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Our Value Propositions

Information and communications technology is converging at an increasingly rapid pace. New technologies, especially cloud computing and big data, are becoming key enablers for ICT innovation and development. They are completely reshaping the CT industry, and creating enormous business opportunities through IT and CT convergence. In response to these revolutionary changes, Huawei continues to innovate around customer needs, focusing on the development of leading technology that meets those needs. Through open partnerships, we focus on providing future-oriented information pipes to build a Better Connected World and continuously create value for customers and society. Huawei aims to become a strategic partner that assists carriers in future transformation efforts, a leading enterprise ICT infrastructure provider, and a top smart device brand that consumers prefer and trust.

Building a Better Connected World

Ubiquitous Broadband
- Ubiquitous networks with a superior user experience
- Enabling customer transformation towards digital operations
- Integrating global content, applications, and development resources

Agile Innovation
- One-stop ICT infrastructure
- Adapted to vertical industry requirements
- Leading industry cloudification with open hybrid cloud architecture
- Big data-enabled identification of business opportunities

Inspired Experience
- Consumer centricity; a top smart device brand preferred and trusted by consumers
- Innovative, premium products
- Device-cloud synergy that provides a superior user experience across all scenarios

Staying customer-centric; innovating at the crossroads of customer needs and leading technology; building an industry ecosystem that thrives on shared success

Ubiquitous Broadband

The Internet makes it easier to disseminate and obtain information, which in turn stimulates the desire to go online anytime, anywhere, on any device. This level of connectivity enables users to access more high-quality content and applications and enjoy the convenience of mobile offices. Enterprises are now migrating their IT systems to data centers and clouds, a trend that significantly raises network requirements. Harnessing future floods of data will require networks with greater capacity, coverage, and agility. Huawei aims to bring the benefits of greater connectivity to more and more people.

Consumer demand for network connectivity, bandwidth, reliability, and security is far from being met. In response, Huawei provides carriers with solutions that best reflect their needs at different stages of development, working together to address their business and technology challenges.
Huawei is committed to helping carriers increase network capacity and optimize network management to achieve digital operations. We continue to innovate with new architectures (such as SoftCOM) and new technologies to deliver cutting-edge products and solutions that enable seamless evolution, and help our customers build highly efficient infrastructure networks. We help carriers consolidate their IT resources, transform their networks with NFV and SDN, and expand their revenue streams through the aggregation of quality content. We also enable carrier digital operations in a way that delivers a ROADS experience and makes ubiquitous broadband readily accessible for all.

**Agile Innovation**

The ICT industry will continue to advance rapidly well into the future. New trends such as mobility, cloud computing, big data, and social networking are driving the industry to new frontiers. Significant digital changes are taking place in the physical world, with the Internet driving the modernization of traditional industries.

Enterprises in all industries need to rapidly identify business opportunities and leverage the collaborative potential of IT to launch new products and services faster and more effectively. IT is evolving from a support system to an operation system, and is becoming a core source of competitive strength.

Huawei is committed to providing innovative one-stop ICT infrastructure. As part of this drive, we provide All Cloud network infrastructure, cloud data center infrastructure, and digital infrastructure solutions to help customers maximize resource utilization (e.g., network, storage, and computing resources), deploy business systems more quickly, perform O&M more easily, and manage their systems more efficiently. We provide industry solutions designed to meet the unique needs of different vertical industries. With an intelligent big data analytics system, we help our customers proactively identify new opportunities and achieve more agile business innovation. Through cooperation and innovation, we incorporate our ICT products into partners’ industry solutions to better meet the requirements of various industries. Our goal is to ensure our solutions can be easily integrated into partner offerings.

Over the next 30 years, enterprises will gradually migrate from traditional data centers to hybrid clouds. Huawei will build open hybrid cloud architecture to lead the cloudification of key industries, and help carriers fully embrace the cloud. To do this, we will first cloudify Huawei and deliver our products and services to customers from the cloud.

**Inspired Experience**

In the future, smart devices will become a more integral part of life, as they will be better at identifying user needs and developing situational and emotional awareness.

With an innovative combination of industrial design and key enabling technology, Huawei delivers premium products that are stylish, secure, and easy to use. By developing robust application and service ecosystems, Huawei offers a wide range of services, mobile phones, smart watches, and other smart devices for various scenarios (e.g., health, lifestyle, work, home, and outdoor settings). Our commitment to device-cloud synergy contributes to a superior user experience in all scenarios and creates a long-term emotional bond between Huawei and our users. We also strive to take user experience to the next level by providing users around the world with a convenient online-to-offline (O2O) purchase experience and services.
Business Review 2016

In 2016, we maintained our strategic focus, continued making breakthroughs, and created real value for our customers. Our annual revenue was CNY521,574 million, up 32.0% year-on-year.

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
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<tbody>
<tr>
<td>Carrier Business</td>
<td>290,561</td>
<td>235,113</td>
<td>23.6%</td>
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<tr>
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<td>40,666</td>
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<tr>
<td>Consumer Business</td>
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<tr>
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<td>10,539</td>
<td>7,092</td>
<td>48.6%</td>
</tr>
<tr>
<td>Total</td>
<td>521,574</td>
<td>395,009</td>
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</tr>
</tbody>
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- Based on ongoing 4G network rollout, sustained growth in the smartphone sector, and our growing capabilities in enterprise and industry solutions, Huawei earned CNY236,512 million in revenue from the Chinese market, up 41.0% year-on-year.
- Based in part on a growing share of the smartphone market, we earned CNY156,509 million in revenue from Europe, the Middle East, and Africa (EMEA), up 22.5% year-on-year.

- Due in large part to network infrastructure build-out in markets like India and Thailand, and growing share in the Japanese tablet market, Huawei maintained its growth momentum in the Asia Pacific Region and achieved CNY67,500 million in revenue, up 36.6% year-on-year.
- In the Americas, carriers in Mexico increased their investment in communications networks, enabling Huawei to earn CNY44,082 million in revenue from this region, up 13.3% over 2015.
Carrier Business

As digital transformation advances in all industries, technologies like cloud computing, IoT, and video are being used more extensively in each domain. Global carriers are leveraging their strengths to shift their business models from an investment-driven approach to one that is more value-driven. They are exploring new services and improving service quality. The aim is to deliver the ultimate ROADS (i.e., Real-time, On-demand, All-online, DIY, and Social) experience to end users, achieve new success, and serve as the cornerstone of digital transformation in all industries.

Huawei always puts customers first. We provide carriers with tailored solutions to help them go digital, increase revenue, and achieve sustainable development. We strive to be the best business partner for global carriers.

- With an eye to the future, we work closely with our partners to help carriers build All Cloud data-center-centric networks, and more agile digital operations systems. We help carriers succeed by developing video into a basic service and offering cloud services to help vertical industries go digital.

- To make the most out of existing networks, Huawei employs innovative solutions and service models to help carriers improve user experience, expand their user base, improve efficiency, and reduce costs. This will help maximize network value and lay a solid foundation for digital transformation.

In 2016, revenue from our carrier business was CNY290,561 million, up 23.6% year-on-year. We continue to move forward with our pipe strategy. With a focus on digital transformation, we have seized key opportunities arising from video, cloud, and operations transformation, and have explored the potential of new solutions and business models. We have responded to uncertainties with agility, and have worked to cultivate an ecosystem that will help drive the industry forward. These efforts have contributed to our steady growth.

Efforts in the video domain include:

- Helped leading carriers in China, Germany, Turkey, and other countries develop innovative video services.

- Worked with industry partners to build a more open, collaborative video ecosystem.

- Led the development of the video mean opinion score (video MOS) standard at ITU-T, and defined U-vMOS, a video experience measurement system focused on user experience that complies with the video MOS standard.

- Helped carriers succeed by rapidly constructing video networks that deliver an inspired experience.

We worked with carriers to expand the B2B market by offering cloud services. Specifically, we:

- Helped Chinese carriers provide e-government cloud services.

- Deployed B2B cloud services for carriers in Thailand, Chile, and other countries.

- Teamed up with multiple leading global carriers to deploy smart home, smart metering, and connected vehicle services to monetize future markets built on 100 billion connections.

We continued to flesh out our All Cloud network solutions, aimed at helping carriers go digital for more success:

- We partnered with a number of leading global carriers, guiding their transformation towards All Cloud network architecture.

- We formed strategic partnerships with carriers like China Unicom Shanghai, HKT, focusing on operations transformation. Our Telco OS digital operation system has allowed them to evolve their O&M systems and go digital. Together, we explored how to deliver the ultimate ROADS experience to end users.
Wireless Networks

As MBB applications and scenarios become more diverse, demand for greater data transmission speed has increased dramatically, from Kbps to Gbps. Requirements for latency have tightened from seconds to milliseconds. This has raised the bar for mobile network capabilities and operations.

Huawei helps carriers maximize the value of their existing networks with a broad portfolio of solutions.

In 2016, deployment of 4.5G networks became a trend in the industry. By the end of the year, we had deployed over 60 4.5G networks. We helped carriers expand their business scope beyond the traditional Business to Customer (B2C) services to also include Business to Home (B2H) and Business to Vertical (B2V) services. They have been able to increase their number of high-value connections and expand their business while delivering a better service experience to users. With 4.5G technology, Huawei is working with customers to explore new network architecture, business models, and operating models to prepare for 5G. Our 4.5G Evolution concept will help carriers further maximize the value of legacy networks and support them in the evolution towards 5G.

As the digital economy gains momentum, households are becoming the center of digital life. Huawei’s wireless home broadband solution known as wireless to the x (WTTx) has been deployed by over 100 carriers in Asia-Pacific, Africa, Latin America, and Europe, among other regions, providing broadband services for more than 30 million households. Featuring faster and more cost-effective deployment, this solution is enabling a growing number of households to make the jump from digital to smart.

As one of the early advocates of the Narrowband Internet of Things (NB-IoT) radio technology standard, Huawei has continued to play a leading role in its development and deployment. We:

- Established five open NB-IoT labs in 2016.
- Partnered with GSMA to establish an NB-IoT industry alliance, which has attracted 50 key members.
- Took the lead in NB-IoT rollout. We worked with 18 carriers in China, Japan, South Korea, Europe, the Middle East, and Africa at a strategic level, and launched over 20 commercial trials.

An ecosystem is fast maturing around LTE integrated Trunked Radio Access (LiTRA), a broadband trunking communications technology developed by Huawei based on LTE. A variety of devices are now available for LiTRA, supporting applications in a range of emergency communications scenarios. Huawei is an active player in the development of LTE trunking standards, we have submitted more proposals and had more of them approved than any other company. Huawei is also the initiator and rapporteur of the 3GPP Mission Critical Push to Video Work Item.

At the Global Telecoms Business Innovation Awards 2016, Telenor Myanmar Limited and Huawei were named Global Telecoms Business Innovation award winners in the Mobile Infrastructure Innovation category for their 9-Sector Solution. Huawei and leading Philippine carrier Globe Telecom won the same award for their joint deployment of the WTTx solution.
With large-scale LTE network deployments underway, mobile video services have become a major source of traffic in the MBB pipe. Huawei offers end-to-end mobile video solutions, and is driving continuous innovation in standards for the mobile video experience and in business applications. We are meeting carriers’ complex requirements for monetization, improved experience, and delivery of B2X video services across all scenarios.

Huawei is actively involved in building national broadband networks to drive global MBB development and bridge the digital divide. Our innovative Lean GU900 and multi-sector solutions have helped over 100 carriers in Southeast Asia, the Middle East, Africa, and South America maximize network value. In particular, our multi-sector solution can help increase single-site capacity by a factor of 3.5.

