The 49th Statistical Report on China's Internet Development

China Internet Network Information Center (CNNIC)

February 2022

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 48 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 marked the 100th anniversary of the founding of the Communist Party of China and the opening year of the 14th Five-Year Plan. In the face of a complex and challenging environment and many risks and challenges, the national system for industry and information technology has been committed to developing a strong country in cyberspace and manufacturing, getting the 14th Five-Year Plan off to a good start. At present, China has made remarkable achievements in industrial and information-technology development. The Internet industry has been developing in a fast and steady manner. The industrial Internet has facilitated the further integration of digital technology and the real economy, providing a new driving force for developing such a strong country.

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 six aspects, including basic Internet development, size of Internet users, Internet applications, industrial Internet, development of e-government, and Internet security. From a multi-pronged perspective, CNNIC has worked to comprehensively demonstrate the development of China's Internet in 2021 through all-round data.

Here, we hereby express our heartfelt thanks to the Ministry of Industry and Information Technology of 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 the Internet development.

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OVERVIEW

Core Data

◇ As of December 2021, China had 1,032 million netizens, up by 42.96 million over December 2020, and its Internet penetration had reached 73.0%, up 2.6 percentage points over December 2020.

◇ Up to December 2021, the number of mobile Internet users in China had reached 1,029 million, up 42.98 million over December 2020. The proportion of China's netizens accessing the Internet via their mobile phones had amounted to 99.7%.

◇ As of December 2021, the size of rural Internet users was 284 million or 27.6% of the national total, while that of urban Internet users was 748 million or 72.4% of the total.

◇ Up to December 2021, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptops computers, TVs and tablet computers were 99.7%, 35.0%, 33.0%, 28.1% and 27.4%, respectively.

◇ As of December 2021, the number of IPv6 addresses had amounted to 63,052 blocks/32, up 9.4% over December 2020.

◇ Up to December 2021, the number of China's domain names totaled 35.93 million. China had 20.41 million domain names ending with ".CN", making up 56.8% of the national total.

◇ As of December 2021, the user size of instant messaging in China reached 1,007 million, up 25.55 million from December 2020, making up 97.5% of the national total.

◇ Up to December 2021, the user size of online video (including video clips) in China had reached 975 million, up 47.94 million from December 2020, making up 94.5% of all Internet users. The number of video clip users amounted to 934 million, an increase of 60.80 million over December 2020, accounting for 90.5% of all Internet users.

◇ As of December 2021, the user size of online payment in China had reached 904 million, up 49.29 million from December 2020, taking up 87.6% of the national total.

◇ Up to December 2021, the user size of online shopping in China had reached 842 million, up 59.68 million from December 2020, taking up 81.6% of all Internet users.

◇ As of December 2021, the user size of online news in China had reached 771 million, up 28.35 million from December 2020, making up 74.7% of the national total.

◇ Up to December 2021, the user size of online meal ordering in China had reached 544 million, up 125 million from December 2020, taking up 52.7% of all Internet users.

◇ As of December 2021, the user size of online office in China had amounted to 469 million, up 123 million from December 2020, accounting for 45.4% of the national total.

◇ Up to December 2021, the user size of online medical services in China had amounted to 298 million, up 83.08 million from December 2020, accounting for 28.9% of all Internet users.

CHAPTER One Basic Internet Development

I Basic Internet Resources

As of December 2021, the number of IPv4 addresses in China was 392.49 million, that of IPv6 addresses was 63,052 blocks/32, and that of active IPv6 users reached 608 million. The total number of domain names in China was 35.93 million, of which the number of domain names ending with ".CN" was 20.41 million, accounting for 56.8%. The number of mobile phone base stations in China totaled 9.96 million, that of Internet broadband access ports reached 1.018 billion, and the total length of fiber optic cable lines amounted to 54.88 million kilometers.

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

	Dec. 2020	Dec. 2021
IPv4	389,231,616	392,486,656
IPv6 (block/32)	57,634	63,052
Number of active IPv6 users (100 million)	4.62	6.08
Domain name	41,977,611	35,931,063
Domain names ending with ".CN"	18,970,054	20,410,139
Mobile phone base stations (10,000)	931	996
Internet broadband access ports (100 million)	9.46	10.18
Length of fiber optic cable lines (10,000 km)	5169	5488

(I) IP Address

Up to December 2021, the number of IPv6 addresses had amounted to 63,052 blocks/32, up 9.4% over December 2020. Of the 23 public recursive services with global visibility under the monitoring of CNNIC, 13 offer IPv6 public recursive services.

Number of IPv6 Addresses

Unit: block/32

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
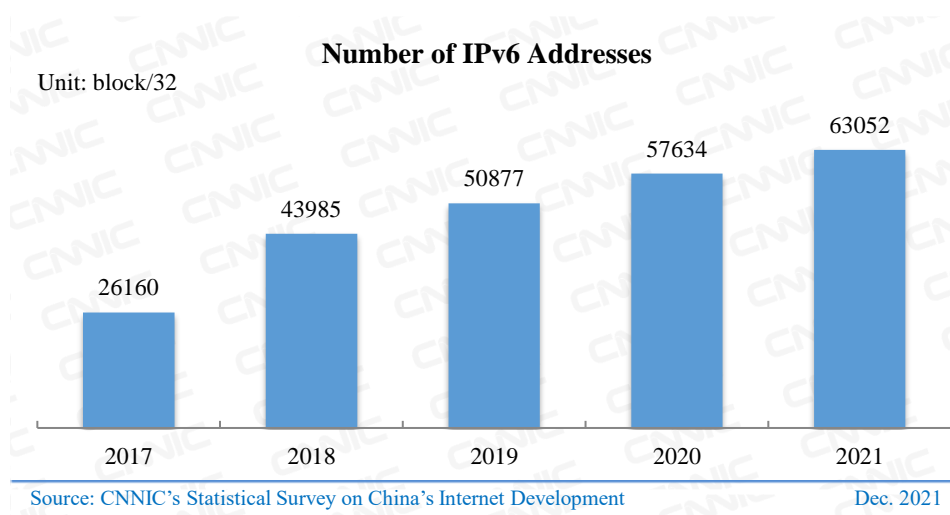
Figure 1 Number of IPv6 Addresses[1]

As of December 2021, the number of active IPv6 users in China reached 608 million.

Number of Active IPv6 Users

Unit: 100 million

Source: China Academy of Information and Communications Technology   Dec. 2021
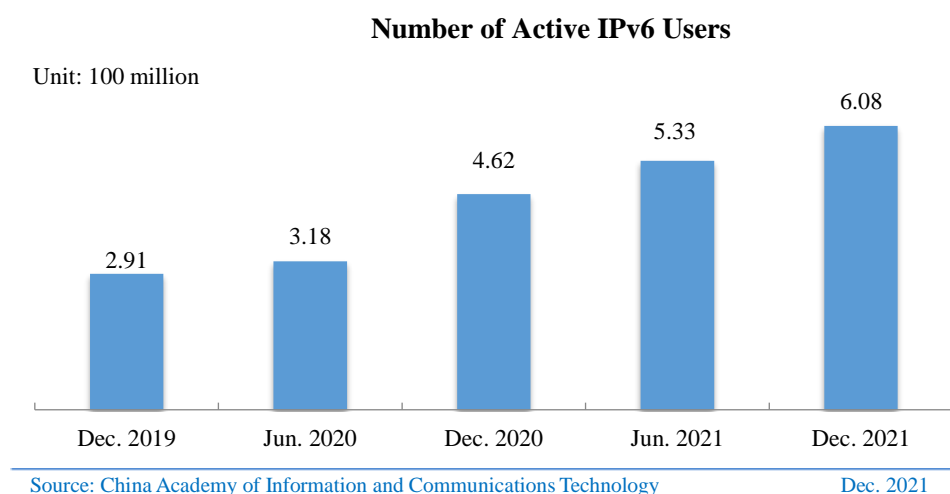
Figure 2 Number of Active IPv6 Users

Up to December 2021, the number of IPv4 addresses in China had amounted to 392.49 million.

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

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Number of IPv4 Addresses

Unit: 10,000

2017	2018	2019	2020	2021
38641	38584	38751	38923	39249

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
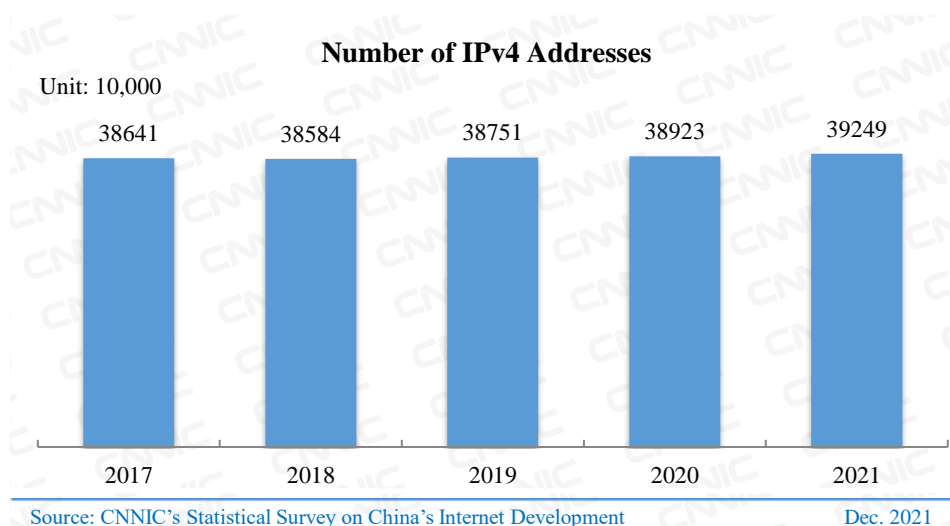
Figure 3 Number of IPv4 Addresses[2]

(II) Domain Name

Up to December 2021, the number of China's domain names totaled 35.93 million. Specifically, 20.41 million or 56.8% ended with ".CN"; 10.65 million or 29.6% ended with ".COM"; 0.21 million or 0.6% ended with ".中国"; and 3.62 million or 10.1% were new generic Top-Level Domains (New gTLD).

