

.CN

China

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Overview

The Chinese government has been working to transform China into an Information Society since the early 1990s, primarily through the nationwide 'Three Golds Projects' in the customs, banking and taxation sectors. The first national informatization conference was held in 1997. The importance of developing China's information sectors has been increasingly emphasized in various sessions of the National Congress of the Communist Party of China (CPC). During the 10th Five-Year Period (2001–05), significant progress in this regard has been achieved, as evidenced by the following:

- The information network has expanded rapidly, and is the essential infrastructure for the country's economic and social growth. The Chinese telephone network and subscriber-base are now the world's largest; China's population of Internet and broadband users rank second in the world and radio and TV networks now cover most Chinese villages.
- The information industry has experienced rapid growth, contributing significantly to the nation's economic growth. In 2005, the ICT industry's contribution to GDP reached 7.2 per cent, electronic and information product exports accounted for over 30 per cent of China's total exports and Chinese enterprises owned more proprietary key technologies.
- Information technology has been applied in a widening set of areas, with notable results. An agricultural information service system has been completed; traditional IT industries like energy generation, traffic and transportation, machinery and chemistry are being reformed; the information service sector is thriving; and information development in finance and banking sector has boosted innovation and a modern

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| Total population | 1.30756 billion (2005) |
| Key economic sectors | Energy, Mining, Manufacturing, Construction, Transport, Storage, Post and Telecommunications, Wholesale and Retail Trade, Catering Services, Tourism, Finance and Insurance, Real Estate |
| Computer per 100 urban households | approximately 31 (2005) |
| Fixed-line telephones per 100 inhabitants | approximately 27.99 (2006) |
| Total computer hosts | 54.50 million |
| Internet hosts per 10,000 inhabitants | 4.2 |
| Cell phone subscribers per 100 inhabitants | approximately 33 (2005) |
| Total bandwidth of international connections | 214,175 Mbps (2006) |

Sources: China Bureau of Statistics, China Ministry of Information Industry.

finance service system has taken form. E-commerce is booming and information development in science, education, culture, medicine and health, social security and environment has been accelerating.

- E-government development has been expanding, enabling governments at various levels to transform their functions, increasing administrative efficiency and promoting transparency. Using information technology, governments at all levels have been expanding public access to information, resource sharing and administrative coordination. Use of IT in the customs, banking and taxation departments has achieved notable results and use of IT in public security and government approval bodies is progressing steadily.
- Online information in China has been increasing and information processing ability has been enhanced.
- A national information security strategy has been formulated and an information security administration and work mechanism has been set up. Internet information safety management has been consolidated.
- National defence and military information development is being pursued.
- Information development legislation and standardization work is moving forward.
- ICT awareness and training have improved significantly and the number of ICT human resources is increasing.

Technology infrastructure

In 2005, there were 38.68 million newly registered fixed-line telephone subscribers and 58.6 million newly registered

cellphone subscribers in China, bringing the total fixed-line telephone subscribers to 350.43 million and the total cell-phone subscribers to 393.43 million.

The *18th Statistical Survey Report on Internet Development in China* released in July 2006 shows that as of 30 June 2006, China had approximately 2.9 million domain names (including names registered in .CN ccTLD and gTLDs); .CN domain names reached more than 1.1 million. The top five provinces and cities in terms of number of websites are Beijing (144,800 websites, or 18.4 per cent of the total), Guangdong (141,105 websites, or 17.9 per cent), Zhejiang (73,304 websites, or 9.3 per cent), Shanghai (64,704 websites, or 8.2 per cent) and Jiangsu (63,933 websites, or 8.1 per cent). Total bandwidth connecting to the United States, Russia, France, the United Kingdom, Germany, Japan, Korea and Singapore reached 214,175 Mbps.

By 31 December 2005, there were 2.4 billion Chinese Web pages, representing a 269 per cent year-on-year increase; 64 per cent of these are dynamic Web pages. Web page bytes increased from 46,763 gigabytes in 2004 to 67,300 gigabytes in 2005, which indicates that Internet content and resources in China have increased substantially. However, since 2004 the number of online databases decreased slightly from 295,400.

As of 30 June 2006, there were 123 million Internet users (netizens), representing an 18.1 per cent (17 million) increase from 2004 figures. In terms of accessing methods, 26.8 per cent use leased lines, 47.5 per cent use dial-up and 77 per cent use broadband.¹ About 13 million access the Internet using mobile phones, and about 6.10 million Internet users have other types of accessing facilities, such as mobile terminals and information appliances.

