

# CHINA SCIENCE AND TECHNOLOGY NEWSLETTER

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## **Special Issue: Internet and 4G Telecommunications in China**

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## **China's Internet in twenty years**

On July 20, 1994, a 64k cable line from the Computer Network Information Center of Chinese Academy of Sciences (CAS) in Beijing was connected to the Internet through a US-based corporation Sprint, which realized the earliest connection between China and the Internet. Since then, China was regarded internationally as the 77<sup>th</sup> country with full-function internet access.

This historic progress derived from a project National Computing and Networking Facility of China (NCFC), which was jointly implemented by CAS, Peking University (PU) and Tsinghua University (TU) in 1990s.

Under the support of the World Bank and the former State Planning Commission of China (now the National Development and Reform Commission), NCFC project completed at that time the building of regional backbones and campus networks of CAS Net, PU Net and TU Net, covering more than 40 research institutes in the Zhongguancun area of Beijing. It also established internet facilities based on a supercomputer with capacity of making 6.4 billion floating point operations per second.

More importantly, with further support of the State Planning Commission, a special satellite line linked

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the Computer Network Information Center of CAS and California, US, started working and realized for the first time a full-function connection between China and the Internet, which ushered the country into the era of Internet for China.

The year 1995 witnessed the opening of four internet backbones, including China Science and Technology Net, China Education and Research Net, China Golden Bridge Net and ChinaNet. In 1998, free e-mail emerged in China, and later the online video came into use through the Internet in 2006.

In 2008, Chinese netizens reached 250 million and outnumbered those in the US for the first time, ranking No.1 in the world. In 2011, the number of Chinese netizens using cellphones for internet surfing stood at 356 million, surpassing those who are browsing the internet on computers. This marked the beginning of a mobile internet era in China. Wechat, an application created in

2011, spent only 3 years on winning 500 million Chinese users. In 2012, the transaction volume of e-commerce in China exceeded 8 trillion yuan, approximately equals to one sixth of China's GDP. By 2013, China had 618 million netizens. By using a business model Alipay, the e-commerce giant Alibaba Group Holding Ltd successfully developed e-business in China, corralling 180 billion yuan within only 6 months.

Today, the development of the Internet is going deeper. Mobile Internet, e-commerce, big data, cloud computing and the Internet of Things are shaping the future of the Internet.

(Source: Science & Technology Daily, articles entitled "A Cable that Changed China – China's Network in 20 years" and "China's Network in 20 years – from 486 Computer to 600 million netizens", April 21, 2014 and April 3, 2014.)

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## China's Internet Development Report 2014

In May 2014, China Internet Development Report 2014 compiled by the Internet Society of China and the China Internet Network Information Center (CNNIC) was released in Beijing.

Divided into 26 chapters, the Report summarized and studied on the development of China's Internet with its ecosystem, resource, priority missions and applications in 2013, as well as analysed such hotspot issues as the mobile Internet, big data, Online To Offline (O2O) and wearable devices, etc.

The data in Report indicates that the number of Chinese netizens has exceeded 600 million, almost half of the Chinese population. The year 2013 saw an increase of 53.58 million new netizens and a network penetration

rate of 45.8 percent. By the end of 2013, China had 618 million netizens and over 500 million mobile netizens, a yearly increase of 80.09 million and a year-on-year increase of 19 percent.

In terms of web devices, 81 percent of the netizens use cellphones for website browsing, while the rate of internet surfing by desktop and laptop has seen a slight decrease. Chinese netizens spend on average 25 hours on the internet every week.

By the end of 2013, China had 302 million online shoppers, a year-on-year increase of 59.87 million and an increase rate of 24.7 percent. The utilization rate of shopping through internet increased from 42.9 percent to 48.9 percent.

The Report says that mobile internet technology and its applications have witnessed a rapid development in 2013, unleashing huge market potential for e-commerce.

Mobile online shopping has seen a rapid development, with the users reaching 144 million and the utilization rate increasing from 13.2 percent to 28.9 percent. Mobile online shopping is becoming an important supplement to shopping on PC. In 2013, 46.1 percent of the online shoppers did shopping through their cellphones. During the Double Eleven (Nov.11) sales promotion day, the total transaction volume on the online market Taobao exceeded 35 billion yuan, among which 5.35 billion yuan came from mobile online shopping.