Table 2 Number of Domain Names by Category[3]

	Number	Proportion in total domain names
.CN	20,410,139	56.8%
.COM	10,649,851	29.6%
.NET	869,686	2.4%
.中国	207,771	0.6%
.ORG	61,489	0.2%
.INFO	30,220	0.1%
.BIZ	20,722	0.1%
New GTLD	3,615,751	10.1%
OTHERS	65,434	0.2%
TOTAL	35,931,063	100.0%

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

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

	Number	Proportion in total ".CN" domain names
.CN	15,466,755	75.8%
.COM.CN	2,972,251	14.6%
.ADM.CN[4]	711,405	3.5%
.NET.CN	680,632	3.3%
.ORG.CN	524,682	2.6%
.AC.CN	31,938	0.2%
.GOV.CN	15,714	0.1%
.EDU.CN	6,571	0.0%
OTHERS	191	0.0%
Total	20,410,139	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 December 2021, the number of mobile phone base stations totaled 9.96 million, a net increase of 650,000 for the year. Specifically, there were 5.9 million 4G base stations and 1.425 million 5G base stations, with over 650,000 new 5G base stations built throughout the year.

Number of Mobile Phone Base Stations

Unit: 10,000

Year	Value
2017	619
2018	667
2019	841
2020	931
2021	996

Source: the Ministry of Industry and Information Technology   Dec. 2021
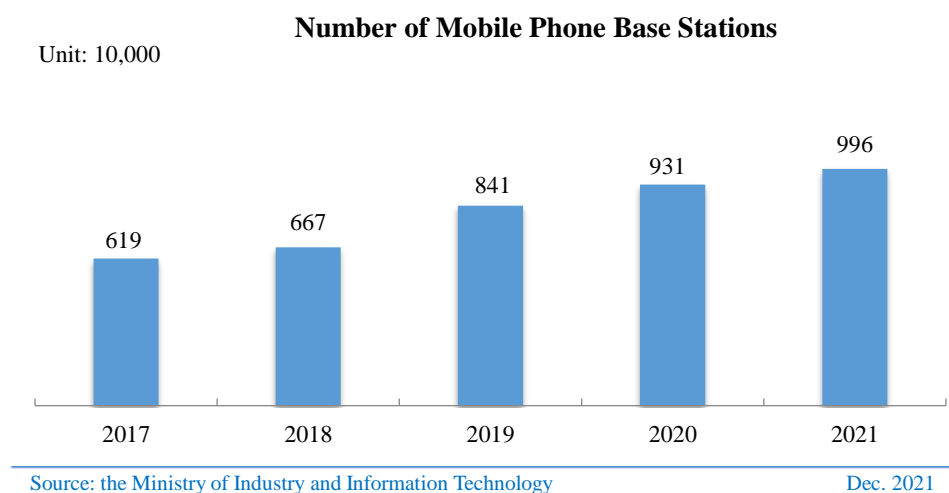
Figure 4 Number of Mobile Phone Base Stations

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[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".

(IV) Number of Internet broadband access ports

The development of broadband networks is being expedited. As of December 2021, the number of Internet broadband access ports nationwide reached 1,018 million, a net increase of 71.80 million from December 2020. Specifically, the number of FTTH/O[5] ports reached 960 million, a net increase of 80.17 million over December 2020, while the proportion increased to 94.3% from 93.0% at the end of 2020.

Number of Internet Broadband Access Ports

Unit: 100 million
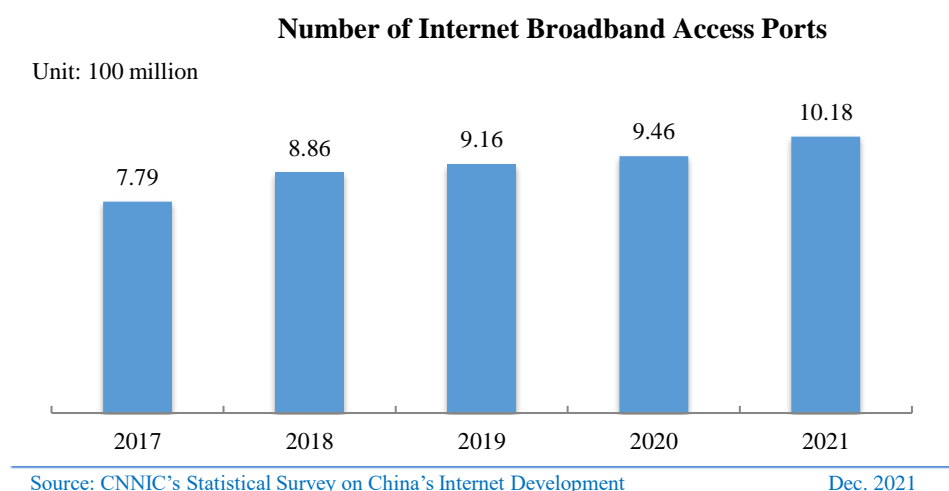
Figure 5 Number of Internet Broadband Access Ports

(V) Length of fiber optic cable lines

The total length of fiber optic cable lines has steadily increased. In 2021, the length of new fiber optic cable lines totaled 3.19 million kilometers, while the total length of fiber optic cable lines nationwide reached54.88 million kilometers. Specifically, the length of long-distance fiber optic cable lines, local relay fiber optic cable lines and access fiber optic cable lines reached 1.126 million km, 18.74 million km and 35.02 million km, respectively. That of access fiber optic cable lines increased by 2.97 million km over 2020 to further ensure the quality of user services.

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

Total length of Fiber Optic Cable Lines

Unit: 10,000 km

	3747	4358	4741	5169	5488
	2017	2018	2019	2020	2021

Source: the Ministry of Industry and Information Technology   Dec. 2021
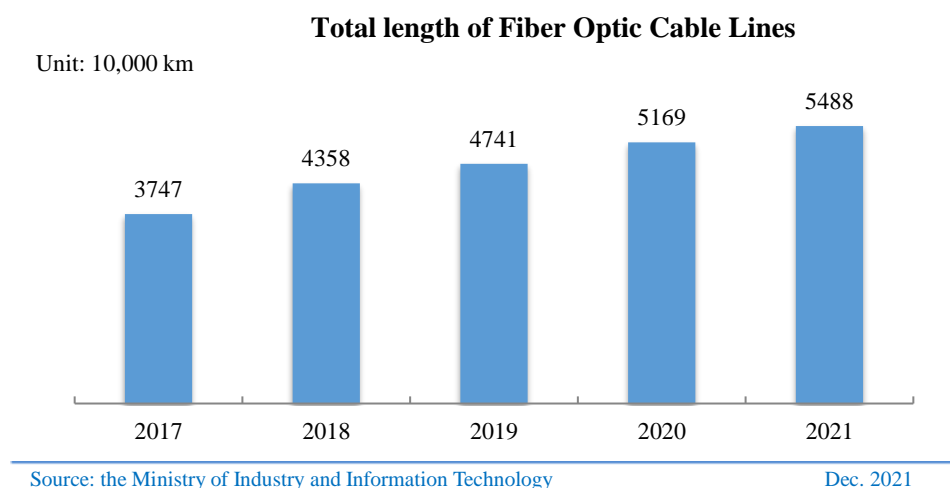
Figure 6 Total Length of Fiber Optic Cable Lines

II Application of Internet Resources

(I) Websites

As of December 2021, there were 4.18 million websites[6] in China, down 5.5% over December 2020.

Number of Websites

Unit: 10,000

533	523	497	443	418
2017	2018	2019	2020	2021

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
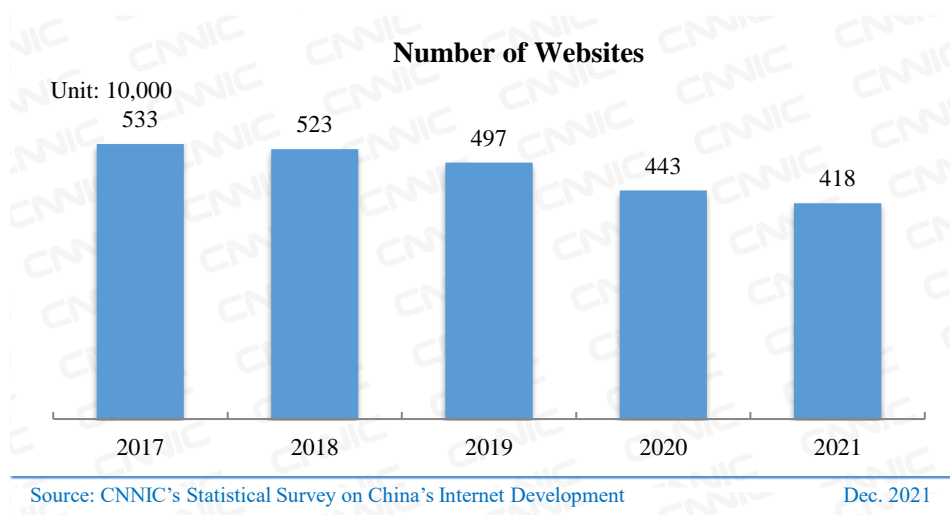
Figure 7 Number of Websites[7]

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

Up to December 2021, China had 2.72 million websites with domain names ending with ".CN", down 8.0% from December 2020.

