The 48th Statistical Report on China's Internet Development

China Internet Network Information Center (CNNIC)

August 2021

Preface

In 1997, China's competent departments authorized China Internet Network Information Center (CNNIC) to organize relevant Internet entities to jointly carry out the Statistical Survey on Internet Development in China and regularly release the *Statistical Report on Internet Development in China* (hereinafter referred to as the "Report") at the beginning and middle of each year. Ever since then, CNNIC has published 47 reports. The Report has reflected the process of building up China's strength in manufacturing and cyberspace through core data. It has provided an important reference for Chinese government departments, domestic and international industry institutions, experts and scholars to understand the development of China's Internet and formulate relevant policies.

The year of 2021 marks the 100th anniversary of the founding of the Communist Party of China and the opening year of the 14th Five-Year Plan. With remarkable achievements made in China's industrial and information development, solid steps have been advanced in manufacturing and cyberspace development. The Internet industry has achieved leapfrog development, with the more prominent role in basic support, innovation, integration and leading, significantly enhancing its status in the national economy and society. Industrial Internet promotes the deep integration of digital technology and the traditional real economy by empowering the digital transformation of thousands of industries, serving as an important engine to boost the high-quality development of the economy and society.

Serving as a faithful recorder of implementing the national strategy for manufacturing and cyber development, CNNIC has followed the development of China's Internet, expanding the scope of research and subdividing research areas. The Report focuses on the five aspects of basic Internet development, size of Internet users, Internet applications, industrial Internet, and Internet security. From a multi-pronged perspective, CNNIC has demonstrated the development of China's Internet in the first half of 2021 through all-round data.

Here, we hereby express our heartfelt thanks to the Ministry of Industry and Information Technology of the PRC, the Office of the Central Cyberspace Affairs Commission, the National Bureau of Statistics of China, the Central Committee of the Communist Youth League, and other departments and units for their guidance and support for the Report. We would also like to express our sincere thanks to other institutions and Internet users that have supported this statistical survey on Internet development.

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Overview

Core Data

◇ As of June 2021, China had 1,011 million netizens, up by 21.75 million over December 2020, and its Internet penetration had reached 71.6%, up 1.2 percentage points over December 2020.

◇ Up to June 2021, the number of mobile Internet users in China had reached 1,007 million, up 20.92 million over December 2020. The proportion of China's netizens accessing the Internet via mobile phones amounted to 99.6%, roughly unchanged from December 2020.

◇ As of June 2021, the size of rural Internet users was 297 million or 29.4% of the total, while that of urban Internet users was 714 million or 70.6% of the total.

◇ Up to June 2021, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptop computers, TVs and tablet computers were 99.6%, 34.6%, 30.8%, 25.6% and 24.9%, respectively.

◇ As of June 2021, the number of IPv6 addresses had amounted to 62,023 blocks/32, up 7.6% over December 2020.

◇ Up to June 2021, the number of China's domain names totaled 31.36 million. China had 15.09 million domain names ending with ".CN", making up 48.1% of the national total.

◇ As of June 2021, instant messaging users in China reached 983 million, up 2.18 million from December 2020, making up 97.3% of all Internet users.

◇ Up to June 2021, the user size of online video (including video clips) in China had reached 944 million, up 17.07 million from December 2020, making up 93.4% of all Internet users. The number of video clip users amounted to 888 million, up by 14.40 million from December 2020, accounting for 87.8% of all Internet users.

◇ As of June 2021, the user size of online payment in China had reached 872 million, up 17.87 million from December 2020, taking up 86.3% of all Internet users.

◇ As of June 2021, the user size of online shopping in China had reached 812 million, up 29.65 million from December 2020, taking up 80.3% of all Internet users.

◇ Up to June 2021, the user size of online news in China had reached 760 million, up 17.12 million from December 2020, making up 75.2% of all Internet users.

◇ As of June 2021, the user size of online meal ordering in China had reached 469 million, up 49.76 million from December 2020, taking up 46.4% of all Internet users.

◇ Up to June 2021, the user size of online office in China had amounted to 381 million, up 35.06 million from December 2020, accounting for 37.7% of all Internet users.

CHAPTER ONE Basic Internet Development

I Basic Internet Resources

As of June 2021, the number of IPv4 addresses in China was 393.19 million, that of IPv6 addresses was62,023 blocks/32, and that of active IPv6 users reached 533 million. The total number of domain names in China was 31.36 million, of which the number of domain names ended with ".CN" was 15.09 million, accounting for 48.1%. The number of mobile phone base stations in China totaled 9.48 million, that of Internet broadband access ports reached 982 million, and the total length of fiber optic cable lines amounted to 53.52 million kilometers.

Table 1 Comparison — Basic Internet Resources from Dec. 2020 to Jun. 2021

	Dec. 2020	Jun. 2021
IPv4	389,231,616	393,187,072
IPv6 (block/32)	57,634	62,023
Number of active IPv6 users (100 million)	4.62	5.33
Domain name	41,977,611	31,362,443
Domain names ending with ".CN"	18,970,054	15,087,000
Mobile phone base stations (10,000)	931	948
Internet broadband access ports (100 million)	9.46	9.82
Length of fibre optic cable lines (10,000 km)	5169	5352

(I) IP Address

Up to June 2021, the number of IPv6 addresses had amounted to 62,023 blocks/32, up 7.6% over December 2020. Of the 23 public recursive server providers with global visibility under the monitoring of CNNIC, 12 offer IPv6 public recursive services.

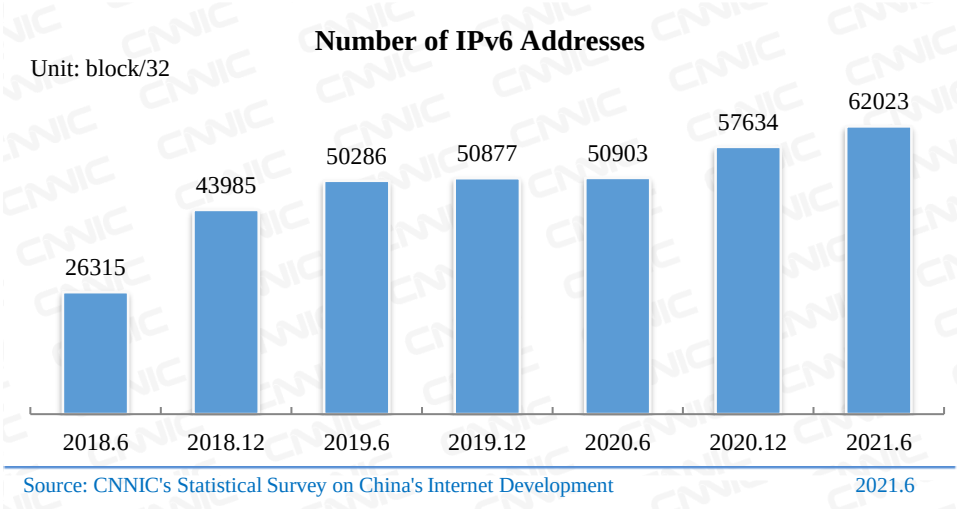


Figure 1 Number of IPv6 Addresses[1]

As of June 2021, the number of active IPv6 users reached 533 million, up 15.4% over December 2020.

[1]The data cover Hong Kong, Macao and Taiwan.

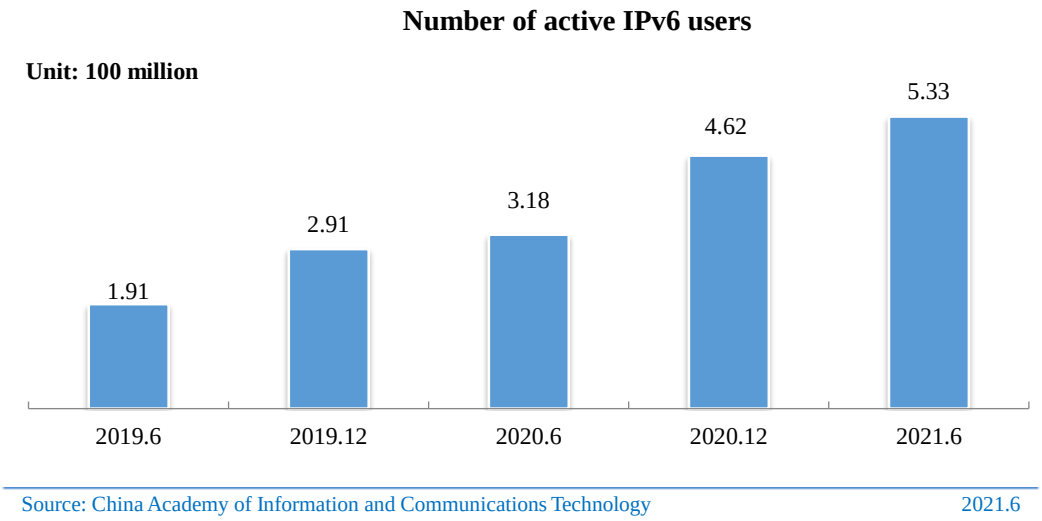


Figure 2 Number of Active IPv6 Users

Up to June 2021, the number of IPv4 addresses was registered at 393.19 million.

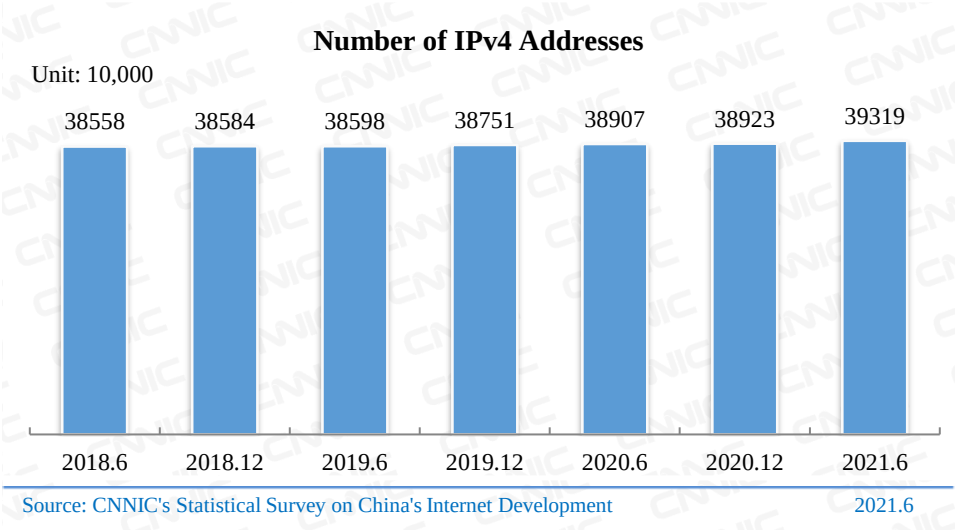


Figure 3 Number of IPv4 Addresses[2]

(II) Domain Name

As of December 2021, China had a total of 31.36 million domain names, of which 15.09 million or 48.1% were ended with ".CN"; 11.34 million or 36.2% were ended with ".COM"; 0.21 million or 0.7% were ended with ".中国"; and 3.61 million or 11.5% were new generic Top-Level Domains (New gTLD).

[2]The data cover Hong Kong, Macao and Taiwan.

Table 2 Number of Domain Names by Category[3]

	Number	Proportion in total domain names
.CN	15087000	48.1%
.COM	11338587	36.2%
.NET	879201	2.8%
.中国	210398	0.7%
.ORG	127650	0.4%
.INFO	26702	0.1%
.BIZ	18644	0.1%
New GTLD	3607385	11.5%
OTHERS	66876	0.2%
TOTAL	31362443	100.0%

Table 3 Number of Domain Names Ending with ".CN" by Category

	Number	Proportion in total ".CN" domain names
.CN	11985873	79.4%
.COM.CN	2559547	17.0%
.NET.CN	268449	1.8%
.ORG.CN	187771	1.2%
.ADM.CN[4]	52502	0.3%
.GOV.CN	16867	0.1%
.AC.CN	9377	0.1%
.EDU.CN	6423	0.0%
OTHERS	191	0.0%
Total	15087000	100.0%

(III) Number of Mobile Phone Base Stations

The number of mobile phone base stations is growing fast, while the construction of 5G networks is being advanced steadily. As of June 2021, mobile phone base stations totaled 9.48 million, a net increase of 170,000 from December 2020. Specifically, the number of 4G base stations totaled 5.84 million, accounting for 61.6%; the number of 5G base stations was 961,000, including 190,000 new ones built in the first half of 2021.

[3] Generic Top-Level Domains (gTLD) and new generic Top-Level Domains (New gTLD) are provided by China's domain name registration units. The number of ". CN" and ". 中国" domain names is the volume of global registration.

[4] .ADM.CN refers to a virtual secondary domain name that is the collective name for all administrative domain names (second-level domain names) under ".CN".

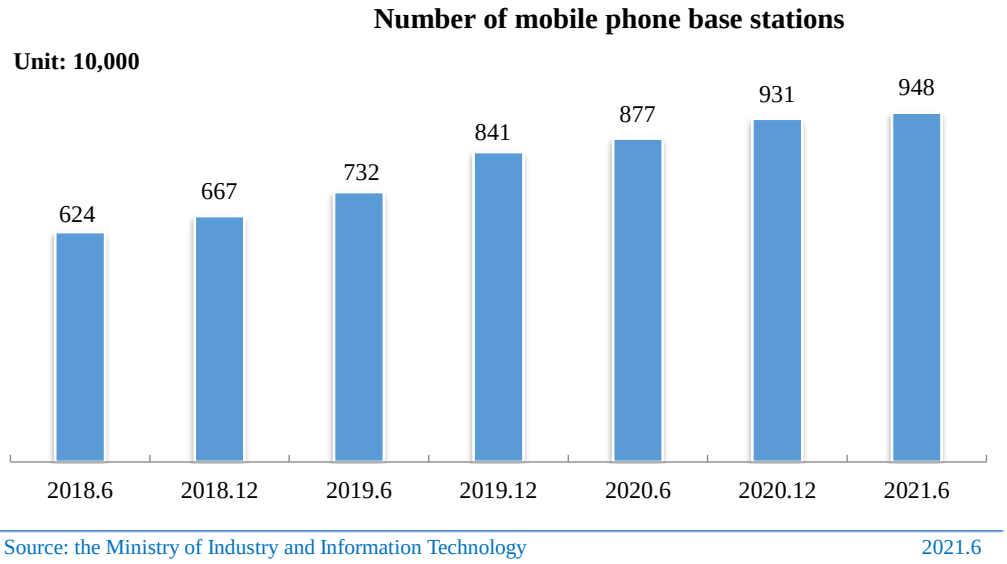


Figure 4 Number of Mobile Phone Base Stations

(IV) The Number of Internet Broadband Access Ports

The development of broadband networks is being expedited. As of June 2021, Internet broadband access ports nationwide reached 982 million, a net increase of 35.63 million from December 2020. Specifically, the number of FTTH/O[5] ports reached 918 million, a net increase of 37.9 million over December 2020, while the proportion increased to 93.5% from 93.0% at the end of 2020. Gigabit broadband deployment accelerates as 10G PON[6]ports are being rapidly developed.

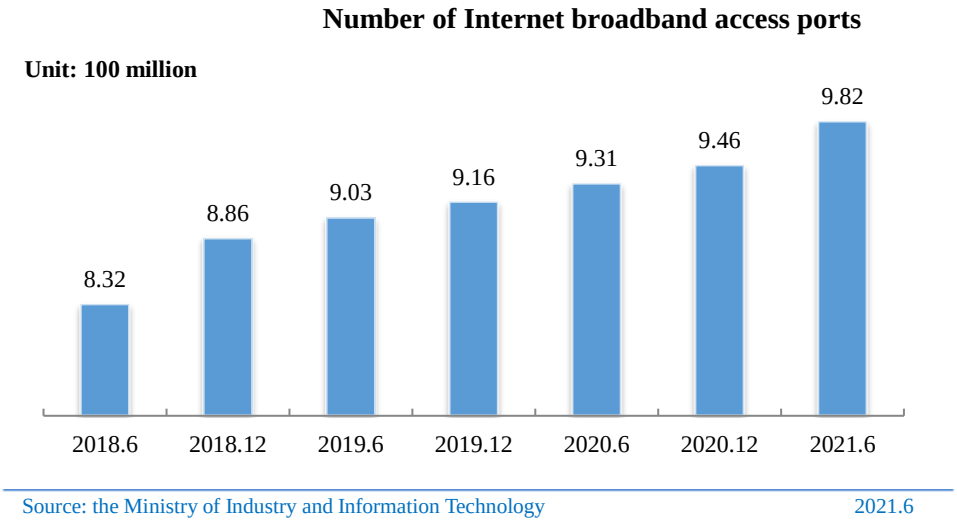


Figure 5 Number of Internet Broadband Access Ports

(V) Length of Fiber Optic Cable Lines

The total length of fiber optic cable lines has steadily increased. As of June 2021, the length of fiber optic cable lines in China totaled 53.52 million kilometers, a net increase of 1.83 million

[5]FTTH/O refers to FTTH and FTTO. FTTH means Fiber to the home. FTTO stands for Fiber to the office.
[6] PON refers to an abbreviation for Passive Optical Network.

kilometers from December 2020. The proportions of access network fiber optic cable, local relay fiber optic cable and long-distance optic cable lines were 63.5%, 34.4% and 2.1%, respectively. The access network fiber optic cable, up by a net increase of 1.93 million kilometers or two percentage points from December 2020, has driven the further optimization and upgrading of fiber optic networks.

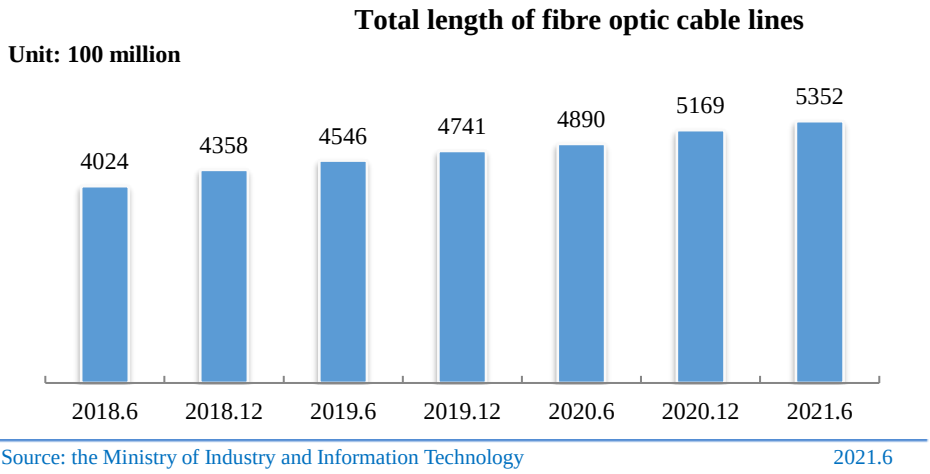


Figure 6 Total Length of Fibre Optic Cable Lines

II Application of Internet Resources

(I) Websites

As of June 2021, there were 4.22 million websites[7] in China, down 4.7% from December 2020.

Figure 7 Number of Websites[8]

Up to June 2021, China had 2.61 million websites with domain names ending with ".CN", down 11.5% from December 2020.

[7] The websites whose domain name registrants are within the territory of the P.R.C.
[8] The number of websites does not include that of those ending with ".EDU.CN".

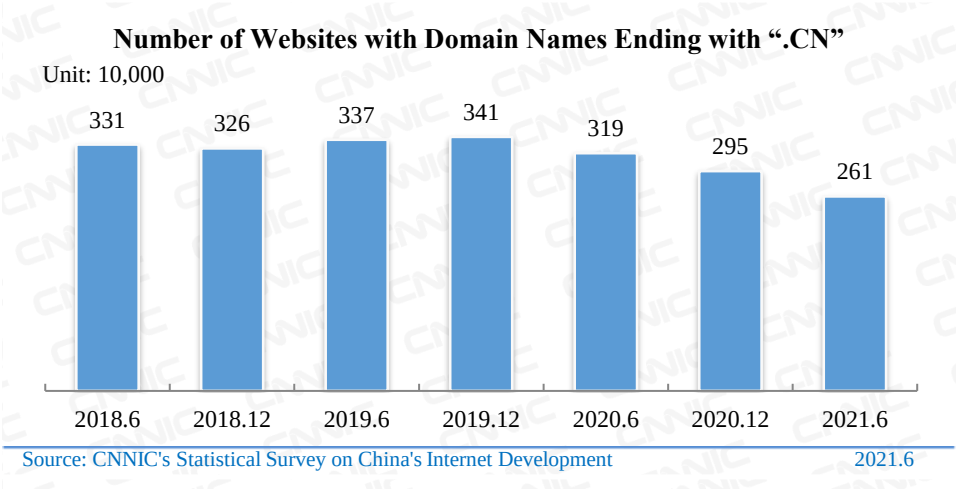


Figure 8 Number of Websites with Domain Names Ending with ".CN"[9]

(II) Mobile Internet Access Traffic

In the first half of 2021, mobile Internet access traffic reached 103.3 billion GB, up 38.7% year-on-year.