According to the statistics of a specialized company, in the e-commerce market in 2013, the market share of B2B e-commerce by SME accounted for 51.7 percent; the share by above-scale industrial enterprises accounted for 26.2 percent; and total share of B2B e-commerce made up 77.9 percent. The transaction volume of online shopping market accounted for 18.6 percent of the total; online tourism market took up 2.3 percent; emerging O2O market share stood at 1.2 percent.

The Internet Society of China said in another report

released in March 2014 that by the end of 2013, there were 3.507 million websites and 2.817 million website sponsors. Among these websites, 2.265 million were enterprise websites, 56,000 were government websites, over 90,000 were websites of government-affiliated institutions, and 41,000 were for social organizations. About 1.055 million websites were set up by individuals, accounting for about 30 percent of the total.

At present, Chinese websites use a total of 4.614 million domain names, and each website sponsor sets up 1.2 websites on average. There are over 16,000 websites providing information services in education, health care, pharmaceuticals, medical equipment and daily news, among which there are 5,820 websites for educational service, having the largest amount in the total. In recent years, there has been quite a batch of enterprises, with strong international influence and competitiveness, emerged in search engine, instant messaging, e-commerce and news spreading, etc in the Chinese market.

(Source: Science & Technology Daily, articles entitled “Chinese mobile netizens increase by 20 percent last year” and “China has 3.507 million websites”, May 20, 2014 and March 23, 2014)

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## **Four Ministries and Commissions Initiate the Building of Next-generation Internet Demonstration Cities**

According to the message from the National Development and Reform Commission (NDRC) in August 2013, the commission, with the Ministry of Industry and Information Technology (MIIT), the Ministry of Science and Technology (MOST) and the State Administration of Press Publication Radio Film and Television (SAPPRFT), decided to jointly launch an action for the building of Next-generation Internet

Demonstration Cities. The four government authorities planned to select influential demonstration cities from 22 candidate cities nationwide.

The major missions of demonstration cities are speeding up the building of infrastructure for the Internet in future, including Metropolitan Area Network (MAN), Access Network (AN), Internet Data Center (IDC) and relevant operational and supportive systems, and

upgrading the present Internet Protocol version 4 (IPv4) to IPv6, increasing IPv6 penetration rate, expanding network access coverage, etc.

According to the requirements, demonstration cities should promote the upgrading of websites of enterprises, schools and public institutions as well as the transition of all businesses to IPv6. In the meantime, they should develop individualized interaction services featuring large demand for URL (Uniform Resource Locator), fast transmission rate and high mobility.

While considering emerging services like the Internet of Things, cloud computing and the mobile Internet, the demonstration city should focus on exemplary next-generation internet applications in the field of education, agriculture, industry, healthcare, transportation, railway, water conservancy, environmental protection and social

management, with an aim to develop new services and markets.

The four authorities also required that demonstration cities would develop backbone enterprises devoted to next-generation network, form initially industrial clusters, establish technology R&D and industrial support system, enlarge industrial scale, improve innovation capacity, increase local employment and boost economic growth. In the meantime, demonstration cities should set up safety assessment system for important network applications, thoroughly deploy network and information safety system, enhance technological guarantee and supporting capacity for information safety, and improve the work on information safety and the Internet guarantee.

(Source: Science & Technology Daily, August 22, 2013)

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## **China Telecommunications Enters “4G Era”**

At the end of 2013, the Ministry of Industry and Information Technology (MIIT) officially issued 4G licenses to China’s three major telecom operators, China Mobile, China Telecom and China Unicom. This marked the beginning of China telecommunications’ “4G Era”.

According to an MIIT official, as China’s 3G market is burgeoning, these three major operators will speed up recouping their investment in 3G network rollouts. For now, 2G, 3G and 4G networks are still expected to coexist and co-develop. This means 3G network will not be knocked out and it will continue to serve its subscribers for quite a long time. 3G technology also serves as a basis for its successor, the 4G evolution technology. By only replacing a few components can a 3G base station upgrade to a 4G one, which well avoids redundant construction. By far, after replacing “a

wire, a board, a software solution”, China Mobile has successfully upgraded its TD-SCDMA base station to TD-LTE base station, and the replacement has effectively saved network investment.