Number of Websites with Domain Names Ending with ".CN"

Unit: 10,000

	2017	2018	2019	2020	2021
	315	326	341	295	272
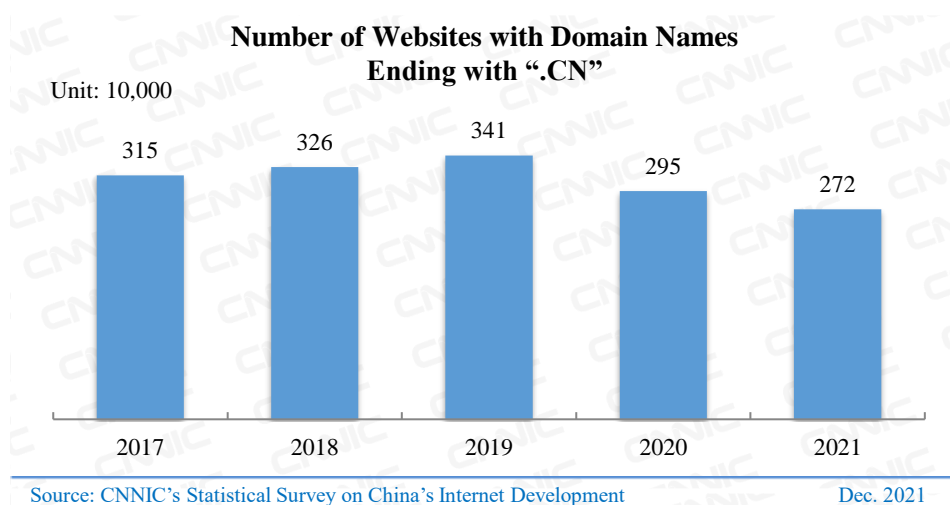
Figure 8 Number of Websites with Domain Names Ending with ".CN"[8]

(II) Web Pages

As of December 2021, there were 335 billion web pages in China, up 6.2% from December 2020.

Number of Web Pages

Unit: 100 million

	2017	2018	2019	2020	2021
	2604	2816	2978	3155	3350
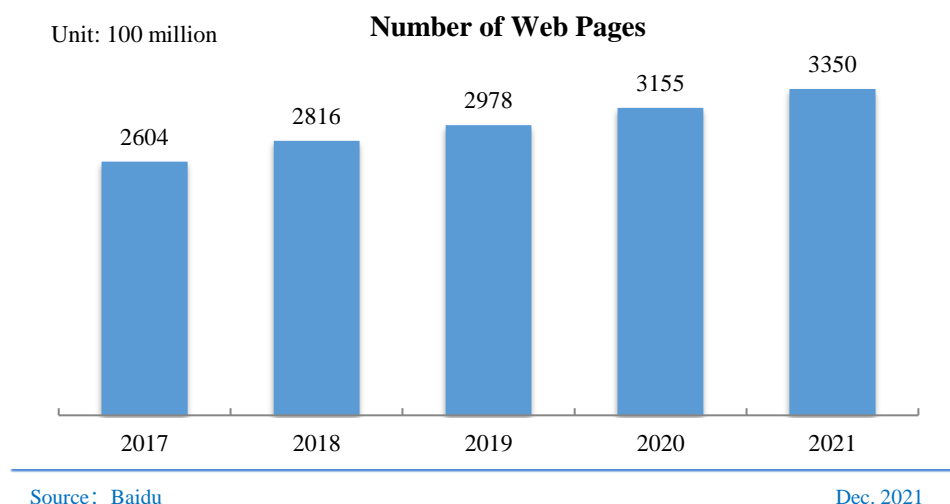
Figure 9 Number of Web Pages

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

There were 225.6 billion static web pages[9] and 109.3 billion dynamic web pages[10], accounting for 67.4% and 32.6% of the total, respectively.

Table 4 Number of Web Pages

	Unit	Dec. 2020	Dec. 2021	Growth rate
Total number of web pages	Page	315,501,097,812	334,963,712,602	6.2%
Static web page	Page	215,529,450,543	225,618,593,713	4.7%
	Proportion in total web pages	68.3%	67.4%	--
Dynamic web page	Page	99,971,647,269	109,345,118,889	9.4%
	Proportion in total web pages	31.7%	32.6%	--
Web page size (total number of bytes)	KB	23,618,193,016,465	25,835,838,532,975	9.4%
Average number of bytes per page	KB	75	77	2.7%

(III)   Mobile Internet Access Traffic

In 2021, China's mobile Internet access traffic reached 221.6 billion GB, up 33.9% year-on-year.

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[9] A static web page means a web page in the standard HTML format whose extension is either .htm or .html and which contains text, images, audio, flash files, client scripts, ActiveX controls and JAVA programs.
[10] A dynamic web page means a web page that displays different content with the time, environment or result of database operation although its code is the same as that used for a static page. This is achieved by a combination of basic HTML language specification with advanced programming languages such as Java, VB and VC, database programming techniques and other techniques.

Mobile Internet Access Traffic

Unit: 100 million GB

Source: the Ministry of Industry and Information Technology   Dec. 2021
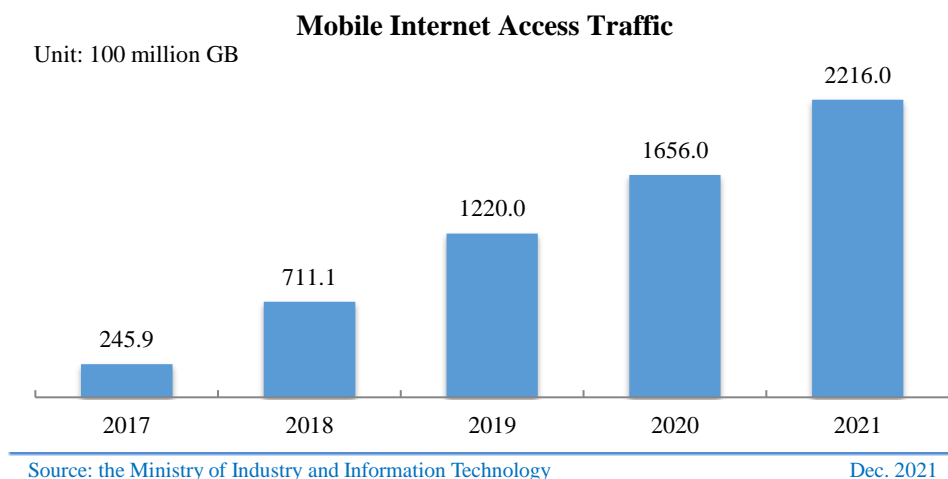
Figure 10 Mobile Internet Access Traffic

(IV)   Number and Category of Apps

As of December 2021, 2.52 million Apps had been available on China's market.

Number of Apps

Unit: 10,000

Source: the Ministry of Industry and Information Technology   Dec. 2021
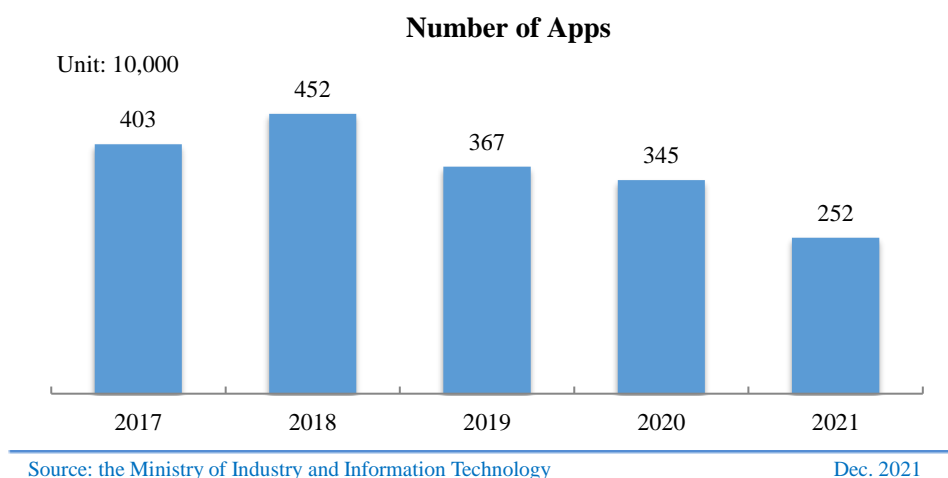
Figure 11 Number of Apps[11]

As of December 2021, the top four categories of mobile Apps, by scale, accounted for 61.2% of the total, while the other ten categories of Apps like life services and education made up 38.8%. Game ranked No.1 with 709,000 Apps, making up 28.2% of the total. The number of daily tools,

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[11] Number of Apps: 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.

e-commerce and social communication Apps reached 370,000, 248,000 and 211,000, respectively, ranking second to fourth[12].