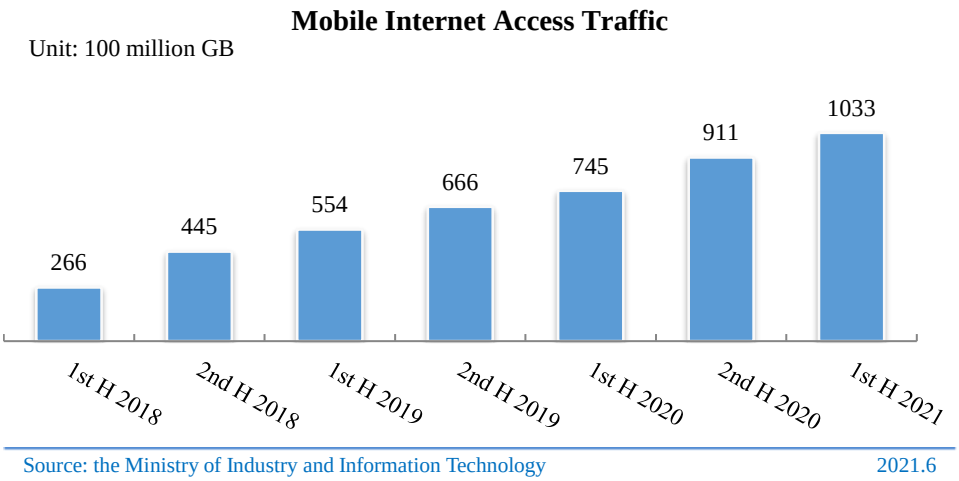


Figure 9 Mobile Internet Access Traffic

(III) Number and Category of Apps

As of June 2021, the number of Apps monitored in the domestic market was 3.02 million, a decrease of 430,000 or 12.5% from December 2020.

[9]The number of websites ending with ".CN" does not include that of those ending with ".EDU.CN".

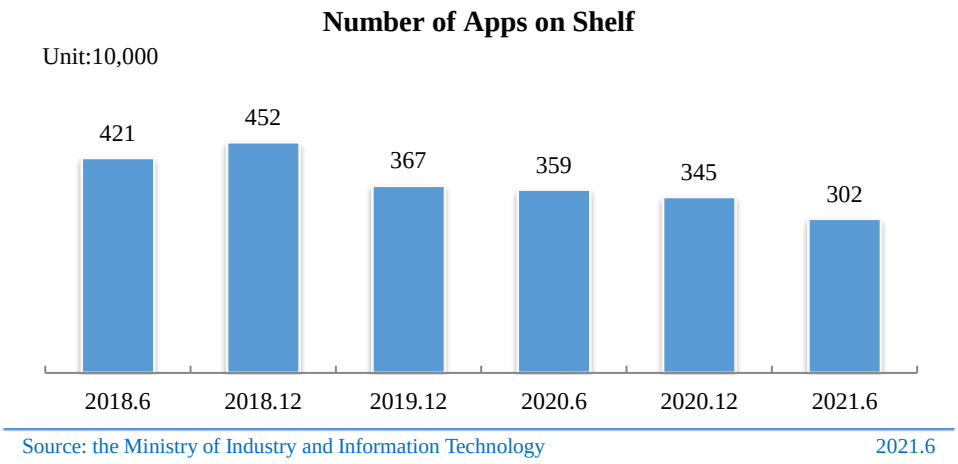


Figure 10 Number of Apps on Shelf[10]

As of June 2021, the top four categories of mobile Apps in their scale accounted for 58.2% of the total. The number of game Apps continued to lead, reaching 729,000, making up 24.1% of all Apps. The number of daily tools, e-commerce and social communication Apps reached 465,000, 295,000 and 271,000, respectively, ranking second to fourth in the scale of mobile applications and accounting for 15.4%, 9.8% and 9.0% of all Apps, respectively.

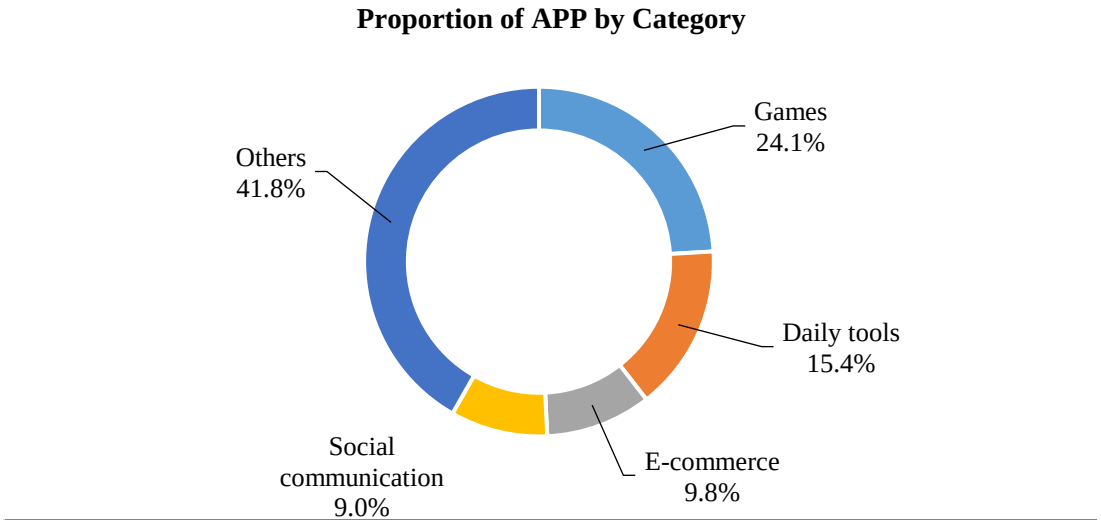


Figure 11 Proportion of APP by Category

III Internet Access Environment

(I) Internet Access Devices

Up to June 2021, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptop computers, TVs and tablet computers were 99.6%, 34.6%, 30.8%, 25.6% and 24.9%, respectively.

[10] On shelf: from 2019 onwards, the method of monitoring data would be shifted from a cumulative strategy (i.e. the statistics are calculated cumulatively) to an on-shelf strategy (i.e. the statistics are only for on-shelf) to more accurately reflect the mobile App market dynamics.

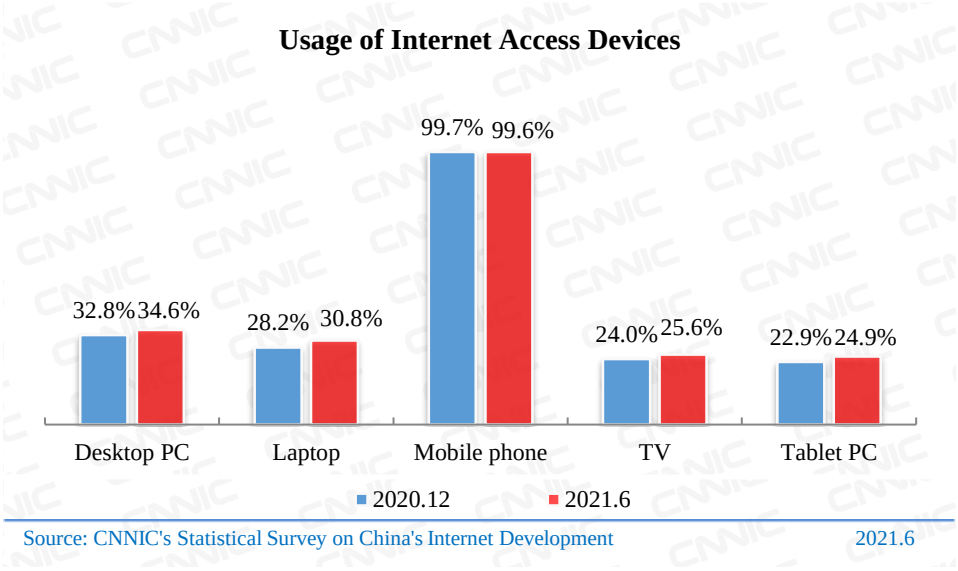


Figure 12 Usage of Internet Access Devices

The size of mobile phone subscribers remained stable. As of June 2021, the three basic telecommunications companies had 1.614 billion mobile phone subscribers, a net increase of 19.85 million from December 2020.

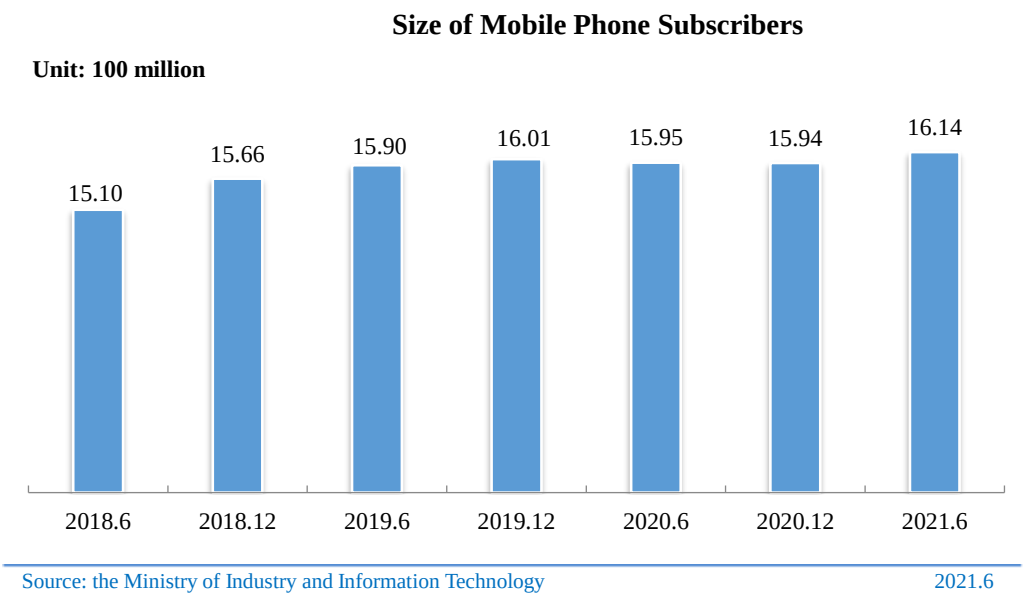


Figure 13 Size of Mobile Phone Subscribers

The number of 5G mobile phone subscribers is growing rapidly. As of June 2021, the three basic telecommunications companies had 365 million 5G mobile phone terminal connections, a net increase of 166 million over December 2020.

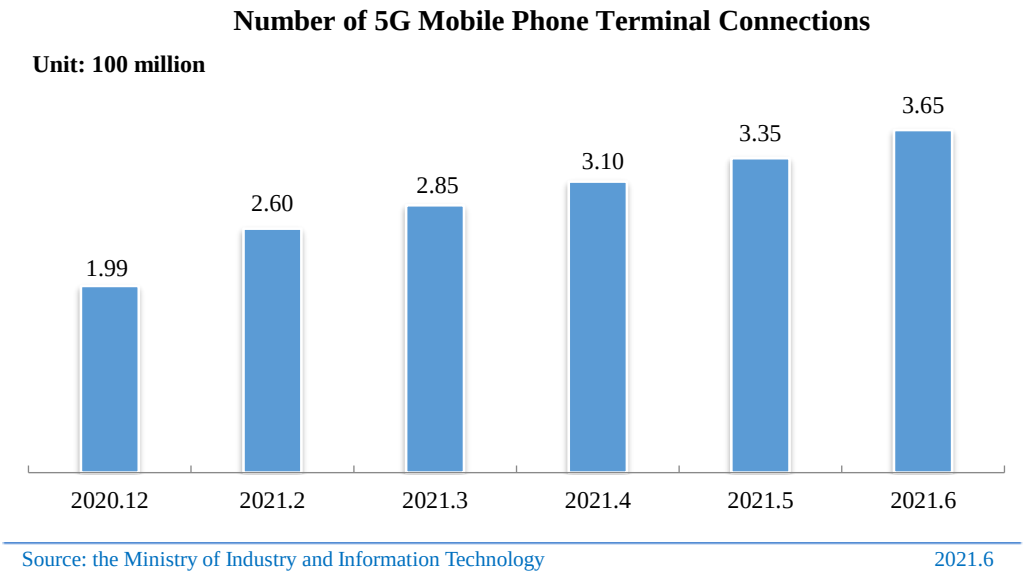


Figure 14 Number of 5G Mobile Phone Terminal Connections

The shipment of 5G mobile phones is making up an increasing share in the total. In the first half of 2021, the shipment of domestic mobile phones amounted to 174 million, up 13.7% year-on-year, including 128 million 5G mobile phones, up 100.9% year-on-year.

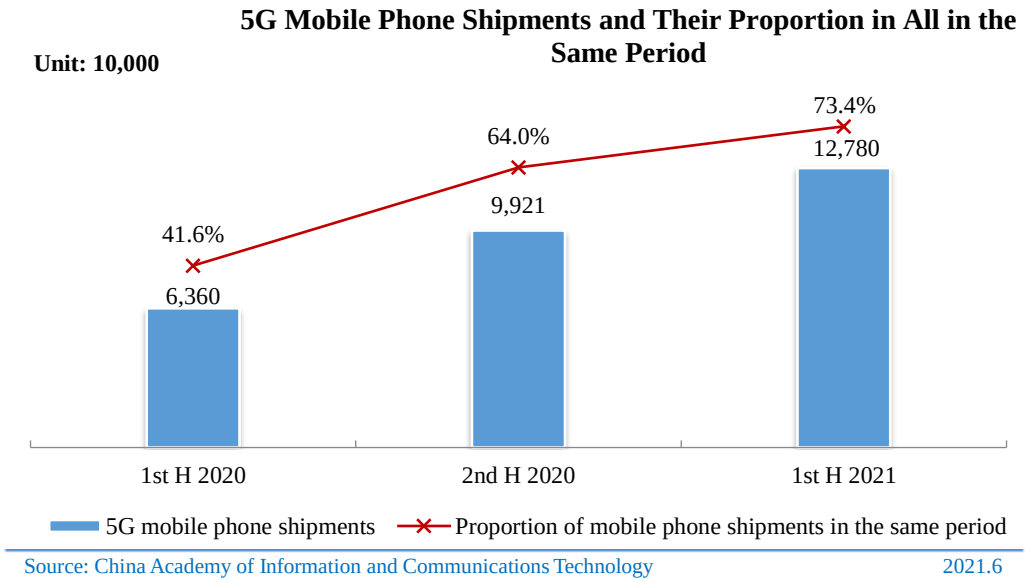


Figure 15 5G Mobile Phone Shipments and Their Proportion in All in the Same Period

(II) Online Duration

As of June 2021, the per capita weekly online duration[11] of China's Internet users was 26.9 hours, up 0.7 hours over December 2020.

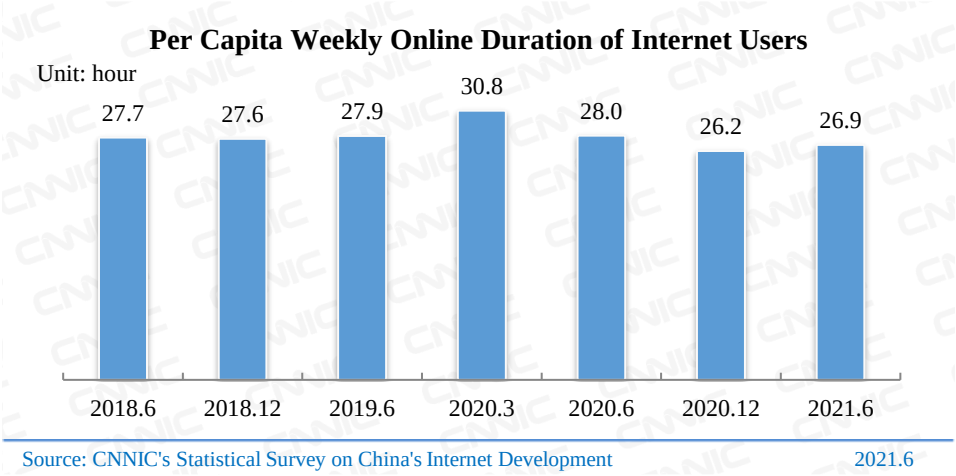


Figure 16 Per Capita Weekly Online Duration of Internet Users

(III) Fixed Broadband Access

As of June 2021, the three basic telecommunications companies had 510 million fixed broadband subscribers, a net increase of 26.06 million from December 2020. Specifically, fixed Internet broadband access subscribers with access rates of 100Mbps and above reached 466 million, accounting for 91.5% of all subscribers, up 1.6 percentage points from December 2020. Fixed Internet broadband access subscribers with access rates of 1000Mbps and above reached 14.23 million, up 122.3% from December 2020, making up 30.1% of new subscribers.

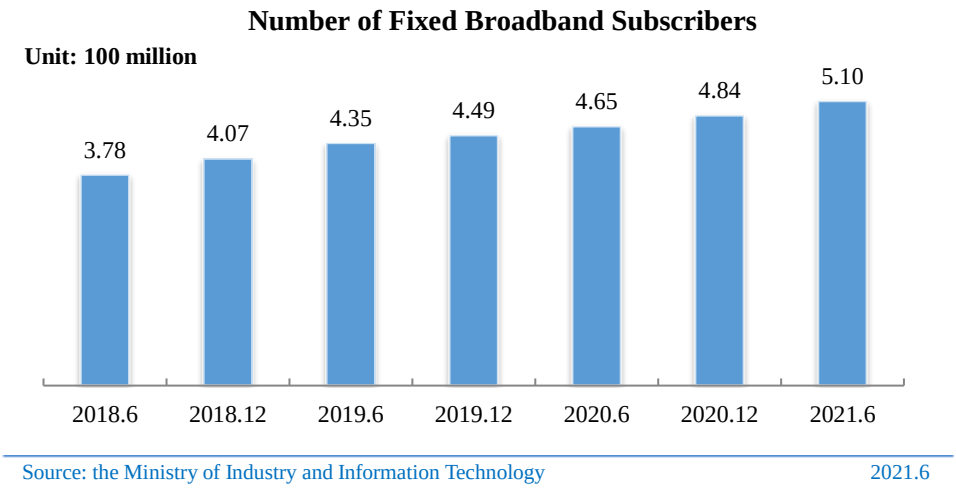


Figure 17 Number of Fixed Broadband Subscribers

[11]Per capita weekly online duration refers to the average daily number of hours of accessing the Internet multiplied by 7 days in a week in the past six months.

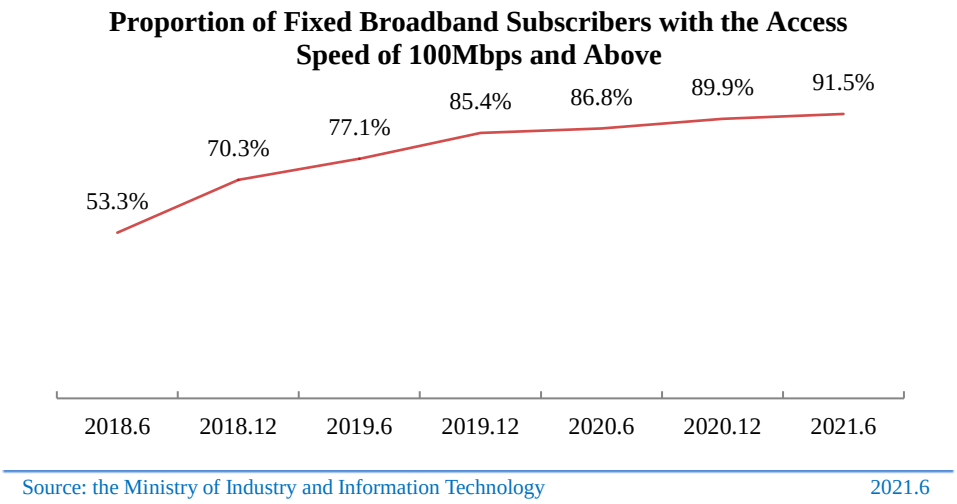


Figure 18 Proportion of Fixed Broadband Subscribers with the Access Speed of 100Mbps and Above

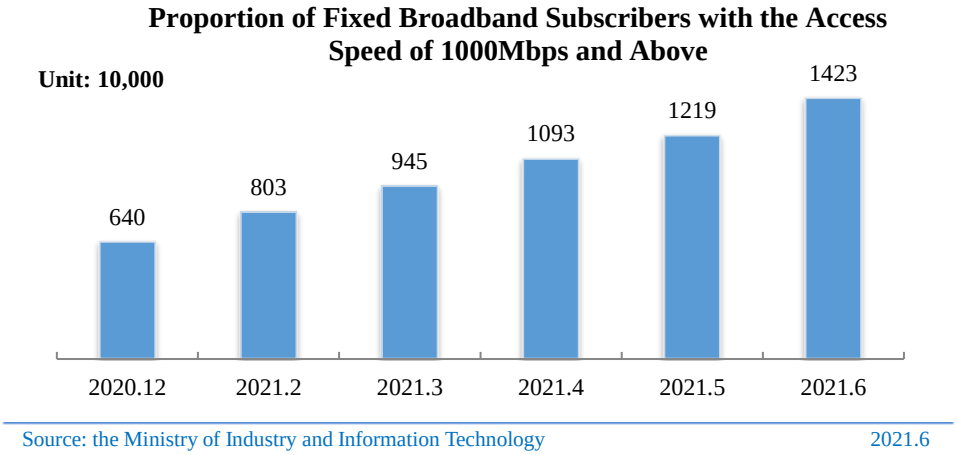


Figure 19 Proportion of Fixed Broadband Subscribers with the Access Speed of 1000Mbps and Above

As of June 2021, the FTTH/O[12] users had reached 480 million, accounting for 94.1% of all Internet broadband subscribers, up 0.2 percentage points from December 2020.