China's Internet penetration rate increased from 8.5 per cent in December 2005 to 9.4 per cent in June 2006, and is increasing both in urban (from 16.9 per cent to 18 per cent) and rural areas (from 2.6 per cent to 3 per cent). The June 2006 data show that the urban penetration rate is six times the rural area penetration rate. It is expected that this digital gap will remain for some time due to the sharp difference in economic development between urban and rural areas and across different regions in the country. The coastal areas, special zones and central cities in the hinterlands have prosperous business communities and have access to advanced science and technology. The western and middle parts of the country are underdeveloped but possess tremendous potential for development.

There is also a big gap between east and middle-west in the volume of domain names and websites per 10,000 people. In terms of the volume of domain names per capita in late 2005, the east grew more quickly than the middle-west. However, the middle-west developed better than the east in terms of website volume per capita.

During the 10th Five-Year Period (2001–05), major innovations were achieved in integrated circuits, computing, network and telecommunications, software, and digital audio and video generation and dissemination. The National High Technology Research and Development Programme (also called the National 863 Programme) has given birth to a range of innovative key technologies and a line of strategic products and systems for technology integration and applications, improving the competitiveness of China's high technology industry. Some of the major innovations during the 2001–05 period are given below.

China-made central processing unit chips

China is one of the top 10 high-performance computer manufacturers in the world. The development of a proprietary CPU series has laid the foundation for the development of core technologies for China's information industry. China-made Longxin and Zhongzhi chips have been massively produced. China has also achieved a breakthrough in making its own computer operating system (such as Kylin) and office software (such as WPS Office, Yongzhong Office and EduOffice) and has produced a line of products with some market share.

IPv6: China's next generation Internet

In September 2006, China announced the launch of the world's largest pure next-generation Internet using IPv6. The Chinese network, called CNGI-CERNET2/6IX or CERNET2 for short, and broadly referred to as the China Next-Generation Internet (CNGI) project, currently links 167 institutes in 25 universities in 20 different cities. It also has links to telecom operators China Telecom, China Unicom, China Mobile and China Tietong, as well as partner equipment providers ZTE, Tsinghua Unisplendor and Tsinghua Tongfang. CERNET2 uses Chinese IPv6 routers rather than the foreign routers that support the current IPv4 network around the world. Chinese experts say that it would take about 10 years to make the full transition from IPv4 to IPv6.

China Next-Generation Internet (CNGI) will:

- move data at about 100 times current Internet speeds;
- support online streaming video at unprecedented levels;
- allow over 160 departments and institutions on CERNET2 to set up experimental labs and conduct research into new applications that people may not have seen before;
- drive new technology deals and innovations;
- allow China to develop new standards for the Internet Engineering Task Force (IETF), which develops and promotes Internet standards; and

- support an infinite number of IP addresses, providing the platform for what many call the Internet of Things, a world in which objects have their own IP addresses and can share data.

3G mobile phone networks

China has made remarkable achievements in the 3G system with its TD-SCDMA (time division synchronous code division multiple access) standard. Under the direction of the Ministry of Information Industries, trials of 3G/UMTS (Universal Mobile Telecommunications System) radio access networks and terminals were completed in 2005. W-CDMA technology has been found to be quite satisfactory on the network side and more dual mode handsets are expected for further testing. With the final results of these trials expected soon, the UMTS Forum anticipates that China will signal its intention to award 3G licenses in due course. The Chinese central government has yet to decide when to license operators to build 3G networks on the mainland. Many industry observers now expect the 3G licensing to occur in the first half of 2007 at the earliest.

Digital content

The *Survey Report on Quantities of China Internet Information Resources* released by the Informatization Office of the State Council on 15 May 2006 shows that 60.4 per cent of Web content in the Chinese mainland are company websites and 21.9 per cent are personal websites. These originate mainly from Beijing, Shanghai, Guangdong, Fujian and Zhejiang, which indicates a digital gap between east and west China.

Portal websites

Portal websites serve as a one-stop place for information and services. The service information available includes information on education, training, jobs, daily-life consumables, leisure, entertainment and tourism, health, sports, hospitals, industry and business.

The *2005 Survey Report on Quantities of China Internet Information Resources* shows that enterprise websites accounted for most (60.4 per cent) of the 694,000 websites in China. But for over 50 per cent of the enterprise sites, daily page views are under 50 due to lack of links to other sites. Most enterprise sites provide only product introduction and display, and are not fully integrated into the business.

