- Police Big Data
- Video cloud
-

Finance



- Real-time credit checks
- Credit card cloud
- Cross-border payments
-

Power



- Smart grid IoT
- Automated power distribution
- Smart microgrids
-

Suzhou Munich Singapore Johannesburg Mexico City Bangkok Dubai ...

OpenLabs: Expanding from 13 to 20

ICT platform capabilities with industry experience and expertise. This integration enables complex and diverse devices in a building to connect and work together. In addition, cloud management of tens of millions of IoT terminals reduces the operating and management costs by 60 percent and decreases power consumption by 50 percent.

- **Becoming an ecosystem enabler**

A further differentiator of Huawei's ecosystem is the Huawei principle of sharing with partners. Huawei is committed to becoming an enabler that helps partners grow quickly through our Developer Enablement Plan.

- Strong cooperation from innovation to marketing for win-win market success: Huawei operates in more than 170 countries and regions. Huawei has a global marketing and services platform in addition to an unmatched technological platform. Joint solutions created with our partners that leverage these capabilities can be launched quickly to capture new market opportunities. For example, in the Safe City domain, Hexagon is a leading Independent Software Vendor (ISV) that has Computer Aided Dispatch (CAD), geographic sensors, GIS, and other professional technologies. The advantages of Huawei and Hexagon complement each other and combine to build a next-generation converged command system. Over the past two years, Huawei and Hexagon have engaged in a joint marketing campaign that has helped to expand Hexagon's business from developed countries to emerging markets in the South Pacific region, the Middle East, Latin America, and others. As a result, Hexagon's revenue in the Safe City field has doubled.

- Leading standards development and expanding the industry: In this new era of digital transformation, we believe it is more important to grow the industry than to gain a bigger share of the market. By leveraging our strengths in technical innovation, Huawei is actively engaged in the promotion of international industry standards that reduce the costs of digital transformation. For example, Huawei has promoted the standardization of 5G, new video codecs, IoT, and other promising sectors that offer huge industry opportunities.

By doing so, Huawei is helping to accelerate key industry projects, drive industry cooperation, and stimulate industry growth.

- Collaborating with partners to build a shared future: Huawei is committed to becoming our customers' most trusted partner, to provide a platform for platforms, and become an ecosystem enabler. Huawei's development strategy is increasingly recognized by customers and partners, as at present the Huawei platform has gathered a pool of more than 400 solution partners, 2,400 service partners, 12,000 channel partners, and 80,000 registered developers.

All Stakeholders Unite to Build a Shared, Richly Diverse Ecosystem

Looking ahead, Huawei will continue to offer maximum access to the company's technical, marketing, training, and services platforms. In addition to the USD 1 billion investment in the Developer Enablement Plan announced two years ago, Huawei plans to do the following over the next three years:

- Supporting 100 partners, each gaining revenues of more than USD 15 million (CNY 100 million)
- Forming a pool of over 1,200 solution partners
- Dedicating USD 150.3 million (CNY 1 billion) as special incentives for cloud partners

Building an ecosystem is not a one-man show and cannot be completed by a single player. Instead, it requires the participation of all stakeholders. It is not about fixing your own backyard, but about working together to create a richly diverse garden shared by everyone. Huawei will continue to invest in building more powerful platforms, helping partners achieve more business success. An ecosystem cannot succeed without powerful platforms, and platforms become richer and more vibrant thanks to the ecosystem. The digital journey has just begun, and an exciting future ahead is awaiting us. ▲

[Digital Huawei]

Huawei's CIO Offers a Look Inside the Company's Own Digital Transformation

By Tao Jingwen, Huawei CIO and President of the Quality,
Business Process & IT Management Department



Huawei's digital transformation is ramping toward a Real-time, On-demand, All-online, DIY, and Social (ROADS) experience across the company's business domains, continuously improving efficiency, productivity, and customer satisfaction by leveraging cloud-based, service-oriented IT platforms.

As industries around the world go digital with expectations of supporting sustainable business growth through transformation, the time has come for Huawei to reveal a little of the company's own digital transformation. In the past, Huawei seldom talked about its business operations and transformation from its own perspective. The world may know that Huawei has experienced remarkably fast growth over the past 30 years, but few know how thoroughly the company has committed to the principles of digital transformation.

This commitment unfolded through several phases and, by 2016, Huawei was fully focused on improving enterprise efficiency through transformation. At the same time, in the face of fast growth, Huawei also considered how to shift from a centralized governance model to a demand-driven supply model that enables organizations at the company's frontlines to have more responsibilities and authority. In making these changes, Huawei will continue to follow the ROADS experience-driven philosophy; improve internal efficiency and productivity; make transactions between customers, partners, and Huawei more convenient and safer; and improve customer satisfaction.

In recent years, Huawei's business and IT expansion have been carried out by focusing on three guiding principles: To improve user experience, to increase business operating efficiency, and to build a lightweight IT architecture. As such, Huawei has explored many options in the company's widely varying business domains – ranging from R&D to sales and delivery – and achieved impressive and fruitful results. We want to share our practices for digital transformation with customers and partners in the hope that enterprises in all industries can gain inspiration from the effort and resources applied by our dedicated teams

of IT professionals. This article describes what Huawei has done in the past, what we are doing during digital transformation, and what we want to do in the future. We hope that the sharing of Huawei's transformation practices can provide reference points for you, and we welcome in-depth discussions and research with all industry players.

Goal of Digital Transformation: To Promote Enterprise Development and Support Efficient Business Operations

Huawei is among the world's best examples of the power of digital transformation. This is a global enterprise. Its sales revenue in 2016 reached all-time highs of USD 78.6 billion, ranking No. 83 in the *Fortune Global 500*. In partnership with telecom carriers, Huawei has built over 1,500 networks, helping over one-third of the world's population connect to the Internet; and Huawei sells hundreds of millions of mobile phones every year. Huawei operates in more than 170 countries and regions around the world, with a total workforce of approximately 180,000 employees. Around the globe, Huawei has more than 900 branches, 15 R&D centers, 36 joint innovation centers, and millions of partners, including more than 60,000 suppliers.

How does Huawei operate in such a large and complex organizational structure? Over the past 30 years, Huawei has continuously implemented business transformation as well as process and IT implementation. These efforts have paid off again and again: Huawei has seen stable development, rapid growth, expansion from China to the world, and diversification from a single



Huawei's digital transformation uses a cloud-based and service-oriented IT platform to deliver the ROADS experience in all our business domains, and continually improve our efficiency and effectiveness at serving our customers and setting industry benchmarks. >>

In the future, Huawei needs to build service-oriented platforms driven by user experience and based on business scenarios to quickly respond to the requirements of frontline users in multiple business scenarios. To make such platforms a reality, Huawei must have unified cloud and service-oriented IT systems. >>

business to multiple businesses. In this process, Huawei has not encountered big bottlenecks or obstacles in the operations of the entire company.

Today, many people are talking about the future of intelligent systems, which pose new challenges for IT planning. Like any enterprise, we are asking what goals Huawei should strive for in business and IT transformation. Huawei believes that migration to cloud and service-oriented operations are only means to achieve goals; the actual goal of transformation is to ensure internal and external compliance, promote business development, and support the company's efficient operations. To put it simply, the goal is to generate more revenue and profits while improving capabilities and efficiency. Surely this goal applies to the digital transformation of all enterprises.

What role does IT and other technology play in this transformation? What is the relationship between technology and business? Huawei believes that technologies must align with the business goals of the company, and drive and enable business transformation. Ultimately, business is the prime driving force of transformation.

Currently, Huawei operates businesses around the world, and business complexity and uncertainty are increasing. If all business processes are managed using a centralized management model, it is impossible to meet future development requirements. In the future, the management model should be like this: Elite team-centric operations supported by big platforms. That is, frontline personnel must be authorized to efficiently make decisions. In this distributed management model, the entire company's management architecture, operating processes, and IT construction will change.

As such, Huawei's transformation needs to be streamlined based on the strategic business goals. First, we need to transform Huawei's business model into one driven by user experience. In the past, Huawei's IT teams passively responded to the requirements of business departments by providing function-oriented IT systems that linked a series of business processes. Frontline personnel had to find the processes first and then locate the corresponding IT functions. As a result, personnel usually needed

to open more than 10 IT systems to complete a single task. In the future, Huawei needs to build service-oriented platforms driven by user experience and based on business scenarios to quickly respond to the requirements of frontline users in multiple business scenarios. To make such service-oriented platforms a reality, Huawei must have unified cloud-based and service-oriented IT systems. This is the vision of Huawei for the overall architecture of future business transformation.

At the same time, we need to provide a ROADS experience for users. Huawei has been noted for product innovations, and customers know Huawei primarily in terms of the company's products. In the future, this corporate image will expand, as Huawei becomes an enabler for ICT transformation of enterprises, providing technical services and ICT transformation support to all types of industry customers. This includes helping telecom carriers to provide ROADS experience-driven services to their users.

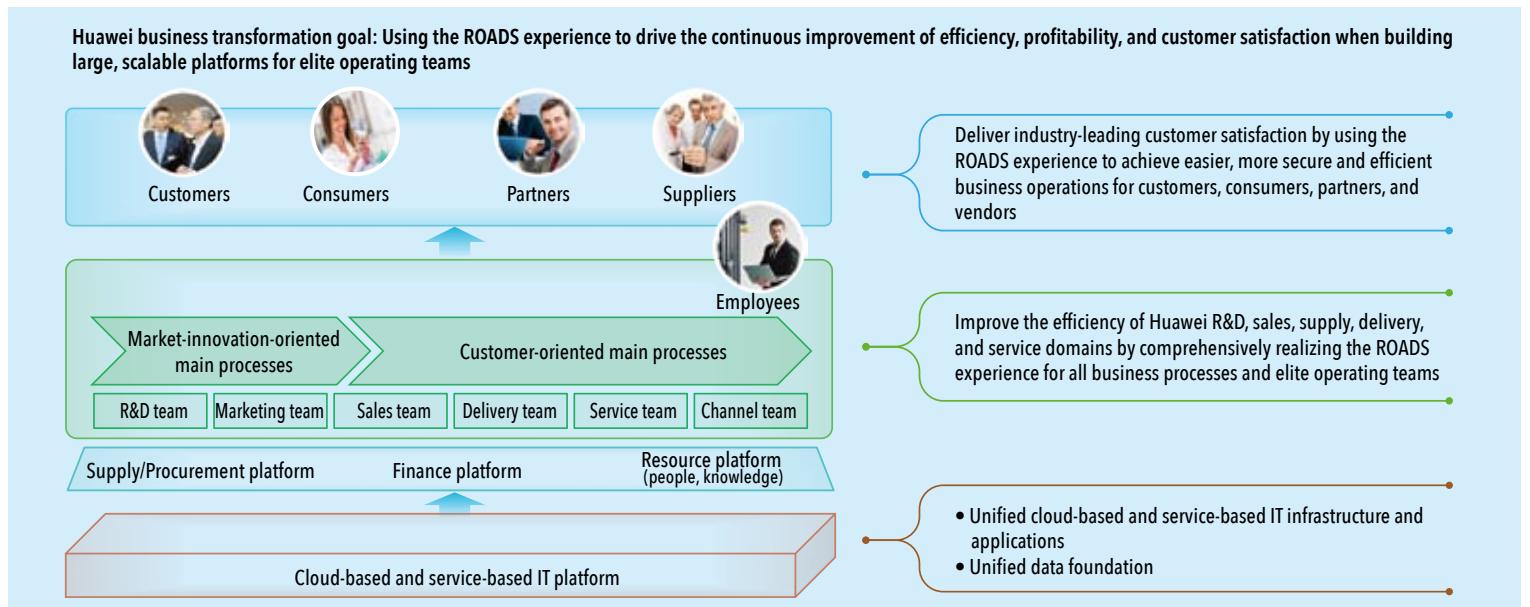
To achieve these goals, Huawei first needs to apply the ROADS principles and technologies to its company's own business platforms. This is the services target of Huawei's IT department going forward. We will stay clearly focused on this goal to achieve success in transformation. As mentioned earlier, the purpose of digitalization is to solve business problems, and I personally endorse this principle in the strongest terms. The first priority of the IT department should be to overcome challenges in user experience and business development.

Transformation Strategy: IT Architecture Requires Three Major Changes

To support business transformation in efficient and versatile ways, IT architecture requires three changes:

- Change 1: From Traditional Siloed and Closed to a Cloud-Based and Service-Oriented Open Architecture**

Many CIOs have faced the disappointment of upgrading IT facilities at great expense only to find that their traditional closed architectures leave IT systems unable to interoperate or share information; the upgraded systems therefore



fail to meet the increasingly diversified requirements of business departments. Huawei faced the same challenge. Like everyone else, our previous approach was vertical streamlining and then horizontal streamlining. However, the result was that the IT systems were too complex for business departments to use. These were high-speed systems, but users described them as slow because IT took a long time to respond to business needs.

For example, Huawei's mobile phone business has grown rapidly around the world, but supporting this growth with new IT facilities took 6 to 9 months or even years. To set up a mobile phone store in, say, Ghana to take advantage of an immediate business opportunity, the IT systems could not meet the requirement.

The primary reason for upgrading the traditional closed IT architecture to an open one is for rapid response to business needs.

• Change 2: From Focusing on Internal Process Operations to Focusing on ROADS User Experience

In the past, Huawei's IT departments did not pay much attention to user experience. When developing an IT application, few IT R&D engineers knew how many people would use the software and who the users were. The engineers did not operate the system themselves, either. In most cases, the IT team would develop an application to meet the requirement of a single business department. The result was that the IT system had a large amount of junk information.

Even though all of Huawei's IT application systems served business processes and functioned well, user experience was unsatisfactory. This problem came up often, and one basic example was when I applied for a local mobile phone number during my work in Germany. The service functions of the telecom carrier were perfect, but my personal experience was poor, because all the service information was in German, but I did not speak German.

Enterprise CIOs who look at the way their users work will see many examples of this issue and, as with me, will look for good answers to this question: What problems do I really need to address for the business groups I serve?

When Huawei committed to implementing these changes, we gave ourselves until 2019 to complete the transformation in all business domains. At the halfway point of our three-year plan, we are on track and confident in the success of this transformation. >>

- **Change 3: From a System that Serves Internal Management to a Real-Time Service System that is Connected to Users**

This is the goal for Huawei going forward because our current IT system is an internal system that does not connect well enough with external networks. For example, when a partner wants to participate in a Huawei project, how can they connect with us to obtain the latest project information? For an innovative technology company that wants to become a Huawei supplier, where can they show their products to Huawei? How do our customers learn about our latest product introductions?

We know we are not alone in dealing with these issues. Like us, other enterprises need real-time service systems connected to users for online, real-time, automatic handling of end-to-end business processes. As Huawei CEO Ren Zhengfei puts it, all transformations and IT constructions must be aligned with business needs to make business operations easier, faster, and more efficient.

Implementing the three changes described here is quite a challenge! First, the IT architecture needs to be layered and deeply decoupled in an experience-driven, service-based manner. For example, the IT system must automatically identify users and display appropriate portals for different users, access devices, access locations, access modes, and access scenarios.

The IT system can then provide information to users rather than requiring that users search for information. Based on user identification, the system should provide the best business processes, business operations, required information, and useful support at the appropriate times.

When Huawei committed to implementing these changes, we gave ourselves until 2019 to complete the transformation in all business domains. At the halfway point of our three-year plan, we are on track and confident in the success of this transformation.

Business Transformation Practices: Following a ROADS Experience-Driven Philosophy to Improve Efficiency, Productivity, and Customer Satisfaction

Even before our latest transformation plan, Huawei explored many IT upgrades for departments that included R&D, sales, manufacturing, delivery, and logistics. These explorations have proved extremely fruitful, as the following examples show.

- **Migrating R&D to the Cloud Makes Global R&D Collaboration a Reality**

R&D is Huawei's largest sector, accounting for almost half of Huawei's

IT Requires Three Changes to Attain Transformation Goals

Change 01

From 'closed IT architecture' to 'cloud-based and service-oriented IT architecture'

Change 02

From focusing on 'internal process operations' to focusing on 'ROADS user experience'

Change 03

From 'an IT system that serves internal management' to 'a real-time smart system that is connected to users'

180,000 employees. Huawei's IT department has decoupled the processes, tools, data, and compilation environments used for product development to provide services such as a test cloud, compilation cloud, and developer community. These services cover the entire R&D process and greatly reduce the time needed to move software and hardware from R&D to production.

To commission a new mobile phone, for example, developers used to take several months for tasks ranging from applying for test equipment to setting up an IT environment. Using the new test cloud service, the environment preparation time is now reduced to a few days. Similarly, when compiling the operating system for mobile phones, the process for each model used to be isolated, so the large number of models took hours to finish. Now, a common compilation platform completes the entire process in minutes.

• Digital Sales Effectively Support Sales Teams' Operations

Huawei's sales managers used to have difficulties getting a clear view of frontline activities and, if problems arose, the causes were often unclear. In recent years, thanks to digital sales, Huawei has unified online and offline management to thoroughly support sales teams' operations. For example, sales managers at all levels can use mobile phones to view the real-time activities of more than 200 subsidiaries in more than 170 countries and regions. These efforts have gradually but effectively improved the operational capabilities and efficiency of sales teams.

• The One-Stop Service-Delivery Platform Improves Service Delivery Efficiency

Huawei's delivery service includes a lot of activities, which used to require that delivery personnel open more than 20 IT systems. Now, Huawei has a service delivery platform that integrates all the necessary activities into a single portal that covers resource management, outsourcing management, site acceptance, goods reception, technical support, and personnel management. This business-oriented portal greatly improves delivery efficiency. In addition, Huawei built a delivery command center in Xi'an, China, where managers can view the progress of global delivery projects

and implementation status of each site on a large-screen display. With this operations support, we achieve efficient field-delivery services with online, real-time, visualized management.

• The Global-Manufacturing Operations and Command Center Supports Real-Time Decision-Making

In Huawei's global-manufacturing operations and command center, the company has integrated global suppliers' status information and market requirements in a service-oriented manner. We build a real-time decision-making system around each business scenario to achieve quality forecasting. For example, if quality issues are found during product testing, quality warnings can be fed into the manufacturing process in a timely way. Through Big Data analytics, material lots can be managed and controlled efficiently.

• The Visualized Logistics Platform Improves Global Logistics Management Efficiency

Huawei has businesses all over the world, and goods are delivered and shipped around the globe. It is a challenge to manage the specific flows of goods in such a huge logistics network. The establishment of a visualized logistics platform in 2014, however, has made a big difference in our ability to meet this challenge. By the end of 2016, Huawei's overall Consistency of Inventory Accounts and Goods (CIAG) rate had significantly increased. Now we can monitor more than 100 Huawei warehouses across the world in real time and manage the inbound/outbound goods in a visualized manner, greatly improving our collaboration efficiency during the global logistics process.