[12]FTTH/O refers to FTTH and FTTO. FTTH means Fiber to the home. FTTO stands for Fiber to the office.

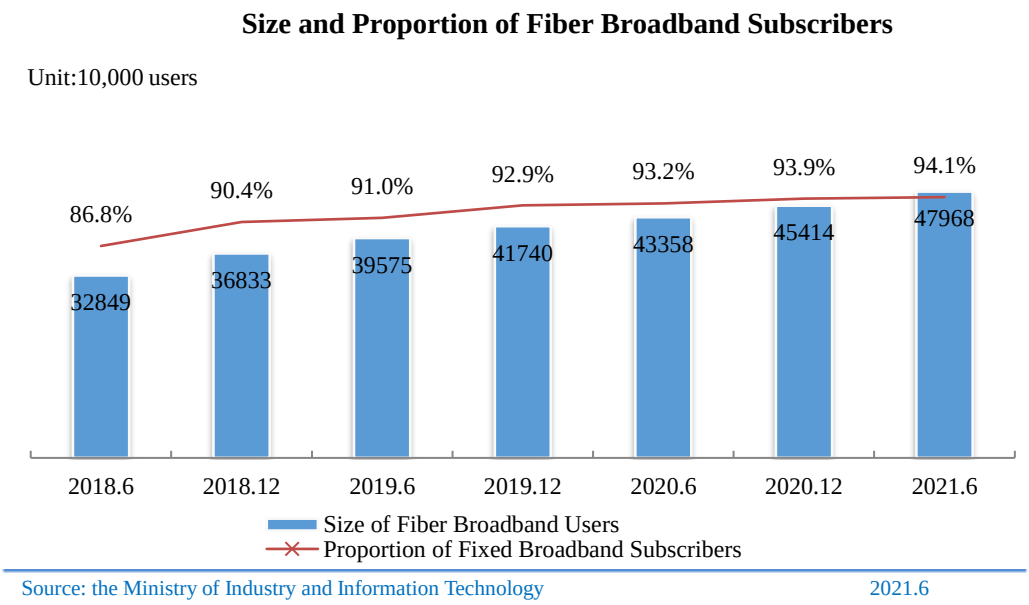


Figure 20 Size and Proportion of Fiber Broadband Subscribers

(IV) Number of Cellular IoT Terminal Users

As of June 2021, the three basic telecom companies developed 1.294 billion cellular IoT terminal[13] users, a net increase of 158 million from December 2020. Terminal users specializing in smart manufacturing, smart transportation and smart public utilities accounted for 17.5%, 17.1% and 22.6%, respectively. End-users of smart public utilities grew by 23.3% year-on-year, the most significant growth.

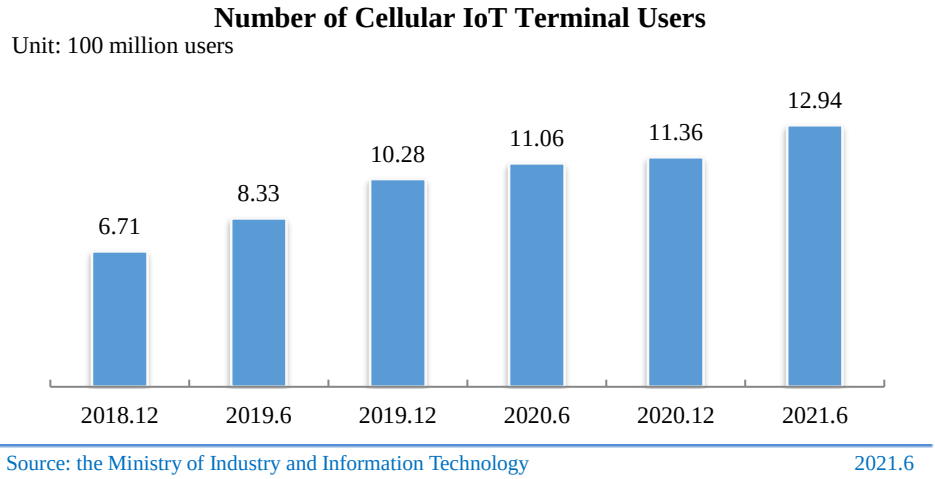


Figure 21 Number of Cellular IoT Terminal Users

[13]Cellular IoT terminal: IoT terminal accesses the GSM network (such as the GPRS network of China Mobile), integrates with the 2G mobile communication module, with a SIM card inserted into it, and exchanges data with background through GPRS network. Cellular IoTs include Narrowband Internet of Things (NB-IOT), Enhanced Machine Type Communication (eMTC), and others.

CHAPTER TWO Size and Structure of Internet Users

I Size of Internet Users

(I) Overall Size of Internet Users

Up to June 2021, China had 1011 million netizens, up 21.75 million over December 2020, and its Internet penetration had reached 71.6%, up 1.2 percentage points over December 2020.

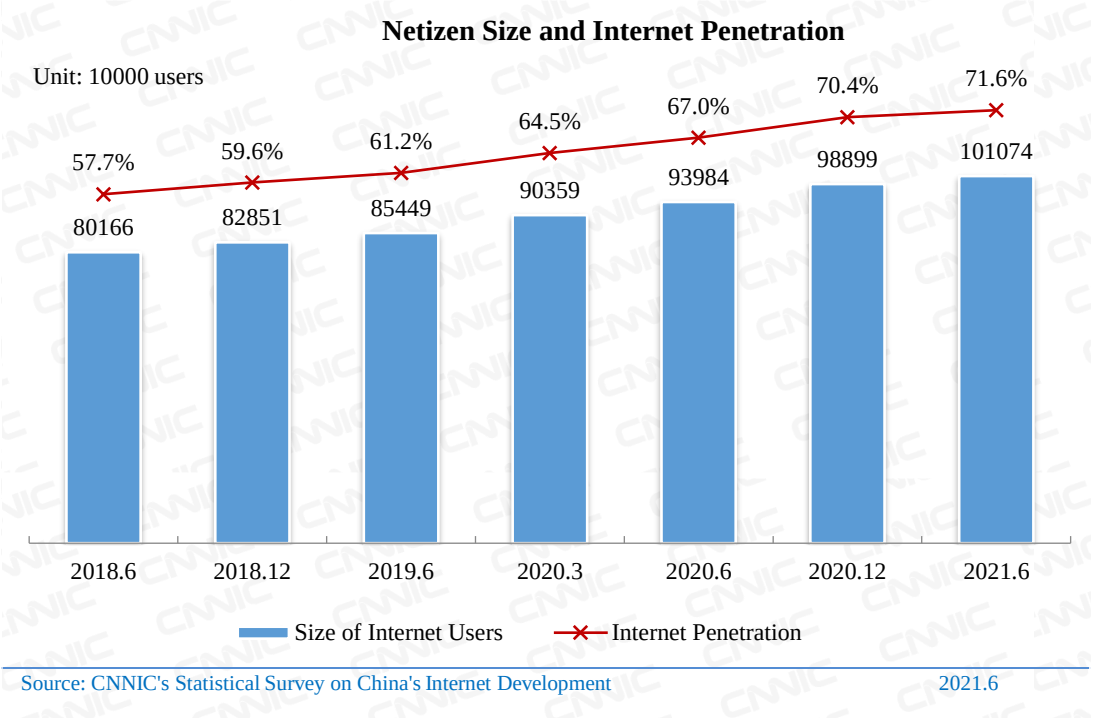


Figure 22 Netizen Size and Internet Penetration

Up to June 2021, the number of mobile Internet users in China had reached 1.007 billion, up 20.92 million over December 2020. The proportion of Chinese netizens accessing the Internet via their mobile phones had amounted to 99.6%, roughly unchanged from December 2020.

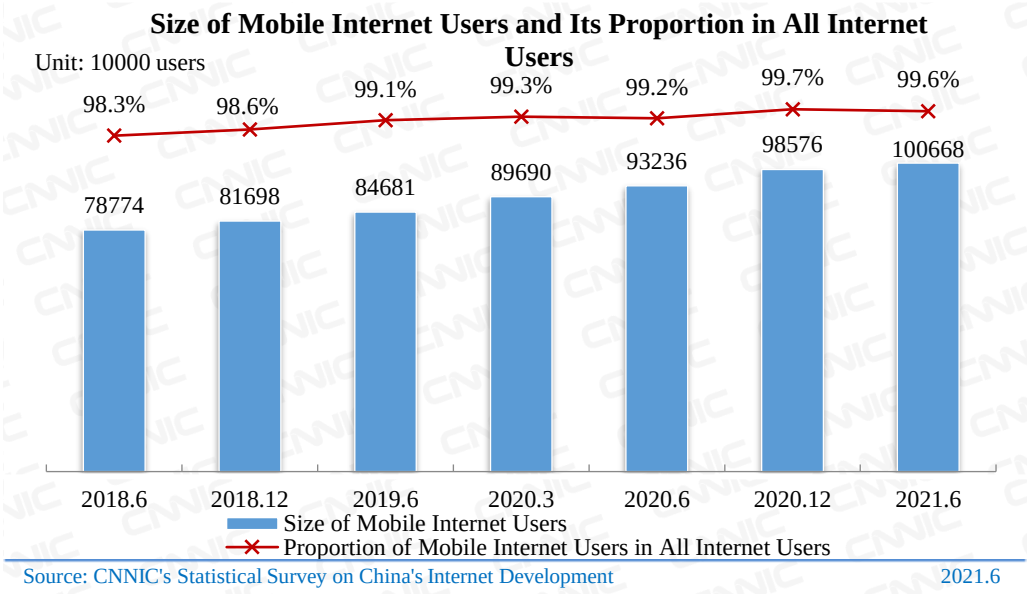


Figure 23 Size of Mobile Internet Users and Its Proportion in All Internet Users

One billion Internet users write a new chapter in the development of the digital economy during the 14th Five-Year Plan period. As of June 2021, the number of China's Internet users exceeded one billion. The huge size has given a robust endogenous impetus to the high-quality development of China's economy, sped up the construction of new digital infrastructure and opened up domestic circulation, improving digital government services. **First, the new digital infrastructure is being accelerated to lay a solid foundation for the growth of Internet users.** In the first half of 2021, China continued to advance the construction and application of 5G networks in an orderly manner, with 5G networks speeding up their coverage in major cities. As of June 2021, China had built the world's largest 5G network on its own, with a total of 961,000 5G base stations covering all cities above prefecture level nationwide and 365 million 5G terminal connections[14]. **Second, digital consumption stabilizes the epidemic's impact and promotes the sustained and stable growth of the national economy.** On the one hand, digital services represented by e-commerce are promoted among the fourth and fifth-tier cities and villages and townships, bringing two-way consumption exchanges and interaction between urban and rural areas. They act as a new engine of economic growth while enhancing the digital convenience of lower-tier markets. On the other hand, with the growing size and consumption capacity of younger and older Internet users, the services drive the consumption demand in such areas as medical care, two dimensions, and electronic sports, constituting a new consumption pattern. **Third, the development of digital government has strongly enhanced government services and the well-being of people.** A comprehensive system for "good and bad reviews" of government services has been built to improve the convenience and fulfillment of enterprises and the public, expand service channels, and put the people-centered service concept in place. On the one hand, the integrated national platform for government services introduced 700-plus high-frequency office services such as work resumption, online recruitment and online taxation during the epidemic, reinforcing the coordination of IT-based application of government services. On the other one, provinces and cities promoted the extension of government services to the mobile end, continuously strengthened the IT-based application of local government services and enhanced the rapid deployment and flexible

[14] Source: the Ministry of Industry and Information Technology of the People's Republic of China.

expansion capacity of local government information systems.

(II) The Size of Internet Users in Urban and Rural Areas

As of June 2021, the size of rural Internet users in China was 297 million or 29.4% of the total, while that of urban Internet users was 714 million, up 34.04 million from December 2020, making up 70.6% of the total.

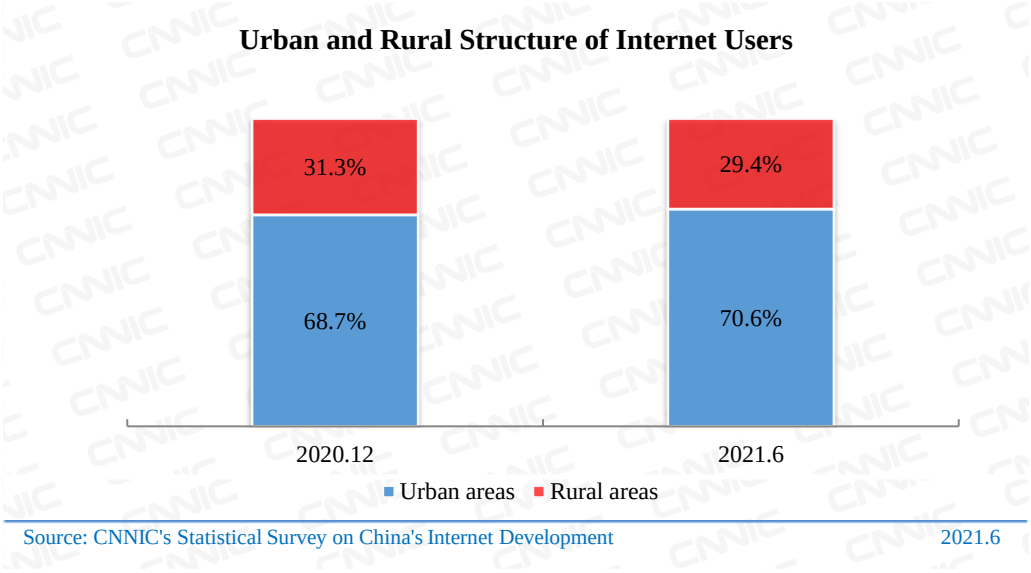


Figure 24 Urban and Rural Structure of Internet Users

Up to June 2021, the Internet penetration in China's urban areas was 78.3%, while that in rural areas was 59.2%, up 3.3 percentage points over December 2020. The urban-rural gap of Internet penetration was narrowed by 4.8 percentage points.

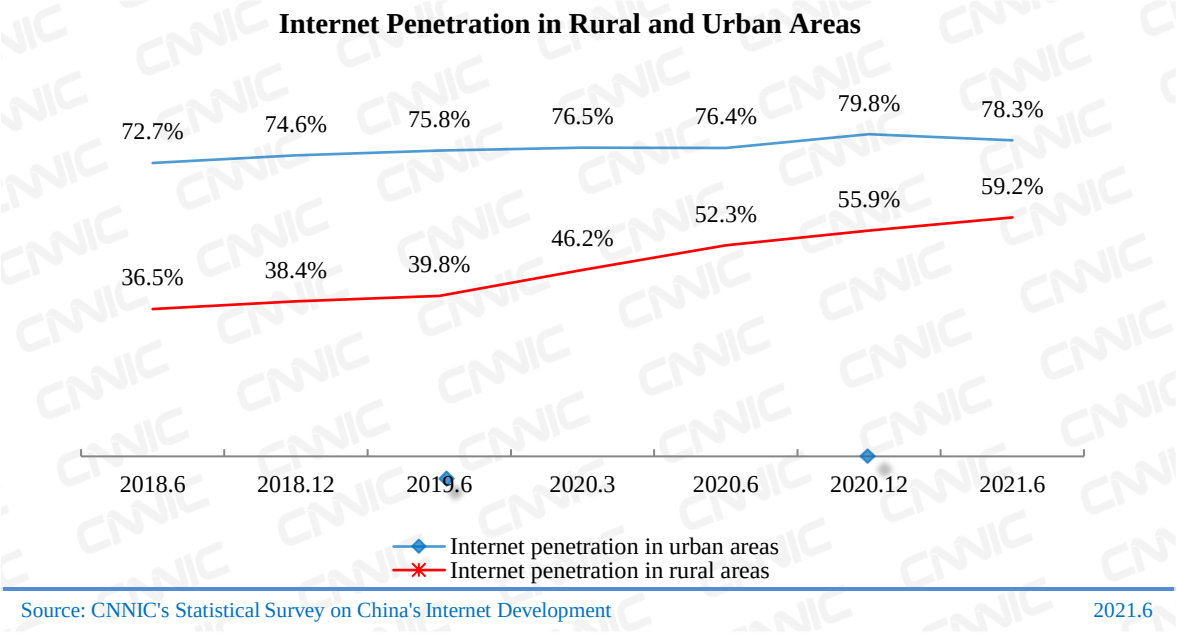


Figure 25 Internet Penetration in Rural and Urban Areas

In the first half of 2021, China's digital development in rural areas continued to advance,

increasing rural Internet penetration. **First, the rural Internet infrastructure has continued to improve.** During the 13th Five-Year Plan period, the Ministry of Industry and Information Technology and the Ministry of Finance implemented six batches of universal telecommunication service pilots, underpinning the construction of 130,000 administrative villages with optical fiber and 50,000 4G base stations. The proportion of administrative villages with optical fiber and 4G access exceed 99% nationwide. The urban-rural gap of Internet access is gradually being bridged. **Second, new business forms of the rural digital economy are taking shape.** The "Internet plus" agricultural products from villages have been sold in cities, basically forming a new mechanism for the development of agricultural e-commerce through government-enterprise collaboration and online-offline integration. Livestreaming e-commerce serving as a representative of the new Internet model has played the role of marketing, blazing a new path to lead the online sales of agricultural products. Meanwhile, postal administrations across the country have fully unlocked the value of postal networks. By the end of 2020, 260 projects of "one place featuring one product" generated a business volume of over one million pieces nationwide, while 590 projects of "one county featuring one product" had a business volume of over 100,000 pieces[15]. The projects have played a role in delivering agricultural products to cities. **Third, the efficiency of digital governance in rural areas is increasing, facilitating the IT-based development of agriculture and rural areas.** To implement the *Strategic Plan for Rural Revitalization (2018-2022)*, all regions have continued to accelerate the extension of the "Internet plus government services" platform to towns and townships, while some regions have established a more complete "e-village affairs" platform to facilitate villagers to follow and monitor village affairs anytime and anywhere.

As of December 2020, 98.99 million rural needy people under the current standards had all been lifted out of poverty through eight-year efforts, with decisive achievements made in risk management, poverty reduction and pollution control. To consolidate the outstanding achievement in poverty eradication, the Central Committee of the Communist Party of China and the State Council issued the *Guidelines on Realizing the Effective Connection between Consolidating and Expanding the Results of Poverty Eradication and Rural Revitalization*, proposing to improve the dynamic monitoring and assistance mechanism for preventing needy people from returning to poverty and to adopt targeted assistance measures. The role of accelerating the digital transformation of agriculture and vigorously building infrastructure such as communication networks has continuously deepened in supporting the development of rural industries with characteristics and improving infrastructure conditions for lifting relevant areas out of poverty. According to the survey, 36.9% of Internet users recognized that the Internet could "make it easier for people in poverty-stricken areas to obtain information concerning jobs, social security and medical services"; 35.8% believed that the Internet could "provide quality learning resources for children in poor areas through distance education"; 27.9% argued that the Internet could "help people in needy areas expand the sales of agricultural products through e-commerce"; and 22.1% contended that the Internet could "pool the strengths from netizens to assist the people in poor areas in shaking off poverty".