III   Internet access environment

(I)   Internet access devices

Up to December 2021, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptops computers, TVs and tablet computers were 99.7%, 35.0%, 33.0%, 28.1% and 27.4%, respectively.

Usage of Internet Access Devices

	Desktop PC	Laptop	Mobile phone	TV	Tablet PC
2020	32.8%	28.2%	99.7%	24.0%	22.9%
2021	35.0%	33.0%	99.7%	28.1%	27.4%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
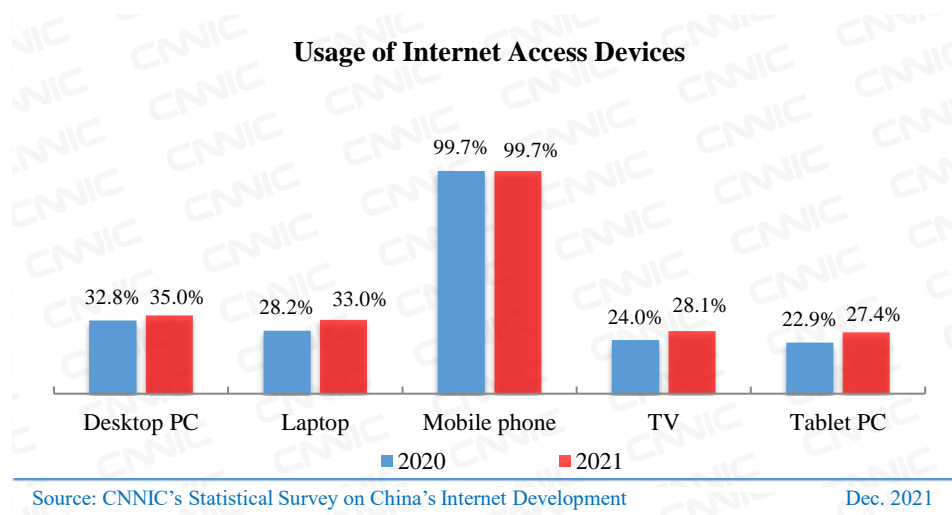
Figure 12 Usage of Internet Access Devices

The mobile phone subscriber base grew steadily, with the 5G mobile phone subscriber base[13] expanding rapidly. As of December 2021, the number of mobile phone subscribers totaled 1.643 billion, a net increase of 48.75 million for the year. Specifically, 4G mobile phone subscribers were 1.069 billion, while 5G subscribers reached 355 million.

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[12] Source: the Ministry of Industry and Information Technology of the People's Republic of China.
[13] 5G mobile phone subscriber base refers to the number of active subscribers who have usage information in the communication billing system and occupy 5G network resources at the end of the reporting period.

Size of Mobile Phone Subscribers

Unit: 100 million
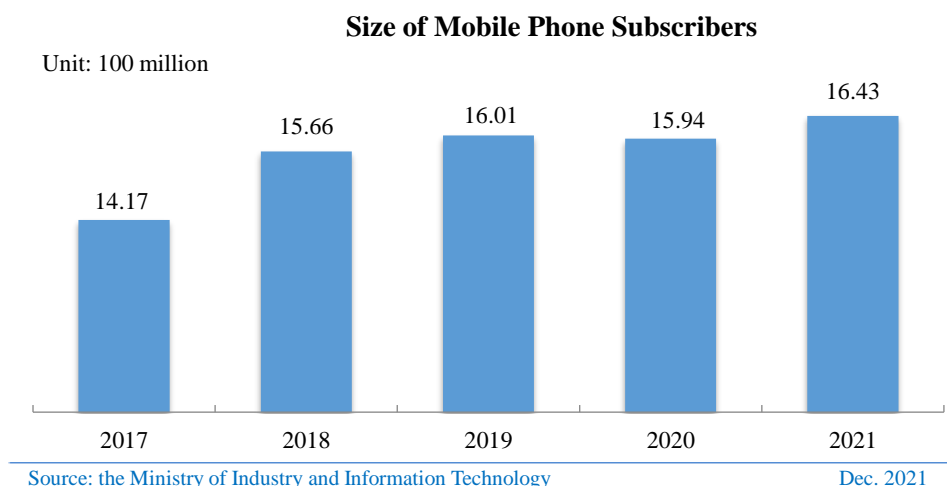
Figure 13 Size of Mobile Phone Subscribers

The shipment of 5G mobile phones are making up an increasing share in the total. In 2021, the shipment of domestic mobile phones amounted to 351 million, up 13.9% year-on-year. Specifically, there were 266 million 5G mobile phones, up 63.5% over December 2020, taking up 75.9% of the total in the same period.

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

Unit: 10,000

5G mobile phone shipments   Proportion of mobile phone shipments in the same period
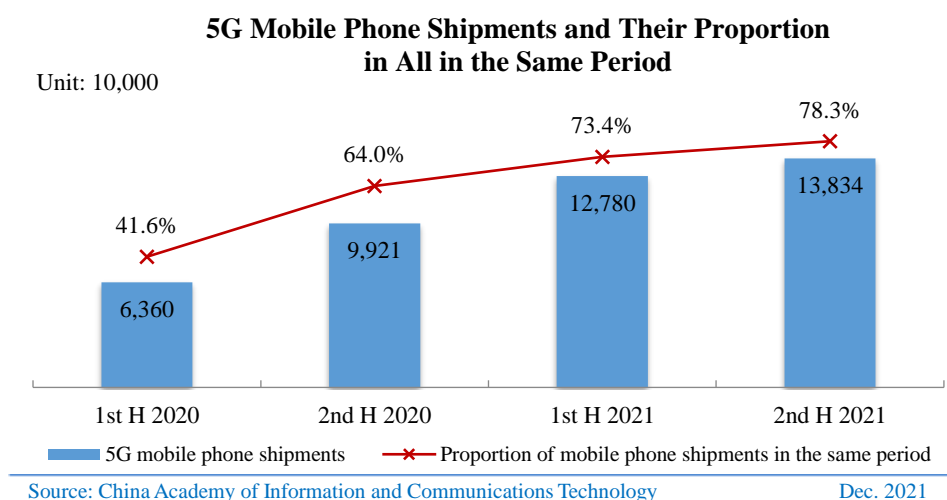
Figure 14 5G Mobile Phone Shipments and Their Proportion in All in the Same Period

(II) Online duration

As of December 2021, the per capita weekly online duration[14] of China's Internet users was 28.5 hours, up 2.3 hours over December 2020.

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[14] Per capita weekly online duration refers to the average daily number of hours of accessing the Internet multiplied

Per Capita Weekly Online Duration of Internet Users

Unit: Hour

Dec. 2017	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021
27.0	27.6	30.8	26.2	28.5

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
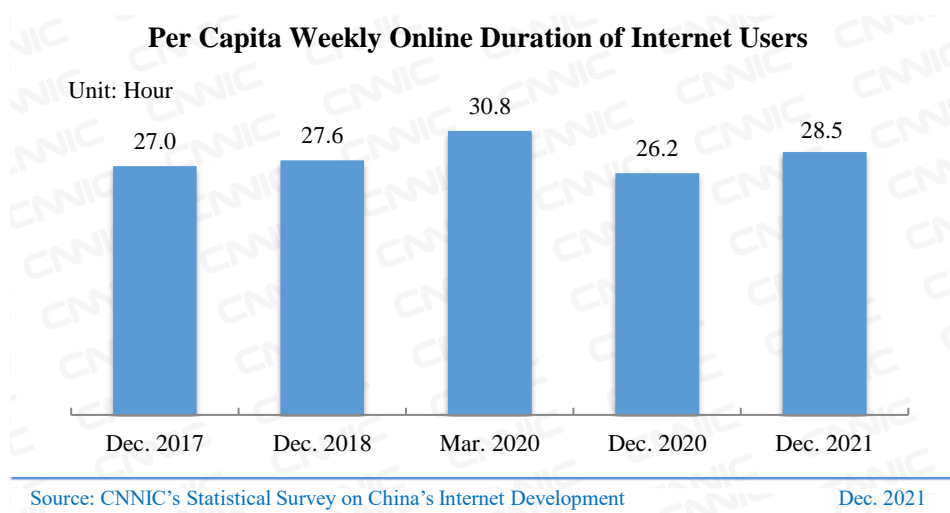
Figure 15 Per Capita Weekly Online Duration of Internet Users

(III)   Fixed broadband access

As of December 2021, the three basic telecommunications companies had 536 million fixed broadband subscribers, a net increase of 52.24 million from December 2020. Specifically, fixed Internet broadband subscribers with access rates of 100Mbps and above reached 498 million, accounting for 93.0% of the total, up 3.1 percentage points from December 2020. Fixed Internet broadband subscribers with access rates of 1,000Mbps and above reached 34.56 million, a net increase of 28.16 million over December 2020.