On June 27, 2014, the MIIT approved China Telecom, and China Unicom to respectively conduct LTE FDD and TD-LTE network trials in order to verify the development mode of both networks in a systematic manner and coordinate these two 4G modes.

It is known that both TD-LTE and LTE FDD are the new-generation international telecom standards. Their convergence and common development has become a trend for the global mobile communications industry, and currently there are 13 TD-LTE/LTE FDD converged networks worldwide.

Following the advice of the International Telecommunication Union (ITU), China, like other countries in the world, planned both TDD and FDD frequencies to satisfy its needs of developing both modes of both modes of mobile communication systems.

Reportedly, the LTE hybrid network trial has four aims: firstly, step by step solve the technical problem of different modes' network interoperability under a hybrid network environment; secondly, promote the development of LTE chipsets and 4G terminal industry to meet users' needs; thirdly, verify the scheduling strategy of network resources under a multi-network coverage environment and accumulate experience for future commercial operations; fourthly, promote application

innovations, mobilize the evolution and development of supportive links such as an operation support system.

Granted approval by the MIIT, China Telecom and China Unicom can each perform hybrid network trials in 16 cities, involving Shanghai, Xi'an, Chengdu, Hangzhou, Wuhan, Changsha, Nanjing, Jinan, Hefei, Shijiazhuang, Haikou, Zhengzhou, Chongqing, Guangzhou, Shenzhen, Nanchang, Nanning, Lanzhou, Shenyang, Harbin and Fuzhou.

(Source: China Hi-Tech Industry Herald, the original titles are "4G's Orderly Advance Attracts Attention", December 30, 2013, and "MIIT Approves China Telecom and China Unicom's to Run 4G Hybrid Network Trials", June 30, 2014.)

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## Beijing's 4G Project

On November 6, 2011, Beijing launched "Beijing New-Generation Mobile Communications Technology and Products Breakthrough Project (also known as 4G Project)", and the Beijing Municipal Science and Technology Commission (the Commission) is responsible for the concrete implementation. Following directives of *the Twelfth Five-Year Plan for the Economic and Social Development of Beijing*, the project gives full play to the Capital's advantage in the aggregation of science and technology resources and endeavors to enhance Beijing's core competency in 4G standard setting, chipset designing, equipment R&D and so on. The project will achieve breakthroughs in a list of 4G core technologies, develop cutting-edge products and make advanced arrangements. It will also guide the development of 4G industry, propel Beijing to lead the country in the 4G era and drive the development of Beijing's Network of Things, spatial information services and other 4G-related industries.

In these two years, the Commission took a series of measures and has promoted the R&D and standard setting of 4G technology, supported a batch of leading enterprises and made outstanding achievements in chipset, terminal design and production, application services and other aspects.

Among the 1200 base stations in construction according to Beijing's 4G network initial plan, nearly 400 has completed their network rollouts. According to a manager of China Mobile's Beijing Branch, the completed sites are mainly for demonstration, and if Beijing subscribers want a fully-operated 4G connection, they should still wait for the operators to get 4G licenses from the MIIT.

*The Broadband Beijing Action Plan*, which is announced by the Beijing Municipal Government in June 2014, puts forward that by the end of 2015, the Municipal Government will strive to attract 80 billion yuan of social investment to fulfill the "Broadband

Beijing” plan and achieve a full 4G coverage inside the Fifth Ring Road of the city.

By far, Beijing has basically formed an industrial chain to support 4G development, and has developed a range of competitive products including base station equipment, smartphones, data cards, measuring instruments, application processor chips, baseband chips and RF chips. There have also emerged many significant hi-tech achievements.

As for setting standards, Datang Mobile, Potevio, MetaNet, the Beijing University of Posts and Telecommunications,

the Institute of Computing Technology of Chinese Academy of Sciences, the Institute of Microelectronics of Chinese Academy of Sciences and some other units actively participated in setting both the international and domestic 4G standards. The last four years witnessed over 2400 patents and over 2300 international standardization proposals, which made essential contribution to the efforts of this indigenously-developed TD-LTE standard to become one of the two main international standards.