E-commerce

In 2005, there were six major B2B e-commerce companies in mainland China, including, in order of strength, alibaba.com, hc360.com, 123trading.com, 8848.com, sparkice.com and meetchina.com; the first three have most of the market share. Chinese B2B e-commerce websites still lack experience in integration into the global procurement system and in marketing clients' products to the international market.

The major B2C e-commerce companies are joyo.com, ebay.com.cn and dangdang.com. Due to a deep pocket and good management, e-commerce companies with foreign investment seem to be more competitive.

IT Information

IT information websites offer information related to highly technical programming knowledge or popular IT software and consumption electronics. But websites with content that is too technical have begun to turn off visitors while those with less esoteric content attract more users. Currently, Chinese language Web page content is being copied heavily across sites, with a 'repetition rate' of as high as 25–40 per cent. China's first IT information website, PChome.net, was acquired by American CNET Networks for USD 11 million in March 2005.

Government affairs

As of the end of 2004, most of China's central government departments had gone online, with over 90 websites established. Local government websites totalled more than 20,000. According to a survey conducted by Singaporean newspaper *Lianhe Zaobao* in 2003, China ranks 74th in the world in e-government readiness. The United States tops the world list, while Singapore ranks 12th, taking the Asian lead. The weaknesses of China's government websites include non-standardization of URLs and site names, incompleteness of contact information, lack of professionalism in page design, lack of timeliness in content updating and lack of interactivity.

Agricultural information

Agricultural websites provide information on agricultural technology, policy and administration, market analysis and prediction, meteorological and environmental information, horticulture, fishery, planting and agricultural machinery, and the like. A China Ministry of Agriculture survey shows that as

of 2001, the Chinese mainland has 2,175 agricultural websites, 2,000 more than in 1998.

In 2005, the China Electronic Commerce Association and China Agriculture Web jointly compiled China's Top 100 agriculture websites in the hope of promoting the growth of these sites.

The weaknesses of Chinese agricultural sites at present are: nearly half of them (49.27 per cent) are based in Beijing and in coastal provinces rather than in more rural western areas, most of these sites are run by governments and some lack

two-way information communications with users, information is repeated across sites, and some information is impractical and outdated.

Personal websites

There are more than 30 million personal websites, accounting for 21.9 per cent of all websites in China. Many have attracted venture capital.

The top 10 portal websites in China

Baidu.com, Inc. (<http://www.baidu.com/>) is a leading Chinese-language Internet search engine. According to Wikipedia, Baidu has an index of over 740 million Web pages, 80 million images and 10 million multimedia files. It also offers blogs and other services. Baidu.com had its initial public offering (IPO) on 5 August 2005.

Sina (<http://www.sina.com.cn>) is the largest Chinese-language Web portal, providing news, entertainment, e-mail, search and related services. Alexa ranks Sina as the 7th biggest Web property in the world, just behind MySpace. It is said to have 94.8 million registered users and more than 10 million active users of fee-based services, with an estimated three billion page views every day.

Founded in August 1996 and developed from the first Chinese search engine, Sohu (<http://www.sohu.com>) claims to be 'China's premier online brand and is indispensable to the daily life of millions of Chinese'. It is in Chinese and is ranked 16th in the world in terms of traffic volume by Alexa.

Also called NetEase (<http://www.163.com>), this famous Chinese-language website is a two-time winner of the Best Ten Chinese Websites Award from CNNIC. NetEase's daily page views in September 2005 exceeded 614 million.

Alibaba.com Corporation (<http://www.alibaba.com>) is China's leading e-commerce company, operating the world's largest online market for international and domestic trade and China's most popular online payment system, Alipay. Alibaba.com also owns and operates Yahoo! China, which it acquired in October 2005.

CE.Net (<http://www.ce.net.cn>), in Chinese and English, is the largest Chinese B2B e-commerce website.

The bilingual (Chinese and English) ChinaChamber.com (<http://www.chinachamber.com.cn>) was established by the All-China Industrial and Commercial Union and partnered with CE.Net in May 2000.

Rongshu.com (<http://www.rongshu.com>) is the biggest Chinese-language cultural and artistic website with an average of 5,000 new articles submitted daily and about 3 million articles in its archive. In October 2005, Rongshu had 4.5 million registered users, with over 700 page views daily, ranking the world's 400th in daily page view numbers.

Ctrip.com (<http://www.ctrip.com>), in simplified and traditional Chinese and English, introduces scenic spots all over China and provides online reservation services.