Number of Fixed Broadband Subscribers

Unit: 100 million

2017	2018	2019	2020	2021
3.49	4.07	4.49	4.84	5.36

Source: the Ministry of Industry and Information Technology   Dec. 2021
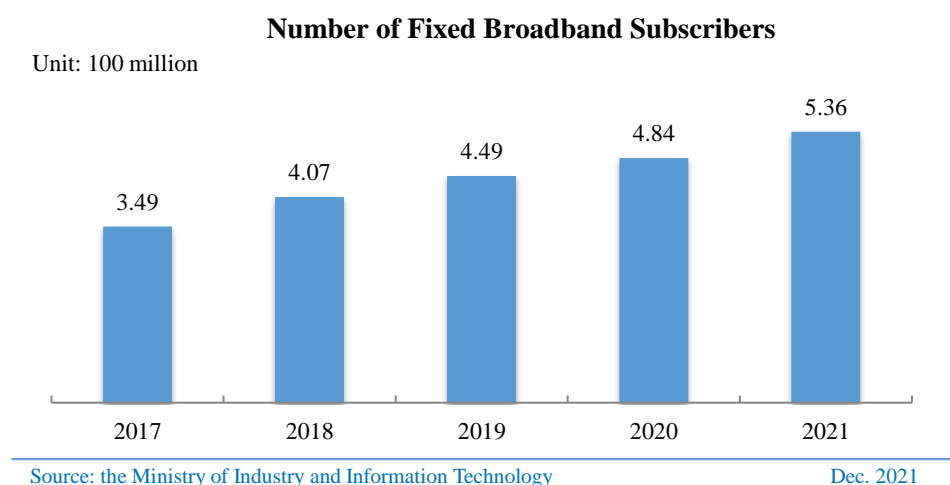
Figure 16 Number of Fixed Broadband Subscribers

by 7 days in a week in the past six months.

Proportion of Fixed Broadband Subscribers with the Access Speed of 100Mbps and Above
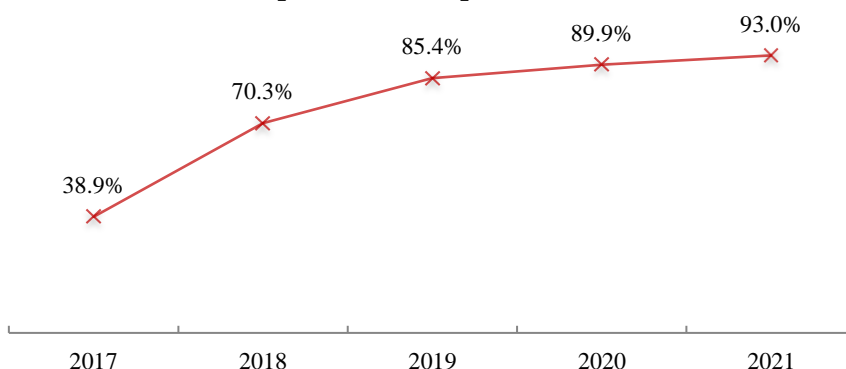
Figure 17 Proportion of Fixed Broadband Subscribers with the Access Speed of

100Mbps and Above

Proportion of Fixed Broadband Subscribers with the Access Speed of 1,000Mbps and Above
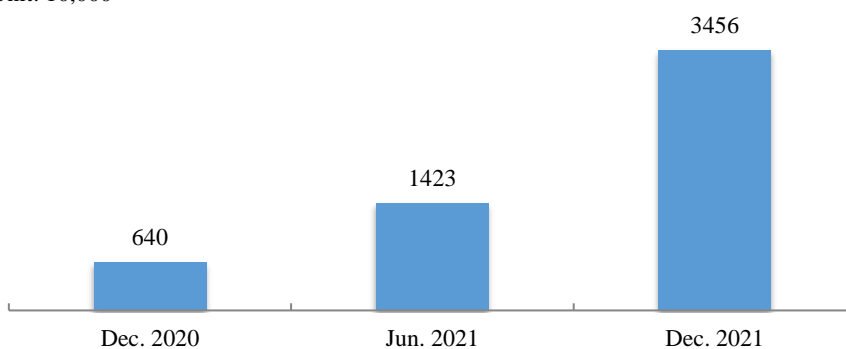
Figure 18 Proportion of Fixed Broadband Subscribers with the Access Speed of

1,000Mbps and Above

As of December 2021, the number of FTTH/O users had reached 506 million, accounting for

94.3% of all fixed Internet broadband subscribers.

Scale and Proportion of Fiber Broadband Users

Unit: 10,000

Source: the Ministry of Industry and Information Technology   Dec. 2021
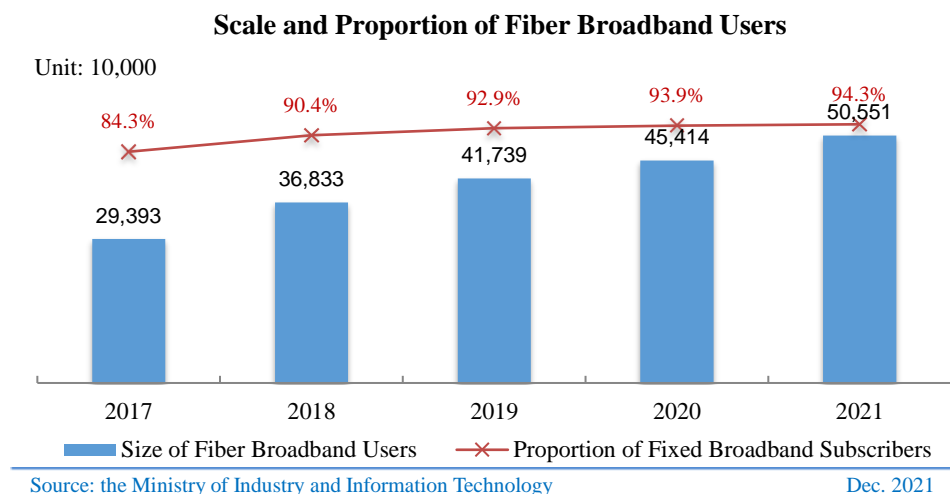
Figure 19 Scale and Proportion of Fiber Broadband Users

(IV)   Number of Cellular IoT Terminal Users

The user size of cellular Internet of Things continues to expand. As of December 2021, the three basic telecom companies developed 1.399 billion cellular IoT terminal[15] users, a net increase of 264 million from December 2020. Terminal users specializing in smart utilities, smart manufacturing and smart transport accounted for 22.4%, 18.1% and 15.6%, respectively.

Number of Cellular IoT Terminal Users

Unit: 100 million

Source: the Ministry of Industry and Information Technology   Dec. 2021
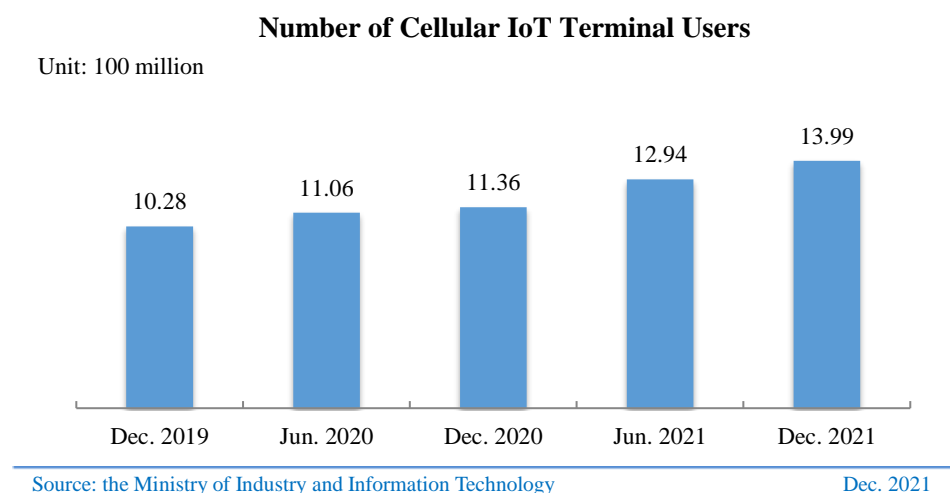
Figure 20 Number of Cellular IoT Terminal Users

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[15] 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.

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CHAPTER Two Size and Structure of Internet Users

I Size of Internet Users

(I) Overall Size of Internet Users

Up to December 2021, China had 1,032 million netizens, up by 42.96 million over December 2020, and its Internet penetration had reached 73.0%, up 2.6 percentage points over December 2020.

Netizen Size and Internet Penetration

Unit: 10,000

	Dec. 2017	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021
Size of Internet Users	77198	82851	90359	98899	103195
Internet Penetration	55.8%	59.6%	64.5%	70.4%	73.0%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 21 Netizen Size and Internet Penetration

Up to December 2021, the number of mobile Internet users in China had reached 1,029 million, up 42.98 million over December 2020. The proportion of China's netizens accessing the Internet via their mobile phones had amounted to 99.7%.