We led the establishment of a site alliance in the Southern Pacific. The alliance draws governments, regulators, carriers, tower operators, and property owners into a synergistic ecosystem, and enables the entire industry to cooperate and create new business opportunities. This alliance now covers over 30,000 sites.

**Fixed Networks**

Cloud services and video, especially 4K video, have given a strong impetus to the development of ultra-broadband networks. The year 2016 saw a boom in the growth of carrier video services.

Video is predicted to contribute approximately 75% of all traffic on carrier networks by 2020\(^1\). All major global carriers now see video as a huge business opportunity. Huawei’s video strategy incorporates consulting, cooperation, platforms, and networks. The strategy aims to help carriers build networks adapted end-to-end for video as a basic service, deliver the best video experience, and succeed in their video business. In 2016, Huawei teamed up with Etisalat to launch the first 4K ultra-HD TV service in the Middle East and Africa.

In the video era, user experience has become an important metric guiding carrier network construction. Huawei actively seeks joint innovation with industry-leading carriers, aiming to provide users with the best possible experience:

- Huawei has deployed 4K video networks for many major carriers to deliver 4K video services.
- Huawei’s Mobile Backhaul Solution ensures the best user experience in HD mobile video.
- By the end of 2016, Huawei had deployed over 190 mobile backhaul networks in over 100 countries, serving one-third of the world’s population.

To develop the industry ecosystem, we joined hands with industry partners to launch the OpenLife smart home business development program, which now has over 200 partners globally. We have signed memorandums of understanding with 20 carriers around the world in an effort to build a robust smart home ecosystem.

**Cloud Core Networks**

With All Cloud architecture, Huawei helps carriers migrate their networks to the cloud, and leverage intelligent pipes to provide communications and connectivity services to individuals and enterprises based on their unique needs. By enabling industries to go digital, we are helping carriers to open up a huge new IoT market.

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\(^1\) Source: The Evolution of Big Video – Examining telco transformation video opportunities, a joint white paper by Huawei and Ovum
Huawei has signed more than 170 contracts relating to commercial cloud networks worldwide. Our NFV solution won the Best NFV/SDN Solution award during the 5G Asia Summit, the Best Network Virtualization Product award at the 2016 LTE Latin America Conference, and the Best Technology Enabler award at the Mobile World Congress.

Personal communications:

- Huawei Voice over LTE (VoLTE) and Voice over WiFi (VoWiFi) solutions have been deployed on 110 networks worldwide.
- We built the world’s largest high-quality VoLTE network with China Mobile.
- We helped China Mobile Sichuan launch its cloud capability exposure platform.
- The Huawei Home Presence solution was awarded Best Innovative Future Comms Service over IMS at the 2016 IMS World Forum.

Enterprise communications: We have evolved from converged communications to cloud-based communications, expanding from enterprise office systems into core production systems, and are actively engaged in open innovation across industry borders:

- We now serve more than 600,000 enterprises in the finance, electricity, healthcare, and public safety industries across more than 150 countries.
- We have established a Cloud Enterprise Communications Alliance to provide more diverse solutions to our customers.
- We were honored with the Frost & Sullivan 2016 EMEA Video Conferencing Endpoints and Infrastructure Growth Excellence Leadership Award.

Smart pipes:

- Our CloudEPC solution is the leading solution for the cloud-based deployment of large-scale commercial networks.
- Our CloudMSE solution improves the video experience.
- Our forward-looking Multi-access Edge Computing (MEC) solution won the Best Edge Computing Technology award at the MEC Congress.
- Our SmartPCC solution remains a leader in the unified policy and charging control market, and won the Innovation in Policy and Charging Rules Function (PCRF) Virtualization award at the 2016 Policy Control Conference.

As a key element of Huawei’s IoT strategy, Huawei launched OceanConnect, an IoT ecosystem with an IoT connection management platform at its core. OceanConnect solutions offer open interfaces to devices and applications and interconnect with third-party platforms via the cloud. By bringing together industry partners, OceanConnect creates value for customers, and makes higher-quality smart lifestyles possible.

Software

Huawei continues to create new digital enabling systems, with five key native features: ROADS-native, Ecosystem-native, Agile-native, Cloud-native, and Analytics-native. The systems behind these features help carriers go digital faster.

Our Hybrid Video Solution helps carriers succeed in their video business by developing video into a basic service and a core competency. We have continued to drive the growth of a robust video ecosystem. We released the Best-UHD Industry Development white paper, and together with our ecosystem partners, we are pushing the video industry forward. In 2016:

- Huawei’s Hybrid Video Solution helped China Telecom Sichuan expand its IPTV subscriber base to over 10 million and add an additional 3.5 million 4K subscribers. We also helped the company improve user video experience by way of intelligent video operations.
- We helped Deutsche Telekom commercialize the first local video service that integrates fixed and mobile services. By delivering the best content and experience, Deutsche Telekom was able to set itself apart from the competition, and rapidly increase its ARPU and user base.
Business Enabling System (BES): The product capabilities of our BES, based on micro services and a digitized architecture that supports hierarchical decoupling, continue to improve:

- The BES was named an industry leader by Gartner and Ovum.
- We successfully launched the SaaS BES Cloud solution.
- We made significant contributions to the evolution of TM Forum Frameworx 16.0 in terms of processes, models, and best practices.

Universe Analytics: Our big data analytics platform Universe Analytics is a core engine for digital transformation. By providing agile, real-time, and intelligent business analytics capabilities based on the needs of carriers, the platform helps carriers improve end-to-end efficiency in delivering mainstream applications such as intelligent video operations and precision video marketing. By opening up analytics capabilities and bringing together industry partners, Universe Analytics enables carriers to monetize their data assets. It won the Best Telco Big Data Analytics Platform award at the Telco Data Analytics Summit 2016.

Digital business cloud: We have developed a leading cloud service platform for digital services, which provides carriers with cloud services like digital content aggregation, video, and enterprise B2B. The platform has attracted over 4,000 partners, and already has over 600,000 units of digital content and applications.

IT

Based on our All Cloud strategy, we leverage our unique strengths in cloud-network synergy to help carriers build a single cloud that meets both their internal and external needs. We are helping carriers go digital in three areas: providing services for industries, improving internal IT efficiency, and reshaping telecom networks.

In 2016, our IT solutions achieved the following:

- Huawei helped Deutsche Telekom, Telefónica, and China Telecom provide convenient and secure public cloud services by engaging in joint innovation with them and supporting their operations. Their big data, IoT, and other new services are moving to the cloud faster than ever.
- Our B2B Hosting Cloud solution has helped Chinese carriers build over 50 e-government cloud platforms. It also helped carriers outside China, including True in Thailand, REDtone in Malaysia, and Entel in Chile, to tap into the new huge cloud services market for governments and enterprises.
- Our FusionCloud Unified Cloud Infrastructure Solution was adopted by over 50 carriers, including Vodafone, Orange, and MTN, to support the migration of their business, operations, and management to the cloud, and to deliver agile operations and efficient O&M for their internal IT systems.
- With its open architecture, Huawei’s NFVi solution effectively helped carriers like Telefónica, América Móvil, and Singtel to migrate their telecom networks to the cloud, and build a fully open architecture and ecosystem.
Huawei is a strategic partner for carriers engaged in ICT transformation. With a tight focus on IT infrastructure, we have made sustained investments in IT. Adopting an open, collaborative approach, we work with partners to provide innovative, differentiated, leading IT products and solutions for carriers. Specifically:

- Huawei was named a leader in Gartner Magic Quadrant for General-Purpose Disk Arrays 2016.
- Huawei's full portfolio of storage products were procured on a large scale by Vodafone, Deutsche Telekom, Teléfonica, KPN, Vodacom, and China Mobile, among other carriers.
- Our HyperMetro Active-Active Solution ensures 24/7 service continuity of the core business systems of carriers, including Hi3G and China Telecom.
- Huawei servers support efficient operations of the core business systems of many carriers, including China Mobile, Teléfonica, and Telecom Italia.

Network Energy

In network energy, Huawei focuses on telecom energy, data center energy, and smart PV. The core concepts of digitization, interconnection, and intelligence inform our integration of power electronics technologies, digital technologies, communications technologies, and IoT technologies, and we provide our customers with a full portfolio of simple, efficient, and reliable network energy solutions. In 2016:

- We expanded our partnerships with China Towercom, Orange, Telenor, Teléfonica, BT, Vodafone, and other carriers.
- We built a solar-powered base station on Aconcagua, the highest mountain in South America. We also constructed a cloud data center for China Unicom in Gui’an New District, Guizhou Province, which is the largest single modular data center in Asia.
- We worked with multiple global carriers and industry organizations including ITU and DataCenterDynamics to drive the establishment of the Green ICT Alliance.
- Huawei's Site Energy Efficiency (SEE) proposal won approval by ITU-T.

To date, Huawei has deployed 2 million telecom energy systems in over 170 countries and regions, and has held the largest global market share in this segment for three consecutive years. We have received a number of awards, including:

- Global Product Innovation Leadership Award in Telecom Energy Solutions from Frost & Sullivan
- Annual Green Innovation Award from TowerXchange
- Cloud Journey of the Year award from DataCenterDynamics

Global Services

Carriers are going digital, and their networks are evolving. Huawei follows a maxim of “first changing ourselves, then serving our customers”. That is why we adopted a Product + Service strategy to help maximize network value. The aim is to help customers improve user experience, increase revenue, and develop their capacity to maintain and operate the complex networks of the future.

We have continued to increase our investment in services, built an open ecosystem, and significantly optimized our ability to deliver business consulting and integration services. This has enabled us to better help carriers give priority to user experience as they transform their operations and re-architect their infrastructure, ultimately shifting towards digital business.

Our global services have helped secure steady growth in carriers' network business:
■ Our Network Experience PLUS solution, Indoor Connected Solution (ICS), Customer Experience Management (CEM) solution, premium video services, and site integration services have helped customers improve the value of their networks. Our HUAWEI SmartCare® CEM solution has been adopted by 16 of the world's top 30 carriers.

■ Our consulting and IT integration services have helped customers evolve towards All Cloud networks. In NFV/SDN integration services, we implemented about 130 NFV and SDN projects worldwide. We have provided integration services for over 420 cloud data centers across the globe.

■ Our ICT managed services made multiple breakthroughs, helping customers improve their O&M efficiency.

■ Our learning services supported the talent development of carriers in over 170 countries and regions.

We continue to improve our delivery and service management system by developing our internal platforms and capabilities, and we have delivered professional services for over 1,500 networks across over 170 countries and regions. In 2016:

■ We successfully delivered over 1 million wireless sites, and supported stable network operations for over 200 key events. Our efforts have helped networks remain robust.

■ As part of our commitment to openness, evolution, and innovation, Huawei launched Cloud OpenLabs – with interconnected facilities across four labs. The labs support the cloud ecosystem by offering pre-integration and pre-verification, and serve as a platform for joint innovation. In 2016, Cloud OpenLabs certified 26 partners, and completed 120 Proof of Concept (POC) projects as well as 94 commercial deployment projects. These achievements enabled network evolution and operations transformation for carriers.

■ We launched OPEN-O, an open source SDN and NFV orchestrator project, in partnership with the Linux Foundation and other organizations, and established an Open ROADS Community. These efforts bring together major carriers and industry partners to spearhead digital transformation practices.

■ We launched a joint innovation project for digital transformation with HKT based on its B2B requirements, aiming to deliver a ROADS experience to end users. For this project, Huawei employed its operations transformation solutions and All Cloud solutions for infrastructure.