The electronic version of the Chinese newspaper *People's Daily* (<http://www.people.com.cn>) reports on China in seven languages: Chinese, English, Japanese, French, Russian, Spanish and Arabian.

Run by the official Xinhua News Agency, <http://www.xinhuanet.com> provides worldwide news 24 hours a day in seven languages: Chinese (simplified and traditional), English, French, Spanish, Russian, Arabian and Japanese. About 5,000 news items are published daily.

A national academic computer network (<http://www.edu.cn>) has been established principally to serve educational and research institutions. It is in Chinese and English.

CCIDNET (<http://ccidnet.com>) is the largest Internet and IT information service and commercial service provider in China. By 30 June 2006, the site had 1.52 million registered users and its daily page views reached 5.88 million; the number of daily visits reached 1.5 million.

Established in 2000, Joyo.com (<http://www.joyo.com>) offers online sales of various books, audio-visual products, software, toys and gifts, and general merchandise. In August 2004, Amazon.com acquired a 100 per cent stake in Joyo.com.

Web2.0 contents

These fast growing websites, copied mostly from their US equivalents, provide very good user experience due to good ideas and their use of the latest Web technologies. Some offer rich content consisting of text, music, pictures and video. Others give users a platform to collaborate online or build social networks.

Online services

Search services

As Internet content increases exponentially day by day, the need to retrieve the right information when it is needed has intensified. Hence the popularity of the major Internet search service providers in China, which include Google China, Baidu, Yahoo, Zhongsou, Sohu, Sina and Skynet. Blog search engines for personal online content are also popular. Chinese blog search engines include feedsearch.net, 8fang.net, grassland (<http://www.cnblog.org/cnblog.html>) and Blogcn (<http://www.blogcn.com/search/index.shtml>) Among the challenges faced by Chinese search engines are that users are currently limited to searching for key words and category browsing, which limits accuracy of search results, and Web content in Chinese is limited.

E-government services

The Chinese government portal site (<http://www.gov.cn/>) received 40.5 million hits and 5.19 million page views on the first day of its official operation on 1 January 2006. The Chinese Ministry of Foreign Affairs website has 3.20 million daily visits. By November 2005, 138,400 new enterprises in Shanghai completed licensing, quality control and tax registration via e-government sites. In Hangzhou, over 9 million data exchanges between government bodies had been recorded by 20 December 2005, suggesting increased government administration efficiency and service quality. Chengdu, a western city, completed in November 2005 a comparison of historical data on 90,900 enterprises, and data sharing between government departments on the registration, licensing and information modification of 19,000 new enterprises.

According to the *China Informatization Report 2006*, the top 10 provinces and cities in the e-government performance evaluation in 2005 were Shanghai, Beijing, Jilin, Zhejiang, Hebei, Anhui, Jiangsu, Yunnan, Shanxi and Heilongjiang. The list shows an even distribution between developed and less-developed areas.

E-commerce

The *18th Statistical Survey Report on Internet Development in China* released in July 2006 shows that as of 30 June 2006, China had approximately 1.8 million websites registered under .com or com.cn. These account for 81.5 per cent of all the websites registered in the Chinese mainland. In 2005, China's e-commerce transactions, most of which were B2B transactions, reached 600 billion yuan, a 40 per cent increase over 2004 figures. China's e-commerce transaction volumes are expected to exceed the 800 billion yuan threshold in 2006. E-commerce models in the Chinese mainland include B2B, such as Alibaba (<http://www.alibaba.com.cn>), Huicong (<http://www.hc360.com>) and Jinyindao (<http://www.315.com.cn>); C2C, such as dangdang (www.dangdang.com); and B2C, such as Ebay China (www.ebay.com.cn).

E-community

According to the *China Online Community Research Report* of the China iResearch Inc., 68 per cent of 3,094 respondents surveyed visited online community websites in 2004. Major online community services in the Chinese mainland include comprehensive community websites, such as Xici (<http://www.xici.net/>) and Xilu (<http://www.xilu.com/>); BBSs affiliated to major portal websites, such as NetEase BBS (<http://bbs.163.com/>) and Sina BBS (<http://people.sina.com.cn/>); hobby websites, such as Rongshuxia (<http://www.rongshuxia.com/>); and online game sites, such as 17173 (<http://www.17173.com/>).

