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China's Policy Practice for Digital Economy Development

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Abstract

The paper highlights the policies adopted by China in building its digital economy. Three phases can be clearly identified in China's digital policy which includes building network infrastructure; accelerating deep integration of the internet with the real economy; and enhancing information technology capabilities in all respects to drive national modernization. Digital transformation in China happened because of a comprehensive strategy which focused not only on the supply side but also strived to create demand for digital infrastructure. On one hand broadband network was built to facilitate faster and affordable internet and on the other hand internet integration was accelerated within industry and agriculture sectors. Data was recognized as a key resource for development of the digital economy and accordingly data governance policies were successfully implemented.

Key words: China's digital policies; China's digital transformation; China's data governance policies

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Introduction

At present, global digitalization has entered a new stage characterized by comprehensive penetration, cross-border integration, accelerated innovation, and leading development. Global economies have generally taken quicker innovation of network and information technologies and maximum release of digital dividends as a key engine to cope with growth instability and uncertainty, deepen structural reform, and promote sustainable development in the era after the financial crisis. The Chinese Government pays great attention to the profound impact of digitalization on economic and social development. In recent years, it has launched a series of strategic plans and policy measures to expedite the development of digital economy and continuously advance the construction of digital China.

1. China's Macroeconomic Policies for Digital Economy Development

From a historical perspective, there are three phases in China's policy deployment to boost the digital economy.

1.1 Phase I: Push for the comprehensive popularization of network infrastructure

Network infrastructure is the critical infrastructure underpinning economic and social digitalization in the era of digital economy. It also serves as the basic platform for implementing the national innovation-driven development strategy. In August 2013, the Chinese Government issued the Broadband China Strategy and Its Implementation Plan (hereinafter referred to as the Broadband China Strategy), which outlined the objectives and pathways of broadband development. It means that the Broadband China Strategy has risen from departmental action to national strategy, and broadband has become national strategic public infrastructure for the first time. In addition to development objectives of the two phases before 2020, the Broadband China Strategy made clear the technical roadmap, development timetable, and key tasks for speeding up broadband network construction.

- **Promote the coordinated regional development of broadband networks.** The eastern region will be supported to carry out the pilot of network upgrade and application innovation, while the central and western regions assisted in expanding backbone network capacity and access network coverage. The broadband countryside project will be launched, which addresses village access to broadband by integrating broadband into the telecom universal services.
- **Accelerate the optimization and upgrade of broadband networks.** Broadband networks will be fully optimized through a variety of projects to support faster speed, including the construction of fiber-optic networked cities, wireless broadband networks, and next-generation broadcast and television broadband networks, and the optimization of backbone Internet networks and backbone transmission networks.
- **Improve the level of broadband networks application.** In economic aspect, broadband application in production and operation will be continuously expanded and deepened. Especially, demonstration projects will be implemented in SMEs to drive industrial optimization and upgrading. In social

aspect, demonstration projects will be carried out in poverty-stricken schools and special education institutions, in an effort to deepen broadband application in people's livelihood fields such as education, health care, and employment. In cultural aspect, demonstration projects of broadband application in digital culture will be launched to increase the efficiency and scale of public cultural services.

- **Improve the industrial chain of broadband networks**. The broadband industrial chain will be made more capable in all aspects by advancing the research of key broadband technologies, the industrialization of major products, the development of intelligent terminals, and the support for platform construction.
- **Build up network security capabilities of broadband networks**. Broadband network security capabilities will be comprehensively strengthened by improving technical support capacity, constructing security protection system, ameliorating emergency communication system, and perfecting security management mechanism.

1.2 Phase II: Accelerate the deep integration of the Internet with the real economy

Proposed in the 2015 Government Work Report, the Internet Plus Action Plan required the deep integration of Internet innovations with economic and social sectors to foster new driving forces of economic growth. After several years of development, China has made positive progress in Internet technologies, industries and applications, as well as cross-border integration, which lays a solid foundation for accelerating Internet Plus development.

In June 2015, the Guiding Opinions on Actively Promoting the Internet Plus Action Plan was released. The top-level design denotes an important initiative to propel the expansion of the Internet from the consumption sector to the production sector, and thereby accelerate industrial upgrading, enhance industrial innovation capability, and cultivate new advantages and new engines of economic and social development.

The guideline set forth 11 specific actions in most concerned fields with urgent transformation and upgrading tasks and obvious integration and innovation characteristics.

- **Internet Plus entrepreneurship and innovation**. The Internet will be brought into full play to support entrepreneurship and innovation. The concentration, openness, and sharing of various factor resources will be facilitated to create a keen atmosphere of mass entrepreneurship and innovation.
- **Internet Plus collaborative** manufacturing. Smart manufacturing and mass customization will be advanced and networked collaborative manufacturing improved, to expedite the service-based transformation of manufacturing sector.
- **Internet Plus modern agriculture**. An Internet-based new agricultural production and operation system will be built, which develops precise production methods and cultivates diversified networked service models.
- **Internet Plus smart energy**. Intelligent energy production and consumption will be promoted. Distributed energy networks will be established, and communication facilities and new services developed based on power grids.