In 2016, our data center integration, IES integration, NFV integration, CEM, and ICT managed services won many prestigious industry awards from DataCenterDynamics, TM Forum, Global Telecoms Business, Informa, Telecoms, and other organizations. In particular, our Operation Web Services (OWS) Cloud Platform won the Cloud Innovation of the Year award from Telecoms, and the Best Managed Services Innovation Award at Informa's Managed Services World Congress 2016.

In 2017, Huawei will continue to work with carriers and partners to build more connections, drive broadband adoption, and support digital transformation in all industries. We will build an open, collaborative industry ecosystem that brings shared success, and construct ubiquitous ultra-broadband networks that deliver the best experience possible. In this way, we will help carriers continue to improve the performance of existing networks, power their sustained success and steady growth, and create Open ROADS to a Better Connected World.
Enterprise Business

In our enterprise business, Huawei’s focus is on ICT infrastructure. With our partners, we help our customers succeed by addressing the challenges of digital transformation in their industries. In 2016, we achieved rapid growth in a number of industries, including public safety, energy, finance, transportation, and manufacturing. Revenue from our enterprise business was CNY40,666 million, up 47.3% year-on-year.

Digital transformation is reshaping industry ecosystems. Huawei is seizing this opportunity and working with partners and customers to build Business-Driven ICT Infrastructure (BDII). We have become an enabler and a preferred partner for industries’ digital transformation, helping our customers lead the new era of ICT.

Smart city: Huawei creates a “nervous system” for cities by bringing together technology like ultra-broadband networks, cloud computing, big data, and the Internet of Things (IoT). With these types of nervous systems in place, everything in a city will gain the ability to sense, will be connected, and will become intelligent.

Our smart city solutions integrate one cloud, two networks, and three platforms. They have been deployed in smart city projects around the world and are widely recognized for their quality. Specifically:

- With the Huawei e-Government Cloud Solution, we built a secure and efficient e-government platform in Beijing that serves tens of millions of people. This platform has effectively reduced cyber security threats and significantly improved O&M efficiency.
- Huawei won the 2016 Outstanding Contribution Award for developing the Asia-Pacific smart city ecosystem, and also the Asia Pacific Leading Smart City Vendor 2016 Award from the International Data Group.
- Huawei stresses the importance of developing a smart city ecosystem. We have invested over CNY100 million in collaborative initiatives with our partners to develop solutions, market them, and cultivate talent.

Public safety:

- We have continued to make new use of advanced ICT technologies, including cloud computing, big data, mobile broadband trunking, IoT, and artificial intelligence (AI). To help cities and the public safety sector go digital, we worked with partners to develop converged, open, one-stop Safe City solutions that are video-enabled.
2016 saw the official global launch of our Integrated Communication Platform. The platform breaks down barriers between different systems, enables on-site video coverage and clear communication of commands, streamlines coordination between different departments, and enables informed command decisions.

Huawei’s Safe City solutions now serve more than 800 million people in over 200 cities across over 80 countries and regions in Europe, Africa, and Asia-Pacific.

Finance: We have pursued joint innovation with more than a dozen top-tier financial institutions and independent software vendors around the world, researching next-generation IT infrastructure based on cloud computing and big data, to help financial institutions go digital faster on three levels: platform transformation, product innovation, and channel services. Specifically, we:

- Helped large Chinese commercial banks migrate their infrastructure to the cloud.
- Innovated in collaboration with the Industrial and Commercial Bank of China (ICBC) and China Merchants Bank (CMB) to apply new technologies in the finance sector, like real-time risk control and Financial Cloud.
- Developed an omnichannel customer service center for China CITIC Bank. This center supports evolution towards multimedia customer services, video-enabled customer services, and remote banking.
- Currently serve more than 300 financial institutions globally, including 6 of the world’s top 10 banks.

Energy:

- Huawei became the only ICT solutions provider among the members of the Global Energy Interconnection Development & Cooperation Organization (GEIDCO).
- Based on our IoT connection management platform, we recently launched the Advanced Metering Infrastructure (AMI) 2.0 Solution, which will help to build the “nervous system” in an age of connected energy.
- The Huawei Better Connected Smart Grid Solution helped Thailand’s Provincial Electricity Authority (PEA) build a secure high-speed production network. We also jointly established an Electricity Innovation Center with PEA.
- Huawei helped Nigeria build smart grids, achieving 100% success in remote daily collection of metering data and reducing line loss by 31%.
- The Huawei IP Hard Pipe Solution helped EPM, the largest public enterprise in Colombia, achieve reliable transmission of its operational data, and move towards unified O&M.
- The Huawei Better Connected Smart Grid Solution has been deployed in 65 countries, serving over 170 customers in the electricity sector.

Transportation:

- We released our Digital Urban Rail 2.0 solution, which has been applied extensively in the urban rail industry.
- We applied cloud computing and big data technology to railway operations (e.g., ticket and freight analysis) to tap into the value of railway data and improve the efficiency of railway operations and management.
- We developed a prefabricated modular data center for Dubai International Airport with our smart airport solution to meet the airport’s growing IT requirements.
- We are working with over 60 industry partners, providing solutions for networks comprising over 220,000 km of railways and highways, and more than 15 airports with annual traffic of over 30 million passengers.
Manufacturing:
- Huawei and KUKA are collaborating on cloud computing, IoT, big data, and mobile technology to help manufacturing customers transform and embrace smart manufacturing.
- Huawei and ABB have teamed up to integrate Huawei’s wireless IoT solution that combines broadband and narrowband technology into ABB robots and industrial automation solutions. The project involves remote wireless monitoring, management, and configuration of robots, supported by O&M, big data applications, and visualized intelligent manufacturing.
- Huawei worked with escalator and elevator manufacturers including Schindler in applying the Edge-Computing-IoT (EC-IoT) Solution to achieve the unified networking and management of millions of escalators and elevators worldwide.

Media: Huawei’s media cloud solution has been extensively applied by media groups in over 10 countries in Western Europe, the Middle East, and Asia-Pacific, to help them accelerate their transformation towards IP-based, mobile, cloud-based omnimedia services. We:
- Helped France’s TF1 build a converged media cloud platform for more efficient production of programs.
- Developed a media industry cloud with UAE carrier du, providing end-to-end cloud services for media customers. The solution covers the production, broadcasting, distribution, and archiving phases, and reduces O&M costs.
- Successfully delivered our media cloud solution for over 100 TV stations, including China Central Television and Shenzhen TV.
- Signed a strategic cooperation agreement with Hunan Broadcasting System to jointly develop one of China’s most advanced omnimedia cloud platforms, integrating cloud with devices and supporting multiple screens.

Education:
- The Huawei Smart Campus Solution for Education has been deployed in over 200 universities in more than 70 countries and regions, including Lincoln University, Tsinghua University, and Nanjing University.
- Our High-Performance Computing (HPC) Solution helped more than 100 global universities and scientific research institutions such as the Poznan Supercomputing and Networking Center (PSNC) to apply innovative ICT to improve their research capabilities.
- Our Smart Classroom Solution has been used to facilitate elementary level education in many countries, including China, the US, Spain, Turkey, and South Africa.
- Through our Huawei Authorized Information and Network Academies (HAINAs), we have worked with over 140 colleges and universities around the world, and have trained more than 5,000 students.

Internet:
- Huawei’s cloud data center SDN solution helped EVRY, one of the largest IT companies in the Nordic region, to build a future-proof SDN multi-tenant cloud data center, and begin its transformation into a cloud services provider.
- Huawei has provided optical transmission, routing, and broadband access solutions to the Amsterdam Internet Exchange (AMS-IX) and LINX in the UK to meet their need for high bandwidth, real-time data synchronization, and lossless failover.
Cloud: The cloud services developed jointly by Huawei and carriers have made significant advances in Europe, Latin America, and China. We:

- Worked with Deutsche Telekom to launch Open Telekom Cloud.
- Built the world's largest science cloud for 10 top scientific research institutions, including CERN, the European Organization for Nuclear Research.
- Partnered with Telefónica to provide high-quality cloud services in multiple countries in Latin America.
- Teamed up with China Telecom to enable cloud services for dozens of medium and large enterprises in China.

Huawei provides innovative, differentiated, leading ICT infrastructure, including both hardware and software, to support the creation of open, flexible, resilient, and secure platforms. We work with partners to help customers address the challenges of digital transformation and succeed.

IT: Huawei helps enterprises quickly migrate to the cloud and unleash their commercial potential. Huawei launched the world's first 32-socket mission critical server called KunLun, and released 31 FusionCloud services, FusionStorage 6.0, and the FusionStage PaaS platform. In 2016, Huawei's full portfolio of IT products moved up the market rankings in reports released by Gartner, Forrester, and IDC. Huawei is now one of the world's most prominent IT vendors. Specifically:

- Huawei's OceanStor products were named a leader in Gartner Magic Quadrant for General-Purpose Disk Arrays.
- Huawei was named a Strong Performer by Forrester for its FusionSphere cloud OS and hyper-converged infrastructure product FusionCube.
- Our FusionServer 4-socket mission critical server was the global leader by shipments in Q3 2016 (Gartner), and moved into the Challengers quadrant in the Gartner Magic Quadrant for Modular Servers 2016.

As of the end of 2016, Huawei has delivered over two million virtual machines and 420 cloud data centers to customers. We worked together with over 500 partners to provide secure, reliable, and efficient cloud computing solutions across over 130 countries and regions.

Networking:

- We announced the Agile Network 2016 suite of innovative solutions and services, fulfilling our value proposition of "For the Cloud, By the Cloud".
- We unveiled two IoT solutions: Connected City Lighting Solution and Connected Elevators Solution.
We released multiple WAN solutions that restructure enterprise WANs on three levels: cloud interconnection, industrial interconnection, and cloud access.

According to reports released by IDC in Q3 2016:

- Our Ethernet switches and enterprise routers are ranked No. 2 globally in terms of market share, and are the market leader in China.
- Our data center switches are No. 3 in terms of global market share, and No. 1 in the Chinese market.
- Our WLAN products rank No. 4 globally and No. 2 in China.
- Our enterprise firewall products are ranked No. 2 both in China and globally.

Our AnyOffice solution was named a Leader in IDC’s China Enterprise Mobility 2016 report. Huawei’s enterprise networking solutions have been deployed in over 100 countries and regions.

Cloud services:

- Huawei has established strategic partnerships with over 30 Chinese cities, built a cloud service resource network that covers all Chinese provinces and municipalities, and has become a leader in China’s e-government cloud market.

- We have established and optimized an online sales and operations system for cloud services, and enjoyed a 10-fold increase in the number of paying users in 2016.

- Huawei’s enterprise cloud services were among the first candidates to receive “Enhanced” certification in the cloud service capability evaluations by China’s Ministry of Industry and Information Technology.

- In Forrester’s Public Cloud Platforms In China 2016 report, Huawei was named a Strong Performer in China’s public cloud market.

In the cloud service domain, we have established many partnerships:

- Huawei and Digital China built China’s largest O2O cloud ecosystem, covering both cloud and devices.

- We teamed up with Philips to build a healthcare cloud platform delivering an end-to-end suite of services.

- We worked with WuXi AppTec to launch China’s first precision medicine cloud platform.