ICT industries and services

According to the *China Informatization Development Report 2006*, total sales in the electronic information sector was CNY 3,841.1 billion (about USD 502.35 billion) in 2005, representing a 24.8 per cent increase year-on-year. Profits reached CNY 130.7 billion (about USD 17 billion), a 5.2 per cent increase; the sector paid CNY 43.5 billion (about USD 5.7 billion) in taxes, a 10.5 per cent increase; and exports totalled CNY 268.2 billion (about USD 35 billion), a 29.2 per cent increase.

After nationwide sectoral restructuring, China now ranks No. 1 in the world in the manufacture of computers, mobile phones and TV sets. New audio-video products, telecommunication networks, equipment and electronic displays are the new growth points of the country's economy. Computers have become a top earner, with a sales volume of CNY 1,064.4 billion (about USD 139.2 billion), a 21.7 per cent increase since 2004.

In the past five years, China’s policy of mindfully fostering ICT giant companies has had notable effects. In 2005, the number of ICT companies with sales of over CNY 10 billion (about USD 1.3 billion) increased to 22. The eastern coastal area, especially Jiangsu, Beijing and Shanghai, have seen a growth rate of over 30 per cent. In 2005, the whole industry’s production–sale ratio was as high as 98 per cent.

Pushed by increasing demand for high-end products, the production growth rates for LCD and plasma TV sets were 418 per cent and 215 per cent respectively. In the computer sector, laptop computers accounted for nearly 60 per cent of all newly made computers.

In 2005, China’s electronic and information product exports totalled USD 268.17 billion, topping the exported product categories.

The software sector has also experienced rapid growth. By November 2005, there were over 11,000 software enterprises, 200 of them with over CNY 100 million (USD 13 million) in sales. Over 200 enterprises have passed CMM2 or above standards.

In 2005, total sales in the Chinese software industry was CNY 390 billion (USD 51 billion), a 40.3 per cent increase year-on-year. Software exports reached USD 3.59 billion, a 28.2 per cent increase year-on-year. By September 2005, there were 28,401 registered software products in China. There are 11 national software industrial bases and six national software export bases.

While getting stronger at home, China’s information industry companies have been expanding overseas, with notable feats by computer giants, such as Lenovo’s acquisition of IBM’s PC branch in May 2005. After the acquisition, Lenovo’s yearly sales are expected to reach USD13 billion at a yearly sale of 14 million PCs.

Enabling policies

The CPC Central Committee’s Recommendations about the Making of the 11th Five-Year Plan on National Economic and Social Development, passed at the Fifth Plenary Meeting of the 16th CPC Central Committee held on October 2005, defines the main tasks and directions of Chinese informatization thus:

- advancing the national economy and social informatization;
- developing distance education and projects to ‘extend radio and TV coverage to every village’;
- improving rural communications and communications networks;

- vigorously developing core industries such as integrated circuit and software, focusing on fostering an information industry based on digital audio and video, a new generation of mobile communications, computers and high quality network equipment;
- enhancing the development and sharing of information resources and promoting the dissemination and application of information technologies;
- strengthening the construction of information infrastructure such as broadband Internet, digital television network and next generation Internet, integrating the three as a whole; and
- improving information security.

Development Strategies of National Informatization 2006–2020, published by the National Leading Group of Informatization in November 2005, emphasizes promoting e-government to enhance the government’s ability to manage state affairs, informatization of national defence and military affairs to maintain national security, social informatization to create a harmonious society, development of core technologies through independent innovative capacities to improve the quality and competitive power of the information industry, accelerated development of technological standards, establishment of a legal framework for ICT and improved training for employees.

To match these macro policies, government has formulated a series of special measures in rural informatization, e-government, e-commerce and information security. A conference on ‘Promoting Rural Informatization to Create a Harmonious Society’ was held in Beijing on 22 September 2005. The State Department’s *Guidelines to Construct China E-Government* published in August 2002 defines the basic principles, development goals, main tasks, guarantee measures and infrastructure for e-government for the next five years. In early 2005, the Office of the State Department published *Ideas about Quickening the Development of E-Commerce*, which defines a policy orientation for e-commerce and focuses on operative measures to respond to the *Electronic Signature Act*. The Central Bank later issued *Regulations of Internet Banking*. The China Banking Regulatory Commission also passed *Regulations of Electronic Banking, Guidelines to Assessment of Electronic Bank Security and Rules of Qualification Certification of Security Assessment Institutions of Electronic Banking*, which require supervision agencies at all levels to encourage financial entities to launch electronic banking by simplifying examination procedures.