- **Internet Plus inclusive finance**. Cloud service platforms for Internet finance will be explored, and financial institutions encouraged to expand service coverage by means of the Internet, so as to increase the depth and breadth of innovative Internet financial services.
- **Internet Plus public services.** Innovative Internet-based governance and services will be introduced. Emerging online and offline consumption and Internet-based emerging services will be vigorously developed, including medical care, health, pension, education, tourism, and social security.
- **Internet Plus efficient logistics**. The logistics information sharing and communication system and smart warehousing system will be established, while optimizing the intelligent logistics distribution system.
- **Internet Plus e-commerce.** The development of rural e-commerce, industrial e-commerce, and cross-border e-commerce will be boosted, and innovative e-commerce applications will be encouraged.
- **Internet Plus convenient transportation.** The Internet will be better used in transportation infrastructure, transportation tools, and operational information to support innovative and convenient transportation services.
- **Internet Plus green ecology.** The Internet will be more deeply integrated with the construction of ecological civilization. The dynamic monitoring of resources and environment will be tightened, and environmental data will be interconnected, open and shared.
- **Internet Plus artificial intelligence.** Efforts will be made to expedite breakthroughs in core technologies, and cultivate and develop emerging industries in artificial intelligence. Innovation will be stimulated to make terminal products more intelligent.

In addition, the guideline provided supportive measures, in the aspects of institutional environment, innovation mechanism, and personnel training, that build Internet Plus into an important driving force of innovative economic and social development.

1.3 Phase III: Enhance information technology capabilities in all respects to drive national modernization

As information networks function at deeper levels in economic and social development, the global economy gradually enters into an era of development led by the information industry. Keeping pace with the times in line with the characteristics, China published the Outline of National Information Technology Development Strategy in 2016 as a programmatic document that guides and regulates information technology development in the next decade.

The Outline explicitly stated the new guiding ideologies, strategic objectives, basic principles, and major tasks on the track of information technology-driven modernization. It called for focus efforts to enhance national information technology capabilities, so that information technology can benefit the society and the people, paving the way for the Chinese Dream of the great rejuvenation of the Chinese nation.

The Outline made enhancing development capacity, widening information technology application, and optimizing the development environment the three basic strategic missions.

- **Enhance development capacity**. Five measures were suggested: developing core technologies, consolidating infrastructure, taping information resources, upgrading talent teams, and deepening cooperation and exchanges. In terms of innovation, a sound public service system will be put in place, covering intellectual property rights, technical standards, results transformation, testing and verification, and industrial investment evaluation, in order to strengthen enterprise capabilities of independent innovation and sustainable development. In terms of infrastructure, universal services will be continuously refined, so that people can understand the world, obtain information, and live a richer and better life full with happiness through the Internet.
- **Widen information technology application**. The Outline laid out arrangements for cultivating the digital economy deepening e-governance, prospering cyberculture, innovating public services, and serving the ecological civilization. In particular, the Network Poverty Alleviation Action Plan was brought forward, in which an information service system will be established to present more agricultural and sideline products to the big market through the Internet, facilitate quality education of more students in remote areas, and enhance the endogenous power of development in poverty-stricken areas.
- **Optimize the development environment**. The Outline emphasized the need to ensure the orderly, healthy, and safe development of information technology and specified three tasks to achieve this purpose: legal system construction, network ecosystem governance, and cyber security maintenance. On the one hand, legislation should be fully used to lead and promote information technology development, on the other hand, user rights should be better protected.

2. Digital Transformation in China's Key Fields

Digital transformation is the prevailing trend of the world economy. The deep integration of digital technology with the real economy will exert comprehensive and profound impacts on global innovation, division of labor, value chain, trade and investment. In view of this, countries around the world have embarked on the journey of digitalization. The International Data Corporation estimated the economic value of digital transformation to be $20 trillion or 20 per cent of global gross domestic product (GDP).

In China, the digital transformation of various sectors has become the focus of policy making in recent years. In this process, innovation has been highlighted to spur the development of new technologies, new industries, new formats, and new models. Meanwhile, institutional and legal systems have been continuously refined to cope with risks and challenges brought by the application of new technologies.

The Chinese Government and related departments have launched a series of strategic plans to effectively promote the digital transformation of service, industry and agriculture.

2.1 Service: Digital upgrade of service driven by information consumption

2.1.1 Information consumption 1.0

In 2013, the Several Opinions on Promoting Information Consumption to Expand Domestic Demand was published, which required a boost to information consumption

development at the national level for the first time and provided a guide to information consumption development at that time.

The policy document clearly defined the critical role and key direction of information consumption at the national level. The spur to information consumption was hailed as an important measure that delivers both immediate and long-term benefits through stable growth and structural adjustment. It can effectively stimulate demand, foster new growth points, and facilitate consumption upgrading, industrial transformation and wellbeing improvement. The policy document also set objectives to be achieved by 2015 in three dimensions.

- **Rapid growth in information consumption.** By 2015, information consumption will exceed ¥3.2 trillion, with an average annual increase of more than 20 per cent, and drive the output of related industries up by more than ¥1.2 trillion. Among them, Internet-based new information consumption will reach RMB 2.4 trillion, with an average annual increase of more than 30 per cent. Along with the rapid expansion of consumption in information platforms such as e-commerce and cloud computing, e-commerce transactions will surpass ¥18 trillion and online retail transactions, ¥3 trillion.
- **Notable improvement in information infrastructure**. By 2015, the new generation of broadband, converged, secure, and ubiquitous information infrastructure that meets the needs of economic and social development will be put in place. Home broadband access will basically reach 20Mbps in urban areas, even 100Mbps in some cities, and 4Mbps in rural areas. Broadband will be accessible for 95 per cent of administrative villages. The construction of smart cities will show great progress.
- **Healthy and active information consumer marke**t. There will be more abundant information products, and services for production, life and management, owing to more active innovation. Market competition will be regulated and transparent, creating a safe and credible consumption environment. Information consumption will generate obvious demonstration effects as residents will have more options and motivations for information consumption. The application of information technology in enterprises will be deepened, and the demand in public services effectively expanded, which further releases the demand for various types of information consumption.