- Huawei has over 500 enterprise cloud service partners in the sectors of smart city, media and entertainment, finance, IoT, smart manufacturing, e-commerce, and healthcare, working together to drive robust development of the cloud ecosystem.
Enterprise wireless:
- Sales of our enterprise wireless products grew rapidly in the public safety industry. Our broadband trunking solution was successfully deployed in Thailand, Spain, and other countries, and our wireless smart rail transit solution has been adopted by multiple Chinese customers in the transportation industry.
- Based on 4G/4.5G technology, Huawei integrated both licensed and unlicensed spectrum in its new wireless IoT solution that combines broadband and narrowband technology. The solution has been successfully deployed to provide uninterrupted, reliable, and secure wireless networks for the electricity, port, railway, manufacturing, and smart city industries.
- As of the end of 2016, Huawei has signed 296 enterprise wireless contracts. In the meantime, the total number of members of the eLTE Industry Alliance rose to 91, further expanding the ecosystem.

Enterprise cloud communications: Huawei’s enterprise communications products and solutions are used in over 150 countries and regions, and help customers improve efficiency and provide innovative services via efficient and reliable real-time audio and video communications. According to a report from IDC, in 2016 Huawei’s videoconferencing products ranked first in China for the fourth consecutive year. Worldwide, Huawei has had the third largest market share in videoconferencing products for three years running.

IoT: NB-IoT technology, developed under the leadership of Huawei, was the first low-power WAN solution to achieve widespread adoption by carriers. Combined with the eLTE-IoT access solution, the WAN solution is able to meet the demand for low-power WAN access in a wide range of use cases. The PLC-IoT technology adopted in Huawei’s energy IoT solution was officially initiated as an IEEE project in September 2016. In 2016, smart meters powered by PLC-IoT were in use in 10 countries. Together with carrier partners, Huawei has begun working on IoT solutions for many manufacturing customers.

Network energy: We leverage fully-integrated, modular technology to provide our customers with simple, efficient, and reliable ICT power supply solutions. In 2016, we achieved the following:
- According to statistics from IHS and Frost & Sullivan, Huawei’s prefabricated modular data center and modular UPS hold the largest market share globally.
- Frost & Sullivan presented the 2016 Modular UPS Company of the Year Award to Huawei, and Huawei UPS won the 2016 Platinum Award in IT from Data Center Insider.
- Huawei’s prefabricated modular data center and modular UPS have been deployed on a large scale in the finance, transportation, ISP, public safety, and government sectors.

Our innovative FusionSolar Smart PV Solution integrates digital technology, the Internet, and photovoltaic (PV) technologies to help PV plants achieve automated O&M around the globe. According to the latest reports from IHS and GTM Research, Huawei PV inverters are the most-shipped PV inverters globally. Huawei has established comprehensive partnerships with global top 50 PV plants.

Huawei emphasizes customer-centricity, creates shared success, and builds a sustainable ecosystem. We have stepped up efforts to develop and invest in industry alliances, business alliances, open source communities, and developer platforms. We leverage the strengths of our partners to grow the industry as a whole, building a symbiotic, interdependent, and regenerative community of common interests.

Huawei innovates in the areas of cloud computing, big data, SDN, and IoT to develop open, flexible, resilient, and secure platforms. We also work actively with customers, partners, developers, industry alliances, and standards organizations to build an interdependent ecosystem that fosters shared growth.
As of the end of 2016, we have more than 12,000 channel partners and 2,000 service partners working with us to deliver solutions to enterprises. We have over 400 solution partners, including Accenture, SAP, GE, T-Systems, Honeywell, Infosys, Siemens, Alstom, and Hexagon. In 2016, we also launched our first Enterprise Solution Partner Program (SPP).

Huawei has 13 OpenLabs worldwide, and opened five OpenLabs in Suzhou, Munich, Mexico City, Singapore, and Dubai targeting vertical industry customers. These labs have become centers for joint innovation, development, and verification, and experience centers for Huawei and our customers and partners. We have joint innovation centers with 36 industry-leading customers.

We have set clear, transparent policies for our partners, and provide strong support in the joint innovation of solutions, finance, supply chain, and IT support. We work with them to build their capabilities and drive their transformation forward to ensure mutual success.

In cloud computing and big data, we:

- Announced enterprise cloud solutions together with Accenture, offering one-stop services to help global enterprise customers cloudify their core applications.
- Partnered with ESI to provide innovative industrial manufacturing solutions for customers worldwide.
- Expanded our collaboration with Oracle to deliver better resource efficiency for key enterprise business systems.

In addition, we have actively contributed to open source communities and worked for the standardization of cloud platforms. Our role in the OpenStack Foundation continues to grow, and we are now a Platinum Member. At the end of 2016, Huawei was among the top three contributors to the Hadoop and Docker communities.

IoT: Huawei and our partners jointly launched the Edge Computing Consortium (ECC) to create a cooperative platform for the edge computing industry, and to promote openness and collaboration in the Operational Technology (OT) and ICT industries.

Huawei has also developed innovative high-end services to support the migration of enterprise data centers to cloud data centers. These end-to-end services range from consulting, planning, and design to systems integration and implementation, consolidation, migration, and O&M management. Huawei is now working with over 2,000 service partners to provide high-quality professional services to over 45,000 customers. We are gradually becoming the preferred ICT service partner for many industry customers.

Development of ICT talent: Huawei is dedicated to linking talent demand with talent supply. We are developing a large commercial training and certification system to cultivate ICT expertise amongst our customers and partners. Huawei is working with over 300 universities. We have opened over 190 network academies and 45 training centers globally, and have signed contracts with 260 training partners. Over 60,000 engineers have received Huawei Certified Internetwork Experts (HCIEs), the highest-level technical certification offered by Huawei.

Innovative ICT is now spreading from enterprise office systems into core production systems. Industry transformation is gathering momentum, which introduces new demands and unprecedented challenges for ICT infrastructure. Huawei will embrace these historic opportunities, face challenges head on, and work with our industry partners to develop open, flexible, resilient, and secure platforms. We will build sustainable ecosystems that enable shared success. With our sights set on industry changes and customer needs, we will continue to innovate, facilitate the transformation of enterprises, and create value to help our customers succeed.
Consumer Business

In 2016, Huawei's Consumer BG maintained its tight focus on consumers, and continuously improved consumer experience. We focused on meaningful innovation, and made major breakthroughs in a number of areas. We achieved new levels of industry leadership, product innovation, and global recognition as a premium brand. Our products are now loved by more consumers and supported by more partners.

In 2016, revenue from our consumer business was CNY179,808 million, up 43.6% year-on-year. We shipped 139 million smartphones throughout the year, an increase of 29% from 2015, and we achieved steady growth for the fifth consecutive year.

Breakthroughs in European high-end market; balanced, steady development worldwide

Thanks to our increasingly innovative products and growing global recognition as a premium brand, Huawei's global smartphone market share rose to 11.9% in 2016, cementing our ranking as one of the top 3 players globally.

- Flagship products were more popular. The HUAWEI P9 and HUAWEI Mate 9 series were particularly well received worldwide.
- Global shipments of the HUAWEI P9 series exceeded 10 million units, the first Huawei flagship handset to reach this milestone.
- The increasing proportion of mid-range and high-end products among all Honor smartphones generated a steady increase in revenue for the Honor brand.

In 2016, Huawei's Consumer BG made major breakthroughs across the European market, and achieved balanced, steady growth in many markets around the world:

- According to GfK, Huawei's smartphone market share is now over 15% in northeastern Europe and over 10% in western Europe.
- In some northern European countries, Huawei holds a leading market share, and our phones have gained a supportive base of dedicated fans.
- By December 2016, Huawei held a market share of over 15% in 33 countries, and over 20% market share in 22 of these countries, half of which were in Europe.

Huawei's share of Europe's high-end smartphone market rose rapidly owing to strong sales of the HUAWEI P9 series. GfK reported that Huawei's smartphone market share in the EUR500–600 price range grew by 6 percentage points in western Europe and 8 percentage points in northeastern Europe after the launch of the HUAWEI P9 series.

In China, Huawei's smartphone market share increased to 18.1% in 2016, and we are in a leading position in the CNY3,000–4,000 price range. In Latin America, Africa, the Middle East, and some other regions, Huawei has achieved over or close to a 15% market share.

1 GfK report on global smartphone market share, 2016
2 GfK report on smartphone market share, December 2016
Meaningful innovation, leading new tech trends

In 2016, Huawei’s Consumer BG focused on meaningful innovation. We made major breakthroughs in areas including chipsets, user interface (UI), and dual-lens camera technology. We also built new capacity for product innovation.

Chipsets: The Kirin 960 chipset is the world’s first system-on-a-chip (SoC) to feature an ARM Cortex-A73 CPU and a Mali-G71 Octa-core GPU:
- Compared with its predecessor, the Kirin 960 enables 180% better graphics performance and an 18% improvement in CPU performance.
- The chipset also includes the latest UFS 2.1 storage technology. Smartphones powered by the Kirin 960 can smoothly support 3D gaming and multi-app scenarios, offering consumers a fast user experience.

UI: Our consumer business R&D team addressed the issue of Android phones slowing down over time, which has frustrated Android users for years. Led by some of the world’s leading Linux experts, the team significantly optimized the Android system, and unveiled EMUI 5.0 – software that is tightly integrated with the Kirin chipset to take full advantage of Huawei’s strengths in both software and hardware. The new UI includes highly optimized system resource allocation controlled by a smart learning system.

Huawei partnered with top global brands including Leica and Porsche Design to design and develop devices that deliver a superior experience:
- Dual-lens cameras: Huawei and Leica jointly developed two generations of dual-lens cameras in 2016, sparking a new trend in smartphone photography. The two companies plan to continue joint research and development in the fields of optical systems, imaging algorithms, virtual reality, and augmented reality, to maintain a leadership position in smartphone photography.
- Industrial design: Huawei worked with Porsche Design to introduce the limited edition Porsche Design HUAWEI Mate 9.

Benefiting from these advances, the HUAWEI Mate 9 series won recognition from high-end business users and the international media after its launch. It won a best smartphone award.
from three major German technology and media publications: Chip, Connect, and Areamobile. At the Consumer Electronics Show (CES) 2017, the HUAWEI Mate 9 was selected as a Best of CES 2017 product by many top-tier media outlets and institutions, including the Wall Street Journal.

Gaining stronger recognition as a premium global brand

As well as building new capacity for product innovation, Huawei's Consumer BG has worked on building a world-class brand, and consumer awareness of Huawei as a premium brand has further increased. According to a survey by Ipsos, global brand awareness of Huawei rose from 76% in 2015 to 81% in 2016. Huawei once again ranked on Interbrand's Top 100 Best Global Brands, this year at 72nd, and in the BrandZ Top 100 Global Brands at No. 50.

Huawei's Consumer BG launched several global marketing campaigns in 2016 integrating elements from fashion, photography, entertainment, and sports. We partnered with global fashion brands Vogue and GQ Magazine, and with many Fashion Week event organizers. These campaigns have helped to communicate the Huawei brand and to associate it with the lifestyles of our target consumers on an emotional level.

For the first time in Huawei's history, we ran a single, global marketing campaign for the HUAWEI P9 series with the same activities, schedule, and images worldwide. The campaign included joint marketing with 39 European carriers. This reinforced Huawei's image as a global premium brand, and helped improve the mix of consumers in our user base.

According to an analysis of Facebook user data, 58% of HUAWEI P9 users are between the ages of 18 and 34, compared with 37% for the HUAWEI P8. The share of female users is 27 percentage points higher for the HUAWEI P9 than for the HUAWEI P8.