• Better-Connected Office Collaboration Simplifies Day-to-Day Enterprise Work

Each enterprise needs to build a smooth and efficient platform to smoothly connect devices, knowledge, businesses, and teams. In 2017, Huawei's IT team launched WeLink to address this requirement, and the App now has 170,000 users. WeLink enables users to hold meetings, use service applications, and view shared files to maintain efficient connections with others in the same team, wherever they may be located.

Enterprise CIOs can find an amazing degree of flexibility and economy by allowing business departments to use whatever IT resources meet functional, reliability, and security specifications, whether the services are purchased or developed in-house.

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IT-Platform Practice: Building a Multi-Cloud Architecture for Enterprises

Enterprises want to migrate their IT capabilities to the cloud but obsess about which cloud to use: Private, hybrid, or public cloud? I believe that CIOs should ignore these terms, because every enterprise needs multiple clouds.

Take Huawei as an example. To protect our core information assets, we need to tailor the migration of core processes to the cloud based on business characteristics. We also recognize that, no matter how good our own cloud is, we will use other public cloud services. During Huawei's business cloudification, building Huawei's private cloud does not conflict with the use of other public cloud services. The two need to be analyzed separately.

For example, I mentioned opening a mobile phone store in Africa. If we build IT infrastructure by ourselves, the IT department needs to build the network first and then connect the IT systems to the network, which is rather time-consuming. The fastest way is to use public cloud services to support business development. After looking at the advantages, it is easy to conclude that all enterprises, large and small, can benefit from the use of multiple public cloud services. These clouds make it simple to quickly respond to business requirements, accommodate diversified and changing operations, and support rapid business expansion around the globe. Enterprise CIOs can find an amazing degree of flexibility and economy by allowing business departments to use whatever IT resources meet functional, reliability, and security specifications, whether the services are purchased or developed in-house.

Based on a global network architecture and data center layout, Huawei has deployed eight 100-millisecond business circles with a focus on business and a ROADS user experience. The goal is to respond to business requirements of all countries within 100 milliseconds. Huawei has also applied a simplified network architecture in several core data centers to reduce the number of optical fibers exponentially. In the process of constructing this global network, we have used a large number of public cloud services, including Office365, video conferencing, WeChat, and

other public cloud services provided by third parties. Even though Huawei provides its own Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS) resources, we still use similar services provided by other vendors to achieve fast services in some areas.

To build a multi-cloud environment, an enterprise needs to do three things:

- **Implement global unified IT resource management.** This capability enables cross-cloud mobilization of resources. For example, an enterprise's multiple research centers worldwide can jointly develop a product without worrying about where the required virtual machines or services come from. At this point in our transformation, Huawei's IT departments have established preliminary IT resource scheduling capabilities that cover physical machines and cloud platforms.

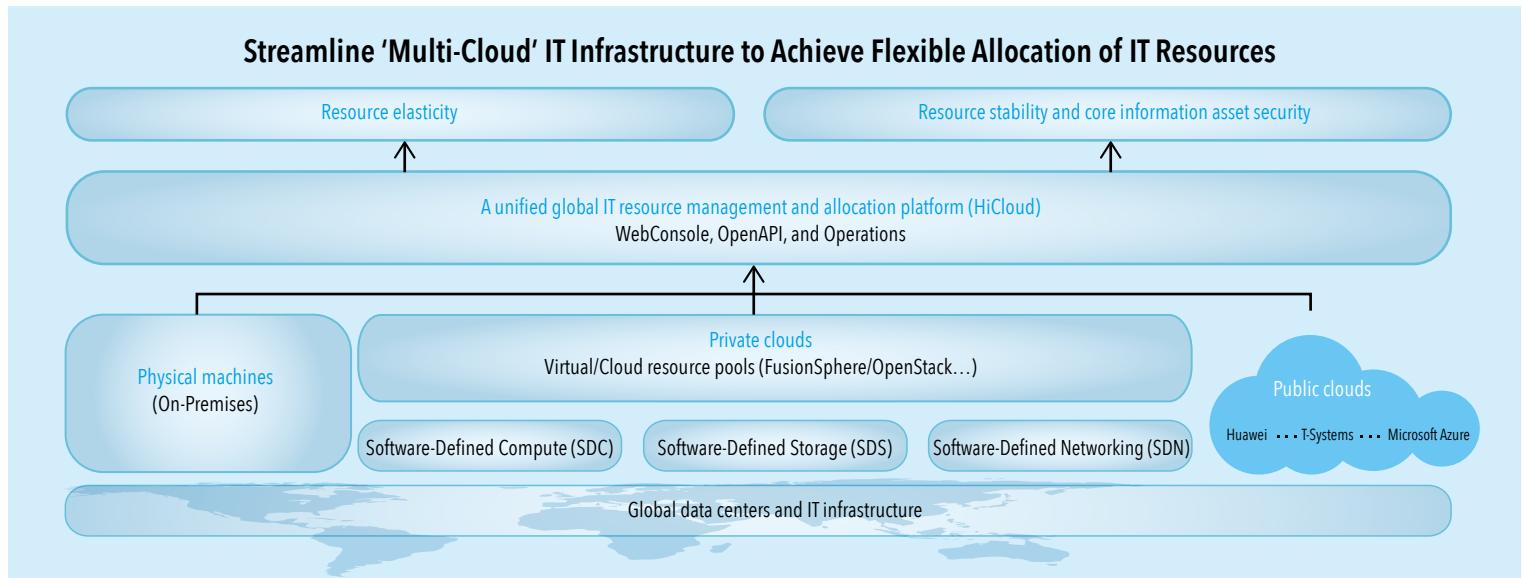
- **Build a unified cross-cloud integration platform.** Connect to multiple public cloud services at the application and data layers so that only one connection with the IT system is required when businesses use the cloud services.

- **Protect enterprise core information assets in a multi-cloud environment.** Because the security of enterprise information assets is vital, a cross-cloud security system needs to be built when the public cloud is used. A multi-cloud security management environment is a necessity for enterprises. It is better to sacrifice some response speed rather than undermine the security of core enterprise assets.

Five Inspirational Thoughts from Digital Practices

In summary, these thoughts help guide Huawei's IT evolution and may help other enterprises:

- **Thought 1:** Digital transformation should be led by business departments. Business managers should know how to support business development and resolve business problems through digital transformation. As an important enabler, IT departments must work closely



with business departments and build a powerful IT platform to drive and support rapid implementation of transformation.

- **Thought 2:** The ROADS user experience functions as both the goal of digital transformation and one of the criteria for measuring the success of transformation. Experience standards for each item involved in digital transformation should be refined and developed.

- **Thought 3:** Digital transformation aims to build a better-connected,

multi-ecosystem platform for customers, consumers, partners, employees, and suppliers – not just internal employees.

- **Thought 4:** Digitalization of business objects, processes, and rules defines the approach to overall digital transformation.

- **Thought 5:** Each enterprise has relatively stable and fixed businesses that can pursue standardization and automation. More variable businesses can be implemented through smart and social networking operations. ▲

Core View

The goal of Huawei's business transformation is to generate more revenue and profits, improving capabilities and efficiency while ensuring internal and external compliance. To achieve this goal, enterprise IT must complete three changes. First, upgrade traditional siloed and closed IT architectures to a cloud-based, service-oriented open architecture. Second, shift the focus from internal process operations to ROADS user experiences. Third, shift the function of the IT system from serving internal management of the enterprise to providing real-time services that connect well to users.

— Tao Jingwen, Huawei CIO and President of the Quality, Business Process & IT Management Department

[Utilities]

Weifang Smart City: The Birthplace of the Kite Gets a New Moniker

By Director Zhang Baoqing, Weifang Smart City

Located in the center of the Shandong Peninsula, the city of Weifang is known as the birthplace of the kite. History books record the creation of the very first kite in Weifang over 2,400 years ago by a philosopher known as Mozi who, according to legend, used kites to send messages. Today, the Internet of Things or IoT technologies are being used in the birthplace of the kite to reach new heights of development in the vast sky to become a smart city.

Spanning 16,000 square kilometers, Weifang is Shandong Province's second largest city in size. It has a population of over 9 million residents and, in 2016, ranked 32nd in economic output among prefecture-level cities in China. In 2014, Weifang established a smart city department to promote smart city construction, with the aim of improving urban management, benefiting residents' livelihoods, executing the strategy of informatization, and building a new type of future-ready smart city.

The City V Pass Moves to the Smartphone

With the rise of the mobile Internet, people's lives are becoming more and more inseparable from mobile Apps. Without losing time, Weifang capitalized on this trend by releasing the Weifang V App. The App acts as a service platform for the smart city – integrating public resources from education, healthcare, transportation, tourism, and administrative approval – in one place. It provides Weifang residents with smart city services at their fingertips.

Taking advantage of the growing popularity of mobile payments from the likes of WeChat and Alipay in China, Weifang took things to the next level and developed an Internet financial services platform called Cloud Pay. The wide-ranging, sophisticated, and widely-available mobile payment service is accessible through the Weifang V App and can be used by city

dwellers to pay for local healthcare, educational, public utilities, government services, and other non-tax revenue services. And as an innovative application inclusive to finance, partner banks are now also providing 'quick loans' for residents and supply chain financial services for local eCommerce retailers through Cloud Pay.

In August 2017, the Shandong Provincial Public Security Department officially completed acceptance of the Zhiji platform in Weifang. Using their mobile phones to access the platform, which is based on the public security household registration information system, users complete a comprehensive verification process to receive an electronic ID in the form of a dynamic QR code. With the e-ID, residents no longer have to carry a physical ID card when they go out. This is a major innovation in online ID verification and a first for China. The Ministry of Public Security has already approved and initiated the project.

Using the Zhiji platform, Cloud Pay has been upgraded into the V Pass, a first-of-its-kind 'smart city pass' for Weifang. The pass combines the user's ID, driver's license, health insurance card, bank cards, bus pass, bicycle card, access control cards, library cards, travel card, and even other types of ID cards into a mobile App. Using just one App, residents can handle day-to-day affairs, travel around the city, and complete mobile payments for

As of October 2017, Huawei had completed construction of an NB-IoT network covering the whole city. The construction strategy was "one network, one platform, n applications." Some 1,574 NB-IoT base stations have been built across the city, providing over 94 percent of network coverage. >>

various public services, making life much more convenient.

Weifang is the third city in China, after Shenzhen and Hangzhou, to enable mobile payments for medical cards, and is the first to implement e-ID cards. As a result of this, Weifang city started a campaign known as the "Three Nos Alliance" to advocate a "No cards, No ID, No cash smart city lifestyle." The V Pass currently has 600,000 active users, and this number is predicted to exceed one million by the end of the year. The V Pass represents a next-generation city pass. With its broad range of usage scenarios, full digitization, and convenient portability, the V Pass will be ideally suited to replace physical city passes currently being used and has huge potential to gain in popularity.

The IoT Enables Smart City 3.0

Weifang's V App represents the starting point of smart city construction in Weifang. It bypasses the PC-based Internet and capitalizes on the mobile Internet wave. In the PC-based Internet era, multiple website applications were the defining feature of the smart city – much less convenient than a mobile App. If we define the smart city in the PC-based Internet era as smart city 1.0 and the mobile-based Internet era as smart city 2.0, then Weifang can proudly claim to have taken the first step towards smart city 3.0.

In October 2016, in the pioneering spirit of past philosopher Mozi, Weifang became the first city to build an urban smart lighting control system leveraging Huawei's NB-IoT technology. This occurred only four months after the 3rd Generation Partnership Project or 3GPP had recognized the Huawei-led NB-IoT standard as a next-generation IoT technical standard in June 2016.

In November 2016, Weifang's municipal government and Huawei signed the *Weifang City IoT Application and Industrial Base Construction Strategic Cooperation Agreement*, which led to the inauguration of the Huawei-Weifang IoT Application Innovation Research and Development(R&D) Center (followed by a ceremony) and the Huawei-Weifang IoT Industrial Alliance.

With the alliance's support, Huawei will build an IoT industrial park and work with Weifang to create the country's first NB-IoT model city.

As of October 2017, Huawei had completed construction of an NB-IoT network covering the whole city. The construction strategy was "one network, one platform, n applications." Some 1,574 NB-IoT base stations have been built across the city, providing over 94 percent of network coverage.

At the same time, Huawei also started to deploy a city-level IoT public service platform, the first of its kind. A total of 12 IoT city applications will be launched on the platform, including smart parking, smart eGovernment, the Internet of Vehicles, smart building, and smart lighting. Smart city 3.0 has already started to take shape.

Positioned as being "based in Weifang, and serving the province," the Weifang municipal-level IoT public service platform integrates industrial IoT applications, solving the issue of fragmentation that has emerged with city IoT applications, and collects fresh, high-value Big Data on a city-wide level. And, with the support of the platform, development costs for various applications are reduced.

The platform allows for the unified management of IoT data through two key methods: integrated device connection and IoT data integration. This enables the IoT application system to provide cross-department and cross-application data sharing, and unified data rendering for decision support on the integrated management platform.

Once construction of the Huawei-Weifang IoT Innovation R&D Center is completed, it will contain an IoT OpenLab that will carry out verification and testing of products and solutions for the 'IoT Weifang' construction project. Additionally, an IoT exhibition hall will showcase innovative applications built by Huawei and partners. At the R&D center, we will broaden cooperation with universities and research institutes, both Chinese and foreign. The center will also help local businesses enhance their IoT capabilities and business development. It will compete for national and provincial-level research projects and push the IoT Weifang standards to



become national standards.

Construction on the Weifang IoT Industrial Park is also set to begin. With the support of Huawei's 'intangible assets,' such as its brand image and outstanding, efficient cloud services, in combination with the IoT Weifang construction project, we will foster an innovative and entrepreneurial environment, and attract both manufacturing and research businesses to the park, creating a highly influential IoT industrial park.

The Huawei-Weifang Smart City IoT Industry Alliance has brought together 52 domestic and foreign IoT partners from domains including city transport, city lighting, city management and services, environmental and ecological protection, refined agriculture, industrial manufacturing, and warehousing and logistics.

Weifang's Changle County has been designated as the pilot county for IoT Weifang. Here, 39 departments and 17 enterprises and institutions are cooperating on research of NB-IoT smart city applications based upon the IoT Weifang public services platform. The work is being done in accordance with the development strategy for the whole city. They are also implementing 18 IoT applications, including smart government, smart parking, smart street lighting, and smart pipelines.

The PC-based Internet provided information symmetry. The mobile-based Internet provided efficient connectivity. The IoT will deliver a fully connected world. This is what will make the smart city 'smart.' The IoT city is smart city 3.0. Specifically, the thinking behind it is by reconstructing the smart city using IoT – leveraging a 'Connected Internet of Everything' consisting of all the people-to-people, people-to-things, and thing-to-thing connections that make up the city – it will be possible to create a 'nervous system' network for the city and control its management center 'brain,' making it truly smart.

Notably, during the IoT Weifang project's start-up process, TelChina joined and became a close partner in the project through a strategic partnership with Huawei. With exceptional insight, Shandong Provincial Department of Water Resources collaborated in the construction of a province-wide smart river chief management system using the Weifang IoT platform. The IoT has redefined the meaning of the smart city. It has added a new dimension to the smart city and, at the same time, expanded our horizons and tested the boundaries of our imaginations of what it can be. ▲

Source: Huawei Technologies

Video-as-a-Service Creates Unprecedented Intelligence and Visibility for Suzhou, China

By Zhuang Wei, Deputy Director, Science & Technology Department, Suzhou Public Security Bureau

The construction goal for the Suzhou video cloud project is to adopt a data-centric approach and build the public safety video sharing platform into one with unprecedented intelligence and visibility. This project will be filled with imaginative exploration for both Suzhou Public Security Bureau and Huawei.

The charm of digital transformation lies in its ability to accelerate an era through technology innovation to create infinite opportunities. Video image technology, when combined with emerging cloud computing, Big Data, and Artificial Intelligence creates a new paradigm that is disrupting the practical operations of the public safety sector. A rich diversity of video applications signifies the advent of an open and thriving video cloud ecosystem. Video-as-a-Service (VaaS) has become possible, marking a new beginning for public safety departments, other government agencies, and every citizen alike.

A 'Finding Families' Story

In 2017, Suzhou Public Security Bureau helped the local civil affairs bureau deal with a tricky situation. The civil affairs bureau was tasked to help many people with hearing or speech impairment or mental illness. These people could not clearly express their identities and, therefore, had to stay for extended periods in the homeless aid station or hospital. As the number of such cases continuously increased, the civil affairs bureau faced more pressure than it could handle. They had no choice except to turn to Suzhou Public Security Bureau for help. Upon receiving this request, we decided to invoke the face-matching system to help these homeless people find their families. Specifically, we entered the photos of the homeless into the face-matching system for reverse image search and face comparison. Then the most similar identity information was quickly presented and prioritized by similarity, significantly improving the efficiency and accuracy of identity comparison. This approach paid off. After comparing more than 800 photos within a short period of time, we succeeded in helping more than 50 homeless people find their families. Seeing the happy reunions between the homeless and their families, we realized the significant role of the innovative usage of video technology in solving real-life problems.

In fact, the above-mentioned case is only one of many video applications that deliver better services. Suzhou is the earliest beneficiary to receive large-scale benefits of static facial imaging applications in China. Statistics show that from June 2015 to November 2017, Suzhou Public Security Bureau has solved 2,500 cases with the help of static facial imaging applications. These achievements have enhanced our confidence in sharing video resources among all other government agencies and have also driven us to explore an increasing number of more refined scenario-specific applications. We can package videos, photos, and even facial images and license plates, into services and provide them to all relevant government agencies for use in various situations. Doing so will help promote the stability, prosperity, and development of the entire society.

Building a Video Cloud Platform

Suzhou Public Security Bureau is an early adopter of a video networking platform and has already taken a leading position in intelligent applications. We took the lead in introducing vehicle model recognition and facial recognition technologies. Despite this, we have always been thinking about how to go further and embrace more innovative video applications. A turning point occurred in 2015 when China released a national-level file about video construction. Guided by this file, we clarified our own direction, integrating videos from the entire society into the public safety system to achieve comprehensive sharing and in-depth development of applications, thereby better safeguarding public safety and improving government services.

However, this direction is full of challenges, including the following:

- Videos are rich in types, come from diverse sources, and involve complex standards. Video sharing imposes high requirements on bandwidth and storage.
- Today, smart video applications are growing in popularity and developing rapidly.

Suzhou Public Security Bureau built a large-scale dynamic facial imaging checkpoint network based on the Huawei cloud. The goal is to set up 10,000 dynamic facial imaging checkpoints. Additionally, about 2,000 vehicle checkpoints have already been networked. Processing such a huge number of photos also calls for a powerful platform. These are tough challenges for both Suzhou Public Security and Huawei. >>

The careful selection of the right video applications is mandatory.