(III) The Size of Non-netizen

Up to June 2021, of 402 million non-netizens in China, these in urban areas accounted for 49.1%, while those in rural areas made up 50.9%. The urban-rural gap among non-netizens is

[15] Source: the *2020 National Report on Express Services for Modern Agriculture* by the State Post Bureau of the People's Republic of China.

gradually eliminated.

While focusing on the growth in Internet users, we still need to pay attention to the non-netizens community. Shortage of skills, limited literacy level and inadequate devices are significant reasons why non-netizens do not access the Internet. According to the data, 54.5% of non-netizens did not access the Internet because they did not know how to use the computer/Internet; 20.0% did not because they did not master Pinyin or due to literacy limitations; 14.0% did not because they did not have access to computers and other devices; 13.8% did not because they were too old/too young to access the Internet; and the proportion of non-netizens having no time to surf the Internet or being not interested in it was less than 10%.

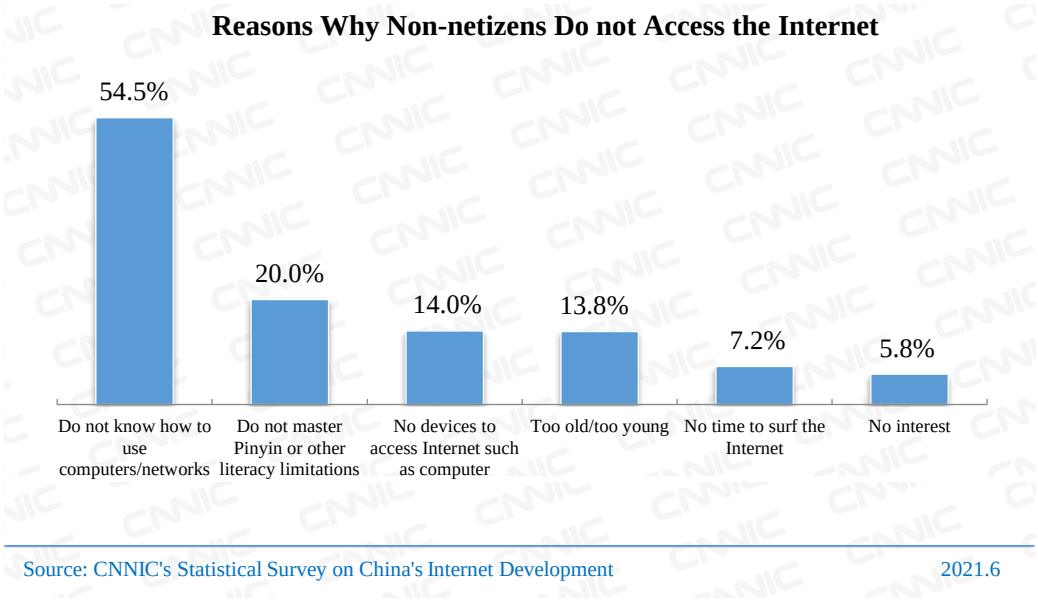


Figure 26 Reasons Why Non-netizens Do not Access the Internet

According to the data, the primary factor for non-netizens to access the Internet was the convenience of communicating with their family members, accounting for 29.8%, followed by the provision of free relevant training and guidance, taking up 27.9%, and the reduced costs of Internet access, making up 27.7%.

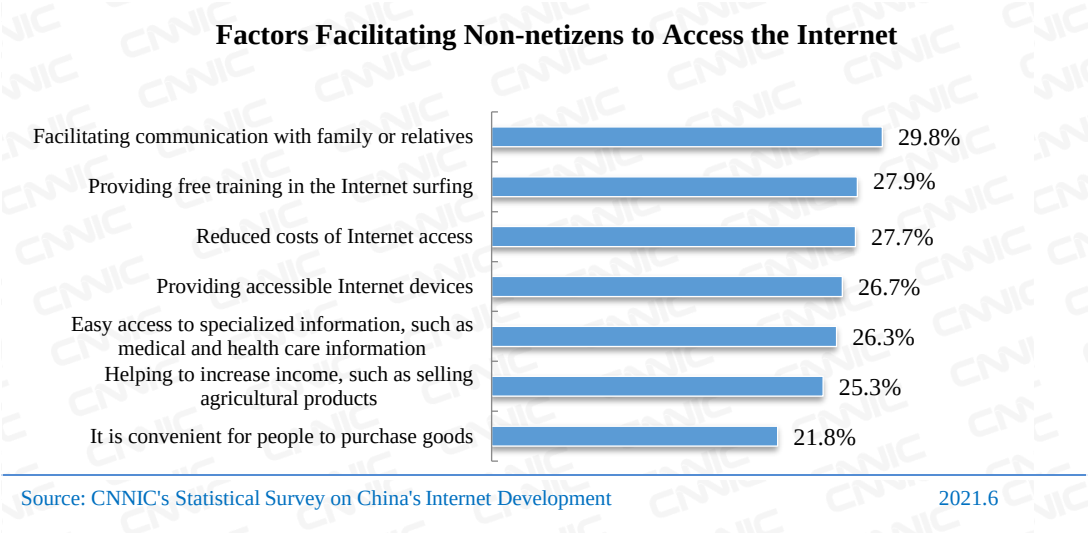


Figure 27 Factors Facilitating Non-netizens to Access the Internet

II The Attribute Structure of Internet Users

(I) Gender Structure

As of June 2021, the ratio of male to female among Chinese netizens is 51.2:48.8, roughly the same as that in China's overall population.

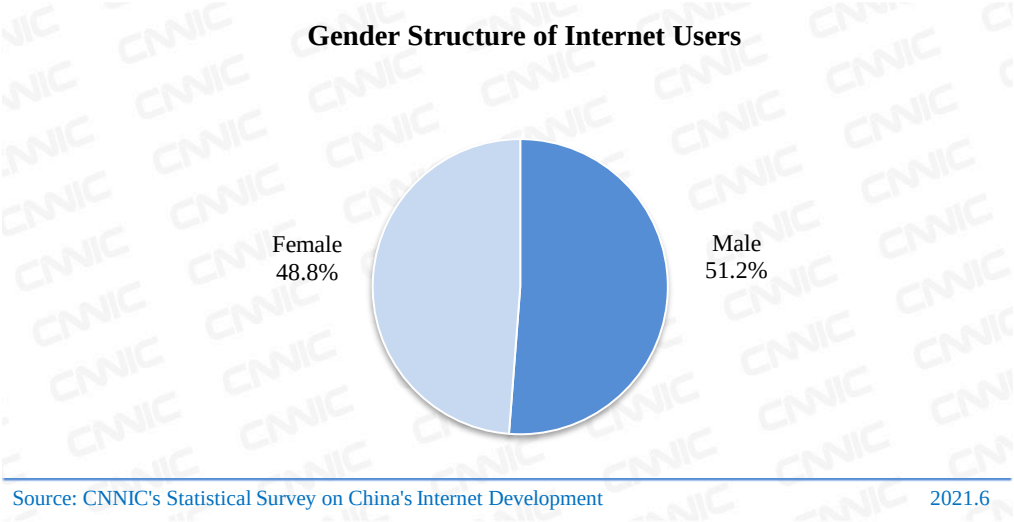


Figure 28 Gender Structure of Internet Users

(II) Age Structure

As of June 2021, the proportion of Internet users aged 30-39 in China was 20.3%, the highest among all age groups; the proportions of Internet users aged 40-49 and 20-29 were 18.7% and 17.4%, respectively, ranking second and third among all age groups.

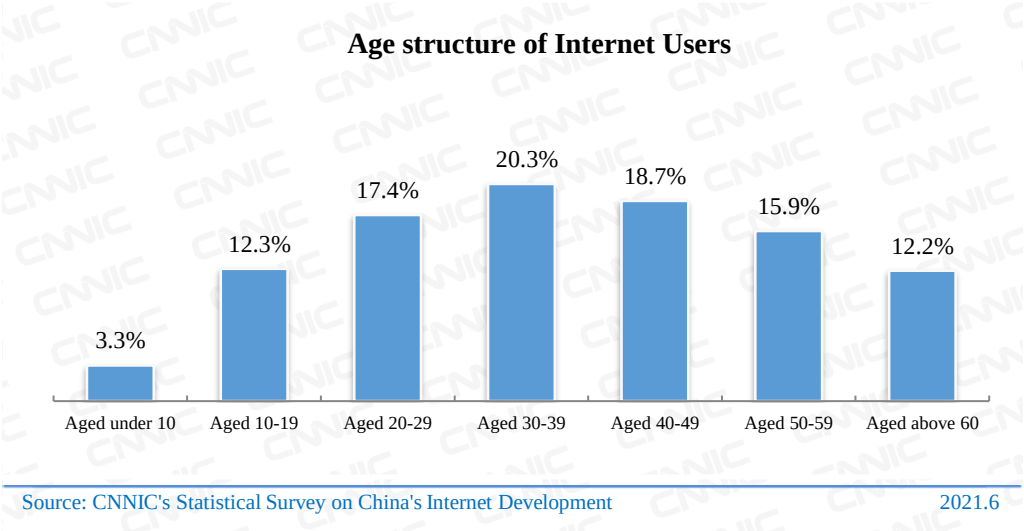


Figure 29 Age Structure of Internet Users

The size of middle-aged and elderly Internet users is growing at the fastest rate. Since 2020, the central and national authorities have taken multiple measures to make remarkable progress in addressing elderly-oriented issues on the Internet. In February 2021, the Ministry of Industry and Information Technology issued the *Notice of the Ministry of Industry and Information Technology on Addressing the Difficulties of the Elderly in Using Intelligent Technology to Facilitate the Use of Intelligent Products and Services*, setting the general requirements and critical tasks for carrying out the aged-oriented work. In April 2021, the Ministry of Industry and Information Technology released the *General Design Specifications for Aged-Oriented Websites* and the *General Design Specifications for Aged-Oriented Mobile Internet Applications (Apps)*, formulating service principles and technical requirements. Convenient conditions for middle-aged and elderly Internet users were created to integrate themselves more deeply into Internet life and share Internet dividends. With the joint efforts of the government, enterprises and society, the proportion of the middle-aged and elderly group in all Internet users has grown significantly. As of June 2021, the share of Internet users aged 50 and older was 28.0%, an increase of 5.2 percentage points from June 2020.

As adolescents are the country's future, the adverse impact of the Internet on them has also been widely concerned by all sectors of society. Up to June 2021, Internet users aged 6-19 in China reached 158 million, accounting for 15.7% of the total. To better guide young people to access the Internet and create a healthy environment, government departments, organizations, enterprises, schools and other sectors have taken active action to make continuous efforts. In February 2021, the Ministry of Education, the Ministry of Industry and Information Technology and other departments jointly issued the *Guidelines on Vigorously Strengthening the Development and Application of Online Education and Teaching Resources in Primary and Secondary Schools*, responding to the concerns of society about the reform and development of online education and teaching in the context of the normalized epidemic prevention and control. The Guidelines has integrated the experience of past teaching resources development and the valuable experience during the epidemic, focused on the development of education modernization and met the needs of rich and high-quality resources, the operation of network platforms and the integration and application of online resources and education and teaching, setting the direction for the future development of online education for youth groups. For three consecutive years, the Department for

the Protection of Youth Rights and Interests under the Central Committee of the Communist Youth League has released the *National Research Report on Internet Usage of Minors*, focusing on the Internet access environment, Internet usage, Internet literacy education, cybersecurity and protection of minors. The Report has also demonstrated the current characteristics of Internet usage and online life among minors in China, providing a valuable reference for the targeted protection of adolescents accessing the Internet.

CHAPTER THREE The Development of Internet Applications

I Overview of Internet Applications

In the first half of 2021, China saw steady growth in personal Internet applications. Specifically, online meal ordering, online medical services and online office featured the most significant growth in user size, with a growth rate at above 10%. Among basic applications, search engine and online news users grew by 3.3% and 2.3%, respectively, from December 2020. Of business and transaction applications, the user size of online travel booking and online shopping increased by 7.0% and 3.8%, respectively, over December 2020. Among online entertainment applications, the user size of livestreaming and online music rose above 3% from December 2020.

Different age groups show various characteristics in utilizing applications. Of all Internet users, those aged 20-29 have the highest utilization rates of online music, online video, livestreaming and other applications, registering at 84.1%, 97.0% and 73.5%, respectively. Internet users aged 30-39 have the highest utilization rate of online news applications, standing at 83.4%. Netizens aged 10-19 have the highest utilization rate of online education applications, reaching 48.5%.

Table 4 User Size and Utilization Rate of Internet Applications from Dec. 2020 to Jun. 2021

	Dec. 2020		Jun. 2021		
Applications	**Number of Internet users (10,000)**	**The percentage of internet users using the application**	**Number of Internet users (10,000)**	**The percentage of internet users using the application**	**Growth rate**
Instant messaging	98111	99.2%	98330	97.3%	0.2%
Online video (including video clip)	92677	93.7%	94384	93.4%	1.8%
Video clip	87335	88.3%	88775	87.8%	1.6%
Online payment	85434	86.4%	87221	86.3%	2.1%
Online shopping	78241	79.1%	81206	80.3%	3.8%
Search engine	76977	77.8%	79544	78.7%	3.3%
Online news	74274	75.1%	75987	75.2%	2.3%
Online music	65825	66.6%	68098	67.4%	3.5%
Livestreaming	61685	62.4%	63769	63.1%	3.4%
Online games	51793	52.4%	50925	50.4%	-1.7%

	Dec. 2020		Jun. 2021		
Applications	**Number of Internet users (10,000)**	**The percentage of internet users using the application**	**Number of Internet users (10,000)**	**The percentage of internet users using the application**	**Growth rate**
Online meal ordering	41883	42.3%	46859	46.4%	11.9%
Online literature	46013	46.5%	46127	45.6%	0.2%
Online car-hailing services	36528	36.9%	39651	39.2%	8.5%
Online office	34560	34.9%	38065	37.7%	10.1%
Online travel booking	34244	34.6%	36655	36.3%	7.0%
Online education	34171	34.6%	32493	32.1%	-4.9%
Online medical services	21480	21.7%	23933	23.7%	11.4%
Internet wealth management	16988	17.2%	16623	16.4%	-2.1%

II Basic Apps

(I) Instant Messaging

As of June 2021, instant messaging users in China reached 983 million, up 2.18 million from December 2020, making up 97.3% of all Internet users.

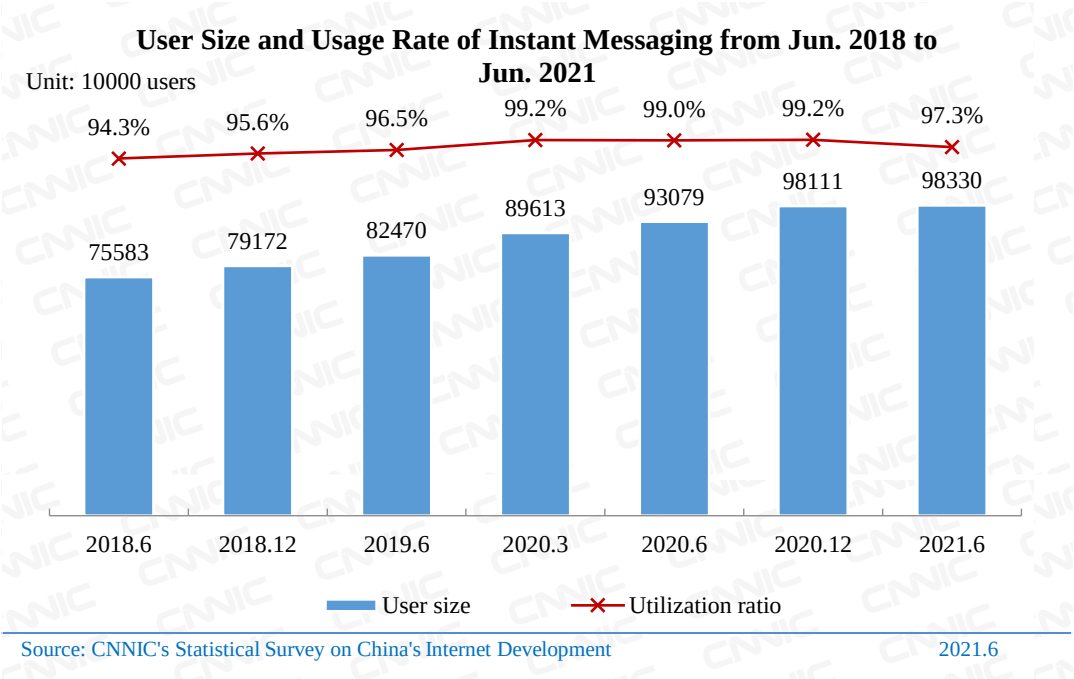


Figure 30 User Size and Usage Rate of Instant Messaging from Jun. 2018 to Jun. 2021

Instant messaging, the most widely used application, maintained further growth at both individual and enterprise ends in the first half of 2021.

On the personal end, with the sluggish growth in the size of instant messaging users, vendors placed more emphasis on leveraging Mini Programs and Channels to enhance the liquidity of their stock users. **First, the size of instant messaging users is facing a bottleneck in growth.** According to the data, of the two most dominant instant messaging Apps, the number of monthly active accounts on the mobile QQ App had declined since its peak (700 million accounts) in 2018 to 606 million in Q1 2021, down 12.6% year-on-year[16], while WeChat's monthly active accounts across the world had slipped to a single-digit growth year-on-year since Q1 2019, up 3.3% year-over-year in Q1 2021[17]. **Second, the synergy between mini programs and the advertising business is starting to unfold itself.** WeChat's Mini Programs connected the advertising and transaction segments and improved the sales conversion rate and ROI of advertisers, boosting the rapid growth in the advertising revenue of instant messaging platforms. Tencent's revenue from social Apps and advertising business reached 18.5 billion yuan in the first quarter of 2021, up 27% year-on-year, the data showed. **Third, the presentation forms of video content are highly valued.** Tencent promoted the "Channels" feature in 2020 and merged its video team with Wesee's team in the first quarter of 2021, seeking the synergy between the feature and social functions while enriching the content of video clips. However, the market has not verified whether the advantages of instant messaging companies in the social field can be extended to the video clip realm.

On the enterprise end, instant messaging evolved towards digital infrastructure for enterprises and gradually penetrated all aspects of their operation. **First, there is an increasing variety of supporting tools**. In meeting the needs of customers for synchronizing work, sharing information, converting results, and solidifying processes, instant messaging vendors integrate

[16] Source: Tencent's financial reports for previous years.
[17] Source: Tencent's earnings report 2021 Q1.

documents, cloud disks, meetings, knowledge bases and other tools into enterprise-version instant messaging applications to form a "collaborative office suite", thus providing customers with all-round and complete enterprise-level services. **Second, hardware products emerge one after another.** The services of instant communication vendors have continued to penetrate from software tools to hardware tools, with mature products including all-in-one videoconferencing machines, attendance machine, access control machine, printer, and front desk equipment, thus giving a more comprehensive underpinning to customers' smart digital office. **Third, application scenarios are more diversified.** In addition to office scenarios, instant messaging vendors focused more on expanding functions in government, retail and healthcare scenarios. Especially in government scenarios, DingTalk and WeCom had corresponding solutions to facilitate the digital development and grid-based management of districts and counties.

(II) Search Engine

As of June 2021, the user size of search engine in China had reached 795 million, up 25.67 million from December 2020, taking up 78.7% of all Internet users.