According to an Ipsos study of consumers in markets other than China, the number of consumers considering buying a Huawei device rose 66.7% over 2015, and those who preferred the Huawei brand doubled during the same period. "Sleek design", "stylish", and "powerfully innovative" are becoming the top-of-mind associations that consumers in markets outside China have with Huawei smartphones.

Throughout this ongoing process of growth, our consumers remain at the heart of everything we do. We have actively expanded our sales channels and service stores to enhance brand awareness and build greater recognition. In 2016:

- Our global retail network expanded.
- We built long-term stable partnerships with thousands of distributors and retailers all over the world.
- The share of revenue contributed by open market channels rose to 71%, up 13 percentage points compared to 2015.

Huawei now has service stores in 45 countries, and we have global service centers that provide hotline services to consumers in 105 countries. According to Ipsos, Huawei ranks No.1 in service satisfaction among consumers in many countries, including China, Poland, Mexico, and Egypt.

Embracing future trends and investing in core technologies for next-generation smart devices

The global smart device industry is undergoing a major transformation. Huawei’s Consumer BG needs to gain insights into what consumers want, embrace and lead industry changes, and have the courage to innovate.

In 2016, Huawei actively pursued innovation geared toward the intelligent products of the future:

- In artificial intelligence, Huawei invested in intelligent sensing, intelligent cognition, and intelligent computing. We developed artificial intelligence systems that enable synergies between software and hardware, as well as between devices and cloud.
- Huawei made breakthroughs in areas such as sensor algorithms, computer vision, search engines, and natural language processing. We introduced HiBoard to deliver situation-appropriate smart services to consumers.
In December 2016, we launched Honor Magic, which offers a glimpse of what future intelligent phones will look like. This future-proof phone demonstrates the achievements Huawei has made in its explorations into artificial intelligence.

Huawei strives to bring a smarter experience to consumers in all scenarios. We have achieved market breakthroughs in PCs, tablets, wearables, smart home, and connected vehicles. In 2016:

- Our tablet business grew dramatically despite unfavorable market conditions. We recorded strong performance in both the B2B and B2C markets. Total shipments exceeded 10 million units, up 90% year-on-year.

- With our HiLink-based smart home platform, we formed strategic partnerships with Haier, Gree, and other major home appliance manufacturers, forging a new collaborative ecosystem.

- Huawei’s innovative connected vehicle products have attracted globally leading brands like Audi and Volkswagen.

To enrich the consumer experience delivered by Huawei devices and software, Huawei’s Consumer BG is working to build an ecosystem of consumer cloud services.

- In China, the ecosystem has already taken shape. Over 220,000 developers have registered to be part of Huawei consumer cloud services. In 2016, our partners earned over CNY2.8 billion from these services.

- Outside China, we have put in place the infrastructure that is needed to deliver basic cloud services, and we have successfully launched multiple innovative services in over 170 countries. Huawei’s basic cloud services are now global.

In 2017, our Consumer BG will maintain its tight focus on the needs of our consumers. We will continue to build capacity in channels, retail, branding, marketing, and services, and will work to make our operations and customer services more efficient and cost-effective. With bold innovation and new, future-ready intelligent products, we will continue to deliver the best user experience in every consumer scenario. We will build core competencies to lead future trends and strive to become a culturally vibrant tech brand loved by global consumers.

Research and Development

Huawei remains tightly focused on its ICT pipe strategy. To build a Better Connected World, we continue to invest in key technologies, basic engineering capabilities, network architecture, technical standards, and product development. We aim to create a better user experience by providing broader, smarter, and more reliable data pipes, with higher performance and zero wait time.

We are committed to translating leading technologies into better and more competitive products and solutions that help our customers succeed.

Wireless networks: Huawei achieved the following in 2016:

- In line with our All Cloud strategy, we released the CloudRAN and CloudAIR end-to-end mobile cloud solutions: CloudRAN redesigns wireless networks with cloud architecture, and CloudAIR revolutionizes the usage of air interface resources.

- Released our 4.5G Evolution concept and furthered LTE evolution, building on the industry-wide consensus on 4.5G and the growing number of 4.5 commercial networks. Widely deployed our Massive MIMO technology, a key 5G technology, on existing 4G networks.

- Launched the industry’s first NB-IoT chipset, the first NB-IoT communications module, and the first NB-IoT commercial release for base stations. All these efforts have helped to nurture the emerging NB-IoT ecosystem.

- Released version 2.0 of our WTTx solution, with increased data pipe capacity, fixed-mobile convergence, more efficient operations, and more support for service innovation.

- Released our indoor digital solution LampSite 3.0. This solution represents a
major breakthrough on the RF bottlenecks that have held back the industry for years. It enables a neutral host model in which the same indoor infrastructure can be shared by multiple carriers.

Carrier and enterprise networks: Huawei announced its All Cloud strategy to help carriers, enterprises, and industries go digital by enabling networks that are ubiquitous, experience-driven, agile, on-demand, and ultra-broadband.

For the telecom market, we:

- Launched our leading Flex-PON solution to overcome the challenges of smooth migration to gigabit access.
- Unveiled our PID to simplify WDM networks and overcome the challenges of the ultra-high bandwidth required by video services.
- Launched our 128 Tbit/s NE5000E 2+8 router cluster system, able to handle traffic spikes on backbone networks and provide high-speed data center interconnects.
- Released the VideoSense solution, enabling carriers to deliver visualized, manageable video services with a guaranteed experience.

For industry/enterprise customers, we accomplished the following:

- Our CloudCampus solution employs cloud technology to manage campus networks on the cloud throughout their lifecycles.

- Our CloudEPN solution helps to connect enterprises to their branch organizations and enables fast provisioning of value-added services.
- We upgraded our CloudFabric solution for DC networks. With its smart analysis system built on big data, the upgraded solution is able to locate a network fault within minutes.

All carriers and enterprises/industries are scrambling to build the strengths that they will need to compete in the cloud era. In this context, Huawei launched the Agile Controller, the industry’s first unified SDN controller able to handle different customer scenarios. It enables customers to build agile, on-demand All Cloud networks that will help them succeed in their business.

Software: We focused on building competitive Digital Native software platforms. Specifically:

- We officially launched our converged video platform and began global delivery. The platform features cloud architecture, high capacity/high performance, agile operations and maintenance, and supports an inspired 4K video experience.
- Our billing solution now supports incremental delivery of suites; smooth evolution of the baseline version; and five best cloud deployment practices, including CDR cloud and Bill cloud. It delivers the best bill run performance and supports open APIs and six types of openness scenarios.

At the Global Mobile Broadband Forum held in Tokyo in November 2016, Huawei announced its Wireless X Labs plan, which aims to bring together carriers, technology providers, and vertical industry partners to jointly explore future use cases for mobile applications, drive innovation in business and technology, and promote an open industry ecosystem.
We further advanced our platform suite strategy to enable third party developers to deliver applications as delivery service vendors (DSVs), and our open and innovative platform has drawn positive response from throughout the industry.

Cloud core networks: Huawei has remained dedicated to providing end-to-end connection and communications to any access network, and to enabling upper-layer applications through differentiated experience controls. Specifically, we:

- Released our CaaS 2.0 solution, a unified enabling platform to open our communications capabilities including real-time voice and video, data pipe functions, and user data functions. This solution delivers network capabilities as a service for application in any industry.
- Announced the OceanConnect open platform ecosystem. With the IoT connection management platform at its core, the ecosystem brings together a great range of applications and access technologies.
- Developed the concept of Big Video network that supports convergent video services for communications and industry applications across networks and geographical areas.
- Launched the world’s first “six-in-one” cloud videoconferencing endpoint, the TE10. Connecting to a wide range of cloud platforms, the TE10 delivers video services for every type of business.
- Unveiled the world’s first 5G end-to-end network slicing prototype and verified its multi-service slicing technology.
- Released the industry’s first future-oriented Multi-access Edge Computing (MEC) solution that delivers lower network latency and a better service experience.

Network energy: Guided by our forward-looking principles of using silicon instead of copper and using bits to manage watts, we combined basic research in power electronics with ICT technology, and continued to provide customers with competitive products and solutions. Specifically:

- We continued to push the boundaries of efficiency in our power supplies, and developed a smart base station power solution to help customers reduce O&M costs.
- For large cloud DCs and high-reliability enterprise applications, we launched a UPS module with efficiency of 97.5% and power density of 50 kVA/3U, able to support all of the world’s power grids.
- We worked on photovoltaic (PV) power systems and grid control algorithms and rolled out our smart PV solution 3.0, with improved end-to-end efficiency and increased capacity to deliver low voltage power.

In the IT field, Huawei has innovated in many different ways on cloud applications. We have provided customers with leading servers, storage devices, networks, and other IT infrastructure and helped them create high-performance computing solutions that are efficient, accelerated, and integrated.

In cloud computing, we achieved impressive results:

- In public cloud, we have developed distinctive competitive strengths. We continuously increased the IOPS capability of our block storage service, which is now leading the industry, and launched a bare-metal server to support mounted block storage devices and automatic service provisioning.
- In private cloud, we have maintained a leading position in our SPECvirt performance, and our host replication DR mechanism delivers unmatched second-level Recovery Point Objective (RPO) performance.
- In NFV, our software switch is No. 1 in terms of forwarding performance. It provides carrier-class virtual machine reliability, enabling fault detection and protection switching within seconds in the event of a fault on the virtual or physical machine.
In hybrid cloud, we launched the industry’s leading hybrid cloud solution, which supports standard OpenStack APIs. It outperforms all other solutions in terms of automatic inter-cloud connectivity and image sharing across heterogeneous cloud environments.

In the storage field, we have accomplished the following:

- In enterprise storage, we released an enhanced version of OceanStor V3, the industry’s most competitive storage equipment, to support SAN/NAS active-active failover, all-flash drives, and deduplication and compression. We also got a head start in launching the most cost-effective entry-level storage equipment that uses Huawei-made CPU. As many customers around the world continue to upgrade mechanical hard drives to solid-state drives (SSDs), we launched the next generation flash array Dorado V3, which is an industry leader for its capability to deliver 150,000 IOPS.

- In cloud storage, we released our HD video solution OceanStor 9000 to support next-generation 4K HD video production systems. Based on the concept of software-defined storage (SDS), we released FusionStorage 6.0, the industry’s first enterprise solution with converged storage of distributed blocks, files, and objects. This solution enables access and storage of structured, unstructured, and semi-structured data across different platforms.

- We also began to shift from selling data storage to offering storage services, and rolled out the Storage as a Service (STaaS) solution. It is the industry’s first storage solution to provide a unified data and control plane for enterprise storage, distributed storage, cloud storage, and to intelligently integrate storage with applications. Based on this solution, we led the creation of the OpenSDS Industry Alliance, which has attracted more than 10 leading providers and customers from around the globe.

Big data: We added a number of key technologies to our FusionInsight, such as unified SQL, unified search, multi-tenant, large heterogeneous environment, relational analysis, and real-time analytics on data streams to address the unique needs of telecom, finance, and security sectors. By using the Superior scheduling engine, the FusionInsight solution supports enterprise-level multi-tenant functionality in a large heterogeneous environment. FusionInsight’s real-time analytics on streaming data mean that for the first time financial risk controls can be effected in real time, rather than retrospectively. In addition, building on existing industry practices, we created Apache CarbonData, a new Hadoop native file format that delivers ultimate multi-dimensional analytics on big data platforms. We also developed the ELK engine that delivers the best interactive experience.

In the server domain, we accomplished the following:

- We launched our KunLun server line at CeBIT 2016. Focused on mission critical enterprise applications, our KunLun servers are an industry breakthrough that paves the way for open-architecture computing. It incorporates Huawei-made NC chips, RAS, open design, and other innovative technologies.