- Video sharing undoubtedly incurs security concerns. In the cloud era, upper-layer applications are mushrooming, while the underlying security threats, such as illegal access, video theft, private network intrusion, and video leakage, are becoming ubiquitous.
- How to compare video data with Big Data in the entire policing system to mine more value must be considered.
- Existing systems are isolated and have become silos and bottlenecks for improving management efficiency.

Facing these and many other new challenges, we cannot hesitate. We understand that the 'new normal,' a buzzword in China, tells us that the only thing constant is change. Over the past decade, we have been constantly solving old problems and responding to new ones; therefore, we needed a long-term, powerful, and open partner to help us lay a solid foundation that not only solved our current problems but also positioned us for long-term evolution. Huawei's video cloud solution is mature. The solution design concepts deeply impressed us, and we finally selected Huawei as our partner.

Huawei's video cloud platform is open, sharing, efficient, and intelligent, enabling a wider range of services. By decoupling software from hardware and applications from data, the video cloud platform contributes to investment protection and sustainable evolution of the public safety sector.

Since 2004, Suzhou Public Security Bureau has invested heavily in ICT system construction and made impressive achievements. We wanted these achievements to be workable on the new platform in 2017; therefore, our entire video platform was not built from the ground up or rebuilt by removing all past installations; instead, it needed to be fully integrated and compatible with the existing foundation and able to usher in further improvements based on previous deployments. We clearly positioned the new platform to bridge the past, present, and future, paving the way for a broader development space for all of Suzhou.

From Video Data to a Suzhou-wide Visual Platform with Unprecedented Intelligence and Visibility

With a clear development direction and the right vendor partner, we had a goal for our video cloud project: Adopt a data-centric approach and build the public safety video sharing platform into one with unprecedented intelligence and visibility. Due to limited experience to draw on in China, or even worldwide, this project would be filled with imaginative exploration for both Suzhou Public Security Bureau and Huawei.

Everything starts from the top-level architecture and involves two actions: Selecting the ideal cloud platform technical solution and conducting the top-level design of the overall city-county cloud architecture. Doing so aims to achieve vertical interoperability, horizontal interconnection, physical distribution, and logical unification.

The construction of a city-level platform provides referential technical specifications for building relevant county-level platforms. This approach proved to be highly successful during the entire public safety video sharing platform construction, which adopts Huawei's 'One Network, One Cloud, One Pool, and One Platform' architecture. It consists of four parts from bottom to top: Awareness, transmission, management, and application.

'One Network' refers to the consolidation of multiple networks (such as front-end access, private video, SDN-based large-scale data center, and government wireless private video networks) into a large network to achieve smooth video transmission and interconnection.

'One Cloud' refers to management, which is the most critical part. Huawei has proposed a good concept for the cloud: Logically, a single data center but using multiple equipment rooms. Multiple Virtual Data Centers (vDCs) can be managed in a unified manner. Of course, 'One Cloud' is the ideal goal of cloud construction, but, in actual practice, changes and compromises would be made based on actual situations.

'One Pool' refers to a video data resource pool that achieves data resource convergence, multi-source data aggregation, and a high level of

data sharing under authorization. Work related to 'One Pool' is the simplest part in this project, because relevant national and international standards and technical specifications are mature. Additionally, video data is processed intelligently and structurally and then stored on the proper media to prepare for data comparison with other public safety Big Data systems.

'One Platform' is to adopt unified video management, video analysis, and Big Data platforms, encapsulate the capabilities of these platforms, and provide unified interfaces and services for different service applications or other government agencies.

Security is another priority. We performed a large number of security hardening operations to ensure almost end-to-end security protection, including front-end access and extranet border protection, unified identity authentication, and sensitive data protection. The central equipment room is the most important part. In particular, a large amount of video data is processed intelligently. In the future, such data will be accumulated to a certain scale to comprehensively reflect the entire social activity and the catering, accommodation, transportation, and consumption of each individual. Therefore, due to a high degree of sensitivity, the security grade of information systems in the central equipment room has exceeded Grade III, as defined in China's information security standards.

Reaping Preliminary Benefits and Embracing the Challenges of Big Video and Big Data

To date, Suzhou Public Security Bureau has built a three-dimensional, real-world map system by leveraging Huawei's cloud computing capabilities. Based on a geographic information platform, the system integrates video surveillance and space information into a real-world map. To avoid blind spots, drone assistance is also included. All these features enable the entire map to provide stereoscopic, 360-degree, blind-spot-free video views for optimal outcomes. The large-scale video convergence – made possible by the powerful cloud computing capabilities of the background platforms – greatly improves the effectiveness of video relay, tracing, and surveillance functions in actual practice. ▲

With the ever-increasing maturity and commercial use of facial imaging technologies, in 2017, Suzhou Public Security Bureau built a large-scale dynamic facial imaging checkpoint network based on the Huawei cloud. The goal is to set up 10,000 dynamic facial imaging checkpoints throughout Suzhou. Roughly 12,000 people pass through each checkpoint each day; therefore, a super powerful platform is required to handle huge amounts of facial imaging data from all these checkpoints every day. Additionally, about 2,000 vehicle checkpoints have already been networked in Suzhou. About 25 million photos are generated each day. In three years, this figure will increase to 60 million each day. Processing such a huge number of photos also calls for a powerful platform. These are tough challenges for both Suzhou Public Security and Huawei; however, we are confident and look forward to future benefits over the next three years.

Keeping the Original Aspirations in Mind and Moving Forward Decisively

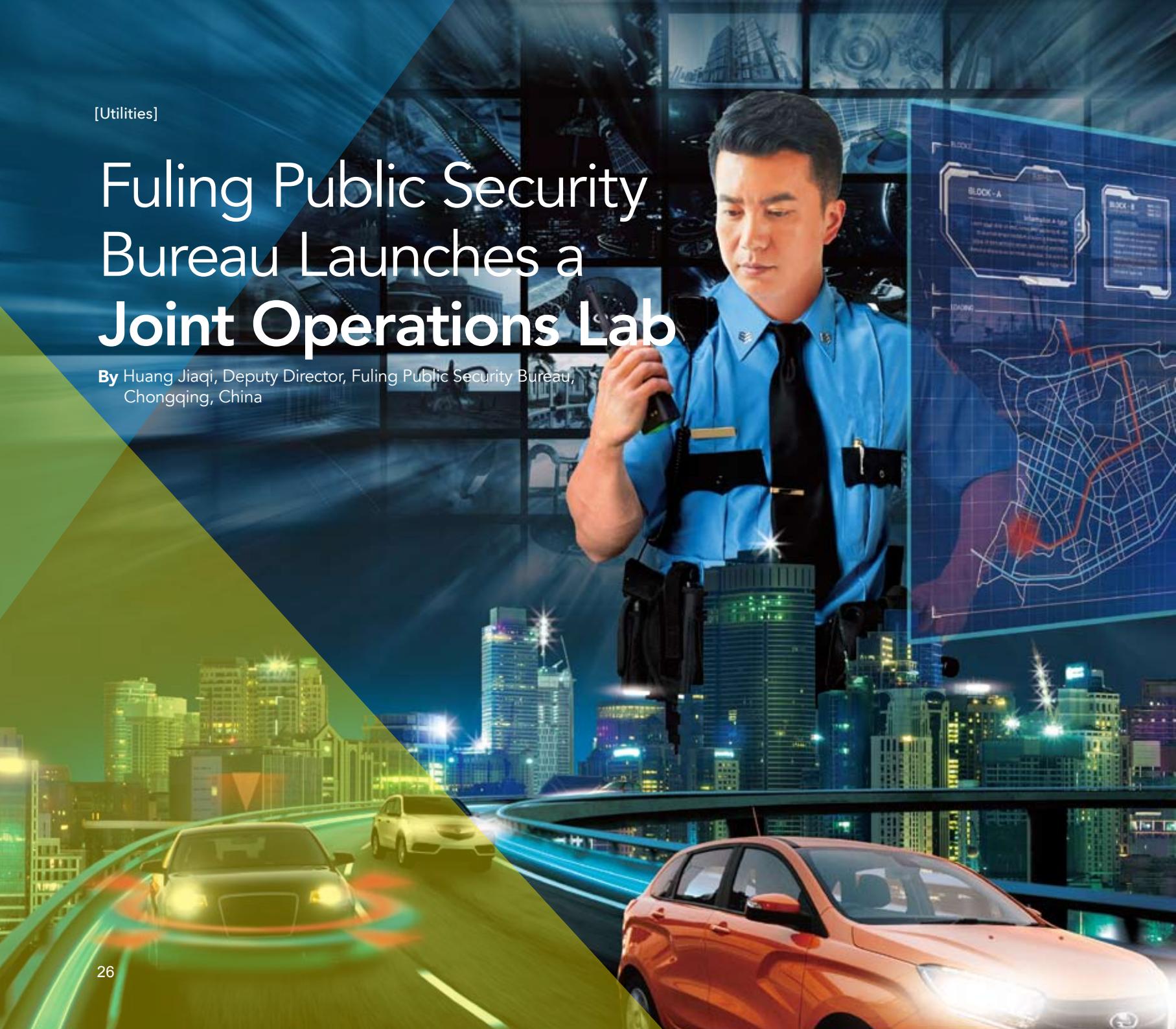
A Chinese saying goes, "Above there is Heaven, below there are Suzhou and Hangzhou." Suzhou is a famous city in South China, well known for its unrivaled cultural heritage. Its elegance is widely recognized around the globe. From ancient times until now, Suzhou has undoubtedly carried numerous Chinese people's aspirations for a better life, and such aspirations should be cherished. Remaining true to our original aspirations requires the dedication of each public safety person in Suzhou. This is more than an aspiration, however – it is also an unshakable mission.

The door to a new era has been opened. The video-assisted operations in China's public safety sector have been developing quickly. As a result, China has already changed from a follower to a leader in this regard. Even further, China has been tapping the 'Blue Ocean' and other untapped video sectors filled with infinite opportunities. Looking ahead, only by continuous exploration, effort, and innovation can we meet the expectations of our times. We will continue to work with leading partners to bring the public safety benefits to every aspect of people's lives. ▲

[Utilities]

Fuling Public Security Bureau Launches a Joint Operations Lab

By Huang Jiaqi, Deputy Director, Fuling Public Security Bureau,
Chongqing, China



By establishing a joint operations lab, the Fuling Public Security Bureau in China propels the converged development of diverse application systems based on service requirements, and encourages agencies to become fully involved with internal cooperation, external linkage, and unified collaboration.

You may only have heard of Fuling for its spicy pickles (*zhacai*, or pickled mustard roots). Located in the middle of the city of Chongqing and within the Three Gorges Reservoir region, Fuling has also become a role model for China's public security industry. Over the past two years, the Fuling Public Security Bureau has completed the integration of six types of investigative police forces into a joint operations lab. The lab has broken down internal barriers to enable the entire police force to process cases simultaneously through the use of multi-dimensional investigation and control techniques that rely on current Information and Communications Technologies (ICT), including Big Data, to gather and analyze input from cameras and sensors located throughout the city.

The use of advanced technologies by the joint operations lab not only alleviates pressure on police officers, but also improves the efficiency of the public security system. More importantly, it encourages changes in the traditional ways of thinking about police work and enables the development of converged application systems that are based on service requirements. City agencies are incentivized to cooperate internally within their own groups and also with external stakeholders mindful of the shared goal of unified collaboration.

Breaking System-based Information Barriers

Here's an example of how the Fuling lab works. Last year, after receiving the emergency call for a serious robbery, the joint operations lab rapidly filtered video of suspects fleeing with motorbikes and, by using vehicle tracking analysis, located the candidate locations where the suspects would most likely be found. The lab captured the facial images on-site, based on heat maps, and rapidly confirmed the identity of the suspects. Due to the combined

capabilities of the joint operations lab, police officers were able to arrest the suspects within two hours of the crime.

Because the joint information lab eliminates information barriers between different police agencies it is easy to conduct efficient joint investigations, provide precise guidance, and accelerate case handling. The lab also seamlessly integrates 110 incident-reporting platforms and jointly analyzes segmented intelligence to create well-planned, accurate intelligence reports. Intelligence is released to the relevant agencies and frontline civilian police officers in real time, enabling police officers to respond quickly to incidents.

Previously, Fuling's six separate police forces investigated cases by type and level of seriousness, and each department had its own working methods and service systems. Departments cooperated with each other only on complex cases.

The city of Fuling faced challenges in the areas of hardware, data handling, and IT technologies:

- **Hardware:** Each police agency was isolated, equipped only to carry out its own specified missions. Some agencies had neither the capability nor willingness to share with others.
- **Data handling:** Each police agency obtained data in their own particular way, and stored the data within only their department. The results were information silos with fragments of data scattered throughout the city.
- **IT technologies:** The systems were incapable of interconnecting structured and unstructured data for use by secondary applications.

Equipped with the latest generation of data analysis tools, the Fuling public security system is now able to fulfill a strategy for 'wide integration, high-level sharing, and deep analytics' that includes unified planning, management, and standards

The report from the local *Chongqing Morning News* shows that the closure rate of cases in Fuling in 2016 increased by 33.18 percent, robberies decreased by 37.29 percent, snatch-and-run cases decreased by 66.67 percent, and thefts decreased by 47.52 percent compared to 2013. >>

compliance. The focus was on breaking data resource barriers, aggregating and sharing internal and external data resources, and accelerating the construction of a new crime-fighting mechanism based on data and intelligence.

Fuling's public security joint operations lab has integrated the information services for all municipal police forces in a way that each department continues to operate within their particular area of expertise. This approach is possible only because of our advanced technical platforms. In one instance, the Fuling Public Security Bureau built a converged resource pool to integrate heterogeneous data from multiple sources onto a data-sharing cloud platform.

Technical Thinking Forces Changes

After constructing the unified platform, Fuling police thought about how to put the system to its most efficient use. This drove the introduction of a bonus point system where, when an incident happens, each public security agency is rewarded when they contribute clues into the resource pool. The system provides different bonus points based on the size and value of the clues. This has inspired agencies to proactively share resources and form a positive cycle of requests, usage, adding notes or links, delivery, and further requests. The result is that there are now cases that are solved before an incident report can be filed with the public security bureau.

The joint operations lab has brought many tangible benefits to the Fuling District. For example, the real-time emergency system previously used the traditional process-based development method: receive information and conduct investigations. Now, incidents are immediately put into the converged resource pool. Different police forces simultaneously focus on active cases, share resources with each other, and supplement clues at any time. Due to the incentives of the bonus point system, case investigations have changed from behind-the-scenes to 'on stage.' All personnel participate in cases, which has forced a change in police procedures.

Increased data interactions are changing the traditional methods of

communications transfer within and between departments. Previously, police forces used third-party social software, such as WeChat, or other internal software as the resource pool for cooperating in processing cases. But this was not secure. Now, with the lab's converged resource pool, it is easy to communicate with different police forces in real time, and ensure secure and timely case investigations.

Police officers' work efficiency and methods also have changed. In the past, each civilian police officer investigated many small cases at the same time. Before they successfully wrapped up these cases, it was hard for them to investigate new cases, which created a bottleneck that slowed investigations. What's more, if incidents occurred over a period of time, crime scenes and clues might be destroyed. Now, the joint operations lab can improve internal mechanisms and help to rapidly solve many cases.

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Creating Ecosystems of Services and Vendors

After building the unified platform, Fuling spared no effort to construct an ecosystem to support centralized platforms, data, and services. The agency also needed an open ecosystem of potential vendors.

To be blunt, the reason is that while the public security industry understands services, it does not understand technologies. Meanwhile, ICT vendors master technologies but do not understand public security services. After the joint operations lab was put in place, it was possible to combine services and technologies, and make great progress. However,

another problem appeared. Fuling collaborates with 29 ICT vendors, and most vendors' systems are incompatible: they aren't 'open.' How did Fuling integrate these systems into the platform?

The Fuling Public Security Bureau chose Huawei, a long-term, trusted partner, as the platform vendor and asked the company to lead a conference of all Fuling vendors to establish an open platform based on unified standards and best practices. The goal was to be able to include all vendors and their products.

In terms of technology, the Fuling Public Security Bureau:

- Not only constructed a converged resource pool to integrate heterogeneous computing and network resources – especially storage resources – onto a single platform
- But also adapted the platform to cloud requirements that combine the sensitivity of a private cloud and the agility of a public cloud

Huawei is a solutions vendor that understands both hardware and cloud platforms. For example, the Fuling Public Security Bureau's video-based surveillance system was developed based on a Huawei solution. In addition, Huawei has products that are compatible with other vendors' products and solutions, and uses its global influence to unify its partners. Huawei satisfies all these requirements based on its influence in the industry and vast experience with Safe Cities solutions.

The Fuling Public Security Bureau plans to establish a public security ecosystem to combine all vendors' applications for collaborative development. Interconnected applications and shared data are a must. Only in this way can Fuling build a cooperative public security system, develop unified, converged Big Data, and move toward Artificial Intelligence (AI) innovations.

At present, with the joint operations lab, Fuling is establishing more joint innovation centers with different vendors. About 30 vendors are taking part. The vendors divide experimental networks based on their specific features, and implement technologies and devices to solve current problems. The

joint operations lab conducts exercises in simulated scenarios with the objective of collaborating to improve products. As a result, vendors gradually develop different ways of exploring products and base their developments on the 'Internet+' model. This enables vendors to continuously advance and construct a collaborative public security framework integrated with a mature architecture. With this framework, it will be not difficult to develop ICT applications.

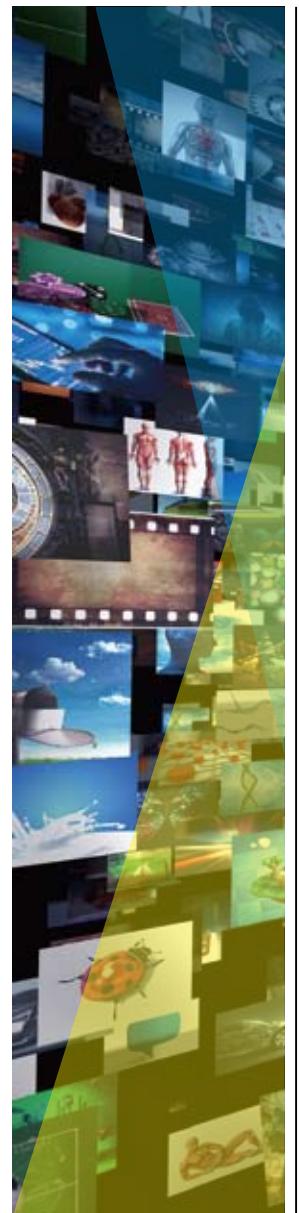
In the next few months, Fuling will increase infrastructure construction and work to continuously improve the operations system. Fuling will converge data systems and develop AI systems on the basic platform. For this next phase, Fuling will broaden the scope of sharing Big Data by connecting tens of thousands of cameras in urban areas and converging several major database resources with other public security systems. After the platform for converged technical data is in place, Fuling will converge infrastructure, applications, and technologies. Data will not stay only at the back end; it also will go to the front end for the creation of new services.