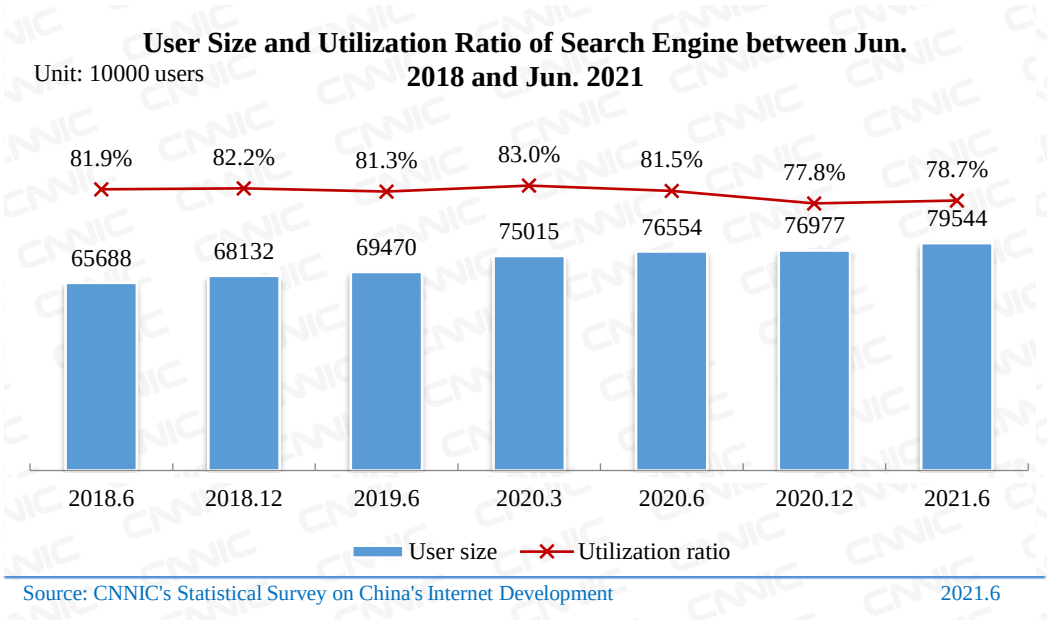


Figure 31 User Size and Utilization Ratio of Search Engine between Jun. 2018 and Jun. 2021

A growing number of active search engine users gave rise to a pick-up trend of revenue. **First**, users are increasingly active thanks to the in-depth development of search engine content. Data unveils that the number of monthly active users of Baidu App reached 558 million in March 2021, up 2.6% from the end of December 2020[18]. **Second**, a rebound is made in the revenue generated around search as the economy picks up. In the first quarter of 2021, Baidu's marketing revenue grew 27% year-on-year[19]. In addition, Toutiao Search and WeChat Search focused on continuously strengthening connection capabilities and improving the search ecosystem to provide growth momentum for commercialization. For example, WeChat Search has accelerated the connection of applets, allowing content, services and brands to access WeChat Mini Programs for the fast growth in transaction volume.

[18] Source: Baidu's financial reports in Q4 2020 and Q1 2021.
[19] Source: Baidu's financial report in Q1 2021.

Search engines continued to diversify their services. **First, in terms of content building**, search engine platforms competed for the duration of user usage by developing searches for video clips. For example, Quark, a search engine, launched Z Video, a knowledge-based video product. **Second, regarding search-connected services,** applets have become a vital traffic destination for mobile search. According to the data, in the first quarter of 2021, the number of monthly active users of Baidu smart applets reached 416 million, while that of smart applets increased by 74% year-on-year[20]. Also, WeChat Search can directly access the service functions within WeChat Mini Programs, making search users more active.

(III) Online News

As of June 2021, the user size of online news in China had reached 760 million, up 17.12 million from December 2020, making up 75.2% of all Internet users.

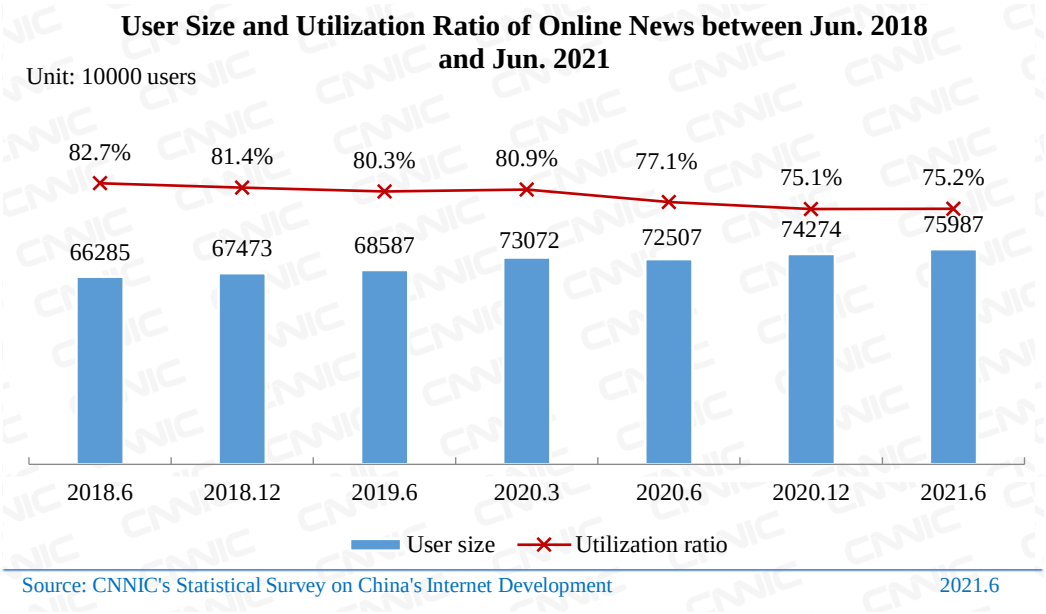


Figure 32 User Size and Utilization Ratio of Online News between Jun. 2018 and Jun. 2021

The year of 2021 marks the 100th anniversary of the founding of the Communist Party of China. Focusing on the theme of the 100th anniversary of the founding of the CPC, online news media tell the stories of the Party vividly through various forms of presentation and demonstrate outstanding achievements in and glories for the centennial anniversary of the Party. The accelerated popularization and application of advanced technologies has promoted the higher-speed integration of traditional and emerging media, underpinning intelligent changes in the all-media era.

Online news media celebrate the 100th anniversary of the founding of the CPC in various forms. In celebrating the 100th anniversary of the founding of the Communist Party of China, online news media gave full play to their respective advantages by reviewing the history of the Party, saluting outstanding Party members, promoting the spirit of the Party and exploring the Party's footprints through micro videos, long pictures and posters, with a good atmosphere of the celebration created. CCTV News has launched 100 episodes of micro videos "Red Archives" on major social media platforms by looking for the deeds of outstanding Communist Party members

[20] Source: Baidu's financial report in Q1 2021.

from the National Archives Administration of China and presenting them in the form of videos to remember the martyrs and inspire the people's love for the Party and their patriotism. The People's Daily New Media, coupled with bilibili, has launched an interactive micro-movie on the theme of the centenary of the founding of the Party. Through interactive videos, viewers can experience the glorious deeds of the martyrs in the revolutionary era and spread the patriotic spirit and the love for the Party.

Technological innovation is driving the smart upgrading of the media industry. AI, cloud computing, 5G and other advanced technologies are driving the accelerated integration of traditional and emerging media, constituting important underpinning forces for smart changes in the all-media era. "Creation Brain" developed by the People's Daily Intelligent Media Institute provides media organizations with smart solutions for the all-media ecosystem, helps develop intelligent editorial departments, realizes live video broadcast of key figures and custom monitoring and early warning of hot data across the Internet, and generates batches of visual big data reports. During the UEFA Euro 2020[21], CCTV relied on official authoritative data to develop the exclusive electronic program guide (EPG) for the Euro, allowing users to customize their EPGs according to their viewing habits and preferences. Sina News promoted the efficiency of the platform employing "big data plus AI" by empowering the whole process of new technologies for media operation featuring interviewing, editing, reviewing and broadcasting" and giving rise to the "Sina Hot List" product with the ability to efficiently integrate hot information.

(IV) Online Office

Up to June 2021, the user size of online office in China had amounted to 381 million, up 35.06 million from December 2020, accounting for 37.7% of all Internet users.

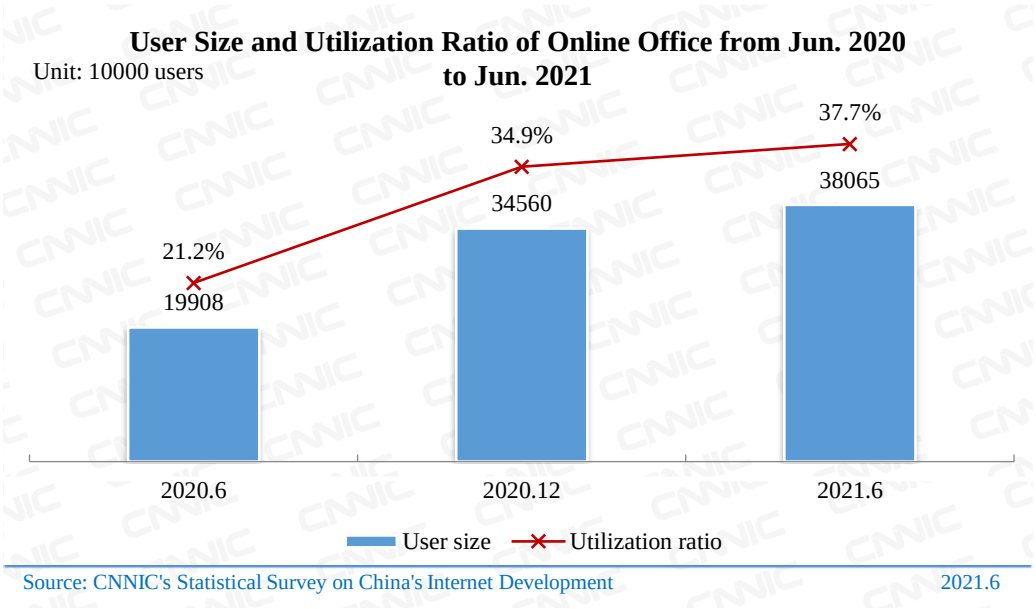


Figure 33 User Size and Utilization Ratio of Online Office from Jun. 2020 to Jun. 2021

In the first half of 2021, the online office market remained active, with steady growth in user size, expanding the service ecosystem and advancing technological innovation.

[21] UEFA Euro 2020: UEFA officially announced that the tournament was postponed to 2021, while retaining the name "UEFA Euro 2020".

The online office market is gaining traction. First, the size of the user base maintained growth. Data shows that the size of online office users grew by 91.2% in one year. The average daily use of online meeting Apps reached 36 minutes in the first half of 2021[22]. Especially in China, as the digital transformation of enterprises continuously advances, the flexible work model represented by the online office will be constantly innovated. **Second, the segmentation of applications continues to grow.** As of June 2021, online video/teleconferencing usage was 23.8% and online document collaboration editing was 23.8%, an increase of 1.0 and 2.6 percentage points, respectively, compared to December 2020. As the new infrastructure represented by 5G, big data, the IoT and AI continues to speed up, innovations are being made in the responsiveness, storage capacity and functional applicability of online office services such as online meetings and document editing.

The online office service ecosystem continues to expand. With instant communication tools as the core, Internet companies integrate a variety of applications through open API (Application Programming Interface), refine the ecosystem, and use a unified entrance to provide users with efficient and professional services. For example, DingTalk provides multi-dimensional solutions for multiple industries such as exclusive healthcare and new retail. Wecom has set up a support fund to help the government and enterprises realize digitalization through the "Program for Wecom Service Providers", diversifying Wecom services to retail, government and finance.

Online office technology innovation continues to follow up. The first is the rise of personalized services for low-code development[23]. Online office platforms offer simple access to technology as a fast, low-cost tool for the "last-mile" digital upgrading of enterprises. For example, DingTalk provides low-code development services to help enterprises lower the development threshold of office applications. Wecom, a WeChat version for enterprises, also builds a low-code development platform to provide more tools to assist system integrators in developing applets for companies. The number of active applets served by system integrators more than tripled year-on-year in the first quarter of 2021[24]. **The second is about the assistance of AI in automating some functions of online office.** Applications such as Tencent Meeting, Baidu AI Cloud and Fengyun Software transcribe speech into text during meetings through speech recognition, natural language processing and other technologies in a bid to achieve intelligent recording of meeting minutes and improve office efficiency.

III Business Transaction Applications

(I) Online Payment

As of June 2021, the user size of online payment in China had reached 872 million, up 17.87 million from December 2020, taking up 86.3% of all Internet users.

[22] Source: the data collected by the Computer Network Information Center under the Chinese Academy of Sciences cover 2,499,905 Internet devices in 12 cities of 9 provinces, with monitoring software including Zoom, VooV Meeting and DingTalk.
[23] Low-code development refers to an approach to application development through visualization that allows developers with varying levels of experience to create web and mobile applications via a graphical user interface using drag-and-drop components and model-driven logic.
[24] Source: Tencent's earnings report 2021 Q1.

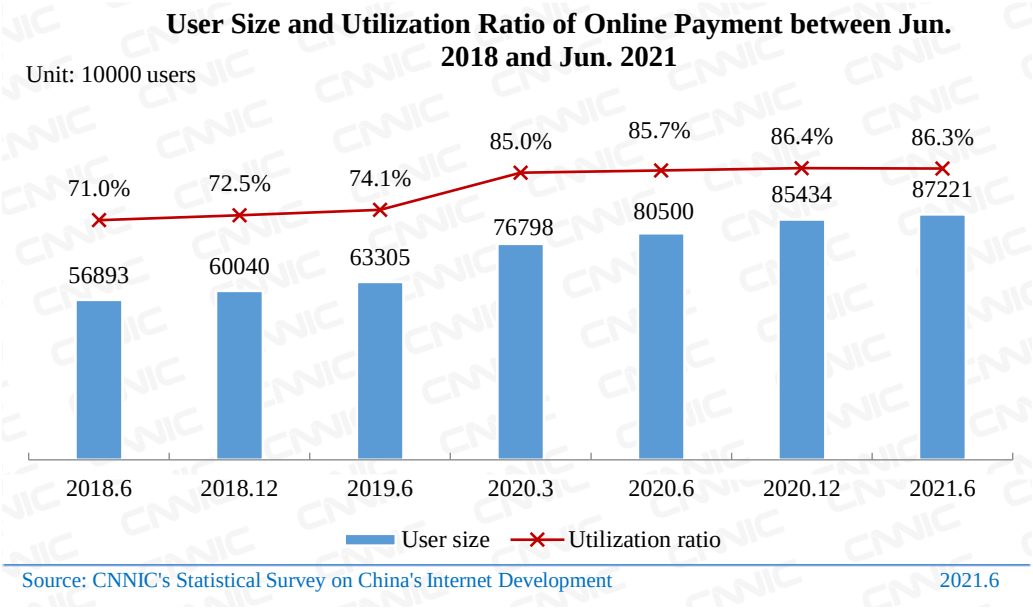


Figure 34 User Size and Utilization Ratio of Online Payment between Jun. 2018 and Jun. 2021

In 2021, the transaction amount of online payment applications hit a new record, with the digital RMB pilot being promoted steadily. Meanwhile, relevant departments have further strengthened their supervision in the fields of online payment, personal information protection and Internet consumer loans in an effort to put in place main responsibilities and safeguard the legitimate rights and interests of the people.

The amount of online payment transactions hits another record high. According to the data[25], banks processed 22.53 billion online payment transactions amounting to 553.5 trillion yuan as of the first quarter of 2021, up 27.4% and 13.5% year-on-year, respectively. **First, the expansion of consumption has driven the wide application of online payment.** In the first half of 2021, domestic residents' online payment consumption market continued to gain popularity, with inter-institutional online payment transactions amounting to 5.06 trillion yuan and 2.96 trillion yuan on the International Workers' Day and Dragon Boat Festival, respectively[26]. The scale of online payment continued to grow, meeting the demand of consumers for shopping, travel and catering. It also provided a strong guarantee for promoting consumption while expanding domestic demand. **Secondly, the digital RMB pilot has been carried out in multiple cities.** As of June 2021, the number of digital RMB pilot scenarios had exceeded 1.32 million, covering living payment, catering services, transportation, shopping, and government services. 20.87 million personal wallets and 3.51 million public wallets have been opened, with 70.75 million transactions amounting to 34.5 billion yuan[27]. Following the opening of digital RMB pilots in Suzhou, Shenzhen, Xiong'an, Shanghai and Chengdu in 2020, six major state-owned banks promoted digital RMB wallets in multiple cities in the first half of 2021, with application scenarios on several Internet platforms starting to accept digital RMB one after another. For example, the digital RMB spending featured primarily in the May 5 Shopping Festival co-hosted by Shanghai and Suzhou, representing the first cross-regional pilot of digital RMB.

[25] Source: the People's Bank of China, http://www.pbc.gov.cn/zhifujiesuansi/128525/128545/128643/4260419/index.html, June 2, 2021.
[26] Source: the statistics from China UnionPay and NetsUnion Clearing Corporation.
[27] Source: the *Progress of Research & Development of E-CNY in China*, the white paper released by the People's Bank of China.

Relevant authorities have doubled their efforts to supervise online payment. In recent years, relevant departments at a national level have increased their regulatory efforts on various Internet platform applications, including online payments, with the aim of further protecting personal information security, preventing financial risks and maintaining social stability. **Regarding payment regulation**, in January 2021, the People's Bank of China issued the *Regulations on Non-Bank Payment Institutions (Draft for Comments)*, which upgraded the sectoral regulations on payment to administrative ones and further strengthened market access and management in the payment sector. In March 2021, the *Measures for the Deposit and Administration of Pending Payment Funds of Customers of Non-Bank Payment Institutions* came into effect, regulating the centralized deposit and administration of customers' pending payment funds and further identifying regulatory responsibilities. **In protecting personal information,** the Cyberspace Administration of China, the Ministry of Industry and Information Technology and the other two departments jointly issued the *Provisions on the Scope of Necessary Personal Information for Common Types of Mobile Internet Applications*, which states the essential functional services and the scope of necessary personal information for online payment applications to prevent relevant applications from soliciting non-essential personal information and protect personal information.

(II) Online Shopping

As of June 2021, the user size of online shopping in China had reached 812 million, up 29.65 million from December 2020, taking up 80.3% of all Internet users.

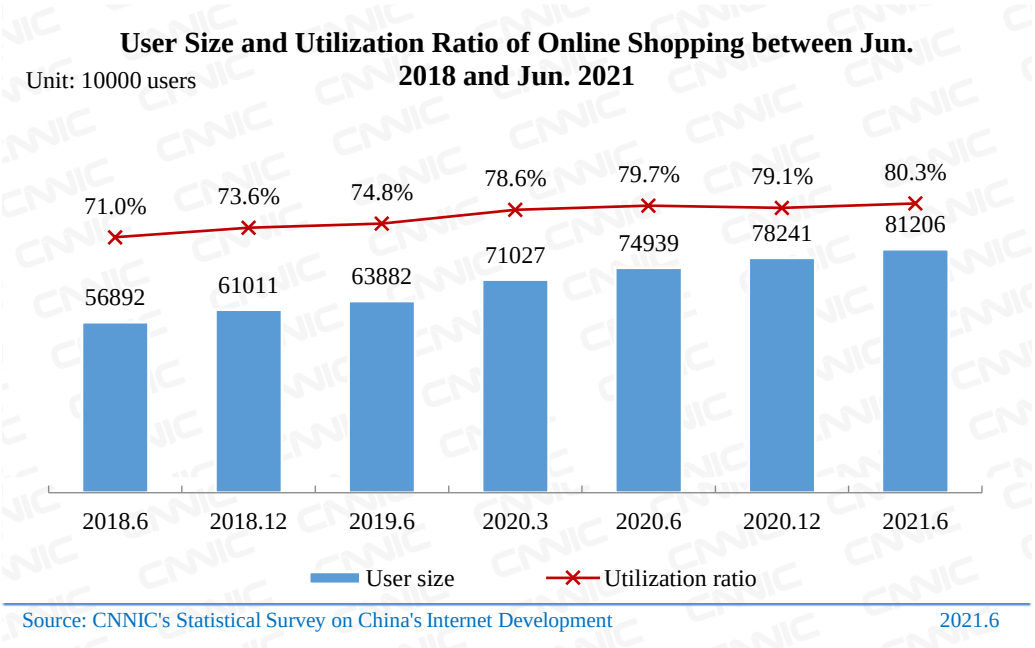


Figure 35 User Size and Utilization Ratio of Online Shopping between Jun. 2018 and Jun. 2021

In recent years, the e-commerce industry has been booming, with the e-commerce demand unleashed in the rural market, further narrowing the consumption gap across the geographical network. This has given a strong boost to the "dual circulation" development paradigm in China. According to the data[28], the national online retail sales amounted to 6,113.3 billion yuan in the first half of 2021, up 23.2% year-on-year. Specifically, the online retail sales of physical goods reached

[28] Source: China's National Bureau of Statistics.

5,026.3 billion yuan, an increase of 18.7%.