- Our ES3000 V3 NVMe PCIe SSD (ES3000 SSD for short) uses Huawei-made chips and standard PCIe interfaces and can significantly improve the performance of databases and enterprise cloud services. Thanks to its superior performance, it won the Best Internet Technology Innovation Award at the Global Technology Innovation Conference in 2016.

- Our FusionCube solution has expanded from single-database scenarios to full-service cloud DC applications.

- Working with leading Independent Software Vendors (ISVs), we pursued collaborative innovation in areas such as HPC and SAP to develop mature, efficient HPC platforms for industries.
Huawei has continued to increase investment in forward-looking fundamental research and innovation, and has made great advances at the frontiers of ICT. Our aim is to drive progress in the industry and to develop successful business models via breakthroughs in technology.

5G mobile communications: Huawei, under the leadership of 3GPP, has actively promoted the formulation of unified global 5G standards, continued to invest in 5G technology research and innovation, and actively worked with carriers to perform field tests of key 5G technologies. We have also achieved important results in the development and verification of new technologies, in network architecture, and in our collaboration with industry players. These advances have helped us maintain a leading position in the industry. Specifically, we:

- Delivered a super-fast speed of 70 Gbit/s over millimeter bands using MIMO technology.
- Became the first company to release a 5G-oriented CloudRAN solution, which uses cloud technology to redefine wireless network architecture.
- Conducted the industry’s first live demo of 5G end-to-end network slicing technology to support diversified 5G use cases.
- Continued to strengthen our partnerships with 5G-PPP, 5GIC, 5GVIA, IMT-2020, and other industry alliances; and established the 5GAA with several leading partner companies to jointly drive the development of unified standards for connected vehicles.

In network technology research, we:

- Proposed the concept of the application-driven network with the aim of creating the most efficient network architecture so that networks can better address the great variety of demands that will be placed upon them by new service applications in the future.
- Achieved breakthroughs in models, theories, and algorithms in the areas of information consumption, network controls, and network measurement.
- Published concept white papers, built the architecture prototype, and achieved impressive results in high performance measurement. We ultimately defined a theory-based, application-driven target network that is highly automated and will satisfy the needs of the coming digital world.

In DC evolution, Huawei has continued to optimize the architecture of our DC 3.0 prototype and greatly improved its overall performance. Specifically, we:

- Released the industry’s No.1 TPCx-BB solution, and played a leading role in drafting international energy testing standards for big data benchmarking.
- Released a series of models and a scale-out parallel emulation platform for typical ICT application scenarios.
- Developed an industry-leading NVM file system with innovative NVM technology.

The DC 3.0 architecture enables major architecture innovations and new software and hardware for the next-generation DCs. Huawei will be offering customers cost-effective, green DC solutions with world-leading performance.
Optical network research: Huawei proposed Optical Network 2.0 for the All Cloud era, and has made significant technological innovations in optical transmission. Specifically, we:

- Released a prototype of 320 Tbit/s OXC, the industry's largest cross-connect capacity. This resolves the capacity bottleneck caused by digital cross-connects in optical networks.
- Unveiled the industry's first all-silicon OXC chip, with 32x32 ports, to deliver ultra-low power consumption and ultra-fast switching.
- Announced a 4-port silicon photonics coherent transmission prototype, able to support Tbit/s-level transmission.

Huawei Optical Network 2.0 aims to deliver the best customer experience by providing ultra-large bandwidth, super-low latency, ultra-high energy efficiency, fast service provisioning, and IT-enabled operation and maintenance.

Artificial intelligence (AI): Huawei has focused on strategic businesses, improved the delivery efficiency and service quality of our Global Technical Service (GTS) team by using AI technologies, and realized early detection and prevention of network faults. All these efforts have helped us to continuously create value for customers. Our achievements include the following:

- Our distributed real-time stream processing system StreamSMART and online learning algorithm StreamMBT enable GTS to provide smart customer services. They have increased the accuracy of automatic fault classification to over 85% and can cover 90% of anomaly scenarios.
- Our Network Mind uses reinforcement learning to better schedule network traffic, and improves transmission efficiency by 40% across applications.
- Our Honor series smartphones are able to intelligently deliver personalized services and are helping the handset industry enter the AI era.
- The Huawei recommendation engine can build an accurate model within minutes and boosts downloads of the apps it recommends by 40%, representing a major improvement to user experience.

Batteries: We continued to focus on three features: large capacity, fast charging, and safety. Specifically, we:

- Delivered a 5V/8A high-current fast charger with new electrode material in our Honor series smartphones, which can charge to over 90% in just 30 minutes.
- Unveiled the industry's first long-life, heat-resistant, graphene-assisted Li-ion battery. The special additive in the electrolytes and doped electrode material allow Li-ion batteries to remain functional even when exposed to temperatures 10°C higher than the industry's current upper limit. This has brought about revolutionary changes for energy storage in telecom base stations in warm climates.

Huawei works with global partners on innovation to advance technological progress at our 15 research institutes and centers, and at 36 joint innovation centers around the world.

The following are some highlights from 2016:

To explore new breakthroughs and innovations in the ICT industry, the Huawei Innovation Research Program (HIRP) sponsored more than 200 innovation and research projects, including research in basic science such as mathematics, physics, and chemistry.

We worked with mathematicians from around the world, including Fields Medal and Wolf Prize winners, on projects ranging from fundamental mathematical theory to key engineering questions. We invested heavily in research into image processing, data mining, network optimization, and related areas.

We also collaborated with physicists around the world (including Nobel Prize winners and their teams) on research projects relating to next-
generation storage systems and media, such as materials science for new storage media; component modeling and simulation; and applications of new memory interface protocols. In addition, we significantly reduced the costs by using new storage media in software and hardware, and dramatically increased their lifespan. This work has boosted Huawei’s research reputation in the field of next-generation storage systems.

Huawei maintains ongoing, in-depth collaboration with global universities in areas such as databases, DC power consumption, and distributed technology. In 2016, we solved the problem of slow response to parallel queries in big data environments with limited resources.

Huawei is a major contributor to ICT standards. We are actively involved in the development and promotion of major international standards. We are also active in open-source communities as part of our ongoing efforts to build out the industry and cultivate an ecosystem that promotes shared success.

In 2016, we:

- Actively participated in 5G, video, IoT, and other major industry initiatives, and promoted broader industry cooperation across multiple industry organizations.
- Worked with industry partners in the 3GPP to advance the unified 5G standards around the world. In the IETF, we committed significant effort to supporting the healthy development of IP standards and the IP ecosystem.
- In the IEEE, we focused on research into Wi-Fi and Ethernet basic technologies, and took strides toward establishing a research presence in vertical industries. In ETSI and ITU, we helped to accelerate industry upgrade by leading the development of carrier technology standards, and lobbied for more spectrum to be released for the wireless industry.
- With industry partners, we created the Green Computing Consortium, ECC, 5GAA, OPRC, and other industry alliances to build up consensus across industries and to expand the addressable market size.
- Facilitated cooperation between GSMA and OPRC, and helped to establish the Digital Maturity Model and Metrics (DMMM) working group within the TM Forum to discuss the goals of digital transformation for carriers, based on empirical business metrics.
- As a member of the Industrial Internet Consortium (IIC), we analyzed the needs and application scenarios relating to the digitization of vertical industries.
- In the Broadband Forum (BBF), we promoted the establishment of the Open Broadband Initiative (OBI), and improved industry consensus on PON convergence and networking cloudification, leading to a better and broader environment for the network industry.
- Promoted collaboration among open source communities, standards organizations, and industry alliances including ETSI NFV, OPNFV, OpenStack, and OPEN-O. Worked with partners to establish the NFV Interoperability Testing Initiative (NFV-ITI) alliance to accelerate commercialization of NFV.

As of December 31, 2016, Huawei has filed 57,632 patent applications in China and 39,613 outside China, with a total of 62,519 patents granted.

As of December 31, 2016, Huawei is a member of over 360 standards organizations, industry alliances, and open source communities, and holds more than 300 positions of responsibility within these organizations. Huawei is a board member of IEEE-SA, BBF, ETSI, TM Forum, WFA, WWRF, OpenStack, Linaro, OPNFV, and CCSA. In 2016, we submitted more than 6,000 proposals to standards organizations (over 49,000 to date).

Huawei has consistently invested over 10% of its revenue in R&D every year. In 2016, approximately 80,000 employees were engaged in R&D, comprising 45% of our total workforce. Huawei’s R&D expenditures totaled CNY76,391 million in 2016, accounting for 14.6% of the company’s total revenue. We have spent more than CNY313,000 million on R&D over the past decade.
Cyber Security and Privacy Protection

Our attitude

Technological innovation is accelerating in cloud computing, IoT, video, big data, and artificial intelligence, while smart devices are connecting more and more people. Against this backdrop, the scale of personal data shared and collected is growing at an unprecedented rate. Rapid technological development and globalization are constantly presenting new challenges to cyber security and presenting us with a fresh set of challenges related to privacy protection.

At Huawei, we adopt an open, transparent, pragmatic, and rigorous approach to cyber security. Huawei’s commitment to cyber security will never be outweighed by its own commercial interests. Establishing and implementing an end-to-end global cyber security assurance system is one of our core development strategies. In addition to steadfast concentration on cyber security assurance, Huawei places special emphasis on user privacy, ensuring that we comply with all local laws and regulations related to privacy and personal data protection.

Our practice

Our Global Cyber Security and User Privacy Protection Committee is the company’s highest organization for managing cyber security and user privacy protection, and has been operating in this capacity for many years. We have a stable and capable security workforce, and our Global Cyber Security & Privacy Officer reports directly to the CEO. All of Huawei’s relevant business units have cyber security and privacy offices. We release a large number of policies and ensure the timely and comprehensive update of all related processes. We recently published the Huawei General Privacy Protection Policy, which specifies the privacy-related responsibilities of Huawei’s business departments and employees regarding the processing of personal data. Protecting end users’ privacy and freedom of communication has been included in Huawei’s Employee Business Conduct Guidelines (BCGs), and all Huawei employees around the world are required to learn, sign, and comply with the BCGs.

It is our belief that all stakeholders must work together, joining efforts to address the global challenge of cyber security. We have taken the initiative to share our ideas and practices and have presented a proactive voice in cyber security:

- In February 2016, Huawei Global Cyber Security & Privacy Officer John Suffolk delivered a keynote speech at the Munich Security Conference entitled Upcoming Security Challenges and Ways to Deal with Them. In the speech, he elaborated on Huawei’s approach to cyber security, and highlighted the importance of focusing on today’s cyber security issues while also reviewing tomorrow’s security risks.

- In March 2016, David Francis, European Cyber Security Officer (CSO) at Huawei, delivered a keynote speech at the Commonwealth Cybersecurity Forum 2016. He explained that security should be built into devices, network architecture, and employee ethos — rather than bolted on as an afterthought.
Francis also outlined why organizations need to take an open and cooperative approach to cyber security, to ensure product security is given the same priority as product quality. Shola Taylor, Secretary-General at the Commonwealth Telecommunications Organisation, applauded Huawei’s efforts in cyber security.

- In June 2016, Huawei published its fourth cyber security white paper, entitled The Global Cyber Security Challenge – It is time for real progress in addressing supply chain risks. Authored by Huawei’s USA CSO, Andy Purdy, the white paper was designed to inform ongoing efforts, best practices, and standards on how the global ICT industry can address supply chain security challenges. The white paper discusses how to ensure security in the global supply chain, shares best practices from supply chain experts and standards bodies as well as Huawei, and calls for all stakeholders pick up the pace of collaboration to address this common challenge.