Fuling also will view these technologies from the service perspective to achieve higher levels of collaboration – ensuring that each module works well with the joint operations lab and that all converged applications have high value.

In conclusion, Fuling will actively embrace Big Data to achieve these goals. The cloud is driving the emergence of new mechanisms. Meanwhile, AI applications are on the doorstep. All of these drivers will push the reformation of police force capability strategies, initiate convergence of policing mechanisms and modern technical applications, and continuously improve the ability to fight crime. ▲

Huawei's Key Solutions

- Huawei Policing Cloud Solution
- Huawei Intelligent Surveillance Solution



[Utilities]

Shenzhen Municipal Public Security Bureau: 'Video + Big Data' Create a Safer City

By Li Shihua, Chief of the Video Police Division, Shenzhen Municipal Public Security Bureau

Video cloud solutions enable features such as wide area coverage, large-scale centralization, and highly intelligent analytics. Applications of these technologies are extending beyond public safety to play a bigger role serving the needs of more urban sectors, including safeguarding people's everyday lives and improving city management.

Video + Big Data: Especially Useful for Public Safety

Video technologies now play a bigger role in assuring public safety. The following describes a real-world example of how such video implementations make Shenzhen a safer city.

Three years ago, a high-profile home break-in, robbery, and murder incident occurred in Shenzhen. Many high-level law enforcement organizations recognized the importance of the case and urged responsible police departments to quickly solve this crime. The case investigation personnel then reviewed related video feeds and quickly identified the suspect – a man in his thirties wearing a black T-shirt and blue jeans. Then, by using the video relay function, investigators followed the subject leaving in a red taxi from the front of a nearby shopping mall. Subsequently, the team fully leveraged video along with Big Data analytics technologies to uncover that the suspect had taken the taxi to an intercity passenger station.

In order not to be detected and tracked, the suspect did not use any mobile phone or other communication devices. Therefore, it was impossible to quickly determine information about the suspect. However, the case investigation personnel did not give up and continued to find more clues. After meticulous investigation, a break in the case occurred at the intercity passenger station. The suspect used a fake ID card when purchasing a ticket and relevant insurance. Although his information was false, the case investigation personnel could continue to follow this information.

The suspect was confident enough. He fled to another province and continued to use the fake ID card to check into a hotel. According to China's existing policing requirements, the hotel must archive and upload information about all guests. Through such clues, the case investigative personnel caught this suspect sleeping in that hotel.

To solve this case, the police used Big Data and video analysis technologies as well as other

high-technology, intelligent criminal investigation methods. These technologies and methods now have become commonplace for investigating and solving similar crimes. The video surveillance system plays an even more important role in routine police work. At present, more than 50 percent of cases have related video clues. Video and IT applications contribute to over 70 percent of clues for major and important cases. All these investigative techniques could not even have been imagined in the past.

Perfect Ending: Shenzhen Video Surveillance System Phase 3

According to the influential agency Shenzhen News, Shenzhen's police departments started to build a video surveillance system in 2006. To date, Shenzhen has implemented three phases of this system, including the deployment of approximately 60,000 level-1 cameras and 1.3 million level-2 and level-3 cameras.

With these gradual upgrades to the municipal video surveillance system and the completion of Phase 1 through Phase 3, public safety in Shenzhen has improved significantly. According to statistics, the number of cases in Shenzhen have decreased over the last nine years, and even have decreased by 25 percent this year, while the solved major and important case rates keep increasing. Currently, about 60 percent of criminal cases are solved with the help of video surveillance recorded by the installed cameras.

Objectively, the security of Shenzhen is improving due to a variety of reasons, such as: Decision-making support from the executive layer, intensity of reform, teamwork, and other ICT enhancements. Another important reason is attributed to the Shenzhen video surveillance system.

After completion of the construction of Phase 2 of the video surveillance system during

During Phase 3 of the construction, Shenzhen Municipal Public Security Bureau quickly streamlined all resources and conducted joint development based on Huawei's 'Platform + Ecosystem' strategy.

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Shenzhen Universiade 2011, Shenzhen has improved its reputation across the nation. For the current activities during Phase 3 of this project, Shenzhen focuses on platform and ecosystem construction. This eliminates the traditional scattered storage systems and helps implement an overall Safe City Solution.

For Phase 3, Shenzhen Municipal Public Security Bureau selected Huawei, a leading global ICT solutions provider with comprehensive strengths, as a core partner. The reason that Huawei was included at this phase was because Shenzhen Municipal Public Security Bureau interconnected with over 50 vendors in Phase 2, consuming a lot of time and energy for communications and coordination. During Phase 3 of the construction, Shenzhen Municipal Public Security Bureau quickly streamlined all resources and conducted joint development based on Huawei's 'Platform + Ecosystem' strategy. Although the project was under a rather tight schedule, Huawei completed the task ahead of time and even constructed a unified resource platform.

A dedicated video network was constructed across the entire city of Shenzhen during Phase 3. This involved huge investments and large service changes. Almost all key service systems constructed in Phase 2 were migrated during Phase 3 of this project. The following describes some key technology improvements:

- The Optical Transport Module (OTM) is used for transmission. This module ensures optimal bandwidth usage.
- Huawei's high-end 100G devices are selected as computer numerically controlled devices. Shenzhen is the first to use such high-end devices among governments and enterprise sectors.
- Data is now stored in a centrally designed architecture. This transforms the original distributed storage system. To ensure storage security and stability, two data centers are built. The two centers use dual-ring links. The switching speed from one node to another reaches 100 Gbit/s, ensuring high line speeds and improved security.

Video Cloud Solution Unleashes Maximum User Benefits

In simple terms, the architecture of the video surveillance system in Phase 3 is completely different from that of Phase 2. Additionally, nearly all hardware devices now use Huawei products and solutions. This helps resolve the heterogeneous platform issues and creates a unified platform.

Based on this, Shenzhen is also expanding its video surveillance system ecosystem and developing diversified applications such as facial recognition and license plate recognition. Judging from the development trends of the video surveillance system, Shenzhen needs to implement a hierarchical video surveillance system, establish a hardware infrastructure platform, and streamline all computing, storage, and network resources. In particular, network resources are a key element for ensuring synchronized video storage.

Shenzhen is now organizing Phase 4 of this project. One of the objectives is to create a video cloud solution. Cloud technologies will be a further advantage and must be service-oriented to unleash the maximum advantages of video. Through open Application Programming Interfaces, or APIs, the video cloud will provide App-style mobile services. Artificial Intelligence (AI) technology will also be integrated during this process. Undoubtedly, future-proof computing must integrate with central and edge computing that places even higher requirements on the central computing capabilities. This will be also the priority of Phase 4 construction.

Video applications will go beyond ensuring public safety and extend to serve the needs of more sectors, playing a bigger role in safeguarding people's everyday lives, city management, and other areas. How to implement networking, expansion, and applications also will be the priorities of Phase 4 construction. One thing is inevitable: A video cloud solution featuring wide area coverage, full networking, large-scale centralization, and high intelligence will continue to improve business strategies, protect lives, and lower investment costs.▲

Shenzhen Traffic Police Bureau and Huawei Jointly Create a **Futuristic 'City-wide Traffic Brain'** for Safe City Driving

By Li Qiang, Director, Science and Technology Office, Shenzhen Traffic Police Bureau

By relying on the most powerful 'City-wide Traffic Brain,' Big Data, and innovative ICT measures, Shenzhen will be able to build an even more robust traffic network. >>

A joint innovation of the Shenzhen Traffic Police Bureau and Huawei started with a high-level design program that formed the basis of a comprehensive plan for an urban traffic system. The plan included cutting-edge technologies such as a video cloud, Big Data, and artificial intelligence in order to build the 'City-wide Traffic Brain,' a unified, open, and intelligent traffic control system.

In just 37 years, Shenzhen has been transformed from a nondescript fishing village to a world-famous, booming metropolis, with skyrocketing economic and population growth. Currently, metropolitan Shenzhen has a population of approximately 21 million, and its GDP has reached CNY 1.94 (USD 0.29) trillion, making it No. 4 in GDP among all Chinese cities.

Like many of the world's other large cities, Shenzhen faces growing pains, particularly traffic congestion. Shenzhen's land size is less than 2,000 km², and there are only slightly more than 600 km of roads. It has the highest vehicle density in China with an average of about 530 vehicles per kilometer. As a result, the conflict between people, vehicles, and roads was an increasing problem. Against this backdrop, the Shenzhen Traffic Police Bureau began exploring the feasibility of innovative new ways to solve the problem.

First, the Shenzhen Traffic Police Bureau adopted Big Data methods of translating data into solid plans and encouraged public participation to drive the transformation of modern policing mechanisms. As a result, the bureau introduced a series of standardized service innovations, such as the 'zipper merge' and reversible lanes. Other efforts included a stronger focus on the rule of law and making enforcement more precise. The bureau also worked to improve driver education.

While Shenzhen has always been considered to be at the forefront of traffic management practices in China, the bureau wanted to do more to make city streets safer as the metropolis continues to grow. Previous achievements by the Shenzhen Traffic Police Bureau would have been impossible without the use of a large number of Information and Communications Technologies (ICT) as well as long-term strategic assistance from ICT vendors. We have long considered Huawei to be our most important ICT partner.

Joining with Huawei to Explore the Road to 'Smart Traffic'

The bureau and Huawei deepened their cooperation by jointly exploring a more efficient and intelligent traffic management technology architecture – China's first city-wide traffic brain. This traffic brain is based on high-level design principles that help to comprehensively plan the urban traffic system. The plan includes cutting-edge technologies such as video cloud, Big Data, and Artificial Intelligence (AI) in order to build a unified, open, and intelligent traffic control system. Our goal was to introduce a truly 'smart' traffic system.

We also improved our use of Big Data to create a unified data collection,

analysis, and processing platform to achieve higher levels of information resource sharing, integration, and utilization. A Big Data resource pool was created in the cloud for instant access. As a result, the analysis of traffic data made it possible to deliver more high-quality and efficient traffic services for our citizens.

Five Significant Areas for the Exploration and Use of the 'City-wide Traffic Brain'

The city-wide traffic brain is focused on the following five significant areas:

- **Ultra-broadband traffic network:** Huawei's high-speed Optical Transport Network (OTN) enables transmission at 400 Gbit/s, data storage of over 20 PB, and data processing capacity for tens of billions of elements. The Shenzhen network carries about 40 times the data of a traditional police network.
 - **Full awareness of city-wide traffic:** The Shenzhen Traffic Police Bureau has set up a road monitoring system that can detect traffic conditions through license plate identification, video surveillance, and other methods with a detection accuracy rate of up to 95 percent. The system collects about 700 million pieces of vehicle data every month, and integrates nearly 40 TB of data from 78 system databases, both internal and external. All these contribute to useful Big Data-enabled traffic congestion analysis and optimization.
 - **AI-assisted law enforcement:** Law enforcement is the main work of the traffic police department. Originally, the Shenzhen Traffic Police Bureau relied on the cop on patrol (on foot or in a car) to confirm that a driver had committed a traffic violation. After we introduced AI technology, the Big Data analytics platform could respond to checkpoint data within seconds. Now that we have technology that can identify vehicle features, the traffic brain can process up to 10 million images per day. We can identify traffic violation images at an accuracy rate of more than 95 percent. In fact, the use of AI technology, which ensures accurate closed-loop processing of the images, has made a tenfold improvement in identifying traffic violation images.
 - **Big Data improves crime fighting efficiency:** In the past, we needed seven days to prepare data resources, develop custom search queries, and perform data analysis to find the proper data for an important case. Today, the Shenzhen Traffic Police Bureau uses a Big Data platform and traffic-analysis modeling engine to create multiple reports for disqualified driving, drunk driving, and cars with multiple violations. As a result, intelligence can be generated and pushed precisely within 30 minutes, which helps pinpoint violations. Recently, 37,055 cases of serious violations of all types were investigated and 874 vehicles with fake or cloned license plates were detained. Police officers' work efficiency is nine times greater than before. Vehicles with cloned or fake license plates, scrapped vehicles, and vehicles with multiple violations have almost disappeared from the streets of Shenzhen.
 - **Improved travel experience:** We also apply innovative technologies to improve citizens' driving experience. The Traffic Police Bureau has set up a real-time surveillance system for all signal-equipped intersections in Shenzhen, and developed a precise traffic signal control mode based on the traffic time-space software engine. We also collect a variety of data via converged checkpoints and roaming police cars. We can then precisely establish lanes through intersections, and organize traffic flow through Big Data management and control. This has helped us increase road capacity by about 8 percent.
- In the future, the Shenzhen Traffic Police Bureau will develop smart police terminals based on 5G technologies; analyze historical data by means of traffic simulation to predict traffic volume in each corner of the city; invest nearly CNY 3 billion (USD 453 million) to upgrade all checkpoint systems, including an improved high-definition video system, so that its coverage rate will reach over 70 percent. By relying on the most powerful city-wide traffic brain, Big Data, and innovative ICT measures, Shenzhen will be able to build an even more robust traffic network. ▲

[Utilities]

New ICT Helps Build Smart Zambia



To ensure the development of secure, efficient and interoperable systems between departments the Zambian government set out plans to build and promote a "Smart Zambia." With Huawei as the primary project supplier, the goal of the "National ICT Development Project" would be to build a national cloud data center and launch an ICT talent training center.

Scott and Ben's Work Worries

Scott is a senior staff member at the Zambian Ministry of Finance (MoF). As part of his job, he analyzes a wide range of economic data, including statistics on power generation, copper production and exports, the use of mobile communication services, and numbers of tourists. Scott's information is sourced from government departments across Zambia.

Scott has often faced delays in receiving critical data. There has been a history of disagreements between departments over the specific data to be released, or when, or sometimes difficulties when needing to access old data stores. Challenges on the systems level have included the inability to deliver a reliable supply of electricity to the IT systems, which at times has caused the loss of important information. Scott relies on his colleague Ben, an IT engineer for the MoF, to resolve all such technical issues as they arise.

Among Scott's concerns is maintaining effective voice and mail communications between the Zambian ministries of finance, agriculture, transport, and customs.

As the national data infrastructure of Zambia has become more digitalized, the need to store and analyze large amounts of data has grown exponentially. However, because the IT resources of the Zambian government have been operated separately, the risk of data loss remained high. Scott, Ben, and their peers throughout the government have been unable to keep pace with the rapid change in the requirements for enterprise ICT leasing, and each of the problems described above were having an equal effect across

other major agencies, including agriculture, transport, customs, and tourism.

To ensure the development of secure, efficient and interoperable systems between departments the Zambian government set out plans to build and promote a "Smart Zambia." The government determined that progress into the digital age would involve the use of innovative technology to advance a national informatization program for eGovernment, eCommerce, and IT talent.

The National Data Center Is the Foundation of a Smart Zambia

In March 2015, during his first official visit to China, Zambian President Edgar Lungu met with Chinese President Xi Jinping. Together they witnessed the signing of a Phase 1 joint framework and financing agreement for the Smart Zambia project. With Huawei as the primary project supplier, the goal of the "National ICT Development Project" would be to build a national cloud data center and launch an ICT talent training center.

Huawei provided the Zambian National Data Center with a reliable solution that included: A Three-Data-Centers-in-Two-Cities (3DC) solution that ensures the security and continuity of government services and data; a Huawei cloud solution with services such as government and enterprise cloud hosting; and Huawei energy solutions to guarantee safe operation of devices in data center equipment room.

Zambia's main national data center at the Information and Communication Technology Authority (ZICTA), is located in Lusaka, the capital city. The ZICTA center

In addition to providing Phase I and II of the Smart Zambia project, Huawei has acted as a lead planner to help the government implement the Smart Zambia ICT Master Development Plan over the next 50 years. The Master Plan is the guiding document for steering the transformation of the Zambian economy into a smart future.

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covers an area of about 450 square meters, with an equipment room containing 72 server cabinets, a power room, monitoring room, and two outdoor diesel-engine generators supported by underground fuel tanks. The ZICTA cloud platform was designed to provide processing, networking, and storage facilities for government and public institutions, and commercial enterprise services.

A 400-square-meter backup data center is co-located at the Roma switch office of Zamtel, the Zambian national telecommunications operator. A second backup data center – this one covering 600-square meters – is situated at the Zamtel Kitwe switch office. Each of the three centers is fully equipped with servers, power, monitoring, and communications equipment rooms.

The Zambia National Data Center project officially commenced in January 2016, and installation and delivery were completed by the end of December 2016. The center was handed over to the government on February 28, 2017. The ZICTA National Data Center is now officially in operation.

Huawei's cloudified 3DC solution has provided the physical infrastructure currently in use by the Zambia government. The result is the delivery of eGovernment services from a centralized facility that has greatly increased government efficiency and accelerated the process of creating a paperless environment. The solution is a powerful and reliable 'information nerve center' that ensures the efficiency and data security of government operations, including support for transportation and commercial applications.

The ICT Academy: Ben's Second University

According to Zambia's 7th Five-Year Development Plan, ICT has been identified as an important catalyst for socio-economic development and a driving force for good governance. In order to fulfill this mandate, Zambia needed to create a national program to train ICT talent. The Zambia

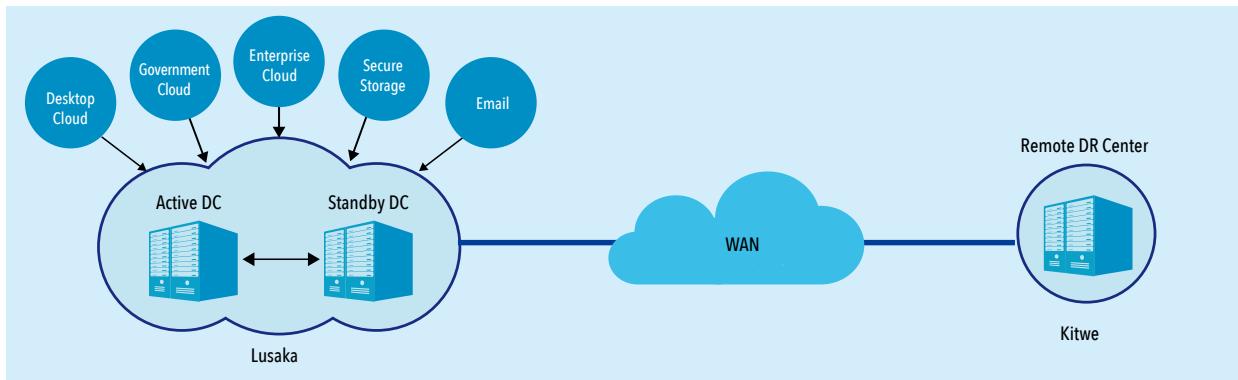
government expects that the expansion of educational opportunities for ICT managers and technicians will increase the employment rate nationally and lower the costs of operation for Zambian ICT enterprises.