The urban-rural circulation system of online retail has been gradually accessible, while the consumption potential of the rural market has been unleashed. Expanding domestic demand is strategically underpinning the domestic circulation, with the rural market emerging as an important growth point for such expansion. According to the data[29], in the first half of 2021, the online retail sales in China's rural areas reached 954.93 billion yuan, up 21.6% year-on-year, including 866.31 billion yuan of physical goods, up 21.0% year-on-year. **On the supply side,** the government, enterprises and other sides were engaged in the digital infrastructure of lower-tier markets, optimizing the traditional supply chain model of agricultural products and helping sell them to other places. For example, JD, Alibaba and Suning have extended towards lower-tier markets new retail infrastructure involving supply chains and logistics. They have promoted the upward movement of agricultural products through measures including traceability system, technology export, brand empowerment and channel expansion. **On the demand side,** rural consumption is driven by constantly improving its environment and industrial products are promoted among lower-tier markets. All established villages have been directly accessible to postal services, with courier outlets covering 98%[30] of townships and towns, solving rural residents' logistics and distribution problems in online shopping.

The customer base of online shopping has expanded in basic terms, while the geographical differences in consumption have been narrowed significantly. In the context of the in-depth development of "Internet plus", e-commerce served as an important way in fighting against poverty in China. Over the past seven years, the urban-rural gap in online shopping usage has been narrowed by 6.7 percentage points. From June 2017 to June 2021, the extreme inter-provincial variation in online shopping usage dropped from 33.8% to 20.2%, down 13.6 percentage points. On the one hand, the poverty alleviation program through e-commerce raised the people's income in poor areas by integrating distinctive agricultural products into the e-commerce industry chain. On the other hand, the poverty alleviation program motivated the surrounding population to use online shopping by cultivating the e-commerce skills of relevant personnel, sharing the results of universal benefits in poor areas of China and further equalizing regional consumption.

(III) Online Meal Ordering

As of June 2021, the user size of online meal ordering in China had reached 469 million, up 49.76 million from December 2020, taking up 46.4% of all Internet users.

[29] Source: China's Ministry of Commerce.
[30] Source: State Post Bureau of China.

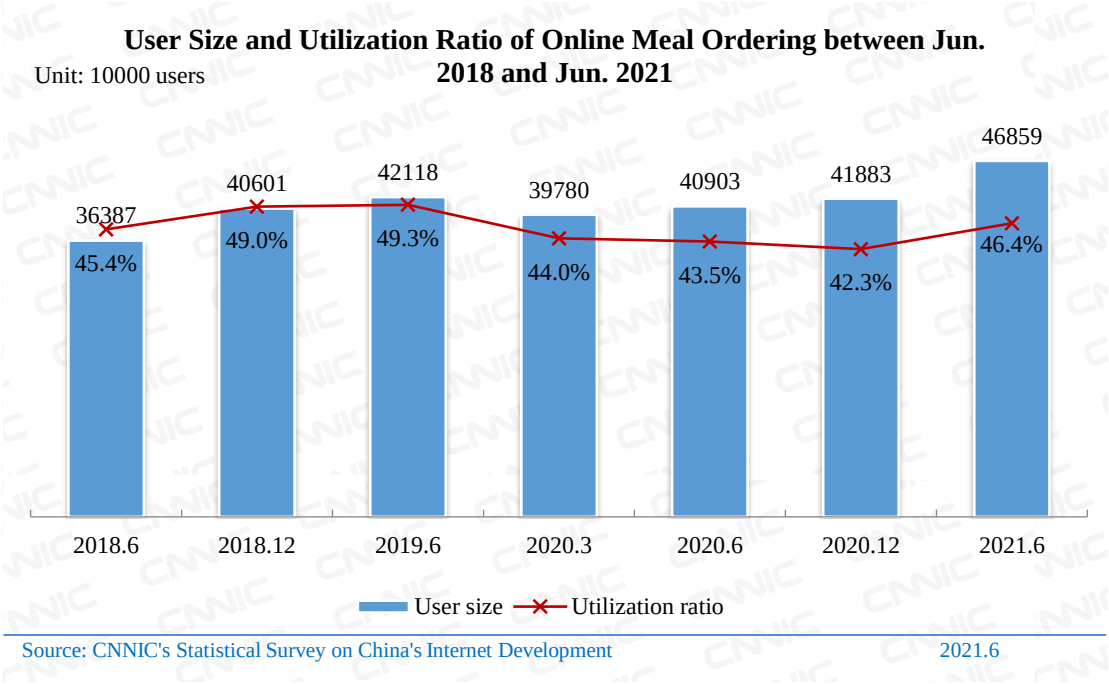


Figure 36 User Size and Utilization Ratio of Online Meal Ordering between Jun. 2018 and Jun. 2021

With the full recovery of China's economy and the further strengthening of regulating the online meal ordering industry, the digitalization in the industry continues to improve, new consumer trends are highlighted and the industry is covering richer and more diversified content. In the meantime, the ecosystem of the online meal ordering industry and the protection of riders' rights and interests have also received widespread attention from the society, boosting the long-term healthy development of the industry.

The online meal ordering industry is booming, showcasing significant features in revenue, digitalization and content. First, takeaway restaurants saw significant growth in revenue and membership. According to the data, Meituan's online meal ordering business generated 20.575 billion yuan in the first quarter of 2021, up 116.8% year-on-year[31]. **Second, the increasing digitization of the online meal ordering industry significantly impacts both the supply and demand sides.** On the supply side, online ordering methods such as takeaway platforms, catering platforms and self-built order coordination brands have further widened the digital development space of catering companies and accelerated their shift towards online services. On the demand side, the new surging consumer demand, such as one-person meals, prepared dishes and self-heating food, has pushed the extension of catering services into home. **Third, the concept of "takeaway" has been broadened and the industry has become more diversified in its content.** Since the COVID-19 outbreak, the instant delivery business, represented by fresh food and medicine, has grown by leaps and bounds, helping benefit the people and stabilize the economy together with food and beverage takeaway. Along with the retail consumption habits gradually developed by users during the epidemic, the proportion of various non-catering takeaway services is expanding, diversifying the online meal ordering industry.

As the industry regulation has been significantly strengthened, the country's social

[31] Source: Meituan's financial report in Q1 2021.

security for flexible employment groups, including riders, has been highly valued, with related improvements being continuously promoted. First, the anti-monopoly regulation of online meal ordering platforms has been strengthened, prompting the industry to return to rational competition. Meituan and ele.me, two online meal ordering platforms, have been fined several times for unfair competition by "choosing one platform over the other". In April 2021, the State Administration for Market Regulation opened a file on the case against Meituan for its alleged monopolistic practice, such as "choosing one platform over the other" according to the law. **Second, the country attaches great importance to developing flexible employment and constantly improves the social security of flexible employment groups, including riders.** On June 30, China's Ministry of Human Resources and Social Security announced the *14th Five-Year Plan for the Development of Human Resources and Social Security*, which draws a roadmap of social security for flexibly employed groups. On July 26, the State Administration for Market Regulation, the Cyberspace Administration of China and other five departments jointly issued the *Guidelines on Implementing the Responsibility of Online Meal Ordering Platforms and Safeguarding the Rights and Interests of Delivery Riders*, putting forward a full range of requirements for legitimate rights and interests of delivery riders in income, labor safety, food safety, social security, the environment in which they work, organization building, and conflict handling.

(IV) Online Travel Booking

As of June 2021, the number of online travel booking users in China had reached 367 million, up 24.11 million from December 2020, accounting for 36.3% of all Internet users.

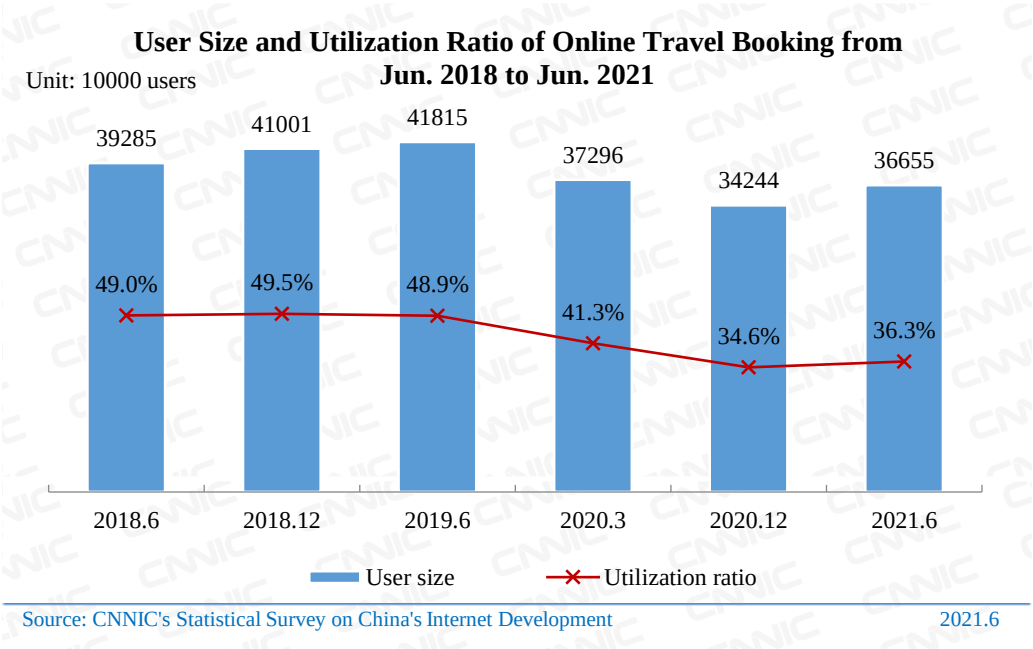


Figure 37 User Size and Utilization Ratio of Online Travel Booking from Jun. 2018 to Jun. 2021

In the first half of 2021, China's online travel booking industry recovered strongly, with a rapid rebound growth in travel trips and a significant improvement in corporate performance. Online travel booking companies constantly upgraded their digital marketing, pursuing new performance growth points. While the industry was rebounding, the travel booking market experienced a change in consumption structure, driving the high-quality development across the sector.

The domestic travel economy is recovering rapidly, while travel booking companies are outperforming expectations. According to the data[32], in the Tomb-Sweeping Day and May Day of 2021, the domestic trips recovered to 94.5% and 103.2% over the same period of 2019, respectively. In this context, travel booking companies rebounded significantly better than market expectations. In March 2021, Ctrip's domestic airline and hotel business achieved a double-digit growth compared to the same period in 2019[33]. In March 2021, Tuniu's contracted transactions grew over 180% month-on-month and contracted transactions of customized tour increased over 800% on a monthly basis[34].

A digitally empowered marketing system for enterprises delivers new growth points. As the recovery of the global outbound travel business is still difficult to predict, travel booking enterprises tap the precision marketing value of aggregation services with the marketing innovation. **First, travel booking companies have taken livestreaming as an opportunity to lay out the content ecosystem and expand marketing channels.** According to the data[35], a series of live e-commerce shows were co-launched by Weibo and Ctrip, with sales reaching 33.46 million yuan. **Second, travel booking companies have introduced the "mystery box"[36] model to gain popularity among the young.** Regarding airline tickets in mystery boxes, hotels would randomly combine travel dates and destinations, bringing consumers a novel and surprising experience. If unsatisfactory, consumers can return tickets to reduce their psychological burden. Such a mystery box has gained popularity among many young people and has become a hot topic on social media. "Why the mystery box of airline ticket appeals to young people", one topic on Weibo, has been read 180 million times[37].

The travel booking market is restructured in consumption, with great potential for high-quality development. First, quality leisure tours have become an engine of recovery for the tourism economy. For comfort, a growing number of tourists are willing to raise their spending levels and pay for the quality and services of their trips. **Second, the silver economy brings development opportunities for the travel booking industry.** Among travel booking users, 16.32 million are above 60 years old. With the concern of the whole society for the elderly in the era of digital economy, aged-oriented services[38] will bring new growth opportunities for the travel booking industry while enhancing the quality of travel.

IV Online Entertainment Applications

(I) Online Video

Up to June 2021, the user size of online videos (including video clips) in China had reached 944 million, up 17.07 million from December 2020, making up 93.4% of all Internet users. The number of video clip users amounted to 888 million, up 14.40 million from December 2020, accounting for 87.8% of all Internet users.

[32] Source: The Data Center of China's Ministry of Culture and Tourism.
[33] Source: Ctrip's financial report 2021 Q1.
[34] Source: Tuniu's financial report 2021 Q1.
[35] Source: Weibo.
[36] Mystery box refers to a sales model primarily featuring the random selection.
[37] Source: Weibo.
[38] Aged-oriented services refer to intelligent products and services that address the difficulties of using smart technology for the elderly and facilitate their use in their tours.

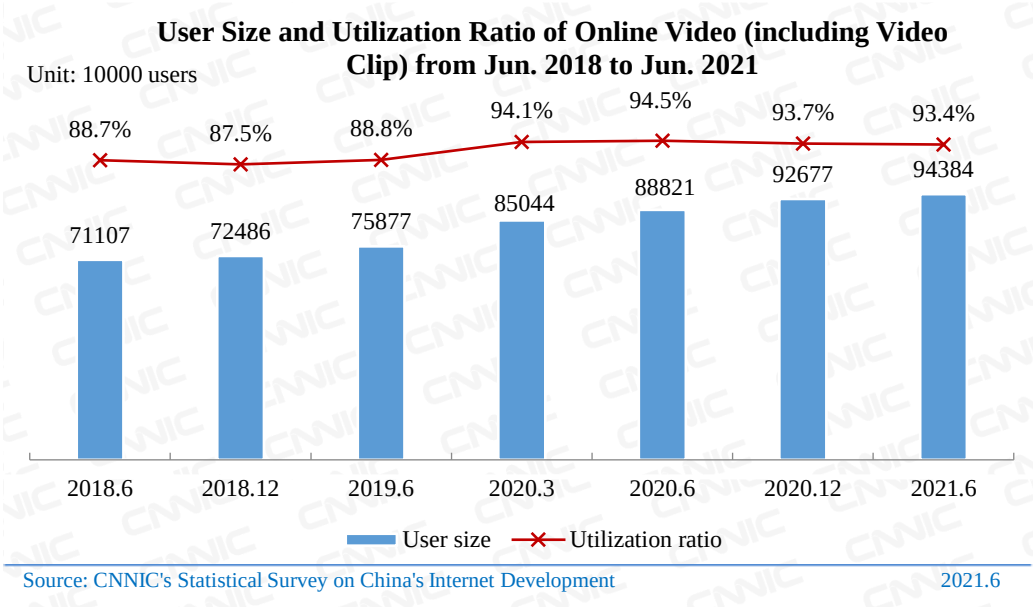


Figure 38 User Size and Utilization Ratio of Online Video (including Video Clip) from Jun. 2018 to Jun. 2021

In the first half of 2021, medium video[39] became a key focus, with more professional and diversified content due to the intensified competition between long video and video clip platforms. Meanwhile, long video platforms expedited film & television industrialization[40] to create a healthy industrial environment.

As the competition between long video and video clip platforms has intensified, medium video platforms have emerged as a good opportunity to develop the culture and entertainment industry. With the accelerated penetration of video clip applications in fourth and fifth-tier cities, more duration of users has further been taken up, with the competition for users between long video and video clip platforms being increasingly fierce. According to the data[41], in March 2021, the per capita single-day use of video clip Apps was 125 minutes, 27 minutes higher than long video ones, with a growing gap; 53.5% of video clip users watch such video programs every day, 17.2 percentage points higher than long video users (36.3%). Amid the fierce competition, long video and video clip platforms began to move in opposite directions. Such platforms launched medium video content to adapt to users' changeable consumption scenarios and diverse content needs. Since 2020, the content of medium video has turned increasingly diversified and specialized, with numerous well-produced and well-received quality works emerging, presenting a new good opportunity for the culture and entertainment industry. In the medium-video content ecosystem, micro and short dramas[42] feature a higher user focus and a clear business model in the market, attracting many platforms to deploy their business compared with content such as micro variety shows, micro documentaries, and knowledge and popular science videos. In the future, micro and short dramas are expected to become another major content following dramas, variety shows,

[39] According to the duration, online videos are divided into long videos, video clips and medium videos. Long videos mainly include online dramas, online variety shows and online films and last for more than 30 minutes. Video clips usually last for no more than 5 minutes. Medium videos are less than 30 minutes.
[40] The film & television industrialization means the industrial production of film and television works.
[41] Source: the *2021 Report on the Development of China's Network Audiovisual Services* by China Netcasting Services Association.
[42] A micro and short drama refers to a single episode of web dramas that is less than 10 minutes in duration.

movies and animations accessible on the Internet, with the influence further enhanced.

Long video platforms speed up film & television industrialization by re-setting the rules of film & television project management and improving intelligent production. Netizens have a strong demand for film & television and entertainment. By continuously improving the film & television industrialization, long video platforms for content providers supply high-quality content and advance the industry. **The first is to re-set the rules for managing film & television projects.** Through the development of rules and standard systems, long video platforms incorporate the entire cycle of film & television projects covering budgeting, project development, shooting, post-production, distribution and development of peripheral derivatives into a standardized and systematic operation, assisting film & television content production with quality control and efficiency management. For example, Youku has developed a digital cloud system that clearly shows the expenses of drama series and is convenient for managing film & TV assets. **The second is about smart production based on technological innovation.** Relying on 5G, AI, cloud computing and other advanced technologies, smart production is emerging as a "new productivity" to enhance the quality of content, representing a key factor for video platforms to promote film & television industrialization. Via applications such as script evaluation system, intelligent casting system and online film review system, iQiyi has been capable of conducting the development, production, labeling and promotion of film & television works in a smart manner.

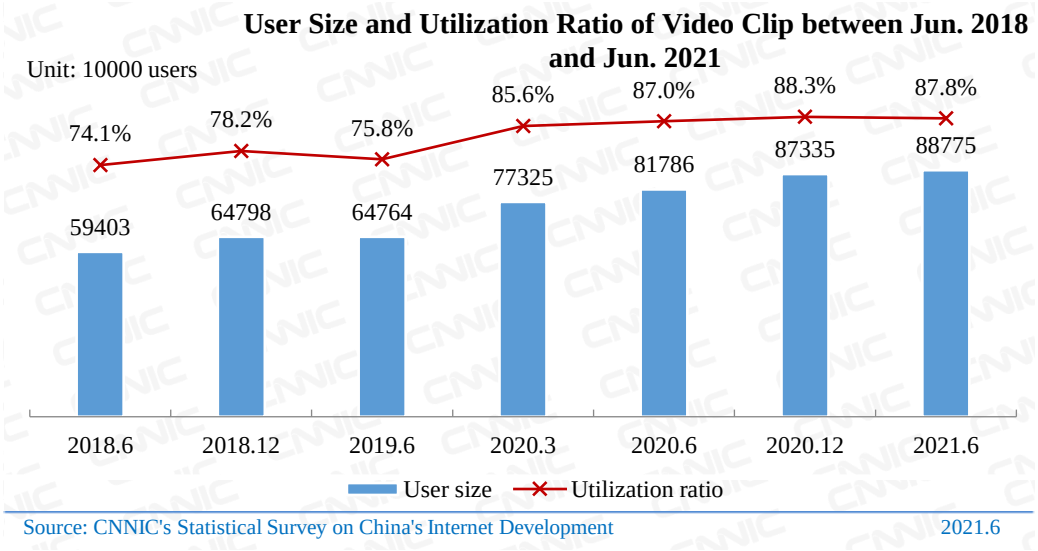


Figure 39 User Size and Utilization Ratio of Video Clip between Jun. 2018 and Jun. 2021

In the first half of 2021, video clip, a basic form of user expression and content consumption, contributed to the significant incremental hours and traffic of mobile Internet and became a basic application. Video clip, livestreaming and e-commerce brought out the best in each other, with Kuaishou and Douyin becoming important platforms for the e-commerce development. On the other hand, video clip infringement has aroused social concerns, with an industry consensus on compliance management of copyright content.

Video clip, livestreaming and e-commerce brought out the best in each other, with Kuaishou and Douyin becoming important platforms for the e-commerce development. Kuaishou and Douyin are developing along the two paths of trustworthy and interest-based e-commerce platforms according to their characteristics. In its trustworthy e-commerce ecosystem that centers on users and e-commerce content creators, Kuaishou relies on creators' continuous

content output to build a strong trust relationship with users, thereby accumulating private domain traffic[43] and improving the e-commerce conversion rate. In the first quarter of 2021, e-commerce transactions on Kuaishou totaled 118.6 billion yuan, up 219.8% year-on-year[44]. Douyin's interest-based e-commerce ecosystem features vivid, realistic and diversified content, coupled with algorithmic recommendation technology, allowing users to discover premium products at good prices, stimulate interest in consumption and create consumption motivation while "going shopping". Such an ecosystem can realize "interest-based recommendation plus massive conversion".