- In November 2016, the Third Huawei MBB Cyber Security Mindshare Forum was held in Tokyo, which focused on the security challenges introduced by 5G/NFV, advocating industry-wide cooperation. A number of carriers (including Telefónica, SoftBank, Telenor, O2, and Bharti), international organizations (including 3GPP, P3, and Infineon), and Huawei’s cyber security experts reached a consensus on 5G cyber security challenges and how to address them. At the event, Huawei released its second white paper on 5G cyber security entitled 5G Scenarios and Security Design, which was well received by attendees. Huawei also released a 2016 technological cooperation initiative for cyber security, and established technology-focused partnerships with Deutsche Telekom, Telefónica, and China Mobile.

- At Huawei, we recognize the value of connecting directly with carriers’ security teams, and are committed to in-depth collaboration. As of the end of 2016, we have established direct working relationships with the Computer Emergency Response Teams (CERTs) of 31 leading global carriers. We have put in place a robust collaboration apparatus for security emergency response to reduce security risks on our customers’ live networks, an initiative that has received positive recognition from our customers.

Governments, customers, industry organizations, and other stakeholders have commended Huawei’s cyber security efforts, which are expected to drive closer and more pragmatic cooperation. These efforts include the following:

- In September 2016, the Open Group announced that Huawei has been accredited under the Open Trusted Technology Provider™ Standard – Mitigating Maliciously Tainted and Counterfeit Products (O-TTPS) for our Wireless Business Unit’s Frequency Division Duplex (FDD) product line. The certification covers the full lifecycle from product R&D to manufacturing, transportation, maintenance, and retirement, and has stringent requirements for supply chain management. Achieving this accreditation demonstrates the maturity of Huawei’s cyber security management system and our security management capabilities. Huawei is the world’s first and only vendor to be accredited for both hardware and software.

- In October 2016, Huawei and REDtone were presented with the Cybersecurity Project of the Year award by CyberSecurity Malaysia in recognition of our B2B public cloud services for government and businesses. The award was an endorsement of the security of Huawei cloud services.

- After awarding the Protocol of Security Development Assurance (PSDA) stamp to several of our products in 2015, Telefónica presented this certificate to Huawei again in 2016 in recognition of our USN, UGW, and eNodeB products and our product security capabilities.
In October 2016, our distribution centers in the Netherlands and Panama received ISO 28000 certification. All six of our supply chain distribution centers around the world have now passed ISO 28000 certification. We have established an ISO 28000 security management system to ensure the cyber security management capabilities of our supply chain and continue to earn customer trust.

While actively communicating with external parties to develop transparency and trust, we are constantly building and improving upon our end-to-end cyber security assurance system. We use a built-in approach and an ABC model (Assume nothing, Believe nobody, Check everything) to provide comprehensive cyber security assurance in the areas of strategy, processes, laws and regulations, employees, R&D, verification, supply, and audits:

- On an annual basis, we develop a strategic plan for cyber security and privacy protection, which reviews the results we achieved over the previous year, seeking to identify gaps, adjust goals, and continuously improve our end-to-end approach to cyber security and privacy above and beyond Huawei’s processes, strategies, and regions.

- We provide basic and business domain-specific cyber security awareness education, training, and competency & qualification (C&Q) assessments that target all employees on an ongoing basis. In 2016, 99.4% employees studied and signed the BCGs, and the job qualification certificate system was implemented in all key countries.

- Our mature code compilation, configuration management, tool management, and traceability platforms in the R&D domain have enabled us to steadily develop our security engineering capabilities. The test automation rate of product security cases has continued to improve, and vulnerability tracing and automatic virus scanning capabilities are industry-leading. Our assessment results based on the Building Security in Maturity Model (BSIMM) are well above industry average in all aspects. We are an industry leader in key security technologies, including trusted computing, prevention of product tampering during runtime, and anonymity/anonymization technologies. These technologies have been used to bolster the security capabilities of our products.

- We are now a leader in security technology standards with a strong team of senior technical experts. In 2016, 154 of the security proposals that we submitted to 3GPP SA3 were approved, and 60 of our proposals were approved by ETSI NFV. We hold 17 chairperson/vice chairperson positions in security standards organizations.

- Our independent verification approaches, such as the model adopted at the UK-based Cyber Security Evaluation Centre, Huawei’s Internal Cyber Security Lab model, and third-party security verification models, have been recognized by numerous governments and carrier customers. Our Internal Cyber Security Lab performs independent security evaluations on products before launch to ensure products are secure prior to reaching customers. In recent years, the density of security-related issues has dropped on a yearly basis, with the average density from 2014 to 2016 going down 66% year-on-year. The number of security issues identified during external testing has also been reduced significantly, with the average number from 2014 to 2016 going down by 43% year-on-year.

- We have continued to improve the compliance levels and delivery quality of our cyber security activities throughout the service delivery process. We have effectively reduced privacy risks by using mature processes and platforms to process customer data stored on spare parts. In addition, we have enhanced the security of our managed services and Global Network Operation Centers (GNOCs) and validated all tools currently in use to improve field delivery quality and ensure security in all delivery activities.
We have controls in place within our supply system to ensure end-to-end security. We have improved suppliers’ delivery quality and compliance with security agreements and have required them to promptly provide solutions and patches for vulnerabilities in third-party software. In doing so, we have put in place a comprehensive security mechanism for managing suppliers.

We have established a mature system for tracing supply chain components and enhanced security management through version control, reverse logistics management, and traceability. For software incorporated into configuration management, the time required to automatically identify affected products and customers after a vulnerability’s disclosure has been shortened from 10 days to less than one hour.

We have continued to conduct independent third-party cyber security and privacy protection audits from different perspectives (i.e., processes, BGs, and countries) to ensure that all of our approaches and requirements are effectively implemented and managed, risks are promptly identified, and improvements are made.

Direction of future work

Looking ahead, we need to accept that what we have done in the past will not continue to be adequate in a fully digitized, cloud, mobile, DIY world. There are many things to consider. How can we optimize our development processes to enable rapid service launch while also continuously improving security capabilities? As 5G and IoT create a potentially global attack surface, how do we secure a world we cannot see or touch? How can we adapt evolving quality standards to meet customer requirements? How should we change our O&M models? Concerns about cyber security will shift from cyberspace security to data security.

An intelligent world is rapidly approaching. In the areas like IoT, big data, and cloud computing, cyber security assurance must ensure the security of integrated solutions, not merely individual products. As an ICT leader, Huawei has extensive experience in the technology, deployment, and management of integrated network products that cover devices, data pipes, and the cloud. We will leverage our decades of experience in CT security technology to align security products with market demand at the strategic level, and further explore and develop approaches to ensure the end-to-end security and privacy of solutions and products.

We are aware that as we progress toward an intelligent world, the industry needs to continue fleshing out its technical solutions and management methodologies for cyber security and privacy protection, and continue to raise awareness. This will underpin the sustainable development of the ICT sector. We will continue to work with all stakeholders across the industry to continuously improve cyber security and privacy capabilities, so that security and privacy will be protected to the maximum extent possible while still enabling users to enjoy the many conveniences of new technology.

Openness, Collaboration, and Shared Success

Huawei believes in the power of dissolving boundaries to work more closely with the world. Together with our partners, we are working hard to build a symbiotic business ecosystem that thrives on shared success.

Building a Better Connected World

Huawei’s vision of Building a Better Connected World is one that we share with all of humanity. Our world is in the process of evolving from a digital world to an intelligent one. Historically speaking, enterprises in traditional value chains establish core competency by owning and controlling vital resources. As industries converge and consumer demand evolves, however, in-house strengths are no longer enough to maintain a competitive edge. Effective use of external resources will become increasingly important, and in order to succeed, enterprises have to become more open and flexible, future-proofing their business based on strengths derived from the industry ecosystem.
In the cloud era, ICT has grown from a single industry to an indispensable tool that enables the digital transformation of all industries. Vertical integration across the value chain is no longer a viable option, and the time is ripe for the ICT industry to establish a new, more cohesive ecosystem. Huawei aims to help build and participate in just such an ecosystem: one that is open, robust, flexible, and prosperous — an ecosystem that will enable the success of all industries as they engage in digital transformation.

The second is that managing cooperation is more important than managing competition. Huawei will not compete for profit with our partners, and will maintain a long-term commitment to openness, collaboration, and shared success.

Our third principle relates to benefit sharing. Through well balanced benefit sharing, Huawei aims to consolidate the strength of as many people and companies as possible to fend off uncertainties in the intelligent world to come.

Huawei contributes to ecosystem development by focusing on practical action, forming industry organizations, and actively participating in them. We establish industry alliances to grow the industry together with our technology partners. We establish strategic business alliances to ensure the business success of customers around the globe. We proactively engage in open source communities to promote collaboration and innovation. And we actively invest in enablement platforms for developers. Through these initiatives we aim to involve more players in joint innovation, thereby bringing prosperity to the ecosystem, paving the way for customer success in digital transformation, and accelerating the monetization of new technology solutions.

Ecosystem in Practice: Three Guiding Principles

Placing special emphasis on openness, collaboration, and shared success, Huawei is ready and willing to play our part in cultivating a productive industry ecosystem. We have three guiding principles:

The first is to make the pie bigger for everyone involved. Growing the industry and enlarging the market is far more important than increasing the size of our own share.

The second is that managing cooperation is more important than managing competition. Huawei will not compete for profit with our partners, and will maintain a long-term commitment to openness, collaboration, and shared success.

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Dissolving Boundaries and Exchanging Ideas

Building an open ecosystem requires regular exchange of ideas with the outside world. In order to achieve this, we are actively dissolving our organizational and intellectual boundaries.

Huawei builds Centers of Expertise (COEs) in areas of concentrated resources to support the development of a more open and innovative R&D system. Through these centers, we proactively engage with external experts, scientists, international organizations, and industry associations. Our approach to open innovation is to build capacity by establishing a presence in talent hotspots. For example, we develop core competencies in places like Europe, where local innovation, design, basic research, marketing, core manufacturing, and financial resources can be effectively integrated into Huawei’s global value chain.

In March of 2010, we launched the Huawei Innovation Research Program (HIRP), which funds innovative research in universities and research institutions, with whom we tackle major issues at the forefront of information and communications technology. As of late 2016, two Nobel Prize laureates, more than 100 fellows from the Institute of Electrical and Electronics Engineers (IEEE) and the Association of Computing Machinery (ACM), and thousands of expert scholars from around the world have taken part in HIRP. The program has involved over 300 universities in more than 20 countries, and has sponsored over 1,200 innovation research projects.

In the digital and intelligent world, Huawei aims to serve as the “soil and fertilizer” of the ICT ecosystem. In this role, we are committed to supporting an open, diverse, and symbiotic environment that will push the industry forward and promote ongoing social progress.
Results of Operations

Financial Performance

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>521,574</td>
<td>395,009</td>
<td>32.0%</td>
</tr>
<tr>
<td>Gross profit</td>
<td>210,129</td>
<td>164,697</td>
<td>27.6%</td>
</tr>
<tr>
<td>– Gross profit margin</td>
<td>40.3%</td>
<td>41.7%</td>
<td>(1.4%)</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td>(162,614)</td>
<td>(118,911)</td>
<td>36.8%</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>31.2%</td>
<td>30.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Operating profit</td>
<td>47,515</td>
<td>45,786</td>
<td>3.8%</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>9.1%</td>
<td>11.6%</td>
<td>(2.5%)</td>
</tr>
<tr>
<td>Net finance expenses</td>
<td>(3,737)</td>
<td>(3,715)</td>
<td>0.6%</td>
</tr>
<tr>
<td>Income tax expenses</td>
<td>(7,006)</td>
<td>(5,077)</td>
<td>38.0%</td>
</tr>
<tr>
<td>Net profit</td>
<td>37,052</td>
<td>36,910</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Revenue in 2016 totaled CNY521,574 million, representing an increase of 32.0% year-on-year. Net profit grew by 0.4% year-on-year to CNY37,052 million. There are several reasons behind this.