Size of Mobile Internet Users in China and Its Proportion in All Netizens

Unit: 10,000

	Dec. 2017	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021
Proportion	97.5%	98.6%	99.3%	99.7%	99.7%
Size	75265	81698	89690	98576	102874

■ Size of Mobile Internet Users ✕ Proportion of Mobile Internet Users in All Netizens

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 22 Size of Mobile Internet Users and Its Proportion in All Netizens

China's digital economy is booming, with over one billion netizens witnessing the development of a strong country in cyberspace and manufacturing. In 2021, Internet-related technological innovations such as big data, cloud computing and AI were being accelerated and better integrated into the whole field and process of Internet user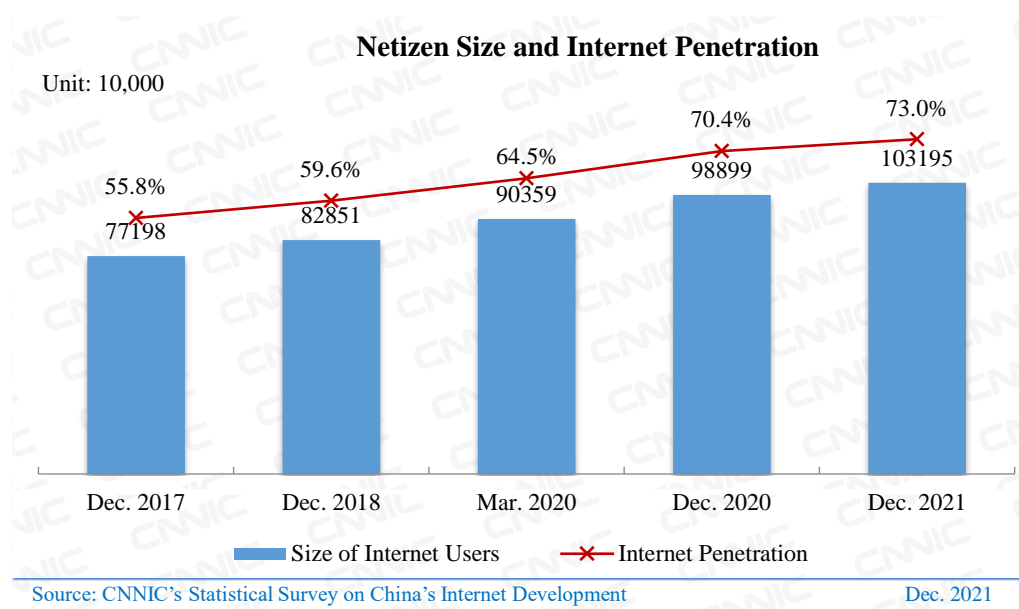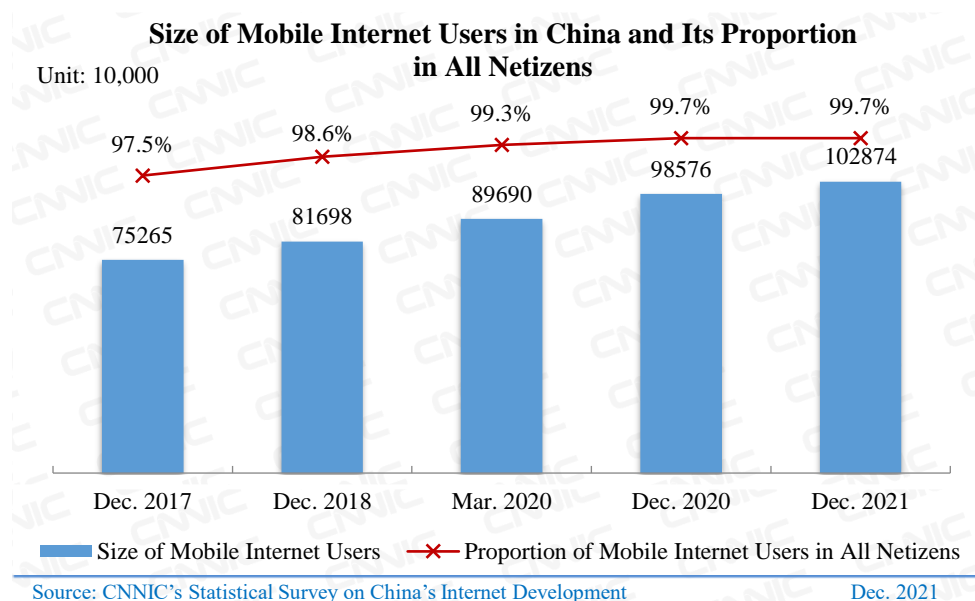s' living. The digital economy is becoming a key force in reorganizing production and life factor resources, reshaping the socio-economic structure and changing the global competitive landscape to promote the growth of Internet users. **First, China's cyber capacity continued to improve.** In 2021, China's information infrastructure continued to be optimized and its supply capacity was significantly enhanced. The country has built the world's largest fiber-optic and mobile broadband network. The fiber-optic transformation had been fully completed, with the development of 5G network expedited. Up to the end of 2021, a total of 1.425 million 5G base stations had been completed, and 5G mobile phone users had reached 355 million[16]. It continued to promote network speed and quality, improve IPv6 end-to-end penetration capability, and advance the overall development of mobile Internet of Things. **Second, the Internet continued to deliver the inclusive effect.** In 2021, China's Internet industry continued to demonstrate development vitality and resilience. New businesses such as telecommuting, online medical care and community group buying continued to develop to alleviate the problem of regional development divide and allow more people to benefit from and be satisfied

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

with the online economy, society and culture. **Third, the development of information accessibility was expedited.** In 2021, all departments in China continued to address the difficulties encountered by the disadvantaged groups of Internet applications in using smart technologies. The Ministry of Industry and Information Technology continued to focus on the characteristics and needs of the elderly groups and direct the first group of 227 websites and mobile phone APPs to complete the evaluation of accessibility transformation for the elderly on schedule. They focused on eight categories of high-frequency matters and service scenarios involved in the daily life of the elderly, such as travel, medical care, consumption, recreation and affair-handling. They timely developed and implemented initiatives to provide multi-channel, multi-dimensional and multi-functional facilitation services for the integration of the elderly into smart life.

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

As of December 2021, the size of rural Internet users in China was 284 million or 27.6% of the total, while that of urban Internet users was 748 million, up 68.04 million from December 2020, making up 72.4% of the total.

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
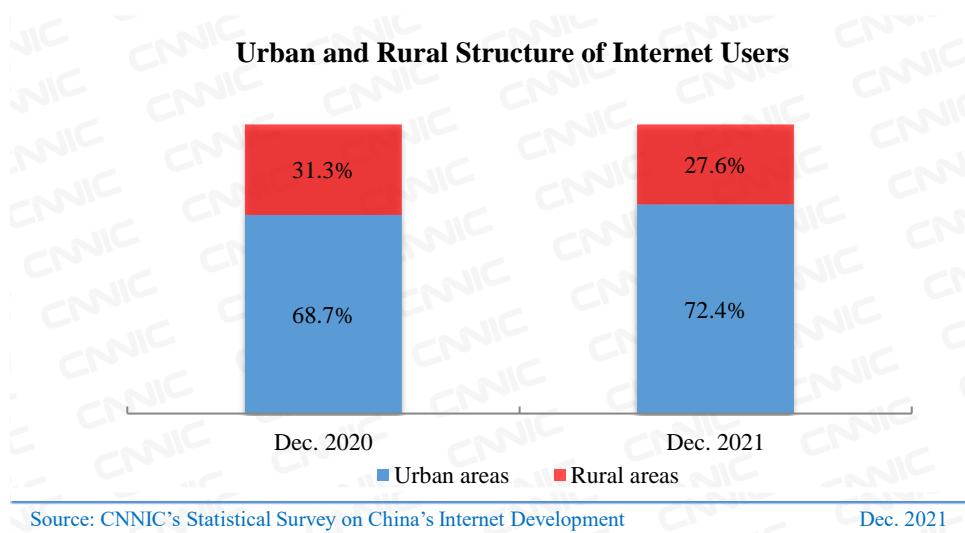
Figure 23 Urban and Rural Structure of Internet Users

Up to December 2021, the Internet penetration in urban China was 81.3%, up 1.5 percentage points over December 2020, while that in rural areas was 57.6%, up 1.7 percentage points over December 2020. The gap of Internet penetration between urban and rural areas was narrowed by 0.2 percentage points over December 2020.