In addition to supplying the technical infrastructure, Huawei has also provided an advanced ICT training solution that includes modern multimedia classrooms and labs, course materials, and on-site training. The result high standard for training and certification ensures that a qualified workforce is available for data center operations and business activities both inside and outside of Zambia.

Ben, this story's second protagonist, was assigned to take part in the Smart Zambia ICT training project. Using electronic whiteboards, teachers and trainees can engage in discussions using remote video though Huawei's smart teaching system. And, in the technical labs, trainees can practice IT operation and maintenance procedures for storage, networking, transmission, and telepresence activities.

In order to meet the Zambia national ICT industry and human resources development strategy, Huawei launched the ICT 'Star Instructors' certified vocational training course that gave trainees the opportunity to travel to China to receive high-quality guidance and hands-on experiments to assure that the teaching methods used in Zambia would meet Huawei's requirements. Following their return to Zambia, instructors are qualified to train more ICT instructors and students to an established international standard.

Ben's training ran from February to mid-September 2016. He attended a total of eight courses, obtained the related certificates, and became a Star Instructor at the Zambia ICT College (Zict College). He, and all other instructors who had received the necessary credentials began to teach at Zict College. At times, and depending on the topic, Huawei Authorized Information and Network Academy (HAINA) instructors may also join the discussions. The ICT online learning system includes courses on networks, IT, enterprise communications,



among others. At present, 156 students are enrolled in the program; and in the future, Ben will both work at the National Data Center and also continue to train up-and-coming ICT talent for Zambia.

Immersive, Efficient Communication

Huawei has supplied a number of telepresence conferencing systems to the Zambian government, including 5 three-screen systems and 21 two-screen systems. According to the mandate, 26 ministries have access to the telepresence facilities, with coverage that includes the President's Office, Cabinet Offices, and the Ministries of Finance, Home Affairs, and Defense.

The video telepresence conferencing system gives participants an immersive, true-to-life experience that transforms the conventional model for convening meetings between separate offices. Communications and decision-making are improved, and many issues can be solved without the need to travel. By eliminating the need for routine face-to-face meetings, the frequency and costs for travel are reduced. The use of Huawei's telepresence system has significantly cut time and costs of government meetings and helped make the communication between Scott and other government officials simpler and more efficient. The Zambian Minister of Foreign Affairs has remarked that, "Things have been changed for the better!"

National Broadband Network: A Step Further toward 'Smart'

With the first phase complete, the Smart Zambia Institute (SII) has launched Phase II of the Smart Zambia project to build a national broadband network and eGovernment platform to benefit 17 cities across the country. 9,050 km of fiber-optic cable will be deployed across ten provinces, with a plan to connect ten-thousand businesses and public-sector organizations, and two-hundred thousand urban households to the National Data Center built in Phase I. The country of Zambia is undergoing a large-scale boost in informatization based on the access and promotion of smart national government applications to the general public.

The Huawei-supplied eGovernment platform is also supporting an eCustoms system for twelve Zambian shipping ports that are connected to the existing Asycuda system. The new system will add logistics tracking, cargo testing, and ensure the collection of tax revenues for all goods passing through customs. The Zambia Customs Commission will use the system to combat tax evasion and increase total revenue.

In addition to providing Phase I and II of the Smart Zambia project, Huawei has acted as a lead planner to help the government implement the Smart Zambia ICT Master Development Plan over the next 50 years. The Master Plan is the guiding document for steering the transformation of the Zambian economy into a smart future. ▲

[Utilities]

Yanbu Industrial City: A Smart City Emerges in the Oil Kingdom

In line with 'Vision 2030,' the Royal Commission for Yanbu (RCY) decided to take the lead in addressing the Yanbu industrial city challenges by constructing the Smart Yanbu Industrial City, to create industrial clusters, enhance collaboration between industries, expand business diversification, improve investment environments, and enhance competitiveness.

In recent years, falling global oil prices have created challenging opportunities for Saudi Arabia to move towards renewable energy and opening new investment projects that will support the economy since oil generates about 70 percent of the country's revenue. As such, Saudi Arabia announced its new transformation program called 'Vision 2030' in April 2016. This ambitious yet achievable blueprint has clarified the goals of developing cities, achieving environmental sustainability, improving digital infrastructures, and expanding the variety of digital services. In particular, this new initiative recognizes the significance of expanding industrial clusters and attracting more high value-added investments – as feasible ways to build up national competitiveness. In line with Saudi Arabia's vision, the Smart Yanbu Industrial City project has started to build upon the hopes of Saudi Arabian citizens for transformation.

Smart Yanbu Industrial City, a Transformative Engine for the Oil Kingdom

In 1975, Yanbu Industrial City was set up according to a royal decree and managed by a Royal Commission. After more than 40 years of fast growth, Yanbu industrial city has become the third largest oil refinery center in the world. It can produce more than 1.1 million barrels of oil every day, and its yearly industrial production capacity reaches 131 million tons. Yanbu has also set up the largest petroleum transportation port near the Red Sea and established key petroleum liquefying and processing locations.

Yanbu industrial city has become the beneficiary of high-speed industrialization. The efficient city layout, wide roads, sufficient public spaces, and green parks all indicate

the vitality of this fast-growing city. However, Yanbu is also facing ever-increasing pressure. For example, limited network bandwidth cannot meet the requirements of governments, enterprises, and residents, affecting office efficiency and online entertainment experiences. The daily operations of large refining factories, ports, and warehouses, as well as large-scale city construction require a large number of heavy vehicles. Overloading and speeding by these heavy vehicles have caused costly maintenance for the roads. Public parking spaces are difficult to manage because there are too many private cars. Road lighting costs are high. Building rubble and waste are sometimes not handled in a timely manner. Security risks exist in densely populated areas. A large number of underground industrial facilities need security due to lack of monitoring.

In line with 'Vision 2030,' the Royal Commission for Yanbu (RCY) decided to take the lead in addressing the Yanbu industrial city challenges by constructing the Smart Yanbu Industrial City.

Dr. Alaa Nassif, Chief Executive Officer (CEO) of RCY, said, "Today's global competition is fierce. We hope to maintain the competitiveness of the city through our Smart City initiative. We have focused on industrial growth over the past 40 years. Now, we will gradually shift to more diversified sectors including entertainment, tourism, and science and technology. In doing so, we desire to create industrial clusters, enhance collaboration between industries, expand business diversification, improve investment environments, and enhance competitiveness."

"The vision of building a Smart Yanbu Industrial City is aligned with the 'Vision

In 2016, for Phase 2 of the Smart Yanbu Industrial City plan, smart applications were launched. Aiming to enhance municipal administration, RCY focused on eight smart applications. These applications improve municipal administration efficiency, enhance public safety, and create a better living environment. >>

2030' goal. It aims to improve the quality of life through a smart city. We have set a series of specific goals. For example, all national transformation projects that have been planned will be on the right track; the annual smart city revenue will exceed USD 66 million; the average incident response time will be less than 7 minutes; the annual traffic accidents will be fewer than 1,200; the optical fiber coverage rate will be greater than 59 percent; the free Wi-Fi coverage rate in public places will be higher than 70 percent; the public lighting costs will be reduced by 30 percent; the waste clearing efficiency will grow by 30 percent; and the road maintenance costs will be reduced by 20 percent." added by Dr. Nassif.

The Smart Yanbu Industrial City plan has three phases:

- **Phase 1 (Smart City 1.0):** Focuses on the construction of city infrastructure, such as city broadband and cloud computing, to build a connected city
- **Phase 2 (Smart City 2.0):** Revolves around city applications, including security, intelligent public services, and environmental protection, to build a sensor-enabled city
- **Phase 3 (Smart City 3.0):** Centers on the city platform, covering the city management platform and smart community portal, to ultimately build a fully intelligent city

The Smart City Initiative Pays Off After Two Rounds of Construction

It is impossible to conceive of smart cities without strong information infrastructures. For Phase 1 of the project, city broadband was the core, and RCY implemented Public-Private Partnerships (PPP). Specifically, RCY provided public infrastructures such as roads, buildings, power grids, and water services, city optical networks, while the telecom operator Mobily delivered telecom infrastructures and Huawei provided ICT solutions, including smart city data centers, GSM/3G/LTE, as well as related service and operations support systems.

This PPP mode gave full play to complementary advantages and ensured mutual benefits. As a result, the wired and wireless broadband networks across the entire city were quickly constructed, providing high-speed network access services, and delivering improved network experiences for governments, industrial, and residential areas. In addition, open access networks were deployed to connect the transportation signal facilities to prepare for the construction of the next phase of the Smart City.

In 2016, for Phase 2 of the project, smart applications were launched. Aiming to enhance municipal administration, RCY focused on eight smart applications, including Heavy Vehicle Management, Smart Waste Management, Smart Streetlight, Smart Parking, Smart Energy Efficiency Monitoring, Crowd Density Analysis, Smart Manhole Cover, and Comprehensive Performance Assessment. These applications improve municipal administration efficiency, enhance public safety, and create a better living environment. Huawei provided a comprehensive portfolio of network and IT solutions (including wireless access points, routers, switches, servers, storage, and 2G/3G/4G base stations), devices such as surveillance cameras, the eSight + Network Management System (NMS) platform which uniformly manages network-wide devices, and software products provided by Huawei partners. All these help ensure that the data collected by front-end devices can be transmitted to the back-end system in a secure, stable, and real-time manner for management and analysis.

- **Heavy Vehicle Management:** Almost all industrial cities have these big headaches: Overloading and speeding of vehicles, which make the road easy to be damaged, and need a lot of maintenance costs. To prevent this, Yanbu has buried pressure and length sensors in important entrances and exits of the industrial areas. These sensors work with HD License Plate Recognition (LPR) cameras that are set up at the roadside to accurately record information about all vehicles passing by, such as the registration information, speed, and weight. Through the networks, routers, and switches, such information will be uploaded to the automatic



management system that can assess penalties to vehicles for overloading and speeding. High efficiency of road transportation is crucial to a country that is undergoing transformation. The new dynamic weighing system does not require vehicle docking or manual guidance; therefore, the traffic is not affected. The dynamic weighing system also does not require fixed weighing sites or employees for on-site work, reducing construction and operations costs by 80 percent.

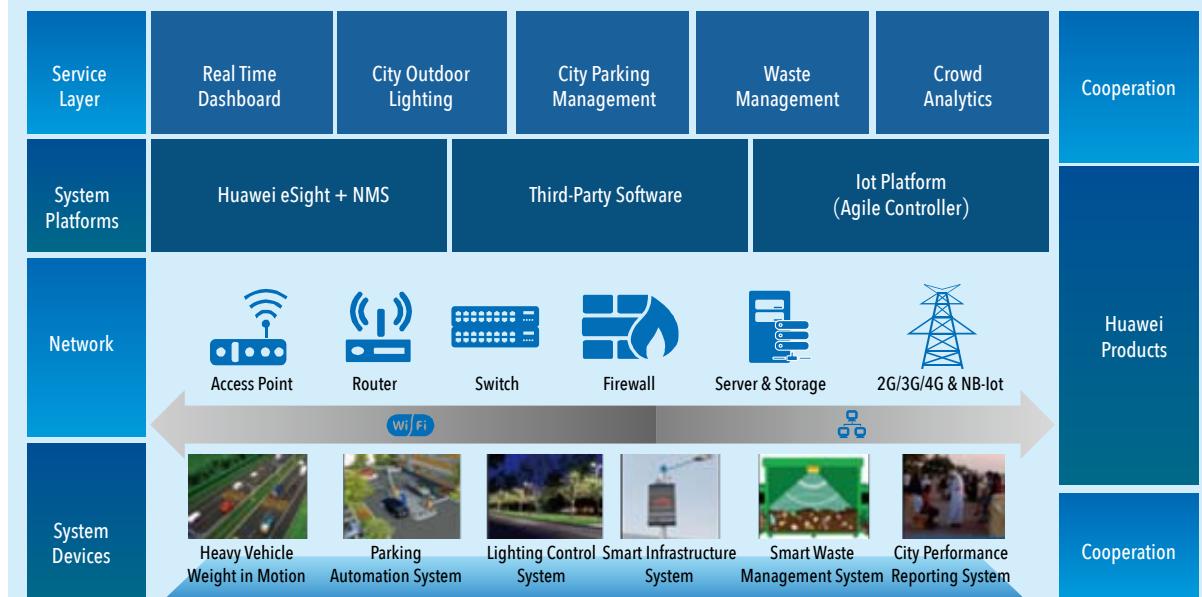
- **Smart Waste Management:** In Saudi Arabia, the hot weather accelerates garbage deterioration. However, almost all garbage bins are uncovered, give an unpleasant smell, and attract stray cats, dogs, and mice, which increases the risk of disease infection and adversely affects people's life comfort and health. The Smart Waste Management Solution provides capacity sensors powered by solar energy. With such capacity sensors installed, the fill-level of a garbage bin is reported in real time, so that the administrator can optimize the driving routes of garbage vehicles to improve garbage collection efficiency. In addition, the oil consumption of garbage vehicles is monitored. The administrator is notified of all exceptional changes in the oil volume to prevent oil theft.

- **Smart Streetlight:** The old streetlight system had limited management and control over streetlights. The system could simply turn on

and off streetlights, and only notify the related management department of streetlight faults. Now, the energy-consuming and high-voltage sodium lamps that could not be remotely controlled have been replaced with new LED lighting modules, which feature low energy consumption, can be automatically turned on/off, and can have brightness adjusted according to the environmental conditions. The use of such modules reduces the lighting energy consumption by 70 percent. With the Smart Streetlight system, the lighting policy can be flexibly configured and modified on a per-streetlight basis, instead of the traditional power-on and power-off based on the power phase line. The management platform provides information about the working status and service life of every streetlight, which reduces the workload of traditional road device inspection. In addition, by integrating terminals such as digital signage, environment monitoring sensors, emergency alarming devices, speakers, and surveillance cameras, the streetlights can provide diverse information (such as emergency notification, business, and weather) and provide convenient services (such as emergency calls and video surveillance), building a better interactive platform for bridging the government and citizens.

- **Smart Parking:** The parking lots in Yanbu have long been free of charge for citizens, which objectively leads to unfair allocation of parking resources

Smart City construction not only greatly improves Yanbu's public service level, but also enhances its capability of attracting high value-added investments. Since the construction of Smart Yanbu Industrial City in 2014, the growth rate of external investments has reached 16 percent, much higher than the previous 2.5 percent. >>



in popular places. While keeping most parking lots free of charge, the smart parking management system charges the residents who use the parking lots in popular places. Such a successful combination of technologies and economics ensures that resources are provided based upon citizens' needs. The usage of a parking space is reported in real time by the geomagnetic and infrared sensor installed on the parking space. The number of available parking spaces and the occupancy duration of each parking space are automatically and quickly determined. Citizens can pay parking fees in various ways, such as using mobile phones and parking fee machines.

- **Smart Energy Efficiency Monitoring:** The high incomes in Saudi Arabia allow citizens to enjoy cheap electricity services which inevitably increases resource consumption and creates a burden to the vulnerable ecosystem. RCY has decided to reduce power consumption in office areas and set a good example to encourage citizens to enhance their awareness of power conservation. The energy consumption sensors in office buildings

can collect power consumption data on each area in real time. Then, diverse management approaches based on power consumption data comparison can be taken to improve government staff's awareness of energy savings and promote reasonable power consumption. The sensors can also remotely control the power supply. During non-working hours, the sensors can be remotely controlled to shut down the air conditioners and lighting devices for more energy savings.

- **Crowd Density Analysis:** With the popularity of smartphones, Wi-Fi is now everywhere. Consequently, monitoring Wi-Fi signals can accurately learn the distribution and flows of people, allowing city authorities to closely follow situations and take necessary measures in a timely manner in the case of any emergencies.

- **Smart Manhole Cover:** As an industrial city experiencing rapid growth, Yanbu has a large number of pipes, valves, and connectors installed underground. The manhole covers for accessing these facilities

have become a focus for security measures to protect the underground facilities from becoming targets for attacks. The Smart Manhole Cover Solution provides remote control over manhole covers. The covers can be opened only when maintenance is required, preventing unauthorized access. Different types of sensors such as hazardous gas detection and water permeation detection sensors can be installed on the covers for different types of manholes, monitoring overflow accidents in real time and ensuring the safety of personnel inside the manholes.

- **Comprehensive Performance Assessment:** With this comprehensive assessment system, the key tasks of all related city departments can be planned and assigned in a unified manner, and the progress of each department's work indicators is monitored. This helps identify problems ahead of time and find the root causes. The unified performance indicators help promote collaboration between departments and hence improve government work efficiency.

Livable and Business-friendly City with Higher Attractiveness

After two phases of Smart City construction, Yanbu Industrial City is starting to enjoy many benefits. The road maintenance cost has been reduced by 20 percent; the garbage clearing efficiency has been improved by 50 percent; the overall cost of the public lighting system has been reduced by 30 percent; and the utilization of public parking spaces increased by 30 percent. In the third phase of Smart City construction, a Big Data analytics platform, IoT data platform, and communications integration platform will be built to support municipal services, investment trend analysis, smart public facilities, emergency response and smart police services, and build an integrated command center. RCY will continue to deepen its collaboration with Huawei and leverage new technologies to enable citizens to enjoy better public services and make Yanbu more attractive.

Thanks to bold exploration and practices, Dr. Alaa Nassif said happily,

"The Smart City project has proven that our Royal Commission is visionary. We are on the right track and all will benefit from the Smart City project, including the government, enterprises, and individuals. Smart City construction not only greatly improves Yanbu's public service level, but also enhances its capability of attracting high value-added investments. Since the construction of Smart Yanbu Industrial City in 2014, the growth rate of external investments has reached 16 percent, much higher than the previous 2.5 percent; by June 30, 2017, RCY has 81 companies of Light/Support industry in operation, 36 under construction, and 33 in design; restaurants account for 16.7 percent in commercial establishments in operation, retail shops occupy 12.42 percent, and business offices take up 14.9 percent; the satisfaction rate of residents has reached 90 percent; and the revenue from the Smart City construction is continuously increasing and is expected to reach USD 100 million in the next year."