With respect to information security, the National Information Leading Group passed in 2003 *Suggestions for Enhancing*

Information Security, and the Information Office of the State Department, together with the Ministry of Public Security and others, began to draft an *Information Security Statute* one year later. The State Administration of Radio, Film and Television succeeded in drafting the *Act Guaranteeing Transmission of Radio, Film and Television*. The Minister of Public Security issued a circular on *Operative Measures for the Protection of Information Security* on 15 September 2004 while the National Certification and Recognition Supervision Commission issued the *Notice of the Establishment of the National Certification and Recognition System for Information Products* in October 2004.

Regulatory environment

China's informatization campaign is supported by the Special Programme of Informatization in the 10th Five-Year Plan released in January 2004. A series of related laws and regulations has been released recently, including amendments to the Criminal Law, Contract Law, Custom Law and others, to cover information network servicing, Internet security, information rights and electronic transactions, thereby legally ensuring the healthy development of informatization. The *PRC Electronic Signature Act* came into effect on 1 April 2005, and legislation of the *Telecommunications Act* is in progress. The *Statute of Governmental Information Openness* has been listed in the first-class legislation schedule of 2006 by the State Department. In addition, research for legislation regarding the protection of minors online has been completed and submitted to the legislature.

The *PRC Electronic Signature Act* confirms the legal power of e-signatures, regulates the use of e-signatures and protects the legal rights of all parties concerned, ensuring the security of e-commerce and laying a firm foundation for the creation of a safe certification system and national Internet trust system. Under this legal authorization, the *Management of E-Certification Service* and *Management of E-Certification Code* have been implemented. By the end of January 2006, 17 e-certification services had acquired a License of e-Certification Service from the Ministry of Information Industry.

Administrative regulations relevant to Internet input servicing, Internet information servicing and Internet logging servicing are likewise in place. The *Temporary Rules of International Networking Administration* issued on 20 May 1997 is the most important legal document for regulating international networking of the Internet in China. *Management Measures of Internet Information Service* came into effect on 25 September 2000, while the *Notice for Further Enhancing Regulation of*

Sites for Internet Access Service was issued by the Office of the State Department on 3 April 2001. In August 2002, *Management Measures of China Internet Domain Names* first came out; this was modified and reissued by the Ministry of Information Industry in November 2004, and implemented since 20 December 2004.

The *National People's Congress Standing Committee's Decision on Maintaining Internet Security*, passed at the 19th Conference of the 9th National People's Congress on 28 December 2000, is China's first legal decision to protect information security. In 2005, the Informatization Office of the State Department began to write the *Draft Information Security Statute*.

Regarding protection of information-related rights, the State Department modified in 2001 the *Statute of Protection of Computer Software* first issued in 1991 and published it on 20 December of the same year. On 27 October 2001, the 24th conference of the 19th National People's Congress passed the decision to modify the *PRC Copyright Law* to take into account the new Internet economy. On 30 April 2005, the Ministry of Information Industry and National Copyright Bureau issued *Approaches of Administrative Protection of Internet Copyright*, improving the system of copyright protection in the Internet environment. The *Statute of Collective Management of Copyright* was also put into practice on 1 March 2005. The *Regulations of Management of Internet News Information Service*, which regulates activities involving Internet news services, was issued jointly by the News Office of the State Department and the Ministry of Information Industry on 25 September 2005.

Moreover, guided by the *CPC General Offices and State Department's Suggestions about Further Promotion of Administration Openness*, by the end of 2005, Central governmental agencies had developed 30 legal documents involving information openness, and 75 local party and administrative agencies had issued related regulations. Handan city in Hebei province and Jiaxing city in Zhejiang province developed rules on openness of governmental information. To regulate the collection, publication and use of business and personal credit information, Shanghai, Hunan and other places issued credit information management measures. Beijing, Jilin, Anhui, Yunnan and others formulated approaches to manage intellectual property rights protection in an Internet environment.

Education and capacity building programmes

Great importance is being attached to the education of citizens, especially the younger generation, regarding ICT applications.

Colleges and universities have produced many information science professionals trained in courses such as information and communications engineering, cybernetics and engineering, computer science and technologies, and electronics. ICT-related education and training is required of all students in universities. By the end of 2004, 389 of 1,731 colleges and universities had computer software majors and 550 had majors related to IT and software. In the same year, there were 67,454 graduate students and 1.794 million undergraduates in these specialized subjects nationwide. There were 31,683 students in 35 demonstration software colleges and 62,550 in 35 demonstration professional software colleges. Currently, there are 127,468 students in the departments of information science of colleges and universities. The number of undergraduate computer and information science programmes has increased from 505 in 2003 to 771 in 2005. The percentage of such programmes relative to all undergraduate programmes has increased from 4 per cent to 18 per cent.