Internet Penetration in Rural and Urban Areas
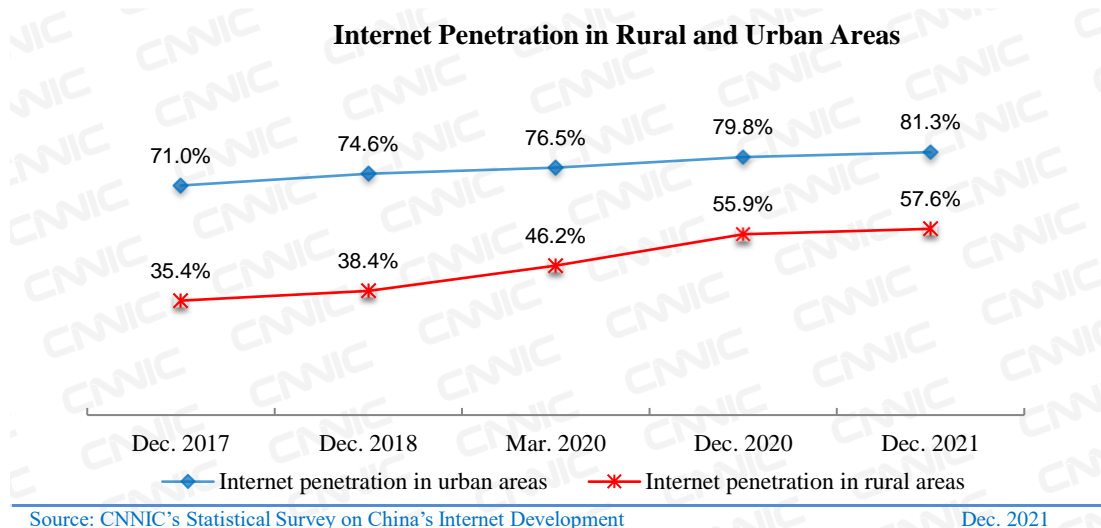
Figure 24 Internet Penetration in Rural and Urban Areas

New Internet business models continued to enhance the ability of rural areas to develop themselves, with good advances in building digital villages. First, digitalization has facilitated the integration of urban and rural development. In new digital infrastructure, as of November 2021, all existing administrative villages had been accessible to broadband, resolving problems such as communication difficulties in poor areas[17]. The *Development Plan of Information and Communication Industry during the 14th Five-Year Plan Period* issued by the Ministry of Industry and Information Technology proposed to achieve a 5G access rate of 80% in administrative villages by 2025. In terms of industrial digitization, the integration of digital economy and real industry was accelerating, the intelligent manufacturing was being steadily improved, and the digital transformation of rural areas was advancing, giving rise to a large number of new business forms and models. Modern agriculture had been improved in informatization and production capacity. Regarding digital industrialization, new breakthroughs were made in core technologies on key fronts. Data has become a key element in driving economic development. Digital industries such as 5G, AI, Internet of Things, and e-commerce contributed more to urban and rural development. **Second, the development of smart green villages is being advanced steadily.** The application fields of agricultural and rural big data systems have been increasing. Through data integration and sharing, the government platform for information resource sharing of the Ministry of Agriculture and Rural Affairs has been running. The platform has been visited over 50 million times a year,

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

involving 50-plus countries[18]. The role of the Internet and other digital technologies in the smart green countryside is increasingly prominent. Through information technology, a series of platforms have been built, including habitat environment, soil erosion dynamics, rural river and lake management in rural areas. The smart green information system for rural environment conservation has been refined. **Third, rural areas have scaled new heights in technological innovation.** Relying on the national key R&D projects, all areas accelerated the R&D, application and demonstration of basic frontiers and major common key technologies in the digital countryside. Since the 13th Five-Year Plan, they have made arrangements on a range of fronts[19], with discipline groups undertaking 1,119 projects[20]. This has facilitated the integration of agricultural and rural development and digital development and attracted, pooled and trained a large number of outstanding agricultural talents. These efforts have supported the talent base and innovation team for industrial and disciplinary development, improving China's innovation capacity for agricultural science and technology.

(III)   Size of Non-Internet Users

As of December 2021, the size of non-netizens in China had reached 382 million, down 34.20 million over December 2020. **By region,** the majority of non-netizens in China were still in rural areas; the proportion of non-netizens in rural areas had reached 54.9%, 19.9 percentage points higher than that of rural population nationwide. **By age,** the elderly aged 60 and above are the main group of non-netizens. As of December 2021, the proportion of Chinese non-netizens aged 60 and above accounted for 39.4% of all non-netizens, up 20 percentage points from that of the national population aged 60 and above[21].

Non-netizens are unable to have access to the Internet, so they could not fully enjoy the convenience brought by intelligent services in daily life such as travel, consumption, medical treatment, and handling of affairs. According to the data, non-netizens believed that among all the

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[18] Source: China's Ministry of Agriculture and Rural Affairs.
[19] The arrangements on a range of fronts include one comprehensive laboratory, 10 professional laboratories, three enterprise laboratories, and two scientific stations for observation and experiment.
[20] Source: China's Ministry of Agriculture and Rural Affairs.
[21] The proportions of the national rural population and the population aged 60 and above are calculated based on the *National Statistical Bulletin for National Economic and Social Development of the People's Republic of China for 2020* by China's National Bureau of Statistics.

inconveniences brought by not accessing the Internet, being not able to enter some public places without health code was the largest inconvenience. Such netizens took up 28.4% of the total. Second, due to the decreased offline service outlets, it was difficult for non-netizens to handling affairs, accounting for 25.6%. Third, those who could not get information in time, such as various kinds of news and information made up 23.9%. Fourth, those could not pay in cash for tickets or registration at a hospital, with each making up 23.1%.

Non-netizens' Inconvenience in Life Brought by Not Accessing the Internet

Those without health code have no access to some public places	28.4%
Off-line service outlets are reduced and it is difficult to handle affairs.	25.6%
They cannot obtain information in time, such as all kinds of news	23.9%
They cannot pay in cash	23.1%
They cannot buy a ticket or register at a hospital	23.1%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 25 Non-netizens' Inconvenience in Life Brought by Not Accessing the Internet

Shortage of skills, limited literacy, inadequate devices and age factors are major reasons why non-netizens do not access the Internet. 48.4% of non-netizens did not access the Internet because they did not know how to use the computer/Internet; 25.7% did not because they did not master Pinyin or due to literacy limitations; 17.5% did not because they did not have access to computers and other devices; and 15.5% did not because they were too old/too young to access the Internet.

Reasons Why Non-netizens Do not Access the Internet

| Do not know how to use computers/networks | Do not master Pinyin or other literacy limitations | No devices to access Internet such as computer | Too old/ too young | No need/ no interest | No time to surf the Internet |
| 48.4% | 25.7% | 17.5% | 15.5% | 10.0% | 7.2% |
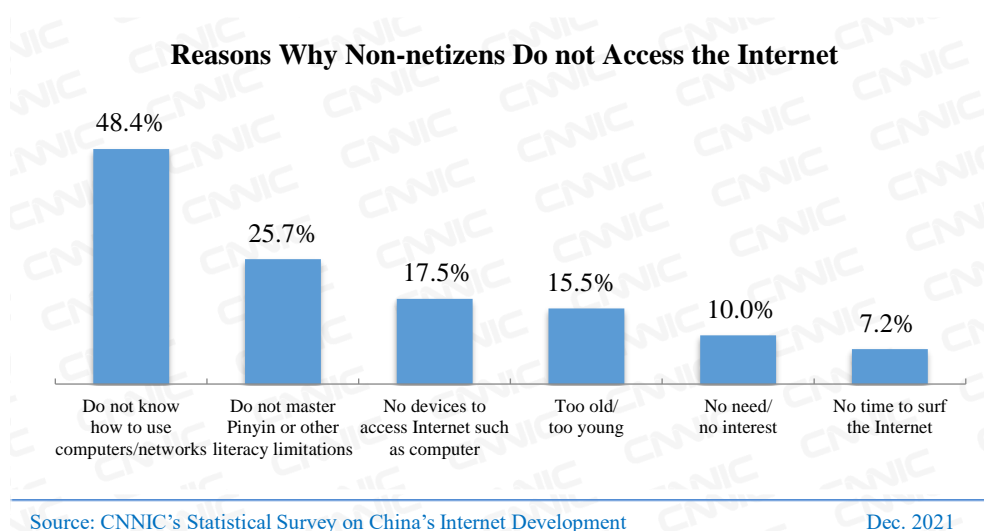
Figure 26 Reasons Why Non-netizens Don't Access the Internet

The primary factor for non-netizens to access the Internet was the convenience of communicating with their family members, accounting for 30.7%, followed by access to professional information, taking up 29.4%, and the availability of barrier-free Internet devices, making up 29.3%.

Factors Facilitating Non-netizens to Access the Internet

Factor	%
Facilitating communication with family or relatives	30.7%
Easy access to specialized information, such as medical and health care information	29.4%
Providing accessible Internet devices	29.3%
Providing free training in the Internet surfing	28.5%
Reduced costs of Internet access	27.2%
Helping to increase income, such as selling agricultural products	26.2%
It is convenient for people to purchase goods	22.7%

Figure 27 Factors Facilitating Non-Netizens to Access the Internet

The growth of Internet users in China still had large development space. However, China faced great transformation challenges. In the future, it is necessary to help non-netizens share the huge dividends in the digital age by further improving the Internet infrastructure, enhancing non-netizens' cultural education level and skills for using digital technology, developing more intelligent and

human-friendly products and services that are suitable to the elderly, improving the facilitation of network services or otherwise.

II The Attribute Structure of Internet Users

(I) Gender Structure

As of December 2021, the ratio of male to female among Chinese netizens was 51.5:48.5, which was roughly the same as that in China's overall population.