"With deeper development of the Smart City project," he added, "more and more young people choose to work and start a new life in Yanbu. Both the employment rate and the population are increasing in a healthy and orderly manner." ▲

Customer Testimony

"The cooperation and achievements of the RCY and Huawei for Smart Yanbu Industrial City establishes a good model for other cities. Huawei leads a robust ecosystem. Through flexible application of new ICT innovations, we can now sense, analyze, and integrate more city operations, enrich key information required by the management system, and make smarter, faster responses to various requirements, such as city governance, public services, and business activities. I believe that such a data-driven city development path can inject new energy towards improving people's lives, optimizing city operations and management, and enhancing business with other cities around the world. It will definitely create a better city life for human beings."

— Dr. Alaa Nassif, Chief Executive Officer of RCY

[Finance]

Major French Banking Group BPCE Chooses Huawei as One of Its Technology Partners



Groupe BPCE has chosen Huawei as one of its technology partners as a part of its infrastructure development. With support from Huawei, Groupe BPCE pursues the technological development of networks of its agencies.

Technological innovation is significant for Groupe BPCE who wishes to offer new services based on architectures, such as cloud-based service platforms or new advanced offerings in agencies, such as virtual teller machines.

Solving Challenges with Better Performance

To meet these new customer requirements, Groupe BPCE must rely on flexible technological infrastructures that allow for more frequent modifications to configurations with easier deployment and management.

High-performance Wi-Fi networks are currently deployed and these networks must be scalable and leverage benefits from technologies that will meet requirements for the next 10 years.

Innovative Solutions from Huawei

To meet the needs of Groupe BPCE, Huawei has proposed its Agile Network solution with its S5700-LI series of switching products, which meets the requirements of a wide range of applications such as High-Definition (HD) video and high-performance Wi-Fi.

Huawei's network solution integrates Intelligent Stack, or iStack, an intelligent infrastructure technology, for enhanced scalability. Huawei's iStack technology allows for simplified network management, facilitating expansion.

The Huawei solution also integrates energy-saving technologies,

including Energy Efficient Ethernet (EEE), port power detection, dynamic CPU frequency adjustment, and device standby. These technologies enable Groupe BPCE to reduce power consumption and operating costs by flexibly adjusting the power, depending on the states and usage of its infrastructures.

Finally, Huawei eSight, the flexible and open platform, helps the companies of Groupe BPCE to customize their intelligent network management system.

To date, 197 companies from the *Fortune Global 500* list and 45 of the top 100 companies have chosen Huawei as their technological partner.

Groupe BPCE, the second largest banking group in France, relies on the two networks of cooperative commercial banks which are autonomous and complementary: Banque Populaire currently has 15 while Caisses d'Epargne has 16. In the housing finance domain, BPCE relies on Crédit Foncier. The subsidiary Banque Natixis is a major player for savings and insurance solutions, wholesale banking services, and specialized financial services. Groupe BPCE has 31.2 million customers and 108,000 employees; BPCE offers a large presence in France with 8,000 local bank agencies and 9 million members.

Groupe BPCE offers its customers a comprehensive range of products and services: Savings and investment solutions, cash management services, financing solutions, insurance, and wholesale banking services. ▲

HSBC Puts Partnership and Data at the Heart of Digitalization

By Linda Xu and Gary Maidment, Huawei



Banks are coming around to the idea that building cross-industry partnerships is more productive now than ever before. In the future, HSBC will extend far beyond traditional banks and will be very much data- and partner-centric.

The world of finance has changed irrevocably. Tech-savvy customers are hungry for lower fees, greater transparency, and fast and easy mobile interfaces, and traditional banks are losing competitiveness and market share to OTT players. HSBC, however, is embracing digitalization and the nascent competition from Fintech startups. HSBC's Chief Architect David Knott outlines the banking giant's vision.

Coopetition with Fintech

Beginning perhaps with the founding of PayPal in 1998, the rise of Fintech companies and services was fairly gradual until a few years ago. Then it skyrocketed. Now, Apple Pay, Android Pay, Tencent, Alipay, and Ant Pay, are disrupting how consumers and small businesses interact with their finances.

These disruptions, from simple P2P e-money transfers to infrastructure projects that integrate payment platforms on company websites, come at a time when mortgages are out of reach for many and personal loans are risky.

Lending Club, the world's largest online credit marketplace, issued USD 8.4 billion in loans to consumers and small businesses last year. In the P2P asset management space, Betterment was recently valued at USD 700

million – nearly doubling in value from USD 450 million just a year before.

Banks are taking notice. Many major players in the finance world are calling for increased regulation of the Fintech world. The question is then, what exactly is the relationship between banks and Fintech companies?

According to Knott, "We welcome competition from Fintechs. But we'd rather see them as potential partners than competitors." In March, for example, HSBC announced its partnership with the Fintech startup Tradeshift, the world's largest commercial business platform. Knott explains that Fintechs are bringing exciting tech to the market, which can provide a compelling offering for financial services customers. "For many years, banks have traditionally been customers of big traditional technology companies," he says. "However, the market for technologies has been shaken up massively in the last few years. There are new entrants literally every day. I see a lot of partnership opportunities."

Knott states that on the business side, HSBC operates a large network of partners and customers, "We're very experienced at building relationships with companies and figuring out how our businesses mutually benefit each other." On the technology front, he points out that new tech models are emerging. HSBC selects its approach based on desired outcomes, "There are a whole range of models like revenue sharing and IP sharing," states

The new digital epoch includes rapid innovation in payments and the broader transformation of systems enabled by digital tech. According to McKinsey, banks have three to five years to become digitally proficient if they wish to survive. HSBC is an early adopter and quick to move. >>

Knott. "We can be a straight customer... buying licenses, products, and services. But we can also run a technology investment vehicle ourselves." His view is pragmatic, noting that sometimes the right thing to do is be a customer, while at others it's better to be an investor, finding out how Fintech companies operate and helping them succeed.

It's All about Digital

The new digital epoch includes rapid innovation in payments and the broader transformation of systems enabled by digital tech. The need to act quickly is acute: According to McKinsey, banks have three to five years to become digitally proficient if they wish to survive.

HSBC is an early adopter and quick to move. Knott explains that, "We've organized our business teams and technology teams into smaller teams, [with] highly empowered people working on new technologies with all the environment, skills, and capabilities they need to get stuff done."

Knott is excited about the impact technology is having on the banking space, "Cloud provides us with a way to both consume new technologies easily and provide massive and elastic scale," he says. "Machine learning [lets you] put data to work to train algorithms to make decisions within your business." He's clear that AI will have huge influence on the sector and become "deeply embedded in everything we do, whether advising or detecting anonymous transactions or helping process normal transactions." When it comes to security – a make or break feature when it comes to personal or business finances – he espouses the importance of biometrics. "It's giving us a means to digitize physical identity, to store a digital representation of people's physical markers that help us to identify them in a seamless, easy, and secure fashion."

Be Mobile, Be Agile

Avoka, a digital business platform provider, recently released its 2017 *State of Digital Sales in Banking Report*, which states that half of all banks

lack a function that lets customers apply for most personal banking products online. Avoka concludes that most banks fail to capitalize on their investments in digital marketing and digital channels, resulting in abandonment rates of 70 to 90 percent when potential customers try to open an online account.

In contrast, HSBC provides a strong online and mobile customer service. Knott explains, "Mobile Apps will potentially have a profound influence on our infrastructure. It has changed the 'come to the front door' way of doing business." He also comments on how people's behavior is changing. Where decades ago monthly statements would pop through the letterbox, people now check their financial status multiple times a day. As a result, "We have to make sure that our mobile Apps are responsive, and also that our backends are tuned and responsive to our customers' demand," says Knott.

Being responsive and convenient is part of HSBC's business ethos. Developed in partnership with the startup Pariti, HSBC's SmartSave App lets customers put money aside without thinking about it. For example, they can set a rounding rule when they buy something on their card. A purchase of £9.66 would be rounded up to £10, and the remaining 34p would be sent to the customer's savings account.

To achieve this sort of functionality, says Knott, "We can do caching. We can build certain throttling performance into our APIs. We're going to make sure [the system] is resilient and performs all the way down the stack."

The Future

Knott is optimistic about banking in the next decade. Not only will convenience increase, but people will have more control over their finances and "use research tools to figure out what they want by themselves," he says. "With richer insights about what other people are doing, customers will be more informed and enact decisions in a far more seamless fashion." He's also aware that they don't necessarily want to directly interact with their bank on a daily basis, "Paying for goods



and services will be much more seamlessly integrated into our everyday experience, and technologies such as smart sensors, IoT, and 5G will make all that possible."

Banks are coming around to the idea that building cross-industry partnerships is more productive now than ever before. Knott says HSBC will continue to partner with traditional IT product and service companies, but also team up with many smaller companies. "We have to figure out how we do that without swamping them with big company processes," he acknowledges.

Knott also talks about forming stronger connections with partners outside or on the edge of commerce. He's responsible for the company's applied and innovation labs, "Through those labs, we're forming partnerships with academic and research institutes around the world. For

example, in the U.K., we have a partnership with the Alan Turing Institute. That's particularly pertinent to data, because they've got a very strong data and machine learning focus." HSBC is currently working on how to use its rich data assets for commercial and social value.

"We've also partnered with the Advanced Science and Technology Research Institute (ASTRI) in Hong Kong, China in research fields such as biometrics, Big Data, blockchain, and other analytics technologies."

His vision of the future, therefore, extends far beyond what we associate with traditional banks and is very much data- and partner-centric, "I see non-traditional, more academic, and richer network ecosystems becoming more universal as we move forward." ▲

Source: WinWin



[Manufacturing]

ABB Leads the Industrial Digitalization Charge

By Justin Springham, Mobile World Live, and Linda Xu

ABB, which is partnering with Huawei in smart manufacturing as well as industrial robotics, is looking at how to combine the latest wireless connection technologies and smart sensors to find new solutions to solve manufacturing challenges.

More countries are starting to see the advanced manufacturing sector as a key catalyst for GDP growth and competitiveness in the global market. The arrival of the fourth industrial revolution will be driven by a growing range of next-gen digital technologies, including advanced networks that go beyond connectivity and sensors that will achieve unprecedented productivity improvements.

The common elements that governments around the world are looking at to drive that growth are automation and digitalization, according to Joni Rautavuori, group vice president and head of ABB Robotics and Applications. "Many nations have launched similar manufacturing-led initiatives, but call them different things," he explained. For example, China has Manufacturing 2025 and Germany has Industry 4.0.

Jerry Li, VP and head of business development, digital solutions and CIO at ABB China, agrees that digital technology is fueling a new round of innovation in industrial markets, with industrial digitalization certainly attracting a lot of attention globally. "I think most governments and businesses are looking for energy efficiency, productivity increases and safer operations. These require all businesses to find a better way to operate," Li said.

Rapid Adoption

Over the last couple of years, he said many innovative technologies have been introduced – from cloud computing and mobility to the Internet of Things as well as advanced materials – and they're being quickly adopted

in industrial areas. In the manufacturing sector, ABB sees a clear need for businesses to improve their production efficiency and energy efficiency.

While ABB offers a wide range of products and services in its portfolio that support improvements in productivity, Li said, "We're also a manufacturing company and we produce a lot of equipment." ABB, with operations in more than 100 countries, isn't just a robotics company. Its solutions range from the software layer to automation systems and to products such as robots, motors and drives. It employs 136,000 staff globally, including 17,000 in China. The company has connected more than 70 million digitally enabled devices and installed more than 70,000 digital control systems and 6,000 enterprise software solutions for its customers. "All of this makes it a really great foundation for digitalization," said Li.

The combination of its digital solutions and a platform that connects customers' devices to perform advanced analytics on the cloud side and control the physical world through its automation systems, robots, and motors creates a huge amount of value for companies.

Partners

ABB is continuously looking for partnerships with all the major players in the industry. Li believes that, "With so many elements in the digital world, there's no single company that can do everything by themselves. If you look at digitalization, we're talking about IT and OT convergence."

The company, which is partnering with Huawei in smart manufacturing

China is now the largest robotics market as well as the fastest growing. However, when comparing the density of industrial robots to the country's entire manual labour force, China is still far from the top in the world, with Japan, South Korea, Germany, and the U.S. leading. >>



as well as industrial robotics, is looking at how to combine the latest wireless connection technologies and smart sensors to find new solutions to solve manufacturing challenges. "We're also working together in many industries to look for joint solutions and joint market developments," Li said.

Forecasts estimate that there will be 2.6 million industrial robots by 2019, and the density of robots will jump from 36 per 10,000 workers in 2014 to 150 per 10,000 workers by 2020 in China. This will create exponential growth, he said.

Rautavuori noted that China is now the largest robotics market as well as the fastest growing. However, when comparing the density of industrial robots to the country's entire manual labor force, China is still far from the top in the world, with Japan, South Korea, Germany, and the U.S. leading. "China is still catching up, but catching up very, very fast, and we're very excited to be part of that journey," said Rautavuori.

Teaching Robots

With regards to Artificial Intelligence (AI), Rautavuori said that ABB focuses on machine learning, "The development in smart components and sensors makes it possible to use machine learning to develop new ways of

programming robots."

For example, he said, instead of programming, the company is moving towards teaching the robot. "We're showing it how to do things. And with smart components and sensors, the robot will figure out and learn by itself, a little bit like a child learns. You teach them and then they try. So that's an area where we're developing solutions that will simplify and make it easier to use robots in the future."

Industrial robots need to be flexible to meet the needs of mass customization, he said, adding that ABB is well known in the market for its software capabilities when it comes to motion control and online and offline programming. Rautavuori believes the industrial robotics market is still a huge untapped market and ABB, which has been in the robotics industry for more than 40 years, is focused solely on the industrial space.

But looking at how robotics is likely to impact people's day-to-day lives, Rautavuori concludes, "We see lots of companies going in the consumer space. And I'm sure there will be lots of, whether we call them robots or not, technology that will help you in your daily life." ▲

Source: WinWin

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[Manufacturing]

Huawei CloudCampus Helps Dongfeng Honda Improve Management Efficiency

Dongfeng Honda would improve their operating efficiency through vigorous ICT-based development. Huawei provides Dongfeng Honda with the CloudCampus solution with fast deployment, simplified management, and various applications, helping customers compete in the cloud era.

Problems Encountered during Developmental Transformation

Since its establishment in 2003, Dongfeng Honda Co., Ltd. has worked hard for more than ten years to eventually become a leading joint venture brand in China's automotive market. Faced with changes to the competitive landscape in the Chinese automotive market in recent years, Dongfeng Honda also faced challenges to its development – should they stand by and hope to be chosen by the market, or innovate to succeed in the market and develop? After careful research, the company decided to gradually switch their market focus towards third- and forth-tier cities in China. At the same time, they would improve their operating efficiency through vigorous ICT-based development. However, there was a considerable discrepancy between the reality and their goals – Dongfeng Honda carried out forecasting on problems that may occur during market expansion and ICT-based development:

- With only five network experts at HQ, it is not possible to construct or upgrade networks in hundreds of dealerships over the coming years.
- The low-voltage engineers in dealerships have poor network-related technical skills, and they cannot carry out professional Wi-Fi network management.
- Dealerships hope that newly recruited after-sales engineers can quickly and independently carry out professional work.

Huawei CloudCampus Remedies These Issues

- **HQ experts provide remote guidance for network deployment in half a day**

Huawei CloudCampus solution leverages its public cloud platform to carry out network planning. Field operation is simple and does not require experts from HQ to go on business trips to provide guidance. Dongfeng Honda planned to reconstruct the networks of seven

dealerships across China in one month, including Tonghua (Jilin), Chengdu (Sichuan), Shenzhen, Taizhou (Zhejiang), and Tianjin. If the traditional network deployment process was followed, network engineers from HQ would be exhausted. However, CloudCampus can offer a solution. The following uses the Tianjin dealership network upgrade as an example:

During this upgrade, HQ did not send engineers to go on site. Instead, the engineers provided guidance from HQ. One week prior to the deployment, the network engineers at HQ used drawings provided from the dealership to complete network planning on the cloud platform. The devices were then sent to Tianjin. On the day of network deployment, engineers in the Tianjin dealership used the cloud management App to scan the MAC and SN on the device, and then installed and powered on the devices. It was then calculated that less than half a day was spent deploying the devices. Due to savings made on travel expenses, the cost of network delivery was 30 percent less than expected.

- **Centralized network O&M means troubleshooting no longer requires days**

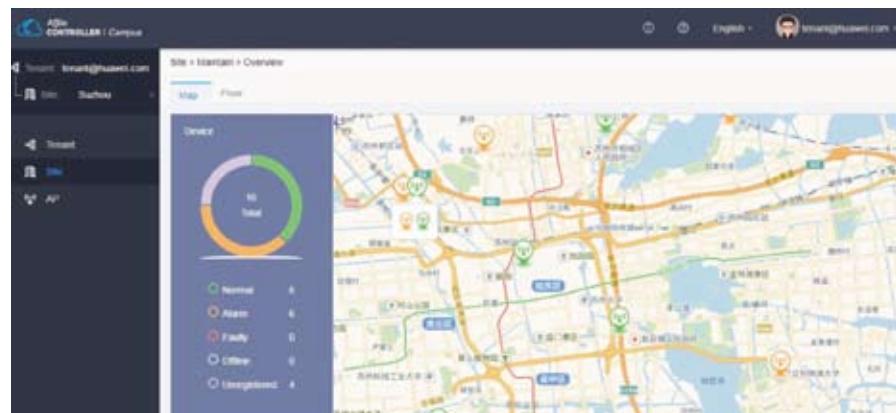
After upgrading the network in an older Dongfeng Honda dealership, the network was upgraded to a cloud management network. This significantly improved the network's operating efficiency. A few days later, a low-voltage engineer received the following customer complaint: "While sitting in the waiting room waiting for the car to undergo maintenance, I couldn't connect to the Wi-Fi." The engineers immediately informed the IT experts at HQ of the problem, who then used the CloudCampus map management system to find that one AP in the dealership was offline, and told the local engineer the location of the faulty AP. From discovery to rectifying the fault took only 45 minutes. Previously, solving similar problems would take at least two days, or even require experts from HQ to go on business trips to deal with the issue.

The above example is just one of the benefits of cloud-managed deployment. After several months since the new network was deployed, the network O&M efficiency was significantly improved for Dongfeng Honda, and great savings were made in travel costs.

- **With its openness and compatibility features, the cloud platform is integrated with Augmented Reality (AR) for automobile maintenance guidance**

It usually takes a few years for Dongfeng Honda's after-sales engineers to go from beginners to experts. In that case, how can the automobile after-sales engineers be helped to grow and quickly engage in automobile maintenance services?

Huawei CloudCampus cooperates with third-party partners to realize interconnection with an AR platform. Dongfeng Honda experts at HQ do not need to travel, and can guide the maintenance of after-sales engineers at the dealerships in real time. After HQ receives a booking from the dealership, engineers can log in to the cloud platform, select the AR glasses



screen, call the dealership, and then give instructions for the maintenance operations.