- As the consumer business grew rapidly and contributed a larger share to total revenue, the company’s gross profit margin dropped by 1.4 percentage points from 2015.
- As the company increased investment in building its consumer brand and consumer sales channels, total operating expenses as a percentage of revenue rose by 1.1 percentage points relative to 2015.

1. Total Operating Expenses

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and development expenses</td>
<td>76,391</td>
<td>59,607</td>
<td>28.2%</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>14.6%</td>
<td>15.1%</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Selling and administrative expenses</td>
<td>86,442</td>
<td>62,281</td>
<td>38.8%</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>16.6%</td>
<td>15.8%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Other (income)/expenses, net</td>
<td>(219)</td>
<td>(2,977)</td>
<td>(92.6%)</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>(0.04%)</td>
<td>(0.8%)</td>
<td>0.8%</td>
</tr>
<tr>
<td>Total operating expenses</td>
<td>162,614</td>
<td>118,911</td>
<td>36.8%</td>
</tr>
<tr>
<td>– as % of revenue</td>
<td>31.2%</td>
<td>30.1%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

In 2016, Huawei continued to increase its investment in research and innovation for the future. However, as a result of rapid growth in revenue and increased efficiency, R&D expenses as a percentage of revenue dropped by 0.5 percentage points.

The company increased investment in building its consumer brand and consumer sales channels for future growth, causing the rise in selling and administrative expenses as a percentage of revenue by 0.8 percentage points, and total operating expenses by 1.1 percentage points.
2. Net Finance Expenses

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net foreign exchange loss</td>
<td>5,223</td>
<td>4,362</td>
<td>19.7%</td>
</tr>
<tr>
<td>Other net finance gains</td>
<td>(1,486)</td>
<td>(647)</td>
<td>129.7%</td>
</tr>
<tr>
<td>Total net finance expenses</td>
<td>3,737</td>
<td>3,715</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Net finance expenses in 2016 amounted to CNY3,737 million, an increase of CNY22 million over 2015. This is attributable to a year-on-year increase of CNY861 million in exchange losses due to depreciation of currencies in emerging markets.

Financial Position

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>December 31, 2016</th>
<th>December 31, 2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-current assets</td>
<td>88,132</td>
<td>70,509</td>
<td>25.0%</td>
</tr>
<tr>
<td>Current assets</td>
<td>355,502</td>
<td>301,646</td>
<td>17.9%</td>
</tr>
<tr>
<td>Total assets</td>
<td>443,634</td>
<td>372,155</td>
<td>19.2%</td>
</tr>
<tr>
<td>Among which: Cash and short-term investments</td>
<td>145,653</td>
<td>125,208</td>
<td>16.3%</td>
</tr>
<tr>
<td>Trade receivables</td>
<td>108,863</td>
<td>92,425</td>
<td>17.8%</td>
</tr>
<tr>
<td>Inventories</td>
<td>73,976</td>
<td>61,363</td>
<td>20.6%</td>
</tr>
<tr>
<td>Non-current liabilities</td>
<td>64,230</td>
<td>40,459</td>
<td>58.8%</td>
</tr>
<tr>
<td>Among which: Long-term borrowings</td>
<td>40,867</td>
<td>26,501</td>
<td>54.2%</td>
</tr>
<tr>
<td>Current liabilities</td>
<td>239,271</td>
<td>212,627</td>
<td>12.5%</td>
</tr>
<tr>
<td>Among which: Short-term borrowings</td>
<td>3,932</td>
<td>2,485</td>
<td>58.2%</td>
</tr>
<tr>
<td>Trade payables</td>
<td>71,096</td>
<td>61,017</td>
<td>16.5%</td>
</tr>
<tr>
<td>Owner’s equity</td>
<td>140,133</td>
<td>119,069</td>
<td>17.7%</td>
</tr>
<tr>
<td>Total liabilities and owner’s equity</td>
<td>443,634</td>
<td>372,155</td>
<td>19.2%</td>
</tr>
</tbody>
</table>

As of December 31, 2016, the balance of cash and short-term investments reached CNY145,653 million, up 16.3% year-on-year.

In 2016, Huawei’s DSO was 75 days, 9 days shorter than the 84 days in 2015. Its ITO decreased by 10 days to 86 days compared with the 96 days in 2015. The company’s DPO was 82 days, 13 days shorter than the 95 days in 2015.

As of December 31, 2016, total short-term and long-term borrowings amounted to CNY44,799 million, an increase of 54.6% year-on-year from CNY28,986 million in 2015.
Cash Flow from Operating Activities

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net profit</td>
<td>37,052</td>
<td>36,910</td>
<td>0.4%</td>
</tr>
<tr>
<td>Adjustment for depreciation, amortization, net foreign exchange losses and non-operating expenses, net</td>
<td>14,655</td>
<td>10,387</td>
<td>41.1%</td>
</tr>
<tr>
<td>Actuarial losses on defined benefit obligations</td>
<td>(829)</td>
<td>(306)</td>
<td>170.9%</td>
</tr>
<tr>
<td>Cash flow before change in operating assets and liabilities</td>
<td>50,878</td>
<td>46,991</td>
<td>8.3%</td>
</tr>
<tr>
<td>Change in operating assets and liabilities</td>
<td>(1,660)</td>
<td>5,309</td>
<td>(131.3%)</td>
</tr>
<tr>
<td>Cash flow from operating activities</td>
<td>49,218</td>
<td>52,300</td>
<td>(5.9%)</td>
</tr>
</tbody>
</table>

Cash flow from operating activities in 2016 decreased by 5.9% year-on-year to CNY49,218 million. This decrease was attributable to the following factors:

- Net profit grew by 0.4% year-on-year, remaining virtually even with 2015.
- Adjustments for depreciation, amortization, and non-operating losses (net) contributed an additional CNY4,268 million to cash flow from operating activities compared with 2015.
- In 2016, operating cash flow tied up in operating assets and liabilities amounted to CNY1,660 million, primarily owing to rapid growth in revenue.

Financial Risk Management

In 2016, Huawei amended and improved its financial risk management policies and processes to further enhance the Group's ability to withstand financial risks and better support its business development.

Liquidity Risk

Huawei has continuously refined its cash flow planning, budgeting, and forecasting system to better assess its short-term and mid-to long-term liquidity needs. The Group has implemented various prudent financial measures to meet its overall liquidity needs, including centralizing cash management, maintaining an adequate level of funds and proper structure of cash assets, and gaining access to adequate and committed credit facilities. As of December 31, 2016, cash and short-term investments increased by 16.3% year-on-year to CNY145,653 million. An adequate capital reserve and a stable cash flow from operating activities enabled Huawei to mitigate its liquidity and debt repayment risks.

<table>
<thead>
<tr>
<th>(CNY Million)</th>
<th>2016</th>
<th>2015</th>
<th>YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow from operating activities</td>
<td>49,218</td>
<td>52,300</td>
<td>(5.9%)</td>
</tr>
<tr>
<td>Cash and short-term investments</td>
<td>145,653</td>
<td>125,208</td>
<td>16.3%</td>
</tr>
<tr>
<td>Short-term and long-term borrowings</td>
<td>44,799</td>
<td>28,986</td>
<td>54.6%</td>
</tr>
</tbody>
</table>
Foreign Exchange Risk

The Group’s presentation currency is CNY. Huawei has foreign currency exposure related to buying, selling, and financing in currencies other than CNY, mainly USD and EUR. According to the Group’s foreign exchange risk management policy, material foreign exchange exposures are hedged unless hedging is uneconomical due to market liquidity and/or hedging costs. The Group has developed a complete set of foreign exchange management policies, processes, and instructions. These include:

- Natural hedging: The Group structures its operations to match receivables and payables in a foreign currency, to the greatest extent possible.
- Financial hedging: For certain currencies where natural hedging does not fully offset the foreign currency position, the Group hedges using a combination of short- and long-term foreign currency loans.

In countries where local currencies depreciate sharply or in those with strict foreign exchange controls, the Group manages foreign exchange exposures via different measures, including pricing in USD, accelerating payment collection, and promptly transferring payments out of these countries.

With other conditions remaining unchanged, exchange rate fluctuations will impact the Group’s net profit as follows:

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD depreciates by 5%</td>
<td>(843)</td>
<td>(1,269)</td>
</tr>
<tr>
<td>EUR depreciates by 5%</td>
<td>(56)</td>
<td>(319)</td>
</tr>
</tbody>
</table>

Interest Rate Risk

Interest rate risks arise from Huawei’s long-term borrowings and long-term receivables. By analyzing its interest rate exposures, the Group uses a combination of fixed-rate and floating-rate bank loans to mitigate interest rate risks.

1. Major interest-bearing long-term financial instruments held by the Group as of December 31, 2016

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effective Interest Rate (%)</td>
<td>CNY Million</td>
</tr>
<tr>
<td>Fixed-rate long-term financial instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term borrowings</td>
<td>4.28</td>
<td>20,774</td>
</tr>
<tr>
<td>Trade and other receivables</td>
<td>6.87</td>
<td>(3,597)</td>
</tr>
<tr>
<td>Floating-rate long-term financial instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term borrowings</td>
<td>2.60</td>
<td>20,092</td>
</tr>
<tr>
<td>Trade and other receivables</td>
<td>0.51</td>
<td>(2,624)</td>
</tr>
<tr>
<td>Total</td>
<td>34,645</td>
<td>21,602</td>
</tr>
</tbody>
</table>
2. Sensitivity analysis

Assuming that the interest rate increased by 50 basis points on December 31, 2016 and other variables remained unchanged, the Group’s net profit and owner’s equity would decrease by CNY72 million (in 2015, the amount was CNY64 million).

Credit Risk

The company has established and implemented globally consistent credit management policies, processes, IT systems, and quantitative credit risk assessment tools. It has established dedicated credit management organizations across all regions and business units, and established centers of expertise specializing in credit management in Europe and the Asia Pacific. The company uses quantitative risk assessment models to determine customer credit ratings and credit limits. It has also set risk control points across key processes throughout the end-to-end sales cycle to manage credit risks in a closed loop. Huawei’s Credit Management Department regularly assesses global credit risk exposures and develops IT tools to help field offices monitor risk status, estimate potential losses, and determine bad debt provisions as appropriate. To minimize risks, a special process is followed if a customer misses a payment or poses an unacceptably high credit risk.

Sales Financing

With its global coverage, Huawei’s sales financing team maintains close contact with customers to understand their financing needs and tap into various financing resources around the world. As a bridge for communication and cooperation between financial institutions and customers, the sales financing team provides customers with professional financing solutions that contribute to ongoing customer success. To transfer risks, Huawei arranges for third-party financial institutions to provide sales financing, such as export credit facilities, leasing, and factoring. These institutions bear the associated risks and profit from these operations. Huawei has established systematic financing policies and project approval processes to strictly control financing risk exposures. Huawei only shares risks with financial institutions on certain projects, and makes provisions for risk contingencies to control business risks.