Meanwhile, IT training in the secondary vocational schools has been strengthened and an IT subject is now a required course in 98 per cent of such schools. There are 1,400 specialized IT vocational schools in the country, and another 5,000 schools have IT majors with a total of 1.5 million students enrolled in IT-related subjects.

On-the-job training is an important way for China to cultivate IT talents. The CPC Central Committee and government ministries and commissions have organized various types of training classes on informatization and e-government, developing a team of professionals to lead, organize and promote informatization and e-government. In 2005, 683,635 government employees were trained through the National IT Training Programme; about a third (218,144) of them participated in qualification tests and over 20 per cent acquired qualification certificates of different grades. Another third (274,112 staff) took part in IT self-study tests, and a little less than a third (191,379) in other tests for authentication. In the National IT Training Programme, the training areas include software, hardware, Web design, Internet and professional English.

The authentication of professional skills in the electronic industry is in full swing. The Ministry of Information Industry has established 50 authentication stations in the country, while 15 provinces with developed electronic industries have set up provincial guiding centres for authentication. Bases for training in advanced IT skills, numbering 109 in all, have been established in the whole country, and 39 national professional standards have been developed and released. To date, 320,568 technical workers, students of technical schools and professionals of various types have been trained and tested; 63,881 of them have acquired

qualification certificates as high-grade workers and 4,679 were granted the qualification of Technician or High Technician.

Chinese provincial and municipal governments are also promoting informatization. In Shanghai for example, the Municipal Association of Women, Municipal Commission of Information, Municipal Office of Civilization, and Municipal Association of Science and Technology jointly organized a project to help one million families to surf the Internet within the next 3–5 years. The project was ranked one of 12 practical undertakings by the municipal government in 2003. Projects like these, which involve the cooperation of foreign educational institutions and domestic IT businesses, are indeed noteworthy.

In the years to come, China will continue to enhance IT knowledge and training, developing the information capabilities of leaders, public servants and professionals. It will continue to carry out the ‘653 Programme’ to develop a large base of human resources skilled in IT, software and integrated circuits.

Open source movement

Open source software (OSS) is increasingly being used in China. Recently, Linux of China and OSS companies forged a mechanism for cooperation in product orientation, R&D, marketing and training, creating a primary ecosystem of open source software, from applications at the business level to tabletop products, from embedded Linux software to hardware and development tools supporting Linux.

Since the 10th Five-Year Plan, the Chinese government has strengthened support for the development of OSS, including the Linux operating system and its applications. The Ministry of Information Industry has vigorously supported R&D work on Linux operation systems and office software for servers, desktop computers and other equipment that embeds such software, contributing to the emergence in the market of products such as Zhangke Red Flag Linux, Zhongbiao Puhua Linux, Gongchuang Linux and Turbo Linux. All these make the Chinese Linux market a rich one.

In May 2005, the Ministry of Information Industry set up a ministerial centre for promoting software and integrated circuits and a public service platform for national software and integrated circuits, and established Linux laboratories with HP and Freescale. With guidance from the Ministry, the Chinese Open Source Software Promotion League was created on 22 July 2004, and now has 80 members. On 10 May 2005, the China Linux Industry Strategic Alliance was officially founded; it has 60 members.

As open source technology matures, more and more Chinese businesses are beginning to think highly of its commercial

value. Studies show that 23 per cent of the Top 100 Chinese Commercial Technologic Businesses in 2005 have deployed Linux or other OSS. However, open source technology still has low penetration in small and medium-scale businesses, open source communities are relatively small and have little influence, open source businesses are small-scale and lack core competencies, and technical support is also lacking.

International cooperation is a promising development. In April 2004, the ministries for telecommunications of China, Japan and South Korea signed the *China, Japan and South Korea: Cooperative Memorandum of Open Source Software*, which defines 10 cooperative projects and sets three governmental IT meetings and three Southeast Asian forums for promoting OSS. China and France also signed the *China-France Cooperative Memorandum of Open Source Software*.

Research into ICTs

As mentioned earlier, various IT innovations have been realized, especially in integrated circuits, computers, networking and communications, software and digital audio and video. The integrated circuit technology of central processors such as Zhongzhi and Longxin are highly effective, the Shu Guang 4,000A super-computer ranks among the Top 500 in the world, new high-speed routers are being used in the construction of Chinese next-generation Internet, industrial standards of TD-SCDMA have been formed, and 3G mobile technology is advancing rapidly.