With the help of Huawei CloudCampus and third-party applications, young engineers in the Dongfeng Honda dealerships are able to quickly take on the duty of automobile maintenance. Scenes of panic can no longer be seen, and the dealership's operating efficiency and customer satisfaction are greatly improved.

Ding Fang, Head of the Infrastructure at Dongfeng Honda Automobile Co., Ltd., said: "Huawei CloudCampus solution is based on cloud technology, and therefore does not require the engineers to travel from HQ to the dealerships to carry out O&M and troubleshooting. In addition, this solution offers various data analysis capabilities, calculating customer flow, number of visits, and duration of visits, helping us to deliver precision marketing."

As a leader in the cloud industry, Huawei is actively leading the innovation and development of cloud-based network management, enabling digital transformation for customers in every industry. Huawei provides more users with the CloudCampus solution with fast deployment, simplified management, and various applications, helping customers compete in the cloud era.▲

Customer Testimony

"Huawei CloudCampus solution is based on cloud technology, and therefore does not require the engineers to travel from HQ to the dealerships to carry out O&M and troubleshooting. In addition, this solution offers various data analysis capabilities, calculating customer flow, number of visits, and duration of visits, helping us to deliver precision marketing."

— Ding Fang, Head of the Infrastructure at Dongfeng Honda Automobile Co., Ltd.

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Andreani: Cloudification Wrapped in Smart Data



As the largest logistics enterprise in Argentina, Andreani Logistics Group is a leader in advanced IT planning, construction concepts, and digital systems. However, the company's growth since it was founded in 1945 has outpaced the capabilities of its legacy IT system. Fortunately, a well-planned cloud solution offered Andreani a way out.

Since its beginnings over 70 years ago, Andreani has expanded into four main businesses covering Argentina and Brazil: Logistics, pharmaceuticals, postal logistics, and real estate. Combined, the resulting service growth caused infrastructural pressures that couldn't be solved by the usual responses: Blind investment and extensive IT construction.

Internet + Logistics

In logistics, Andreani is active in the B2B space, providing warehousing and distribution solutions as part of an end-to-end logistics package. Now, it has expanded into the digital realm of eCommerce and stepped up investment in technologies that enhance transaction capabilities.

When Andreani's eCommerce platform went live, it became Argentina's first platform of its type that could provide customers with end-to-end solutions that featured management and control systems for services like product warehousing, packaging, supplier management, and door-to-door delivery.

Andreani now runs multiple branches across Argentina, forming a unified order distribution network supported by a dedicated team that develops online sales solutions and tools to continually optimize processes, warehousing, goods preparation, delivery, and shipment tracking.

Its service scope provides subject matter experts to multinational groups, plus complete and customized eCommerce service solutions that help these groups promote products on their own platforms.

Andreani's customers run into the thousands and include big names like Santander Bank and Hewlett-Packard.

However, its IT capabilities were beginning to let it down.

Four Service Bottlenecks

First, Andreani manages almost all of its servers on cloud platforms or in hosting mode. At present, four carriers provide services for Andreani's data centers. So, it lacks a unified platform for centralized O&M.

Second, after launching its eCommerce platform, the increasing traffic and lack of scalability in its system architecture cannot flexibly allocate resources to match needs. Users frequently struggle to log into the platform during peak hours, user experience is poor, and Disaster Recovery (DR) is non-existent.

Third, logistics real-time requirements need large dedicated networks that remain stable. However, the cloud service provider of Andreani's SAP ERP system didn't build any local nodes, increasing network delay for application systems and causing user experience to deteriorate.

Huawei and Telefónica Business Solutions jointly released Open Cloud and Cloud Server services in Chile, Brazil, and Mexico – a partner collaboration to cloudify Andreani's traditional IT enterprises. >>

Fourth, Andreani's core warehousing system uses VMware's Veeam solution for remote DR. But the DR center's construction costs are high and the center doesn't guarantee that services aren't interrupted.

Telefónica Open Cloud to the Rescue

In October 2016, Huawei and Telefónica Business Solutions jointly released Open Cloud and Cloud Server services in Chile, Brazil, and Mexico – a partner collaboration to cloudify Andreani's traditional IT enterprises.

In addition to technical support for both Open Cloud and Cloud Server, Huawei's solutions cover software and hardware, including servers, storage, networks, and cloud operating systems.

To address Andreani's four business requirements, Telefónica developed four specific solutions for planning, rectification, and follow-up O&M based on the carrier's two cloud solutions:

- **O&M:** Formulate a cloudification plan to migrate existing application systems to Telefónica Open Cloud and manage scattered data centers on a unified O&M platform.
- **Infrastructure:** Deploy cloud servers and elastic, scalable services to cloudify the IT infrastructure of Andreani's eCommerce platform, enabling the platform to easily scale resources up or down.
- **User experience:** Use Telefónica's network resources and geographical

advantages to improve user experience of cloud applications, and build local nodes to prevent network delays from affecting Andreani's service applications like SAP DEV and QAS.

- **DR:** Implement a PAYU-based DR solution for core warehousing that's stable and cost-effective.

Three-Step Plan for Getting Smart

Telefónica and Huawei jointly launched an Open Cloud public cloud service to fulfill Andreani's business requirements, and then created the following customized three-step cloudification plan: Cloudify eCommerce, reduce SAP network delays, and cloudify the DR system for core warehousing.

Currently, the project is in the second phase.

So far, Andreani can centrally manage resources on heterogeneous cloud platforms, thus improving O&M efficiency. By setting up and optimizing a complete set of backup and DR solutions including migration, coupled with high-performance and reliable solutions, Andreani has reduced its DR TCO.

Telefónica Open Cloud has paved the way for Andreani to evolve its service offerings to the IoT, robotics, and process optimization, accelerating the Argentine company's digital transformation into a smart logistics leader. ▲



Giant Port Operator SIPG Transforms Mass Data Communication and Exchange Using Huawei Cloud

By Shen Bin, Deputy General Manager, Shanghai Harbor E-Logistics Software Co., Ltd.,
Shanghai International Port (Group) Co., Ltd.



As Cloud continues to transform the shipping industry, the vision of Shanghai Harbor e-Logistics is to connect scattered resources into an open, win-win industry ecosystem through deeper cooperation with Huawei and make our vision a reality.

>>

Shanghai Harbor E-Logistics Software Co., Ltd., a high-tech company owned by Shanghai International Port (Group) Co., Ltd. (SIPG), has implemented a one-stop shipping tracking platform for the entire organization using Huawei's cloud technologies. This platform, highly recognized by users since its debut one year ago, helps resolve two main issues in the shipping industry by improving mass data queries and data communication.

Shanghai has served as one of China's major trading ports for about one hundred years. China has aspired to build Shanghai into an international financial and recognized shipping center since the country launched economic reforms and announced an opening-up policy.

Shanghai International Port Group Co., Ltd. or SIPG, founded in June 2005, is one of the largest port operators around the globe and the biggest in China. In 2016, SIPG reported a container throughput of more than 37 million Twenty-foot Equivalent Units (TEUs), ranking first in the world for the seventh year in a row. During the first half of 2017, SIPG already handled a record high of approximately 19.604 million TEUs. Additionally, SIPG went public in 2015, becoming one of the constituents of the Shanghai Stock Exchange (SSE) 50 Index. In 2017, SIPG became one of the first barometer stocks included on the Morgan Stanley Capital International (MSCI) Index. Further, SIPG has expanded its business into other sectors; for example, investing in the famous Shanghai SIPG Football Club that has a favorable reputation similar to Guangzhou Evergrande Taobao Football Club.

Shanghai Harbor E-Logistics Software Co., Ltd. is a high-tech company owned by SIPG. Shanghai Harbor E-Logistics stands out for its port Enterprise Resource Planning (ERP) and logistics software, and other products that rank among the top in the domestic market. The company's new product lines specialize in port management software and improving port automation. The Chinese ports built upon Shanghai Harbor E-Logistics are among the first ports where China owns the indigenous intellectual property rights.

One-Stop Shipping Tracking Platform Resolves Mass Data-related Issues for Modern Ports

Shanghai Harbor E-Logistics constructed an extensive shipping tracking platform (<http://www.hb56.com/>) with Huawei's cloud technologies by the end of 2016. This platform helps resolve two main issues in the shipping industry:

- The data generated by daily operations at ports and wharfs rapidly expands so data queries were difficult in the past. However, utilization of the new shipping tracking platform greatly facilitates data queries and is highly accepted among industry users. With the platform, users can accurately and quickly query the location of each container and understand subsequent operations.
- The platform also solves the data communication issues existing between many enterprises and users in the industry. Currently, this platform has consolidated all data of 17 midsize and large wharfs along the backbone and trunk lines of the Yangtze River, and implemented standardized data exchanges. The latest version – 2.0 – of this platform has added a new function of proactively pushing the shipping information to registered users, in contrast to the traditional approach where users had to log in to perform data queries. This convenient function has been highly commended by users to improve operations.

During the early stages of platform development, the project team at Shanghai Harbor E-Logistics faced great pressures. After in-depth communications with the project survey team and software development

team, three main issues emerged when defining platform requirements:

- How could we cope with mass access requests? Our original data query system was for internal use only, and the volumes of access and data bursts were controllable. However, after the platform goes live on the Internet, outsiders can also access the platform and the access requests are going to increase dramatically.
- Infrastructure set-up must be completed within one month, which is a great challenge.
- How could we determine the initial size of basic systems in the design phase? Would we have to build a small data center or invest in only a single device at the very beginning?

With these three main issues in mind, we conducted many rounds of internal discussions and assessments, and finally selected a cloud solution proposed and recommended by Huawei. With the support of Huawei cloud services, the platform currently supports the following six main functions:

- **Sailing schedule query:** Provides the departure plan for outbound containers, the sailing schedule applied for by the shipping agent, as well as berthing and unberthing plan for containers at the wharfs for the Port of Shanghai.
- **Container and cargo query:** Allows users to query information about containers, cargo, permitted release, pre-recorded information, plans, and others; provides information about containers at the wharfs along the Yangtze River enabled by the Port of Shanghai; and implements a complete tracking process.
- **Verified Gross Mass (VGM) weighing information:** Allows users to download the weight records of the Outbound Full (OF) containers at the wharfs of Shanghai's port.
- **Permitted release information:** Allows users to query the customs-permitting-release information sent through Electronic Data Interchange (EDI).
- **Packing list pre-recording:** Allows users to query the EDI pre-recording information about the packing list for OF containers.
- **Links to other major websites:** Provides links to Shanghai E&P International Inc., the customs clearance portal for Shanghai Customs, various wharf systems from different operators, and official websites of various shipping enterprises.

Partnering with Huawei Builds an Open, Win-Win Industry Ecosystem

Huawei's cloud technologies and products are mature and meet our requirements in various aspects. Specifically, these technologies and products offer high flexibility and allow for customized network bandwidth, to best fulfill Internet services. Testing, service rollout, and Operations and Maintenance (O&M) are more convenient. Huawei's pre-sales and after-sales teams are highly skilled professionals who provide powerful support and implemented a detailed solution within just one week. As a result, system deployment and team training were completed within 18 days. Regarding future system capacity expansion, Huawei's approaches also meet our requirements: From the initial phase of this project, the overall budget was manageable, and there is a very clear price system for future phases.

The platform continues to streamline operations since its completion in late 2016. During this period of time, the system has been continuously upgraded and optimized. Huawei always provides unmatched professional services. In addition to a dedicated after-sales service manager for this project, Huawei engineers are reachable around the clock and help to quickly solve problems. To date, Huawei has improved system performance by more than 10 times, not to mention the resolution of many tiny issues. In particular, Huawei's service teams have patiently assisted us in analyzing and resolving the inherent issues of our own products.

For cloud technology advancement, Huawei has been continuously innovating and launching a series of novel products and solutions, paving the way for future needs. After long-term cooperation, we have established a clear division of responsibilities: Huawei is responsible for the design and implementation of infrastructure, and we take charge of the development and deployment of the entire set of software applications. In doing so, the two companies assure win-win outcomes, which is the key to collaboration between both parties.

As Cloud continues to transform the shipping industry, at Shanghai Harbor e-Logistics, we are clear about our responsibilities and positioning. Our vision is to connect scattered resources into an open, win-win industry ecosystem. This aspiration will be a long, constant journey. Our plan is deeper cooperation with Huawei to ease this journey and make our vision a reality. ▲

How Did Huawei Build the 100G SDN Campus Network for KMITL of Thailand?



KMITL's Computer Center aimed to build an SDN-based, high-performance, unified campus network that integrates various education functions. Huawei had developed a full-service comprehensive campus solution that perfectly matched the Computer Center's blueprint.

The King Mongkut's Institute of Technology Ladkrabang (KMITL) is a major science and technology university in Thailand and has the strongest ICT capability among the country's universities. Located in Bangkok, the university is considered the most prestigious for technical undergraduates and offers a curriculum that includes machinery, electronic engineering, architecture, control, management, communication, medicine, and liberal arts.

Unlike many of its conservative counterparts, KMITL's Computer Center has kept abreast of ICT developments and put together an advanced plan for its campus network. They aim to build an SDN-based, high-performance, unified campus network that integrates various education functions. After nearly ten months of communication and customized development, Huawei had developed a full-service comprehensive campus solution that perfectly matched the Computer Center's blueprint.

How was the campus network built from scratch? What difficulties were encountered during the construction? How were the difficulties overcome? Let's find out.

Disagreement at the Beginning

Responsible for network construction and O&M, the KMITL Computer Center put forward specific requirements on computing nodes, block storage nodes, and object storage nodes, based on its own understanding and ideas of campus network construction. Although the requirements were clear, smooth communication is important to avoid misunderstandings. For example, the Computer Center insisted that the computing nodes must be open and that Huawei's solution must support OpenStack. At that time, however, their understanding of the development, applicable scenarios, and O&M of OpenStack in the ICT industry was misguided, leading to the concern that the OpenStack versions of different vendors are isolated and against the open source principle.

KMITL's technical team further required distributed block storage equipped with the open

source distributed storage software Ceph, because block storage was mainly used for storing VM data. They also recommended connecting block storage to a gateway to provide object storage.

After several rounds of proactive talks, Huawei had dug out the deep requirements behind the project and provided an optimized and professional solution. Huawei deployed FusionStorage to support VM data storage requirements and used OceanStor 9000 distributed NAS systems for storing files. This solution is easy to deploy because the NFS/CIFS protocols are supported without the need for a gateway. By using NVMe SSDs as the cache, FusionStorage hybrid storage can provide performance several times higher than AFAs running Ceph. OceanStor 9000 adopts distributed RAID, which can improve the efficiency and security of resource information service compared to the triple-write redundancy of Ceph, not to mention the better scalability and easier cost control enabled by OceanStor 9000. At last, the customer was fully convinced by the professional capabilities of Huawei and accepted all of Huawei's proposals.

The Devil Is in the Details

Huawei thoroughly analyzed KMITL's requirements and offered solutions according to conditions on the campus network, impressing KMITL with its professionalism and knowledge. For example, KMITL suggested that, due to the scattered deployment of servers, deploying a location-independent virtual network would be preferential. Huawei also suggested the need to automate network configuration, helping KMITL improve efficiency over its current use of the self-service network construction mode. In addition, KMITL required that in-depth security checks be performed and traffic be directed to the security resource pool based on requirements to ensure access security of the virtual network.

Huawei's ultimate solution perfectly meets KMITL's requirements. Huawei's software-defined agile switches support development of customized solutions. The solution uses a

KMITL required a container-based data center. The container-based data center solution can meet the education data computing requirements of the university without changes to the environment. Huawei's Prefabricated All-in-One Data Center solution perfectly matches KMITL's requirement. >>

vendor-independent open platform and supports various storage services, reducing the required investment. In addition, it supports unified and heterogeneous management, reducing O&M costs.

What Does the KMITL Campus Network Look Like?

After months of deployment, Huawei helped KMITL realize its original plan and ideas.

Today, KMITL's campus network is composed of the campus network, data center network, and RND network. In the organizational structure of the campus network, networks of the different organizations are interconnected or isolated based on service requirements. In the network service model, each virtual network forms an independent security domain based on the KMITL NG Campus, which is the unified physical carrier network. The virtual networks are isolated from each other, and security control is implemented by the security group inside virtual networks.

In the virtual campus network architecture, KMITL built the SDN-based virtual campus network and used the VXLAN network architecture to co-deploy both the campus network and the DC and to provide virtual campus network services. Thanks to the campus network, the university's staff and students can benefit from the 100G non-blocking forwarding, large bandwidth, and high security that the campus network provides, as well as the improved user experience brought by in-depth wired and wireless convergence. In addition, the layer-by-layer security isolation from the virtual network to the firewall and then to the security group ensures network security.

KMITL also had difficulties in deciding the location of the equipment room. The existing equipment room was old, and renovating it would be an arduous task. However, building a new equipment room on KMITL's land would incur significant costs in terms of labor and time. Therefore, KMITL required a container-based data center. Its advantages include a



small footprint and easy deployment. It can be deployed in a container that houses all necessary facilities, including the power supply, cooling system, cabinets, cable layout, fire suppression, lightning protection, and surveillance. The container-based data center solution can meet the education data computing requirements of the university without changes to the environment. Huawei's Prefabricated All-in-One Data Center solution perfectly matches KMITL's requirement.

Disagreement is inevitable in any cooperation. Fortunately, Huawei considered how to deploy the campus network to better meet the service requirements from KMITL's perspective. Through KMITL and Huawei's joint efforts and thorough communication, the solution was delivered and brought the following benefits to KMITL:

- Industry-leading ICT technologies, such as 100G and SDN, will consolidate KMITL's leading position among the universities in Thailand.
- The unified physical network supports virtualization to share resources and isolate services of different departments of the university.
- After the education cloud platform is built, cloud services can be leased to the departments of KMITL and other universities.

KMITL's above-100G SDN campus network sets a benchmark for IT system construction for other universities and provides a showcase of high-end 100G SDN and cloud data center for the education industry – not just in Thailand, but also around the world. ▲

Huawei Succeeds in Upgrading HPC System for EPFL



To enhance future competitiveness, EPFL has planned to upgrade and expand its HPC system. Huawei's solution is widely recognized and deployed relying on high efficiency, performance, scalability, and easy management.

High Performance Computing (HPC) is involved in a variety of fields, including aerodynamics and space technology development, long-term climate prediction, high-precision weather forecasting, ocean current calculation, air and water pollution simulation analysis, flood and earthquake prediction, engine and mold design, biological medicine design, wind tunnel simulation testing, petroleum exploration, and new materials research.

Currently, HPC is developing rapidly and being applied widely for two reasons:

- One is demand. In this data era, as data volume increases and people pursue high data-analysis efficiency, a strong computing capacity is required.
- The other is technology development. Information technologies have developed rapidly in recent years, and now people can enjoy HPC's strong computing capacity at low cost rather than paying for a huge quantity of manpower and materials.