2.1.2 Information consumption 2.0

In August 2017, the Guiding Opinions on Further Expanding and Upgrading Information Consumption to Constantly Release the Potential of Domestic Demand was issued, which again provides policy support for information consumption. At this time, China has become the largest information consumer market and a major supplier of information products and services in the world. It needs to further expand and upgrade information consumption, so as to constantly unleash development vitality and domestic demand potential, and build broad consensus among all walks of life.

As an upgraded version of the 2013 guideline, the policy document put forward the objectives and priority areas for information consumption towards 2020, noting that information consumption has risen into one of the most innovative economic fields with fastest growth and widest radiation.

—Objectives. By 2020, information consumption is expected to reach ¥6 trillion making an average annual increase of more than 11 per cent. Information technology will give a more prominent boost to the consumer field by driving the output of related industries to ¥15 trillion. New types of consumption based on network platforms will expand

rapidly, and new consumption ecosystem featuring online and offline synergy and interaction will grow stronger. An integrated public service system for enterprises and residents will be basically established, with remarkable results achieved in facilitating faster and more affordable Internet connection.

- Priority fields.
  - Life-related information consumption encompasses online-offline integration services for community life, transportation services for convenient travel, creative digital contents and services, and other new facilitation services.
  - Public service-related information consumption mainly involves efficient and equal online public services, such as intelligent health services, online medical services, online education services, and Internet Plus governance services.
  - Industry-related information consumption covers e-commerce platform services for vertical industries and supportive services for the entire process of information consumption.
  - New types of information consumption include novel information products such as high-end mobile communication terminals, wearable devices, and digital home products, and cutting-edge information products such as virtual reality, augmented reality, intelligent and connected vehicles, and intelligent service robots.

2.2 Industry: Digital transformation of industry accelerated by industrial Internet

2.2.1 Informationization and industrialization integration

It is a long-term strategic task to promote the deep integration of informationization and industrialization. Since 2013, the Ministry of Industry and Information Technology has successively published the *Special Plan of Action on Deep Integration of Informationization* and *Industrialization (2013–2018)* and *Implement the Guiding Opinions on Actively Promoting the Internet Plus Action Plan (2015–2018*), which continuously deepens the understanding and steps up the effort in the integration.

2.2.2 Manufacturing and Internet integration

Based on a series of major plans made in the previous period, the Chinese Government issued the *Guiding Opinions on Deepening the Integration of Manufacturing and Internet* in 2016, providing a guide for action to systematically deepen the integration of manufacturing and Internet. The document put forward a group of important development pathways and initiatives to stimulate the innovation vitality, development potential and transformational power of manufacturing enterprises. By means of entrepreneurship and innovation platforms, new models, new formats and new ecosystems for manufacturing and Internet integration will be actively cultivated, with focus on key links of the integration. To achieve the objectives by 2025, two steps will be taken. By 2018, 80 per cent of the key enterprises in the pillar industries of the manufacturing sector will have established entrepreneurship and innovation platforms, which will inject new impetus to manufacturing transformation and upgrading, and enable notable progress in digital, networked and intelligent manufacturing. By 2025, the entrepreneurship and innovation system for manufacturing and Internet integration will be basically in place. With the wide application of new integration models, a new

manufacturing system will be basically established, which contributes to the significant improvement in the comprehensive competitiveness of manufacturing sector.

2.2.3 Industrial Internet

In November 2017, the Chinese Government adopted and issued the *Guiding Opinions on Deepening Internet Plus Advanced Manufacturing and Developing Industrial Internet* to regulate and guide industrial Internet development and promote digital, networked, and intelligent industrial economy.

The guideline proposed a three-step roadmap for building an industrial Internet ecosystem that is compatible with national economic and social development.

- By 2025, an infrastructure and industrial system with international competitiveness will basically take shape. The industrial Internet identify resolution system will be continuously refined and applied in large scale. Three to five international Internet platforms up to international standards will be created, and one million industrial APPs and millions of enterprise clouds will be cultivated.
- By 2035, the world's leading industrial Internet infrastructure and platform will be put in place, and an internationally advanced technological and industrial system will be formed. The industrial Internet will be deeply applied on all fronts, able to lead innovation in the advantageous industries, and be at the forefront of the world in key fields, owning to comprehensive improvement in security capabilities.
- By 2050, the industrial Internet infrastructure will fully support economic and social development. The industrial Internet will reach international advanced levels in terms of innovation capability, technological and industrial system, and integration and application, and rank front in terms of comprehensive strength.

Considering the common needs of global industrial Internet development and the urgent deficiencies in domestic development, the Guiding Opinions highlighted the construction of network, platform and security systems.

- **In terms of network infrastructure**, the focus will be to advance the internal and external network upgrades of enterprises, and build the identity resolution and standard system and low-latency and high-reliability network infrastructure with wide coverage, which provides strong support for industry-wide element interconnection.
- **In terms of platform system**, platforms with higher operational capacity will be built on consolidated foundation, while enterprise clouds and industrial APPs will be nurtured. A robust development pattern will be created, in which construction platforms and use platforms integrate organically and promote mutually.
- **In terms of security assurance**, the overall industrial Internet security capabilities will be enhanced by strengthening protection capacity, establishing the data security protection system, and developing technical measures.