Video clip infringement has aroused social concerns, with an industry consensus reached on the compliance management of copyright content. The size of video clip users continued to grow, driving a surge in demand for content. On video clip platforms, the commentary, summary, clip mixes and roasting concerning film & TV dramas met users' viewing needs and gained immense popularity. Without authorization, a multitude of video clip accounts reposted and distributed others' video works and profited from them, infringing the interests of copyright holders. In April and June 2021, a legion of film & television companies and long video platforms opposed the infringement of editing, copying and disseminating film & television works through various channels. In this regard, video clip platforms introduced a range of measures, including purchasing copyrights for secondary creative content and timely handling of videos and accounts involved in violations, committing themselves to creating a good environment of copyright.

(II) Livestreaming

As of June 2021, the user size of livestreaming in China had reached 638 million, up 75.39 million from a year earlier, accounting for 63.1% of all Internet users. Specifically, the user size of livestreaming e-commerce was 384 million, up 75.24 million year-on-year, accounting for 38.0% of all Internet users.That of game livestreaming was 264 million, down 4.52 million year-on-year, making up 26.2% of the total. That of host live show was 177 million, down 8.75 million year-on-year, taking up 17.6% of the total. That of live concert streaming was 130 million, up 8.96 million year-on-year, representing 12.8% of all Internet users. That of live sport broadcasting was 246 million, up 53.05 million year-on-year, accounting for 24.4% of the total.

[43] Private domain traffic refers to the traffic that is private to a merchant, as distinguished from public domain traffic and other domain traffic.
[44] Source: Kuaishou's financial report 2021 Q1.

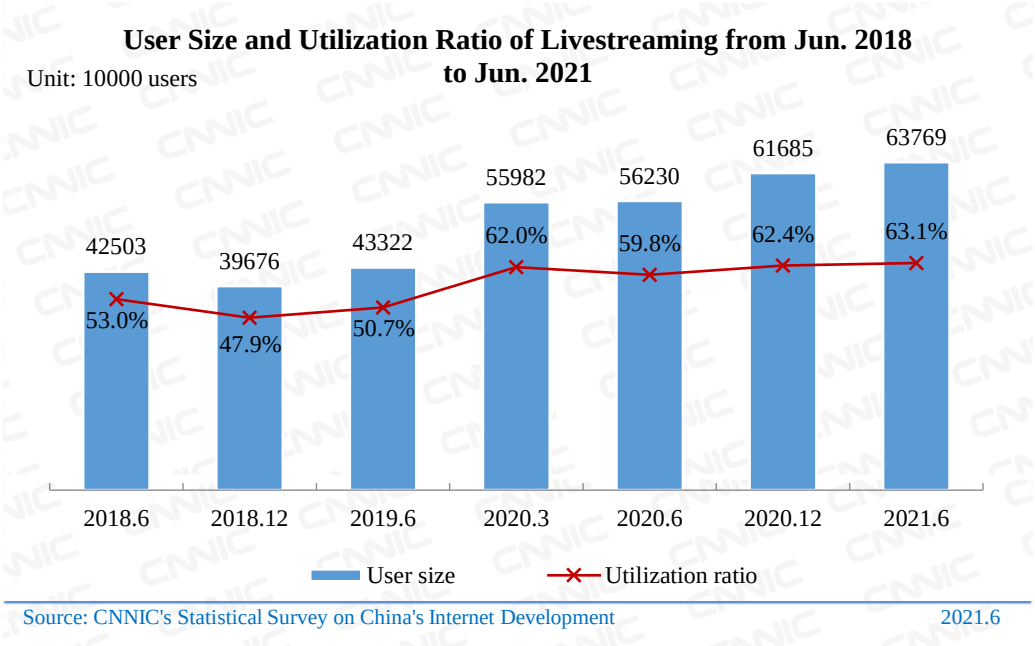


Figure 40 User Size and Utilization Ratio of Livestreaming from Jun. 2018 to Jun. 2021

The market order is more standardized in the context of the booming e-commerce livestreaming industry. First, market competition is empowering the industry to be more prosperous. In addition to traditional e-commerce platforms, Douyin and Kuaishou further invested more in their e-commerce livestreaming divisions in the first half of 2021. In April 2021, Douyin said that it would support its partners in three ways: training in assessing service capacity, multi-dimensional incentives, and professional tools. **Second, the industry standardization has taken a new step forward**. Despite the rapid development of the e-commerce livestreaming industry, livestreaming marketers have many problems such as misconduct, data falsification and counterfeit and shoddy goods. Under such circumstances, the *Measures for the Supervision and Administration of Online Transactions* and the *Measures for the Administration of Livestreaming Marketing (Trial)* came into effect one after another in the first half of 2021, which has explicitly incorporated e-commerce livestreaming into the online transaction supervision and promoted the further standardization of the market order of the e-commerce livestreaming industry.

The game livestreaming industry's rapid growth period is gradually coming to an end. Due to the impact of COVID-19, the game livestreaming saw a significant increase in both corporate revenue and paid subscribers in 2020 before declining in the first quarter of 2021. Regarding the revenue of major game livestreaming platforms, Huya's revenue grew by only 8.0% year-on-year in the first quarter, while Douyu's revenue declined by 5.5% year-on-year, with a significantly lower growth rate compared to previous quarters. In terms of the number of paid subscribers, both of the above major game livestreaming platforms also had the lowest number of paid subscribers in the first quarter of 2021 since the lastest five quarters[45]. In addition, the State Administration for Market Regulation banned the merger between Huya and Douyu in early July in accordance with the *Anti-Monopoly Law of the People's Republic of China* and the *Interim Provisions on the Review of Operators*, reflecting the fair competition and healthy development in China's game livestreaming and safeguarding the freedom of choice of game livestreamers and consumers.

[45] Source: the financial reports released by Douyu and Huya.

Multiple factors are driving the recovery of the live sport broadcasting sector. The live sports broadcasting industry rebounded in the first half of 2021 thanks to multiple factors such as the restart of major sports events, the continued development of livestreaming technology and the gradual recognition of users for the paid program model. Large Internet companies such as Tencent, ByteDance and Kuaishou have cooperated with overseas and domestic sports event rights holders, trading in the online broadcast rights for the Winter Olympics, the Chinese Football Association Super League, and the Copa America in the first half of 2021.

(III) Online Games

Up to June 2021, the user size of online games in China had reached 509 million, down 8.69 million from December 2020, making up 50.4% of all Internet users.

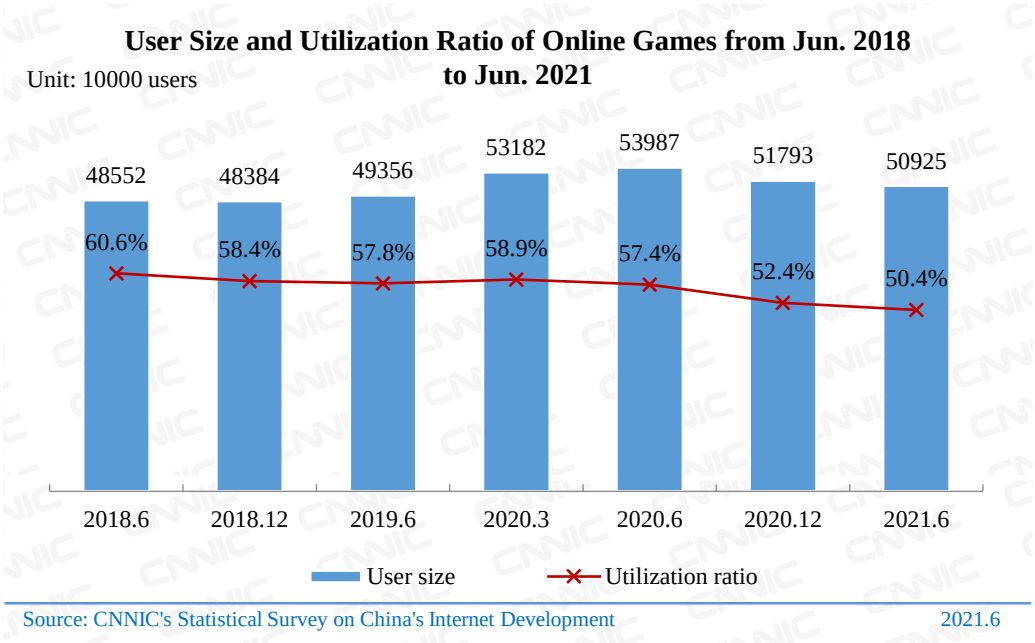


Figure 41 User Size and Utilization Ratio of Online Games from Jun. 2018 to Jun. 2021

Equal emphasis on social responsibility and business development features primarily in the development of the online game industry in the first half of 2021.

In terms of social responsibility, the social impact of the online games industry is attracting increasing attention both inside and outside the industry. First, relevant legislation and standards are being refined. The newly amended *Law of the People's Republic of China on the Protection of Minors* came into effect on June 1, 2021, with a new chapter on "Internet Protection" included, well defining that providers of Internet products and services shall not offer minors with the products and services that induce them to become addicted. In addition, 14 top enterprises jointly participated in drafting the group standard of the *Social Responsibilities and Management System for Enterprises in the Online Games Industry*, which aims to help enterprises better fulfill their compliance obligations and establish social responsibility goals. **Second, relevant technical means continue to be upgraded.** Relevant game platforms have further upgraded their protection measures for minors, expanding the application of face recognition technology based on "limiting play and re-charging and implementing curfew" for minors with real names. They have performed face recognition and verification when users log in and make

payments so as to effectively deal with problems such as "children fraudulently using their parents' identity information to bypass supervision".

In the business development, industry competition further intensified, with overseas business continuing to expand. First, competition in the mobile game market was made more fierce. In February, ByteDance officially launched its game business. Since then, it has acquired Moonton Technology and C4-Games, strengthening the deployment of mobile games. Meanwhile, Kuaishou, relying on its user base of game-based video clips, also began to penetrate from the distribution segment to the R&D segment and released its first self-developed game product in the first half of 2021. With the entry of large Internet companies such as ByteDance and Kuaishou, the market position of top companies in the mobile game industry has been affected, with more fierce market competition. **Second, overseas business was further expanded.** With the continuous improvement of domestic game makers' capital, R&D and operation capabilities, a growing number of game vendors are pinning their future growth on overseas markets. There are even a large number of game companies that have focused on overseas markets.

V Public Service Applications

(I) Online Car-hailing Services

As of June 2021, the user size of online car-hailing services in China reached 397 million, up 31.23 million from December 2020, making up 39.2% of all Internet users.

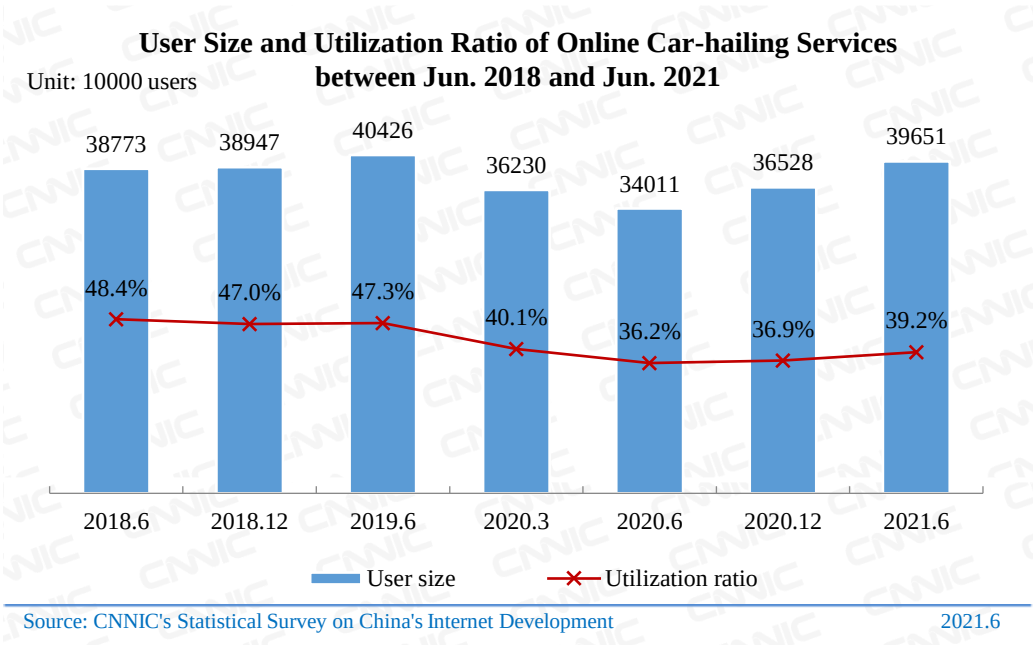


Figure 42 User Size and Utilization Ratio of Online Car-hailing Services between Jun. 2018 and Jun. 2021

In the first half of 2021, online car-hailing services covered more than 400 cities across China, with orders exceeding 4.31 billion[46], closely linked with people's lives. China has continued to strengthen the industry supervision and secure the bottom line of safety and development. By

[46] Source: China National Interactive Information Platform for the Regulation of Online Car-hailing Services.

emphasizing safety and development equally, autonomous vehicles for online car-hailing services have embraced new development opportunities, with the application process being advanced.

The regulation of the online car-hailing industry has been further strengthened. First, seven departments had conducted cybersecurity reviews of online car-hailing companies. In early July 2021, the Cybersecurity Review Office launched a cybersecurity review of "Didi Chuxing", taking down 25 apps, including Didi's enterprise edition. On July 16, the Cyberspace Administration of China, coupled with the Ministry of Public Security, the Ministry of State Security, the Ministry of Natural Resources, the Ministry of Transport, the State Taxation Administration and the State Administration for Market Regulation, conducted a cybersecurity investigation at Didi Chuxing. **Second, digital means were used to supervise the compliance of online car-hailing services.** The interaction platform for the regulatory information of online car-hailing services has accessed data from many companies to support compliance governance. According to the data[47], as of June 2021, 236 companies nationwide had obtained licenses to operate online car-hailing platforms, issuing 3.493 million car-hailing driver licenses and 1.327 million vehicle transport licenses, up 8.3%, 13.2% and 14.3% respectively over January 2021. **Third, the pricing of the online car-hailing industry is made more transparent.** The *Guidelines on Deepening the Reform of Road Transport Prices*[48] requires that online car-hailing companies "shall take the initiative to disclose their pricing mechanisms and dynamic fare increase mechanisms".

China has embraced an excellent opportunity for the development of autonomous ride-hailing vehicles. First, the achievements in new infrastructure have created an environment for the development of autonomous ride-hailing vehicles. Beijing, Hangzhou, Changsha and Henan province announced their new infrastructure plans concerning intelligent and connected vehicles. Beijing will expedite the construction of a highly reliable, low-latency and dedicated network to support high-level autonomous driving and the development and renovation of coordinated IT-based facilities for vehicles and roads in autonomous driving demonstration areas[49]. **Second, autonomous ride-hailing vehicles have been put into service.** Following Changsha, Shanghai and Beijing have successively liberalized test rides for autonomous ride-hailing vehicles, Beijing has set up China's first pioneer zone for the policy of intelligent connected vehicles.

(II) Online Education

Up to June 2021, the user size of online education in China had reached 325 million, down 16.78 million from December 2020, making up 32.1% of all Internet users.

[47] Source: China National Interactive Information Platform for the Regulation of Online Car-hailing Services.
[48] Source: the *Guidelines on Deepening the Reform of Road Transport Prices* issued by the Ministry of Transport and the National Development and Reform Commission of the People's Republic of China.
[49] Source: the *Action Plan of Beijing for Accelerating New Infrastructure Construction (2020-2022)*.

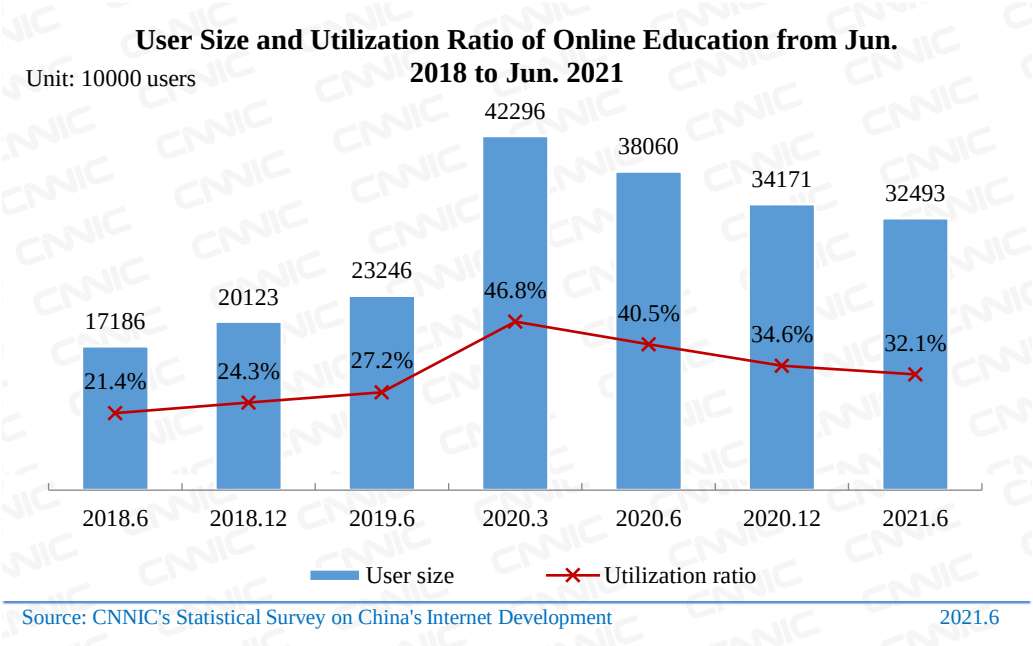


Figure 43 User Size and Utilization Ratio of Online Education from Jun. 2018 to Jun. 2021

With the management of off-campus training institutions further standardized, leading enterprises have accelerated their penetration in the continuing education and intelligent hardware. In the first half of 2021, relevant departments intensively introduced policies to regulate the basic education in primary and secondary schools, rectify off-campus training courses and deepen the reform of after-school education and training. In May, the 19th meeting of the Central Committee for Deepening Overall Reform considered and adopted the *Guidelines on Further Reducing the Burden of Homework and Off-Campus Training for Students at the Compulsory Education Stage*, pointing out the disorderly development of extra-curriculum training institutions and the prominent phenomenon of "reducing the burden inside schools but increasing the burden after school". It is a must to comprehensively regulate and manage off-campus training institutions.[50]. In June, the Ministry of Education established the Department for the Supervision of After-School Tutoring Institutions, which is responsible for regulating tutoring institutions for kindergarten children and primary and secondary school students. In the context of increasingly standardized policies, leading online education enterprises for primary and secondary school students have accelerated their transformation by seizing new opportunities in subdivided areas and exploring new models of cross-sector integration. **The first is about the development of continuing education.** For example, Gaotu Education has set up Gaotu School that focuses on adult training, Zuoyebang has launched a new brand "Bufan Classroom", and NetEase Youdao has also established a continuing education division to help adult learners to update their professional knowledge and enhance their career value. **The second is about developing smart devices.** Regarding personal smart devices, ByteDance and Tencent have rolled out intelligent homework lamps, Zuoyebang has launched smart learning machine, Alibaba has applied Tmall Genie in education scenarios, and Yuanfudao and Tomorrow Advancing Life have also established their hardware teams. In the field of campus intelligent devices, smart classroom screens and smart interactive tablets have been applied in teaching with the advancement of IT-based education.

[50] Source: the Ministry of Education of the People's Republic of China, http://www.moe.gov.cn/jyb_xwfb/s6052/moe_838/202105/t20210521_532904.html, 21 May 2021.

(III) Online Medical Services

The first half of 2021 saw an increasing demand for online medical services. From laboratories to the clinical frontline, pathogen detection, epidemic tracing, rapid screening to vaccine research and development, and online consultation, telemedicine to Internet-based hospitals, online medical services have eliminated limitations of time, space and geography and continued to boost the digital development of medical care in China. Driven by a combination of favorable policies and market demand, medical platforms have seen rapid growth in traffic and the industry has ushered in a new phase of development.

Favorable policies and technological advances are boosting the rapid growth of China's online medical users. As of June 2021, the user size of online medical services in China had amounted to 239 million, up 24.53 million from December 2020, accounting for 23.7% of all Internet users. **In terms of policy,** online medical regulations have been further implemented. In Internet-based hospitals, online consultations for patients with common and chronic diseases can be reimbursed by medical insurance. From online sales of drugs, core medical treatment to medical insurance for online medical services, all regions have supported the comprehensive development of online medical services by introducing corresponding schemes, laying a solid foundation for the growth of online medical users. **Regarding technology,** deep learning, one of the core technologies of AI, has achieved better results in many medical research directions such as speech recognition, visual recognition and target detection. China's huge and rich base for medical sample data has also provided a wide range of datasets for continuously training AI and refining algorithms. The accelerated development of 5G network will bring disruptive changes to the domestic industry chain for medical big data and secure the sustainability of online medical services.