(Source: Science and Technology Daily, October 10, 2013)

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## China Mobile 4G Terminals 100 Million in 2014

In 2013 China Mobile Global Partner Conference, Xi Guohua, Chairman of the Company, indicated that China Mobile would build the largest 4G network in the world, and by the end of 2014, its number of base stations would pass 500 thousand and the number of 4G terminals over 100 million.

According to estimation, till 2019, China will emerge as the world’s biggest 4G LTE market with more than 700 million subscribers.

Based on China Mobile’s statistics, it sold over 155 million TD-SCDMA terminals in 2013, of which over 1000 types were subscribed to 4G services and 30 types sold over a million respectively. Its TD terminal product partners increased from 306 in 2012 to 400, and the share of product types increased from 25 percent to 60 percent.

In 2014, China Mobile’s sales target of TD terminals is 190 million to 220 million (unsubscribed ones taking up more than 50 percent), among which over 100 million will be TD-LTE terminals. The types of 4G mobiles will amount to over 200, and meanwhile China Mobile will

launch new terminals like the 1,000-yuan smartphone and self-branded 4G mobiles.

China Mobile’s 2014 *White Paper for TD Customized Terminals Products* introduces its promotion strategy, product planning, product requirements and quality management requirements for TD terminal products. Within 2014, China Mobile endeavors to launch VoLTE commercial products that meet its own criteria, in order to promote a larger scope of 4G application and popularization in the world.

So far, 18 countries in the world have deployed 23 TD-LTE commercial networks serving over 5 million subscribers, and another 40 or so commercial networks are being planned. The Global TD-LTE Initiative, initiated by China Mobile, has gathered 80 international operators and 63 industrial partners, building a sizable platform for their cooperation. The TD-LTE industrial chain is taking shape.

(Source: Science and Technology Daily, December 25, 2013)

## Huawei pioneers Global LTE 4G Progress

Today Huawei's wireless network products and solutions are serving over 500 mobile operators and over 2 billion 3G and LTE subscribers in the world. Its services are omnipresent: they stretch from Arctic Norway to Australia's southernmost region, from Germany's villages to Namibia's deserts and from the Philippine's tropic rainforests to Russia's lands of ice and snow; they cover urban as well as rural areas and developed as well as developing countries.

In its global LTE 4G network rollout efforts, Huawei has signed 241 contracts to commercialize LTE networks, which tops the industry. Among the world's 244 commercialized LTE networks, Huawei is involved in 110, ahead of Ericsson (100), Nokia Siemens (56) and Alcatel-Lucent (24).

Huawei's LTE networks cover over 100 capitals and top financial centres – London, Hong Kong, Singapore, Zurich, Seoul, Tokyo, Geneva and Toronto. The large coverage proves Huawei's capacity in deploying complex networks adapted to different local conditions.

According to a manager of Huawei's Wireless Network Business Unit, in 2014 Huawei's wireless business sales revenues are predicted to grow at 10 percent, and its global sales revenues will achieve 12.9 billion US dollars, among which the revenues of LTE markets will double to 4 billion dollars.

As the China market launches 4G projects, China's three major telecom operators start their 4G businesses. China Mobile carries out large-scale GSM+TDS+LTE rollouts in 326 cities, China telecom CDMA+LTE rollouts in 42 cities and China Unicom GSM+UMTS+LTE rollouts in 55 cities. The FDD/TDD convergence has become a theme. This manager thought that Huawei's global experience would help China's three major operators save twists and turns. For example, it will give advice in tariff package design and help the operators offer better user experience.

He also noted that the reason why Huawei had won the most 4G orders in the world is that Huawei can think from the perspective of its customers and offer them tailor-made solutions. The whole world is still exploring what more businesses can be loaded to a LTE-4G network, and there are no successful cases yet. Huawei also joins hands with operators to explore and practise. In the future, mobile network will connect all devices from every corner in the world with zero latency. Healthcare, retailing, transportation, banking, media, education, manufacturing and other industries will enjoy infinite opportunities, and Huawei will also enjoy greater progress.

(Source: Science and Technology Daily, January 15, 2014)