2.3 Agriculture: Digital blueprint of agriculture planned comprehensively by digital countryside

Attaching high importance to the issues of agriculture, rural areas and farmers, the Chinese Government continues to increase policy support for strengthening agriculture, benefiting rural areas and enriching farmers, in a steadfast effort to advance agricultural

modernization and new countryside construction. Issued in early 2018, the *Opinions on Implementing the Strategy of Rural Revitalization* made it clear to implement the digital countryside strategy and bridge the digital divide between urban and rural areas. To this end, China will speed up the coverage of broadband networks and 4G mobile communication networks in rural areas, develop information technologies, products, applications, and services adapted to the characteristics of agriculture, rural areas and farmers, and push forward the popularization of telemedicine, distance education, and similar applications.

In May 2019, the *Outline of Digital Countryside Development Strategy* was officially unveiled. It represents the overarching design and overall planning for digital countryside construction drafted by the Chinese Government， based on field investigations and opinions and suggestions from parties concerned.

The Outline regarded digital countryside as an important component of digital China, taking into account the national and agricultural conditions in a new era. It demanded quicker information technology development to drive and upgrade overall agricultural and rural modernization, which specifically involves four stages:

- **By 2020,** initial progress will be made in digital countryside construction. The rural Internet penetration rate will increase markedly, and the rural digital economy will develop rapidly. The Internet Plus governance will extend to the countryside more quickly, which facilitates network poverty alleviation at deeper levels. Information technology will play a more prominent role in building beautiful and livable countryside.
- **By 2025,** major progress will be made in digital countryside construction, with urban-rural digital divide effectively narrowed. 5G innovations will be gradually applied while 4G gains more popularity in the countryside. Benefited from more convenient circulation services, the rural cyberculture will prosper, and the rural digital governance system will become more perfect.
- **By 2035,** substantial progress will be made in digital countryside construction. The digital divide between urban and rural areas will be sharply reduced as the digital literacy of farmers will be significantly improved. Eco-livable beautiful countryside will be basically realized, in addition to the modernization of agricultural and rural areas, the equalization of basic public services in urban and rural areas, and the modernization of rural governance system and capacity.
- **By 2050,** digital countryside will be built in all respects to support full rural revitalization with strong agriculture, beautiful rural areas and rich farmers.

Ten major tasks were laid out to quickly bridge the urban-rural digital divide and foster new driving forces of rural revitalization, including accelerating rural information infrastructure construction, developing rural digital economy, strengthening innovative technical supply for agriculture and rural areas, building smart green countryside, boosting rural cyberculture, modernizing rural governance capacity, deepening public services in information technology, creating the endogenous power of rural revitalization, deepening network poverty alleviation, and promoting urban and rural integration of information technology development.

3. China's Policy Initiatives for Digital Infrastructure Construction

3.1 Continuously optimize the policy environment

3.1.1 Broadband China Strategy

In August 2013, the Chinese Government unveiled the *Broadband China Strategy and Its Implementation Plan*, which established, at the national level for the first time, the status of broadband networks as strategic public infrastructure, and outlined the phased objectives, implementation roadmap, and key tasks for broadband development.

From 2013 to 2015, the Chinese Government carried out the Broadband China Special Action for three consecutive years to constantly push forward the full upgrade of broadband networks. In order to advance the Broadband China Strategy implementation at the local level, the Chinese Government initiated the program of Broadband China Demonstration Cities (Urban Clusters) in 2014. A total of 117 demonstration cities have been successively built, which accelerates and improves urban broadband development through demonstration and pilot.

All the 31 provinces in the country have released plans or opinions for implementing the Broadband China Strategy and upgrading broadband development. Some provinces have included information infrastructure such as fiber-optic networks and communication base stations into the master plan for urban and rural development, or arranged special funds to support broadband network construction. These efforts have effectively optimized the policy environment for broadband development.

3.1.2 Policy on facilitating faster and more affordable Internet connection

In May 2015, the Chinese Government issued the Guiding Opinions on Accelerating the Construction of High-Speed Broadband Networks and Facilitating Faster and More Affordable Internet Connection. It required accelerating broadband network infrastructure construction and facilitating faster and more affordable Internet connection and better services, and suggested specific measures such as perfecting supportive policies and strengthening organizational implementation.

In March 2016, the *Outline of the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China* laid out the deployment for faster and more affordable Internet connection, including simplifying the tariff structure and raising the cost-effectiveness of telecom services, refining the Internet architecture, access technologies and billing standards, and tightening oversight over Internet pricing practices.

From 2016 to 2018, the Chinese Government launched a special campaign to facilitate faster and more affordable Internet connection that brings extensive benefits to both enterprises and the people. The clear requirements and comprehensive plans made in the campaign include improving network supply capacity, reducing broadband tariffs, increasing high-speed broadband penetration, and optimizing the telecom market environment.

In October 2015, the Chinese Government decided to improve the compensation mechanism for universal broadband telecom services in rural and remote areas, in order to narrow the urban and rural divide, break the bottleneck of rural broadband development, and promote coordinated urban and rural development. In November

2015, *the Decision on Wining the Fight Against Poverty* was announced, clearly required "improving the compensation mechanism for universal telecom services and accelerating the broadband network coverage of poverty-stricken villages." This year, announced also kicked off the pilot program of universal telecom services, aiming to form a joint force for broadband construction followed the principle of "led by central funding, supported by local coordination, and advanced mainly by enterprises". To date, four batches of pilots have been organized, which greatly expanded the coverage of fiber broadband and 4G networks in rural and remote areas.