Healthcare for the aged has become a new hot issue in online medical services. As the size of the aged group grows in China year by year, the focus on health care for the elderly has become a key direction for each Internet platform to diversify into online medical services. **On the one hand,** mature listed companies for pharmaceutical devices have cooperated with hospitals to offer multiple service models for chronic disease management in the elderly population. They have enhanced their advantages by building their platforms and providing management devices to build closed-loop health management services that integrate hardware and software. **On the other hand,** for home-based medical care, platforms have cooperated with enterprises serving the elderly and used its advantages to empower health & wellness institutions with digital and smart technologies to realize the online-offline integration and full-scene healthcare and wellness services. In addition, as smart services for the elderly continue to develop, smart devices have become a breakthrough in developing the field. For example, JD has launched the "Family Doctor Guardian Star" smart speaker, smartphones for elders, wearable devices and other smart hardware products to conduct smart health management for the elderly at home.

Appendix 1 Survey Methodology

I. Survey Methodology

(I) Telephone Survey

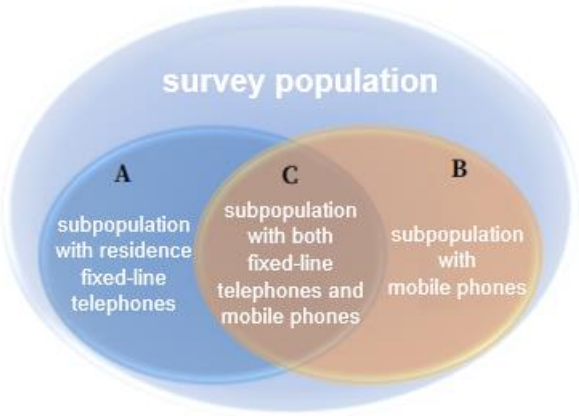
1.1 Survey Population

Chinese permanent residents at the age of 6 or above who have residence fixed-line telephones (including home phones and dormitory telephones) or mobile phones

◇ Sample scale

There are 21,000 samples in total, covering 31 provinces, autonomous regions and municipalities in Chinese mainland.

◇ Division of survey population



The survey population can be divided into three categories:

Subpopulation A: Survey subpopulation using residence fixed-line telephones (including residents with home phones, students with dormitory telephones, and other users with dormitory telephones);

Subpopulation B: Survey subpopulation with mobile phones;

Subpopulation C: Survey subpopulation with both residence fixed-line telephones and mobile phones (there is an overlap between subpopulation A and subpopulation B, and the overlapped part is subpopulation C), C=A∩B.

1.2 Sampling Method

CNNIC surveys subpopulation A, B and C. Double sampling is adopted for the survey so as to cover as many Internet users as possible. The first sampling frame is subpopulation A, the people with residence fixed-line telephones. The second sampling frame is subpopulation B, the people with mobile phones.

For the survey population with fixed-line telephones, stratified two-stage sampling is adopted. To ensure the sufficient representativeness of samples, the whole country is divided into 31 tiers according to the province, autonomous region and municipality directly under the central government and the sampling is made independently at each tier.

The self-weighted sampling method is adopted for each province. The sample sizes for each district, city and prefecture (including the governed districts and counties) are allocated in accordance with the proportion of the people at the age of 6 or above covered by residence fixed-line telephones in the local area compared to the total covered population in the whole province.

Sampling in subpopulation B is the similar to that in subpopulation A. The whole country is divided into 31 tiers according to the provinces, autonomous regions and municipalities directly under the central government, and sampling is made independently in each tier. Samples are allocated in accordance with the proportion of the residents in each district or city, in order to make the sample allocation in each province conform to the self-weighting method.

To ensure the telephones are taken with almost the same probability in each district, city or prefecture, that is, the local bureau number with more telephones will more likely be taken, and to make the phone visit more feasible, the telephone numbers in each district, city and prefecture are taken according to the following procedures:

For mobile phone user groups, all the mobile bureau numbers in each district, city and prefecture are sampled; a certain quantity of 4-digit random numbers are generated according to the valid sample size in each district, city or prefecture, and then combined with the mobile bureau numbers in each district, city or prefecture to form a number library (local bureau number + the random 4-digit number); randomly order the number library; dial and visit the randomly ordered number library. Survey of the subpopulation with fixed-line telephones is similar to that of the subpopulation with mobile phones: a random number is generated and combined with the local bureau number to form a telephone number, and then such number is dialed and visited. To avoid

repeated sampling, only residence fixed-line telephones are visited.

According to the latest population attribute structure published by the provincial statistical bureaus, we use the method of multi-variable joint weighting to estimate the size of netizens.

1.3 Sampling error

Based on the design, analysis and calculation of sampling, 0.6 percentage points is the estimated maximum allowable absolute error of the proportional target quantity (e.g. the popularity rate of netizens) among the individual netizen survey results, when the confidence is 95%. From this, we can deduce the error range of estimating other kinds of target quantities, such as the scale of netizens.

1.4 Survey Method

The Computer-assisted Telephone Interviewing (CATI) system is adopted for the survey.

1.5 Differences between survey population and targeted population

A study for the subpopulation who are not covered by telephones, conducted by CNNIC at the end of 2005, shows that Internet users are very few in this subpopulation. Currently, the subpopulation is downsizing gradually with the development of our telecom industry. In this survey, there is an assumption, i.e., Internet users who are not covered by fixed-line telephones or mobile phones are negligible.

(II) Online Survey

2.1 Survey Population

All netizens.

◇ Sample scale

There are 20,000 samples in total, covering netizens in urban and rural areas, of different genders and all ages.

2.2 Method to Complete Questionaires

Automatic filling in.

(III) Automatic Online Search and Statistical Data Reporting

Automatic online search mainly makes technical statistics on the number of websites, and the

reported data mainly includes the number of IP addresses and domain names.

3.1 Number of IP Addresses

The data of IP addresses counted by province come from the IP address databases of Asia-Pacific Network Information Center (APNIC) and CNNIC. Registered data in each database, that can be distinguished by the province which the addresses belong to, can be added respectively by province to generate data of each province. As address allocation is a dynamic process, the statistical data are only for reference. The Ministry of Industry and Information Technology, as the national competent department for IP addresses, also require IP address allocation organizations to report the quantity of IP addresses they own semiannually. To ensure the accuracy of IP data, CNNIC will compare and verify APNIC statistical data with the reported data to confirm the final quantity of IP addresses.

3.2 Number of Websites

The number of websites is detected and obtained by CNNIC according to domain name lists.

The lists of ".CN" and ".中国" are obtained though the database of CNNIC, while the list of gTLD is provided by international relevant registries.

3.3 Number of Domain Names

The numbers of domain names under ".CN" and ".中国", respectively, are derived from CNNIC database, while those under gTLD and New gTLD are provided by domestic registrars.

II. Definitions of Terms in the Report

◇ **Internet Users or Netizens:** Chinese residents at the age of 6 or above who have used the Internet in the past 6 months.

◇ **Mobile Internet Users:** Internet users who have used mobile phones to access and surf the Internet in the past 6 months.

◇ **Computer Internet Users:** Internet users who have used computers to access and surf the Internet in the past 6 months.

◇ **Rural Internet Users:** Internet users who have been living in rural areas of China in the past 6 months.

◇ **Urban Internet Users:** Internet users who have been living in urban areas of China

in the past 6 months.

◇ **IP Address:** As the basic resource on the Internet, the IP address functions to identify computers, servers and other devices connected to the Internet. Connection with the Internet can be realized only when an IP address (in any form) is acquired.

◇ **Website:** It refers to a web site with a domain name itself or "www. + domain name". Such domain names include Chinese ccTLD, such as .cn and .中国, and gTLD, and registrants of the domain names are within the territory of P.R.C. For example: for the domain name of "cnnic.cn", it has only one website and the corresponding web address is "cnnic.cn" or "www.cnnic.cn". Other web addresses with such domain name as the suffix, like "whois.cnnic.cn" and "mail.cnnic.cn", are regarded as different channels of the website.

◇ **Scope of Survey:** Unless otherwise expressly indicated, data in this Report only refer to mainland China, excluding Hong Kong, Macao and Taiwan.

◇ **Deadline of Survey Data:** The deadline of the statistical survey data is Jun. 30, 2021.

◇ **Data Explanation：** Most of the data in this Report are approximate values after rounding and retaining significant digits.

Appendix 2 Attached Tables of Basic Internet Resources

Table 1 The Number of IPv4 Addresses in Different Regions of China

Region	Number of Addresses	Equivalence
Chinese mainland	344,539,904	20A+141B+72C
Taiwan	35,693,824	2A+41B+215C
Hong Kong SAR	12,616,704	169B+250C
Macau SAR	336,640	5B+33C

Table 2 The Allocation of IPv4 Addresses among Organizations in Chinese mainland

Organization Name	Number of Addresses	Equivalence
China Telecom	125,763,328	7A+126B+255C
China Unicom	69,866,752 注1	4A+42B+21C
IP Address Allocation Alliance of CNNIC	63,247,872 注2	3A+196B+244C
China Mobile	35,294,208	2A+26B+140C
China Education and Research Network	16,649,984	254B+16C
China Mobile Tietong	15,796,224 注3	241B+8C
Others	17,921,536	273B+118C
Total	344,539,904	20A+141B+72C

Data sources: APNIC and CNNIC

Note 1: The addresses of China Unicom include the addresses of former China Unicom and former China Netcom. Specifically, the IPv4 addresses 6316032（96B+96C）of former China Unicom are assigned by CNNIC.

Note 2: As a national Internet registry (NIR) approved by APNIC and national competent authorities in China, CNNIC has organized ISPs, enterprises and public institutions of certain size in China to set up IP Address Allocation Alliance. So far, the total number of IPv4 addresses held by the members of IP Address Allocation Alliance is 85.36 million, equivalent to 5.1A. The IPv4 addresses of the IP Address Assignment Alliance listed in the above table do not include those IPv4 addresses already assigned to former China Unicom and China Mobile Tietong.

Note 3: The IPv4 addresses of China Mobile Tietong are assigned by CNNIC.

Note 4: The deadline for the above statistical data is Jun. 30, 2021.

Table 3 The Number of IPv6 Addresses in Different Regions of China (unit: /32[note1])

Region	Number of Addresses
Chinese mainland	58,962
Taiwan	2,566
Hong Kong SAR	488
Macau SAR	7

Table 4 The Allocation of IPv6 Addresses among Organizations in Chinese mainland

Organization Name	Number of IPv6 Addresses
IP Address Allocation Alliance of CNNIC	21,343 [note2]
China Telecom	16,387
China Education and Research Network	10,258
China Unicom	4,097
China Mobile	4,097
China Mobile Tietong	2,049 [note3]
China Science and Technology Network	17 [note4]
Others	714
Total	58,962

Data sources: APNIC and CNNIC

Note 1: /32 as shown in the IPv6 address tables is a method to present IPv6 addresses, and the corresponding number of addresses is 2（128-32）=296.

Note 2: At present, the number of IPv6 addresses held by the members of IP Address Allocation Alliance of CNNIC is 23409/32. The IPv6 addresses held by the members of IP Address Allocation Alliance listed in the above table do not include those IPv6 addresses already assigned to China Tietong Telecom and China Science and Technology Network (CSTNET).

Note 3: The IPv6 addresses of China Tietong Telecom are assigned by CNNIC.

Note 4: The IPv6 addresses of CSTNET are assigned by CNNIC.

Note 5: The deadline for the above statistical data is Jun. 30, 2021.

Table 5 The Proportion of IPv4 Addresses in Each Province / Autonomous Region / Municipality Directly under the Central Government

Province / Autonomous Region / Municipality Directly under the Central Government	Proportion
Beijing	25.50%
Guangdong	9.54%
Zhejiang	6.47%
Jiangsu	4.76%
Shanghai	4.52%
Shandong	4.89%
Hebei	2.85%
Liaoning	3.33%
Henan	2.63%
Hubei	2.40%
Sichuan	2.77%
Fujian	1.95%
Hunan	2.36%
Shaanxi	1.63%
Anhui	1.65%
Heilongjiang	1.21%
Guangxi	1.38%
Chongqing	1.68%
Jilin	1.21%
Tianjin	1.05%
Jiangxi	1.73%
Shanxi	1.28%
Yunnan	0.98%
Inner Mongolia	0.77%
Xinjiang	0.60%
Hainan	0.47%
Guizhou	0.44%
Gansu	0.47%
Ningxia	0.28%
Qinghai	0.18%
Tibet	0.13%
Others	8.92%
Total	100.00%

Data sources: APNIC and CNNIC

Note 1: The above statistics are made on the basis of the location of the IP address owners.

Note 2: The deadline for the above statistical data is Jun 30, 2021.

Table 6 The Numbers of .CN Domain Names and .中国 Domain Names by Province

Province	Domain Names		“.CN” Domain Names		“.中国” Domain Names	
	Number	Proportion in total domain names	Number	Proportion in “.CN” domain names	Number	Proportion in “.中国” domain names
Guangdong	3,882,789	12.4%	1,485,600	9.8%	18,159	8.6%
Beijing	3,270,530	10.4%	1,561,898	10.4%	26,187	12.4%
Guizhou	2,952,398	9.4%	2,510,161	16.6%	3,409	1.6%
Henan	1,932,009	6.2%	685,799	4.5%	4,349	2.1%
Jiangsu	1,711,000	5.5%	908,098	6.0%	9,671	4.6%
Sichuan	1,393,776	4.4%	610,588	4.0%	11,763	5.6%
Shandong	1,362,606	4.3%	665,653	4.4%	25,585	12.2%
Zhejiang	1,253,734	4.0%	419,898	2.8%	8,174	3.9%
Shanghai	1,230,797	3.9%	714,139	4.7%	7,822	3.7%
Hunan	1,200,855	3.8%	477,251	3.2%	2,762	1.3%
Hubei	1,165,381	3.7%	501,535	3.3%	3,453	1.6%
Fujian	1,145,718	3.7%	521,374	3.5%	24,435	11.6%
Anhui	1,067,612	3.4%	542,083	3.6%	3,215	1.5%
Jiangxi	817,319	2.6%	364,485	2.4%	2,997	1.4%
Guangxi	793,104	2.5%	453,382	3.0%	2,064	1.0%
Hebei	773,707	2.5%	364,437	2.4%	6,628	3.2%
Yunnan	588,575	1.9%	220,350	1.5%	5,169	2.5%
Shaanxi	588,571	1.9%	283,283	1.9%	6,373	3.0%
Chongqing	580,015	1.8%	244,095	1.6%	5,449	2.6%
Liaoning	415,420	1.3%	202,522	1.3%	6,084	2.9%
Shanxi	374,128	1.2%	216,902	1.4%	1,999	1.0%
Heilongjiang	310,707	1.0%	172,176	1.1%	2,922	1.4%
Jilin	304,633	1.0%	99,592	0.7%	1,618	0.8%
Tianjin	238,790	0.8%	98,068	0.7%	1,524	0.7%
Hainan	226,738	0.7%	131,703	0.9%	759	0.4%
Gansu	195,726	0.6%	118,849	0.8%	1,061	0.5%
Inner Mongolia	120,894	0.4%	57,131	0.4%	1,155	0.5%
Xinjiang	111,080	0.4%	48,925	0.3%	767	0.4%
Ningxia	42,191	0.1%	20,958	0.1%	478	0.2%
Qinghai	30,304	0.1%	23,930	0.2%	235	0.1%
Tibet	8,852	0.0%	4,382	0.0%	503	0.2%
Others	1,272,484	4.1%	357,753	2.4%	13,629	6.5%
Total	31,362,443	100.0%	15,087,000	100.0%	210,398	100.0%

Data sources: APNIC and CNNIC

Note: The deadline for the above statistical data is Jun 30, 2021.

Appendix 3 Supporting Organizations

We would like to express our heartfelt thanks to the following organizations that have supported the collection of data in this report. (Not listed in any particular order)

Ministry of Industry and Information Technology
Office of the Central Cyberspace Affairs Commission
National Bureau of Statistics
Central Committee of the Communist Young League

China Organizational Name Administration Center
China Academy of Information and Communications Technology
National Computer Network Emergency Response Technical Team / Coordination Center of China（CNCERT）
Reporting Center for Illegal and Inappropriate Internet Information of Cyberspace Administration of China（12377）
Computer Network Information Center of Chinese Academy of Sciences

China Mobile
China Unicom
Beijing Micro Dream Network Technology Co., Ltd. (Micro-blog)
Alibaba Communication Technology (Beijing) Co., Ltd.
Beijing Oriental Wangjing Information Technology Co., Ltd.
Beijing Guoxuwangluo Technology Co., Ltd.
Beijing HuaRui Wireless Technology Co., Ltd.
Beijing Shouxinwangchuang Network Information service Co., Ltd.
Beijing DNS.com Co., Ltd.
Beijing ZW.cn Co., Ltd.
Beijing Zhuoyueshengming Technology Co., Ltd.
Chengdu Feishu Technology Co., Ltd.
Chengdu West Dimension Digital Technology Co., Ltd
Daqing Zhuochuang Multi-media Production Co., Ltd.
PANASIA Jiangsu Co., Ltd.
Fujian Litian Network Technology Co., Ltd.

China Telecom
Beijing Ucap Information Techonology Co., Ltd.
Tencent Cloud Computing (Beijing) Co., Ltd.
Alibaba Cloud Computing Co., Ltd.
Beijing Guangsuliantong Technology and Trade Co., Ltd.
Beijing Hongwangshenzhou Technology and Development Co., Ltd.
Beijing Jinluoshen E-commerce Co., Ltd.
Beijing Wanweitonggang Technology Co., Ltd.
Beijing Xinnet.com Co., Ltd.
Beijing BrandCloud.cn Co., Ltd.
Beijing Zihai Technology Co., Ltd.
Chengdu 51web.com Co., Ltd.
Dalian Zhongyihulian Technology Co., Ltd.
Fanxi Corporation Service (Shanghai) Co., Ltd.
Foshan Yidong Network Co., Ltd.
Fuzhou Zhongxu Network Technology Co., Ltd.

Guangdong HUYI Internet & IP Services Co., Ltd.
Guangdong Jinwanbang Technology Investment Co., Ltd.
Guangdong Nicenic.net Inc.
Guangdong Now.cn Co., Ltd.
Guangxi bbw.org.cn Co., Ltd.
Guangzhou Mingyang Information Technology Co., Ltd.
Guangzhou Yunxun Information Technology Co., Ltd.
Guest Internet Industry Co., Ltd.
Hangzhou Mingshang Network Co., Ltd.
Hefei Juming Network Technology Co., Ltd.
Henan Weichuang Network Technology Co., Ltd.
Heilongjiang E-link Network Co., Ltd.
ZDNS Beijing Engineering Research Center
Jiangsu Bangning Science & technology Co., Ltd.
Maoming City Qunying Network Co., Ltd.
CERNET Co., Ltd.
Xiamen Dianmei Network Technology Co., Ltd.
Xiamen Nawang Technology Co., Ltd
Xiamen 35.Com Technology Co., Ltd.
Xiamen Shangzhong Online Technology Co., Ltd.
Xiamen ChinaSource Internet Service Co., Ltd.
eName Technology Co., Ltd.
Xiamen Zhong.top Co., Ltd.
Shandong CTRL Group Co., Ltd.
Shanghai Oray Co., Ltd.
Shanghai Chinafu.com Co., Ltd.
Shanghai Meicheng Technology Information Development Co., Ltd.
Shanghai Yovole Network Co., Ltd.
Shenzhen idcicp.com Co., Ltd.
Shenzhen Works Online Co., Ltd.
Shenzhen Wanweiwang Information Technology Co., Ltd.
Shenzhen Yingmaisi Information Technology Co., Ltd.
Sichuan Yuqu Network Technology Co., Ltd.
Tianjin Zhuiri Technology Development Co., Ltd.
Xi'an Qianxinet Technology Co., Ltd.
Yantai DNSpod Network Technology Co., Ltd.
Ejee Group Beijing Co., Ltd.
Yunnan Landui Cloud Computing Co., Ltd.
Zhejiang 22net Inc.
Zhengzhou Shanglu Technology Co., Ltd.
Zhengzhou Shijichuanglian Electronic Technology Development Co., Ltd.
China Education and Research Network
Knet Registrar (Tianjin) Co., Ltd
Chongqing Zhijia Information Technology Co. Ltd.
Zunyi zhongyuzhike Network Technology Co., Ltd.

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