More investment is being put into the R&D of typical IT businesses, resulting in many innovations. In 2004, the Top 100 in China's electronics industry spent CNY 311,000 million (about USD 40,673.27 million) on R&D, representing a 17 per cent increase on R&D spending in 2003 and 3.8 per cent of sales revenues. There were more than 3,600 patent applications in 2005. The Huawei Company, which has the most number of patent applications, has applied for over 3,000 3G patents and owns 5 per cent of the basic patent of WCDMA. In June 2005, the Haixing Digital Video Processing Chip, the first video chip in China developed by the Haixing Group, passed qualification by the concerned agencies, freeing the Chinese colour TV industry from its dependence on the import of core chips. The Yongzhong Science and Technology Co. Ltd. in Wuxi, Jiangsu has succeeded in solving technological puzzles worrying the global software sector by relying on an independent innovation: the Yongzhong Integrated Office which integrates word processing, worksheet and briefing using digital object storage base technology development.

Current efforts aim to establish and improve an innovation system combining production, study and research. The guideline

to develop high-performance 64-bit CPUs has been defined and the Longxing Industry Alliance has been set up. The construction of a public information platform for home-made hardware and software and a platform for national auto computation is advancing. China is also speeding up its implementation of standards and intellectual property rights and encouraging large domestic corporations to participate in international standard R&D.

Future trends

China's 11th Five-Year Plan commenced in 2006. With *Development Strategies of National Informatization 2006–2020* and *Special Program of Informatization for the 11th Five-Year Plan* in place, informatization in China in the next 5–15 years will enter an entirely new development phase marked by the trends discussed below.

According to the new requirements for rural development, information servicing through radio, television and communications in Chinese rural areas will gradually improve. This will contribute greatly to reducing the digital divide between urban and rural communities, and between east and west. IT will serve as an important means of saving energy, water and materials, and protection from pollution caused by such industries as metallurgy, oil chemistry, construction materials production and paper making. IT will play an important role in reducing land pollution and resource waste arising from urban development and exploitation of mineral resources. IT will also improve the productivity of new industries through such services as networking, e-finance, modern logistics, chain operations, special information services and consultancies.

Social informatization plays an important role in promoting the construction of a harmonious socialist society. There have been significant developments in terms of social security, employment, digital radio, digital television, digital publication, video games and public cultural information service. Informatization will be systematically deepened in education, health, epidemic prevention and monitoring, emergency response and environmental protection.

With the development and implementation of the *Overall Framework of National E-Government*, the construction and integration of national e-government networks will accelerate. E-government applications, interdepartmental information sharing and business cooperation with a focus on basic information sharing, e-port creation, comprehensive governance of taxation and regulation of the market economy will progress further. The system of governmental websites will be improved. The building of applied and integrated environments, such as an administrative information resources directory, exchange

system, simulation examination of e-government, promotion of home-made products and the like will take place.

With the implementation of *Suggestions for Strengthening Development and Exploitation of Information Resources*, more policy work in this area will be conducted. Research on policies regarding the development of the digital content industries, supervision of information resource markets, wider and better uses of governmental information and management of information assets will be enhanced. To optimize the structure of information resources, efforts are being made to improve the exploitation of information resources in fields such as production, distribution, science and technology, population and environmental resources, and speeding up the digitization of information resources in education, culture and literature.

To improve the IT industry's ability to innovate core competencies independently, the government is focusing on the following efforts: enhancing close cooperation between sectors to study and promote IT innovations, increasing financial investment in IT businesses, strengthening R&D on information security technologies and on the basic and common technologies involved, speeding up the implementation of standards and intellectual property rights, promoting the IT innovation system with business as the main body, with a market orientation and a combination of production, learning and research, and formulating new rules and regulations on IT innovation. To accelerate the structural adjustment of the information industry and its optimization and upgrade, the state agencies concerned will develop related policies and measures that will further encourage the development of the software and integrated circuit industries.

Guaranteeing information security is a continuing priority. Based on the tasks proposed in *Suggestions for Enhancing Information Security* and *Suggestions for Further Enhancing Management of the Internet*, the basic infrastructure for information security continues to advance and the Internet environment will be developed further.

Note

1. The percentages do not add up to 100 per cent as Internet users who adopt multiple accessing methods are recounted.

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