In order to further advance cloud computing infrastructure, the relevant policy documents such as Outline of National Informatization Development Strategy and the 13th Five-Year Plan for National Information Technology Development step up the support and guidance for application-oriented infrastructure construction. The 13th Five-Year Plan for National Information Technology Development stated that cloud computing data centers should be deployed moderately early and intensively to achieve optimal matching between application-oriented infrastructure and broadband network. The Opinions of the State Council on Promoting the Innovative Development of Cloud Computing and Cultivating New Formats of Information Industry proposed to accelerate the development of cloud computing, create new formats of information industry, and facilitate the upgrading of traditional industries and the growth of emerging industries, so as to foster new growth points. The Guiding Opinions on Data Center Construction and Layout specifically demanded more guidance on application and encouraged administrative agencies to take the lead in using cloud services provided by professional organizations. The Three-Year Action Plan for Cloud Computing Development (2017–2019) deployed a series of measures for better development and application of cloud computing according to the new situation. Propelled by industrial policies at all levels and market demand, cloud computing infrastructure construction picks up the pace in China.

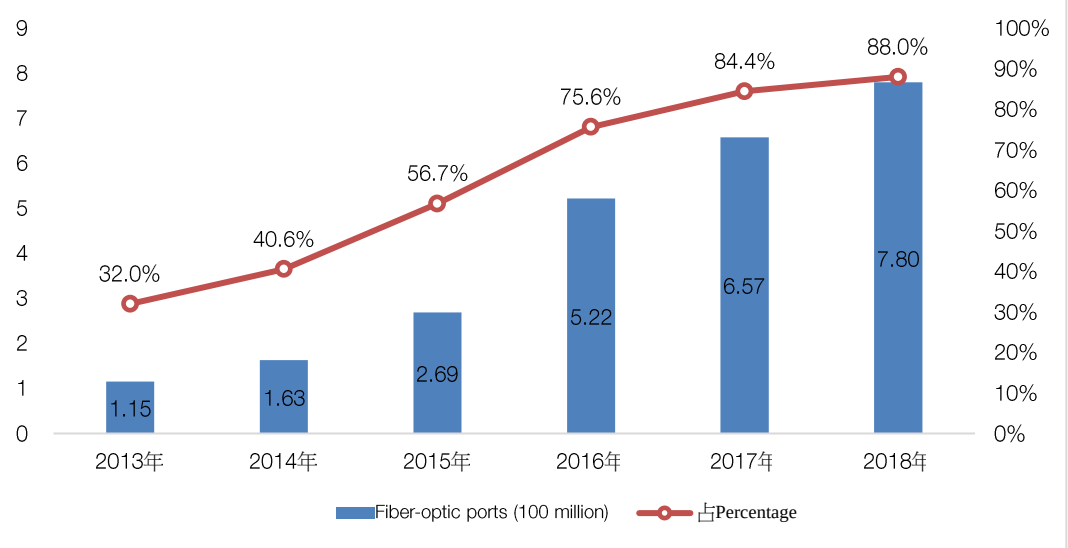
3.2 Make strides in digital infrastructure construction

Under the overall guidance of advancing digital infrastructure construction, the information and communications industry (ICT) sector has moved broadband networks forward in bounds and leaps through joint efforts, mainly reflected in the following aspects:

3.2.1 Entry into the fiber-optic era of fixed broadband networks

As fixed broadband networks are upgraded from copper to fiber, cities have been linked up to fiber-optic networks. By the end of 2018, there were totally 890 million ports for fixed broadband access, covering all cities and towns and over 98 per cent of administrative villages. Fiber-to-the-home (FTTH) has become the dominant broadband access technology, and fiber-optic ports have raised their percentage to 88 per cent in fixed broadband networks.

Figure 1. Quantity and penetration of fiber-optic ports in China



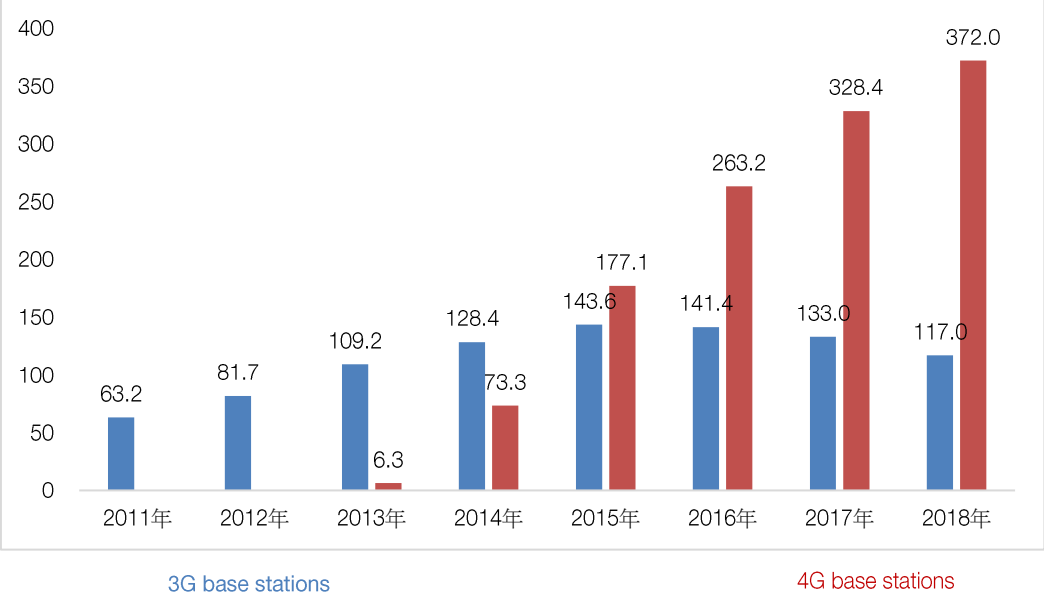
Source: MIIT

3.2.2 Continuous expansion of network construction

China issued the 4G mobile network licenses in December 2013, three to five years later than developed countries. The three major telecom operators speeded up the 4G network construction and put in place the world's largest 4G network in just over two years.