These two reasons interact with and promote each other so that more and more industries can start using HPC and benefit from the resulting reforms.

The higher education industry is a typical example. Statistics show that among the world's top 500 HPC clusters released in June 2017, 41 are from universities, with the proportion exceeding 8 percent. Why does the higher education industry require HPC so strongly? The reasons are similar to those of HPC popularization, but the industry has more outstanding characteristics.

Using the automobile manufacturing industry as an example, automobile manufacturers design vehicles using HPC, and universities may also use HPC because they set relevant curriculums. Both of these two industries have HPC demands. The difference lies in that the manufacturers only use HPC to design vehicles while universities use HPC in physics, chemistry, and biology. In other words, compared with enterprises, HPC is more widely applied in universities. This is why HPC is developing so rapidly in the higher education industry.

Challenge from EPFL

Here, I would like to introduce to you a case to further explore HPC usage in the higher education industry, that is, École Polytechnique Fédérale de Lausanne (EPFL). EPFL is a top world-class university, ranking twelfth in the QS World University Rankings. It enjoys a great reputation in engineering technology and natural science fields and has students, professors and staff from over 120 countries and regions. To maintain its industry-leading scientific research level, EPFL keeps strengthening HPC system construction and established the first HPC system to serve all students and teachers in 2008.

To enhance future competitiveness, EPFL has planned to upgrade and expand its HPC system since last year because resources are insufficient. In the demand list from EPFL, the application demand column stands out and lists all items to be met, including HPC benchmark, HPL test, HPG test, and various applications in science, engineering, biology, and medical care. All of these applications must keep running properly.

In addition, there are many mandatory requirements, such as theoretical computing capability \geq 475 TFLOPS, shared storage \geq 340 TB, read/write bandwidth up to 40 Gbit/s, cabinets \leq 8, and power consumption per cabinet \leq 25 kW. The system must be open and easy to manage and scale. Partners should be forward-looking in technologies and able to offer sufficient support to EPFL to build a 5 PFlops HPC cluster in the coming 5 years.

Huawei Solution

It is easy to meet a certain requirement but difficult when it comes to all requirements. No pressure, no drive. Huawei repeatedly conducts detailed analysis with Transtec and figures out a solution.

This solution has 408 FusionServer XH620 servers deployed as compute nodes, and each node has two Intel Xeon E5-2690 v4 CPUs, with a theoretical computing peak of 475.2 TFLOPS. The InfiniBand network, which adopts the layer-2 fat-free networking technology, is used. The storage system is composed of six OceanStor 5800 systems and a General Parallel File System (GPFS), with a capacity of 350 TB.

Huawei adopts a number of advanced products and technologies in this solution, which achieves remarkable effects. For example, FusionServer X6800 high-density servers are used, increasing the single-cabinet computing capacity by 70 percent and decreasing the number of cabinets by 40 percent. If FusionServer X6800 servers are used, a 4U chassis is needed to accommodate 8 compute nodes and 16 CPUs. If ordinary 1U two-socket servers are used, an 8U chassis is needed. As a result, 6 rather than 10 cabinets are required to accommodate 408 compute nodes. FusionServer X6800 adopts a heat dissipation design and Dynamic Energy Management Technology (DEMT), so its power consumption is 10 percent to 20 percent lower than that of a traditional rack server. Other features are not listed herein exhaustively.

This solution is widely recognized and deployed relying on high efficiency, performance, scalability, and easy management. In actual applications, it



completely meets users' requirements and the measured computing power is 402 TFLOPS, with the computing efficiency up to 89.3 percent.

EPFL and Huawei announced that the Fidis HPC cluster, developed by EPFL SCITAS, was successfully rolled out in June 2017.

Vittoria Rezzonico, Executive Officer of EPFL SCITAS, spoke highly of Huawei in an interview. "Transtec has closely cooperated with Huawei to provide EPFL with a top-quality system, which meets our demands in the high-performance computing field. We are impressed with the excellent hardware solutions introduced by Huawei engineers and professional planning, installation, and configuration services from Transtec," she said. ▲

Customer Testimony

"Transtec has closely cooperated with Huawei to provide EPFL with a top-quality system, which meets our demands in the high-performance computing field. We are impressed with the excellent hardware solutions introduced by Huawei engineers and professional planning, installation, and configuration services from Transtec."

— Vittoria Rezzonico, Executive Officer of EPFL SCITAS

From a Burden to a VAS: The Secret behind Free Commercial Wi-Fi at Italy's Top Retailer, UniEuro



Huawei's commercial Wi-Fi solution for shopping malls and supermarkets improves advertisement delivery efficiency and marketing quality. Free Wi-Fi service has become a marketing tool with a high ROI, evolving from a burden to a Value-Added Service (VAS) for UniEuro.

UniEuro is one of the top three Italian retailers in home appliances and digital products. Since 1967, it has developed into a well-known European chain enterprise of electric appliances, following the business principle of 'Excellence and Achievement'. Consumers have been impressed by its high-quality products, abundant choices, and professional service.

Challenges of Free Wi-Fi Networks

With the development of mobile Internet and smartphones, Internet access anytime, anywhere has become an accepted lifestyle. According to Mobicia, Wi-Fi networks carry about 70 percent of the world's data traffic on smartphones. The proportion reaches 80 percent or even higher for indoor scenarios. Free Wi-Fi service is indispensable almost everywhere; therefore, more shopping malls and supermarkets hope to use it to attract customers and improve service satisfaction. Free Wi-Fi in these scenarios, however, faces the following challenges:

- **Unprofessional network planning:** No simulation tools, or only 2D simulation tools, are available, which cannot prevent interference between APs on the same floor and neighboring floors. Wi-Fi coverage holes hinder concurrent access and fail to achieve the desired access rates. Customer STAs fail to obtain IP addresses and are disconnected frequently during roaming,

degrading customer experience. Unprofessional or improper network planning may also cause inaccurate STA location.

- **No Return On Investment (ROI):** Standard industry Wi-Fi solutions typically provide Internet access and simple portal advertisement pushing, failing to deliver any significant ROI.

UniEuro's Requirements for Free Wi-Fi Solution

As one of Italy's top three shopping malls and supermarkets, UniEuro is always committed to providing customers with stable, high-quality free Wi-Fi service; therefore, the retailer required a Wi-Fi solution that could achieve 100 percent coverage, eliminating any signal interference between APs on the same floor and neighboring floors.

Customers should be able to easily access the Wi-Fi network to enjoy high-speed Internet service, even in densely populated scenarios. Additionally, UniEuro needed to leverage the Wi-Fi network to serve the enterprise itself. Accurate STA locations, device models, and other information gathered from the Wi-Fi network would be integrated with a professional third-party retail analysis platform for customer archiving and analysis. Based on the analysis result, UniEuro could trace the efficiency of marketing strategies and advertisements. The Wi-Fi network would become

After intense research, Huawei's commercial Wi-Fi solution for shopping malls and supermarkets was selected as the Wi-Fi network provider for UniEuro. Huawei won UniEuro's trust for its high-performance APs, professional automated network planning tool, eSight location engine, and open architecture.

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an online-offline integrated marketing tool as well as an open platform, which could be integrated with professional third-party retail analysis platforms.

Changing Free Wi-Fi Service From a Burden to a VAS

After intense research, Huawei's commercial Wi-Fi solution for shopping malls and supermarkets was selected as the Wi-Fi network provider for UniEuro. Huawei won UniEuro's trust for its high-performance APs, professional automated network planning tool, eSight location engine, and open architecture.

- Huawei's high-performance indoor AP5030DN access point supports the HD Boost feature that allows customers to easily access the Wi-Fi network in densely populated areas.

- Huawei's professional 3D network planning tool can avoid coverage holes and signal interference between APs on the same floor and neighboring floors. This significantly optimizes access experience in

shopping malls and supermarkets and lays a solid foundation for accurate STA location.

- Huawei's solution allows for easy advertisement customization and push on customizable portal pages to maximize the value of entrance advertisements.

- Huawei's unique eSight PAIRS wireless location solution implements accurate STA locations for customers. Location information is transferred to a third-party professional retail analysis platform through Application Programming Interfaces (APIs). The platform creates archives for customer location information, enabling UniEuro to learn customer preferences and perform Big Data collection and analysis. Based on online and offline promotion advertisement, UniEuro can develop more effective marketing activities, greatly improving advertising ROI.

Huawei's commercial Wi-Fi solution for shopping malls and supermarkets improves advertisement delivery efficiency and marketing quality. Free Wi-Fi service has become a marketing tool with a high ROI, evolving from a burden to a Value-Added Service (VAS) for UniEuro. ▲

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[Hospitality]

Ultimate Network Experience Helps Rejuvenate the Queen Elizabeth 2 Cruise Ship



By using Huawei's wall plate AP solution, guests of the Queen Elizabeth 2 cruise ship hotel receive an ultimate Wi-Fi experience. The customer satisfaction increased by 60 percent for the cruise ship hotel, providing an overall improvement to its competitiveness.

Queen Elizabeth 2, currently the world's fastest cruise ship, has the world's largest marine motor and was once honored as the world's largest cruise ship and the best transatlantic cruise ship. From its maiden voyage in the 1960s to its retirement in 2008, Queen Elizabeth 2 has traveled over 8 million kilometers, which is equivalent to 13 roundtrips to the moon. After retirement, the cruise ship headed towards the world's largest artificial island – Palm Jumeirah in Dubai, United Arab Emirates. Here, it continues its story, revealing its new face as a deluxe sea hotel, as well as a shopping and entertainment center.

In 1969, at only 18 years old, Tracy Whitney was fortunate to be among the first passengers to witness the maiden voyage of Queen Elizabeth 2 across the Atlantic Ocean. After nearly half a century, Tracy went on holiday to Palm Jumeirah with her husband and family and chose to stay at the Queen Elizabeth 2 cruise ship hotel. The biggest difference from 50 years ago was that the first thing they did once checking in was not to visit the deck to view the scenery, nor was it to watch a play at the theater. Instead, it was to connect to the hotel Wi-Fi to share their traveling experience on social media.

With the development of the digital society, Wi-Fi has already become deeply integrated into our modern-day lives. Just like Tracy's family, guests hope for smooth access to the Internet anytime and anywhere, and to share their wonderful moments in the cruise ship hotel with family and friends afar. For the hotel management, improving the operating efficiency of the hotel has always been the target, and the reputation of a hotel can directly

improve its operating efficiency. Data from a well-known hotel booking website shows that: as a hotel gains a star in its star rating, its average room rate can be increased by 11 percent; as a hotel's rating increases by one percent, its number of stays increases by 0.54 percent, average room rates increase by 0.89 percent, and average revenue increases by 1.42 percent. The quality of hotel wireless networks is a key factor in improving the reputation of a hotel. A survey by Forrester showed that 90 percent of customers think that good quality hotel Wi-Fi is essential. In addition, according to the statistics, 84 percent of luxury hotels around the world charge for network services, and a high-quality network will bring in extra income for these hotels.

Therefore, the hotel operations management personnel want to provide customers with a high-quality Wi-Fi experience to enhance customer satisfaction, improve the hotel reputation, and increase revenue. In addition, they can analyze the behavior of the guests to offer them a more comprehensive range of considerate services. The cruise ship hotel must also rely on networks to achieve modernization of services and management.

Queen Elizabeth 2 cruise ship is 293.52 meters long, which is nearly the length of three soccer fields. The cruise ship is 54 meters high, which is equal to an 18-floor building. It has a displacement of over 70,000 tons. The ship has 950 suites, of which over 670 (70 percent) have sea views. It can accommodate 1,791 guests and 921 crew members. The ship has

Huawei's wall plate AP uses the latest 802.11ac Wave 2 technology and supports air interface bandwidth of up to 1.267 Gbit/s. This meets the requirements of various services, such as HD VoD and Augmented Reality (AR) games. >>

entertainment and leisure venues available, such as a swimming pool, golf course, library, and theater.

The cruise ship hotel's large number of rooms are densely distributed and have complex structures. The rooms also have varying floor areas, from the Queen Elizabeth and Queen Mary luxury duplex suites of over 1,000 square feet to the small double rooms on Deck 5. These factors pose huge challenges on Wi-Fi coverage. Huawei and the hotel are both exploring ways to provide guests with an ultimate Wi-Fi experience, and also to facilitate deployment and operations and maintenance (O&M).

Bottleneck of Traditional Wireless Access Solutions

The two traditional hotel Wi-Fi layout solutions are the corridor settled solution and indoor settled solution.

In the corridor settled solution, APs are mounted to the ceiling of the corridor, covering rooms on both sides of the corridor. Each AP covers four rooms. Results of testing show that in the parts of the guest rooms far away from the AP, the wireless signal is weak or even coverage holes exist. Average bandwidth per user can only reach 1 Mbit/s to 2 Mbit/s. After analysis, it was found that the main reason is that in order to provide guests with a nice environment, hotels adopt a series of sound insulation measures. These include the use of luxurious marble walls and a lot of sound insulation material. Luxury suites have multiple doors which obstruct the signal. These factors all cause severe Wi-Fi signal attenuation. The High-Definition (HD) Video on Demand (VoD) services in each guest room means that each user requires at least 10 Mbit/s bandwidth. Therefore, the traditional corridor settled solution cannot meet customers' requirements for network quality.

Some large hotels that adopt the AP indoor settled solution may easily solve the problem of signal attenuation, but new problems arise. Indoor settled deployment greatly increases the number of APs, therefore increasing the AP cost. Also, installation and deployment of APs in this way

requires a large amount of cables and wall engineering, and a large area. Not only is the installation difficult and expensive, but it also affects the aesthetics of the guest rooms and negatively impacts the overall visual experience of guests. This is especially true for rooms on cruise ships that are of such high value. In addition, during the installation and deployment, daily operations of the cruise ship hotel are greatly affected, reducing the income of the cruise ship hotel. Therefore, the traditional AP indoor settled deployment is also unacceptable to customers.

Customer Experience-centric Wall Plate AP

Huawei proposed the use of the wall plate AP2050DN solution for the Queen Elizabeth 2 cruise ship hotel, with its unusual environment and network demands. The wall plate AP supports concurrent wired and wireless access, and provides pass-through and USB ports to conveniently use IP phones and charge USB devices. The wall plate AP is designed to match the plate and can be easily installed on an 86-type box to fit the plate seamlessly to the wall. As well as not affecting aesthetics of the guest rooms, it also does not occupy space in the room. As the wall plate AP is deployed in a room, the signal does not need to pass through the wall. This makes the signal coverage and network bandwidth better than the traditional corridor settled solution. This solution allows wireless signals to cover the entire room, without signal interference generated with other rooms.

Using wall plate APs can greatly reduce the time spent on construction and deployment. Wall plate APs also do not damage the original decoration and building structure while reducing costs. Regarding deployment, engineers need only a quarter of an hour on average for the network deployment of a room, greatly improving deployment efficiency and letting customers put more time into operations.

Luxury hotels have stringent requirements on the hotel stay experience. Among these, not disturbing guests is a basic requirement. If a hotel guest reports a network problem, the hotel needs to send someone to the room,



which will disturb the guest. This severely affects the hotel stay experience. Huawei provides the eSight network management system for the Queen Elizabeth 2 cruise ship hotel. eSight offers automatic deployment of devices, and provides functions such as visualized fault diagnosis and intelligent capacity analysis. eSight can help the hotel management improve O&M efficiency, increase resource usage, and reduce O&M costs, ensuring the stable running of network devices. When a network is faulty, the hotel management can use eSight to perform automatic fault diagnosis and remote O&M on the network, without the need to enter the guest's room. This improves the hotel stay experience.

Huawei's wall plate AP uses the latest 802.11ac Wave 2 technology and supports air interface bandwidth of up to 1.267 Gbit/s. This meets the requirements of various services, such as HD VoD and Augmented Reality (AR) games.

A wall plate AP integrates several access methods, such as wireless access, wired access of four PCs, and access of two phones. Wall plate APs can optimize guest room cabling, beautify the environment for guests, and improve the network experience. Wall plate APs also provide an emergency telephone line. Luxury hotels usually will have an analog phone in the

bathroom to ensure that guests can use the phone in an emergency. Huawei's wall plate AP solution provides an analog phone port, ensuring that this 'analog lifeline' is not eradicated by the arrival of the digital era.

By using Huawei's wall plate AP solution, guests of the Queen Elizabeth 2 cruise ship hotel receive an ultimate Wi-Fi experience. From the standard rooms to luxury suite balconies, and from the swimming pool to the golf course, all guests can conveniently and flexibly enjoy a mobile office as well as leisure and entertainment. Finally, the customer satisfaction increased by 60 percent for the cruise ship hotel, providing an overall improvement to its competitiveness.

Carl of Queen Elizabeth 2 cruise ship hotel said, "We believe that, with the enormous help of Huawei's Wi-Fi solution, the cruise ship hotel will identify new opportunities in the future. This will make various new services possible and help provide guests with an ultimate experience that will make them never want to leave."

For Tracy's family staying at the Queen Elizabeth 2 cruise ship, not only can they share their hotel stay experience in real time on social media from anywhere in the hotel, but they can also provide a live stream for the loyal fans of Queen Elizabeth 2 who are far away in the UK. This allows the fans to see for themselves the rejuvenation of the cruise ship. ▲

Yan Lida
President, Huawei Enterprise Business Group

In this new era of digital transformation, we believe it is more important to grow the industry than to gain a bigger share of the market. By leveraging our strengths in technical innovation, Huawei is actively engaged in the promotion of international industry standards that reduce the costs of digital transformation.

Tao Jingwen
Huawei CIO and President of the Quality
Business Process & IT Management Department

Huawei's digital transformation uses a cloud- and service-based IT platform to deliver the ROADS experience in all our business domains, and continually improve our efficiency and effectiveness at serving our customers and setting industry benchmarks.

Dr. Alaa Nassif
Chief Executive Officer of RCY

The cooperation and achievements of the RCY and Huawei for Smart Yanbu Industrial City establishes a good model for other cities. Huawei leads a robust ecosystem. Through flexible application of new ICT innovations, we can make smarter, faster responses to various requirements, such as city governance, public services, and business activities.

Vittoria Rezzonico
Executive Officer of EPFL SCITAS

Transtec has closely cooperated with Huawei to provide EPFL with a top-quality system, which meets our demands in the high-performance computing field. We are impressed with the excellent hardware solutions introduced by Huawei engineers.

Ding Fang
Head of the Infrastructure at
Dongfeng Honda Automobile Co., Ltd.

Huawei CloudCampus solution is based on cloud technology, and therefore does not require the engineers to travel from HQ to the dealerships to carry out O&M and troubleshooting. In addition, this solution offers various data analysis capabilities, calculating customer flow, number of visits, and duration of visits, helping us to deliver precision marketing.