As of 2018, totally 3.72 million 4G base stations were built nationwide, accounting for 57 per cent of the total mobile communication base stations. The 4G networks have achieved the continuous coverage of all towns, hotspot coverage of administrative villages, and full coverage of high-speed railways, subways, and key scenic spots.

Figure 2. China's 3G/4G base station construction



Source: MIIT

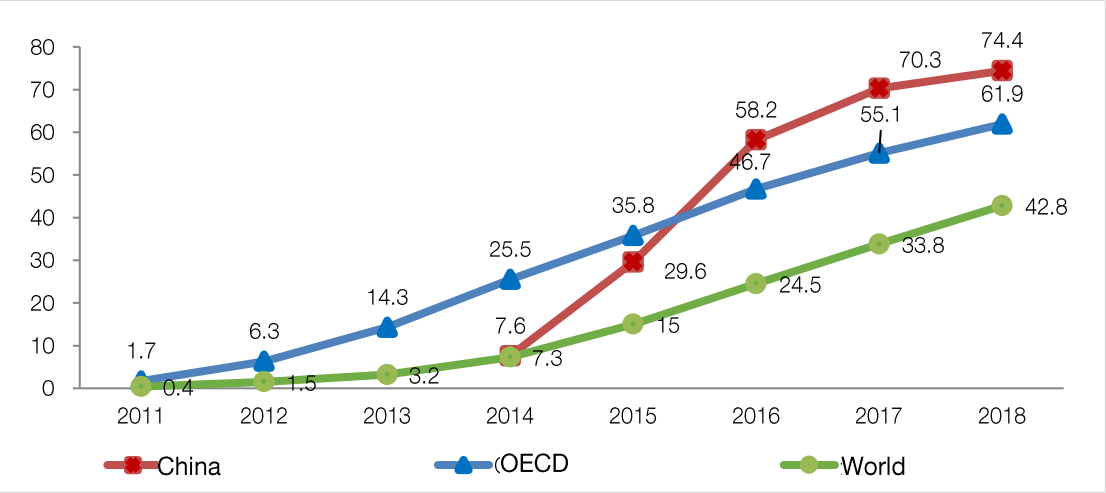
3.2.3 Rapid growth of broadband penetration

In terms of fixed broadband, China's fixed broadband subscriptions attained 407 million as of the end of 2018, and the fixed broadband penetration in population increased to 29 per cent[1], which narrows the gap with developed countries. Among them, 368 million or 90.4 per cent were fiber-optic broadband subscriptions, topping countries around the world.

In terms of mobile broadband, China's 4G subscriptions surpassed 1.17 billion, rendering the largest scale in the world. They accounted for 74.4 per cent of mobile broadband subscriptions, ranking among the world's top five, which far exceeds the level of Organization for :onom Coope :ion an)evelo ıent (O :D) co ries and the global average.

[1] Fixed broadband penetration in population is a core indicator to measure the level of fixed broadband in a country. It is equal to fixed broadband subscriptions divided by the total population in the country the same year.

Figure 3. International comparison of 4G subscription penetration

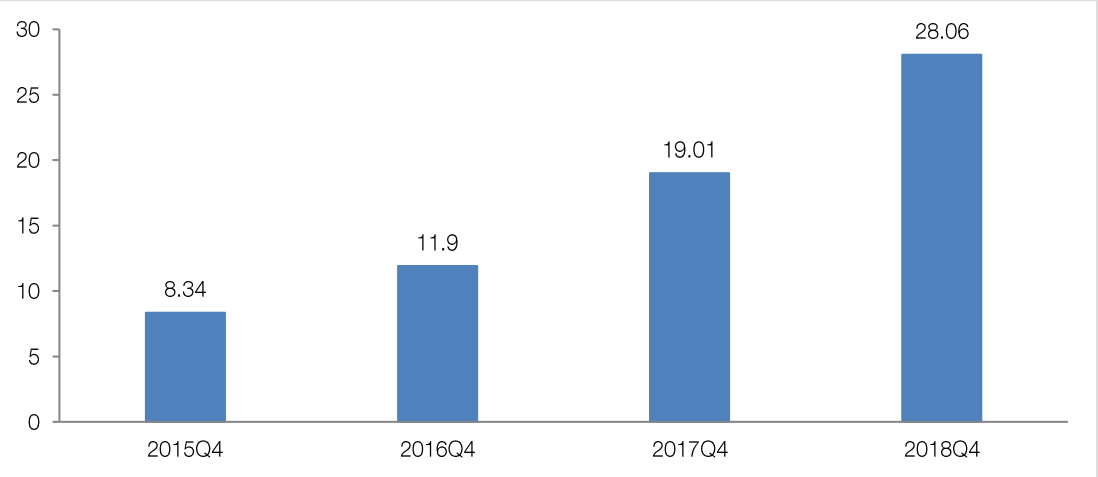


Source: MIIT, OCED, GSMA

3.2.4 Dramatic improvement in download speeds

Fixed broadband access has entered the 100Mbps era. At the end of 2018, 365 million subscribers had access to fixed broadband at speed 50Mbps or above and 286 million subscribers at speed 100Mbps or above, accounting for 89.6 per cent and 70.3 per cent respectively. An increasing proportion of subscribers use high-bandwidth products. The average fixed broadband download speed nationwide reached 28.06Mbps, 3.4 times that of the same period in 2015. The average 4G download speed registered 22.05 Mbps, 1.9 times that of the third quarter of 2016.

Figure 4. Speed of fixed broadband in China

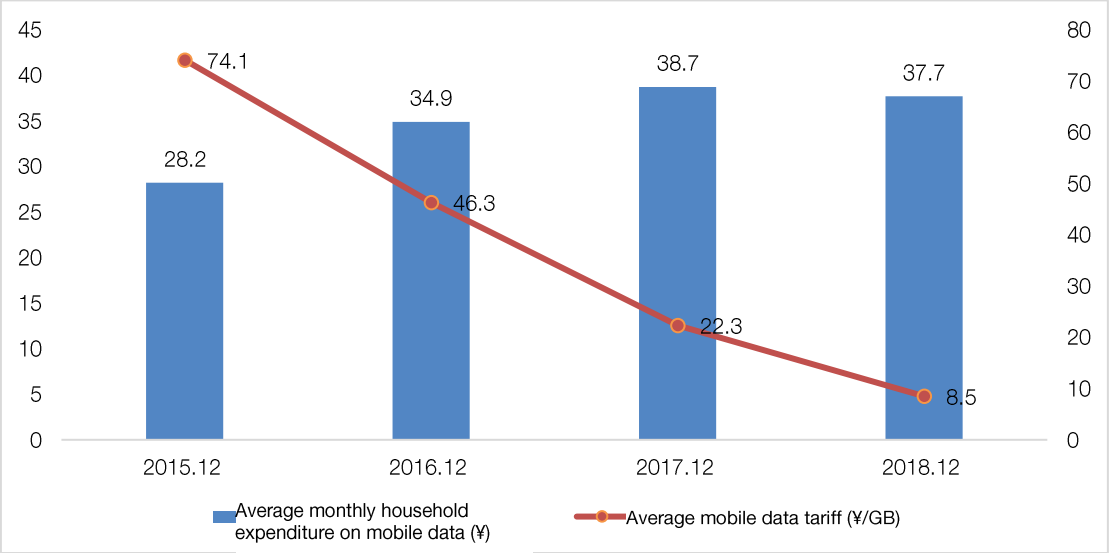


3.2.5 Decline of broadband tariffs year by year

The average fixed broadband tariff decreases steadily. In 2018, the monthly household expenditure on fixed broadband declined by 10 per cent year on year to ¥39.3. The average mobile data tariff fell sharply to ¥8.5/GB, down by 61.8 per cent year on year. While the average monthly household usage increased by 134 per cent year on year to 6.3GB, the average monthly household expenditure decreased by 2.7 per cent year on

year to ¥37.7. China's mobile communication tariffs are at a low level on an international scale.

Figure 5. Mobile data costs of China's mobile broadband subscribers



Source: MIIT

3.2.6 *Noticeable progress in rural broadband network construction*

Since 2015, China has carried out the four pilots of universal telecom services, in which the Central Government and enterprises pooled more than ¥400 million to support the broadband construction in 130,000 administrative villages in 27 provinces (autonomous regions and municipalities).

By the end of 2018, the FTTH penetration in administrative villages hit 98 per cent, and the broadband penetration in poverty-stricken villages exceeded 97 per cent, which means that the objective of over 90 per cent coverage set by the 13th Five-Year Plan has been achieved ahead of schedule.

3.2.7 *Quicker development of cloud computing, data center, and other application-oriented infrastructure*

In recent years, China has moved faster towards the optimal deployment of application-oriented infrastructure as core platforms underpinning network development. Equal emphasis has been put on the scale and layout of data centers. By the end of 2017, China has built 125 large and super-large data centers. The western region accommodates an increasing proportion of data centers that widely use green and energy-saving technologies. Cloud computing infrastructure construction has advanced quickly. At present, cloud computing is enabled in 23.9 per cent of data centers, and industrial clusters are taking shape. Leading enterprises accelerate the global deployment of cloud services to cover North China, East China, and South China and gradually expand to the Asia-Pacific, the United States, the Middle East, and the European Union.

4. China's Data Governance Policies and Regulations

Data has become a key element in the development of digital economy. In order to promote the development and application of big data on all fronts, the *Action Outline for Promoting the Development of Big Data* was issued in 2015. It pointed out that by promoting the development of big data, China will accelerate the construction of national data strength and release technological, institutional, and innovation dividends. Further, three specific tasks were set down: accelerating governance data openness and sharing to improve governance capacity; encouraging industrial innovation to catalyze economic transition; and strengthening data security for healthy development".

As a strategic and guiding document, the Action Outline fully embodies the overarching design and overall layout for big data development at the national level, and guides the development of big data applications, industries and technologies in the country. Pursuant to the document, China continues to formulate and refine relevant policies and regulations in recent years to promote data openness, utilization, and security.

4.1 Facilitate openness and sharing of government data

Government departments often occupy the most abundant data resources in a country, with an absolute advantage in terms of data quantity, quality and variety. In recent years, China has stepped up the efforts to open and share government data, amid the international trend of accelerating data openness and sharing.

The *Regulations on the Openness of Government Information （revised in April 4, 2019)* defined the principles of government information disclosure as routine and non-disclosure as exception. Government departments at all levels are required to strengthen the normalization, standardization, and information technology management of government information resources, and to gradually establish unified platforms that support information retrieval, access and download to improve the quality and efficiency of government information disclosure.

In order to implement the relevant plans on opening public information resources, the related Chinese Government departments announced the *Pilot Program for Opening Public Information Resources*. In accordance with the Program, local governments including Beijing, Shanghai and Guizhou will carry out the pilot of opening government data. Based on the practice, they will formulate relevant local regulations (i.e., *Beijing Measures for Public Data Management* and *Guiyang Regulations on Government Data Sharing and Openness*), and establish unified platforms for pooling, storing, and opening government data (i.e., Beijing Municipal Government Data Resource Network and Guizhou Provincial Government Data Platform). At present, the advanced experiences of the pilot areas are shared throughout the country.

In addition, the Chinese Government announced the *Interim Measures for the Administration of Sharing of Government Information Resources,* for the purpose of accelerating the interconnection of government information systems and the sharing of public data and improving governments' credibility and services. According to the *Interim Measures*, *the Guidelines for the Preparation of Catalogues of Government Information Resources* will be made at the nation level to specify the categorization, format, attribute, updating time, sharing method, and use requirements, among others,

of government information resources. Unified data sharing and exchange platforms will also be created.

4.2 Promote the development and utilization of data resources

China released the *Big Data Industry Development Plan (2016–2020)* in order to accelerate the implementation of national big data strategy and promote the sound and rapid development of big data industry. Focusing on strengthening innovation capabilities, the Plan proposed to advance big data application, accelerate market player cultivation, and improve the support system for big data industry. It put forward such key projects as the research & development and industrialization of key big data technologies and products, upgrade of big data service capacity, and construction of big data public service system.

Under the guidance, the requirements for promoting the development and utilization of data resources have been refined in various fields. For example:

- Governance. The *Several Opinions on the Use of Big Data to Strengthen Service for and Oversight over Market Players* called for the use of big data to innovate governance concepts and approaches. Big data technologies should be fully employed to actively grasp the common and differentiated needs of different regions and industries and different types of enterprises, so as to proactively provide more targeted services in terms of registration, market access, and bidding.
- Transportation. The *13th Five-Year Plan for the Development of Modern Comprehensive Transportation System* required strengthening the collection, mining and application of transportation information, facilitating the comprehensive development of data resources in all fields and the utilization and sharing across sectors, and encouraging the industrialization of transportation big data.
- Scientific research. The *Administrative Measures on Scientific Data* clearly stated legal entities shall analyze and mine the scientific data according to their needs, including data generated by basic research, applied research, and experimental development in the fields of natural sciences and engineering sciences, and shall form valuable scientific data products and value-added services.

4.3 Enhance the protection of personal information security

China attaches great importance to personal information protection， has initially established a legal system for the protection of personal information, including the *Decision of the Standing Committee of the National People's Congress on Strengthening Online Information Protection, Criminal Law*, *General Principles of Civil Law*, *Cybersecurity Law*, *E-commerce Law*, *Law on the Protection of Consumer Rights and Interests*, and *Regulations on the Protection of Personal Information of Telecommunications and Internet Users*.

- Definition of personal information. Personal information refers to various information recorded by electronic or other means that can clarify the personal identity of natural persons, either alone or in combination with other information,

including but not limited to the name, date of birth, identity number, personal biometric information, address, and phone number of natural persons.

- Personal information protection of natural persons by law. Any organization or individual that needs the personal information of others shall obtain information and ensure information security according to law.
- Principles and preconditions for collecting and using personal information. Network operators shall follow the principles of legitimacy, justice, and necessity, make public the rules and clearly indicate the purpose, method and scope of information collection and use, and obtain the consent of targeted groups. E-commerce platform operators shall develop platform service agreements and transaction rules to define the rights and responsibilities in the protection of personal information.
- Disclosure notice obligation. Where there is or may be leakage of personal information, network operators shall promptly inform users and report to the relevant competent departments;
- Tort liability and penalties for related acts: Market operators, who infringe the consumers' rights of personal information protected by law, shall stop such infringement, restore consumer reputation, eliminate influence, make an apology, and compensate for the losses of consumers. Where a crime is constituted for selling or providing personal information to others, they shall face up to seven years in prison in accordance with the provisions of the Criminal Law.
- Based on above-mentioned provisions, the legislatures of China are building a more systematic and comprehensive system for personal information protection. In September 2018, the Standing Committee of the National People's Congress (NPC) issued the "Legislative Plan of the Thirteenth NPC Standing Committee", which included the "Personal Information Protection Law" into the first category of legislative projects to accelerate its development.

4.4 Improve the security management of critical data

Ensuring the safety of critical data is a consensus of the international community. In recent years, China has clarified the basic principle of “equal emphasis on safety and development, promotion and regulation”, and on the basis of encouraging the rational use of data resources according to law, continuously strengthen the protection of critical data such as the fields of critical information infrastructure, map surveying, population health and so on.

At the same time, China is working on a more systematic and complete system for data security protection, in order to adapt to the development of the digital economy and changes in international legislative trends. At present, the *Data Security Law* has been included in the *Legislative Plan of the 13th NPC Standing Committee*, and the legislatures are accelerating the research and development of this law. The national cyberspace authorities have formulated the *Measures for Data Security Management (Draft for Comments)*, which is now available for public comments.