Gender Structure of Internet Users

Female
48.5%

Male
51.5%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
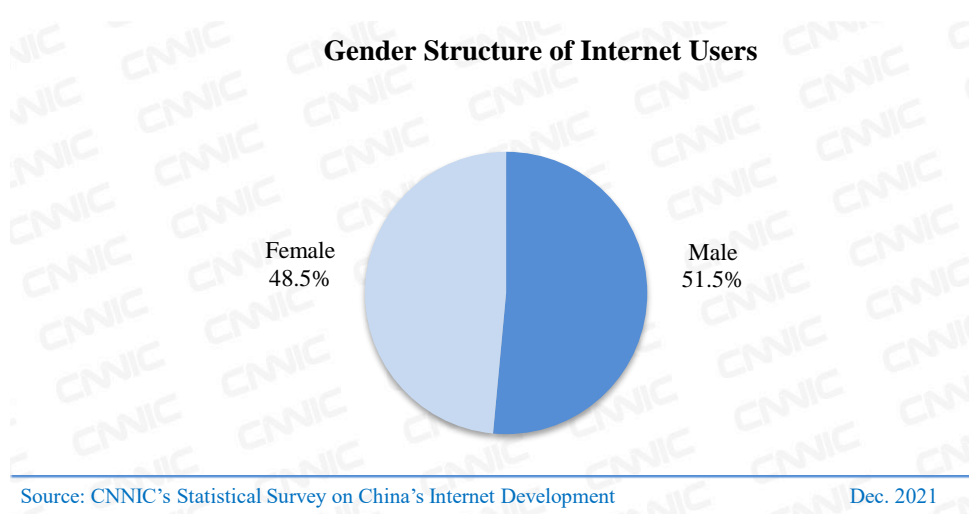
Figure 28 Gender Structure of Internet Users

(II) Age Structure

As of December 2020, the proportions of Internet users aged 20-29, 30-39 and 40-49 were 17.3%, 19.9% and 18.4% respectively, higher than that of other age groups. That of Internet users aged 50 and above increased to 26.8% from 26.3% in December 2020. The Internet further penetrated middle- and old-age groups.
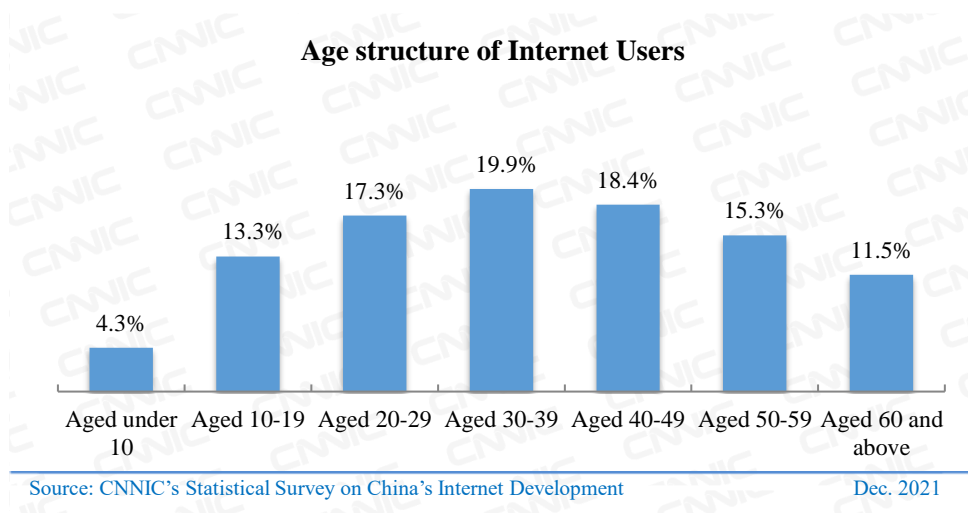
Age structure of Internet Users

Figure 29 Age Structure of Internet Users

CHAPTER Three Development of Internet Applications

I Overview of Internet Applications

In 2021, the user size of various personal Internet applications in China showed a general growth trend. Specifically, the user size of online medical services and online office had the most obvious growth, up 83.08 million and 123 million respectively over December 2020, accounting for 38.7% and 35.7% respectively. The user size of online meal ordering and online car-hailing services increased by 125 million and 87.33 million respectively over December 2020, up by 29.9% and 23.9%, respectively. The user size of online travel booking, Internet wealth management, live streaming, online music and other applications grew at a rate of above 10%.

Table 5 User Size and Utilization Ratio of Internet Applications from

Dec. 2020 to Dec. 2021

Applications	Dec. 2020		Dec. 2021		Growth rate
	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	
Instant messaging	98111	99.2%	100666	97.5%	2.6%
Online video (including video clip)	92677	93.7%	97471	94.5%	5.2%
Video clip	87335	88.3%	93415	90.5%	7.0%
Online payment	85434	86.4%	90363	87.6%	5.8%
Online shopping	78241	79.1%	84210	81.6%	7.6%
Search engine	76977	77.8%	82884	80.3%	7.7%
Online news	74274	75.1%	77109	74.7%	3.8%
Online music	65825	66.6%	72946	70.7%	10.8%
Live streaming	61685	62.4%	70337	68.2%	14.0%

Applications	Dec. 2020		Dec. 2021		
	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 games	51793	52.4%	55354	53.6%	6.9%
Online literature	46013	46.5%	50159	48.6%	9.0%
Online meal ordering	41883	42.3%	54416	52.7%	29.9%
Online car-hailing services	36528	36.9%	45261	43.9%	23.9%
Online office	34560	34.9%	46884	45.4%	35.7%
Online travel booking	34244	34.6%	39710	38.5%	16.0%
Online medical services	21480	21.7%	29788	28.9%	38.7%
Internet wealth management	16988	17.2%	19427	18.8%	14.4%

II   Basic Apps

(I)   Instant Messaging

As of December 2021, the user size of instant messaging in China reached 1,007 million, up 25.55 million from December 2020, making up 97.5% of the national total.

User Size and Utilization Ratio of Instant Messaging from Dec. 2017 to Dec. 2021

Unit: 10,000

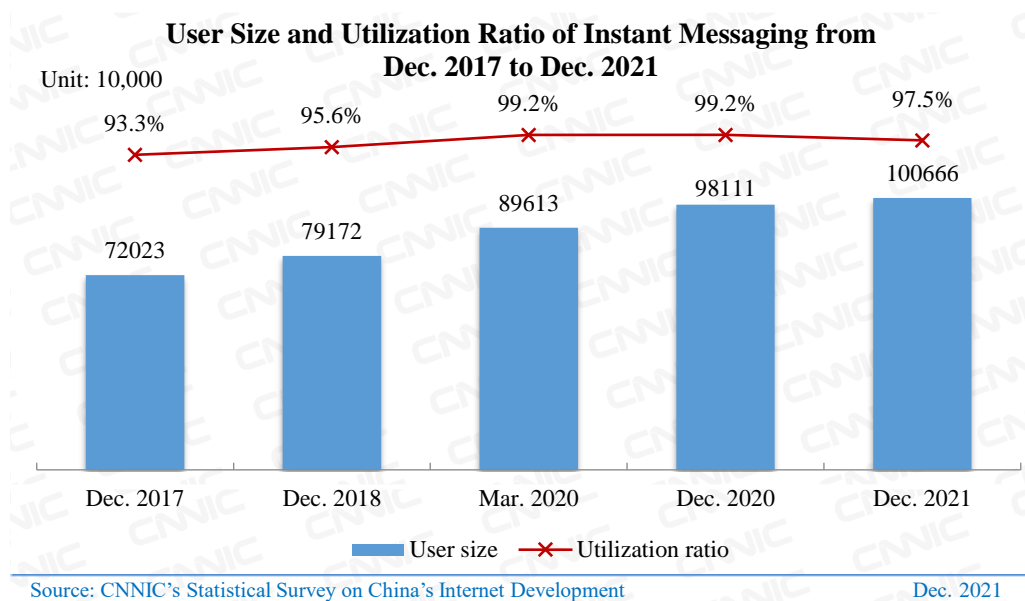Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 30 User Size and Utilization Ratio of Instant Messaging from Dec. 2017 to Dec. 2021

The user size of instant messaging continued to grow steadily in 2021. The industry development was primarily embodied in three aspects, including smoother URL link access, continued exploration of new features, and robust development of enterprise-specific products.

First, users have smoother access to URL links of instant messaging. In July 2021, China's Ministry of Industry and Information Technology launched a rectification campaign for the Internet industry, focusing on hot and difficult issues reported by the public, such as the blocking of URL links by instant messaging Apps. Since then, main instant messaging products have been rectified under the guidance of the regulatory authorities to effectively improve the access to legal URL links and the experience of Internet users.

Second, instant messaging companies have continued to explore new features such as Mini Programs and Channels. Regarding Mini Programs, instant messaging platforms offer a variety of development tools for small and medium-sized enterprises to lower the development threshold, thus bringing a growing number of enterprises into the mini program ecosystem. According to the data[22], daily active users of WeChat's Mini Programs exceeded 450 million, and the number of active Mini Programs increased by 41% year on year. In retail, tourism and catering sectors, Mini Programs transactions grew by more than 100% year on year. In terms of Channels, instant messaging companies strengthened attracting and fostering content creators and assisted

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[22] Source: WeChat open courses in 2022.

users in producing more quality video content through customized services and operational support as well as tools such as smart templates, augmented reality technology and automatic video editing.

Third, enterprise instant messaging Apps have been developed vigorously in terms of user size and product functions. As of the end of August 2021, the number of enterprises, schools and other organizations accessing DingTalk services exceeded 19 million[23]. Up to the end of 2021, the number of enterprises and organizations using Enterprise-version WeChat services also reached 10 million[24]. DingTalk, WeChat and Feishu all launched their updated versions for more users in 2021. Specifically, it is the main direction of product updates to optimize their functions, provide integrated solutions for hardware and software, and enhance customized development for customers in traditional industries.

(II) Search Engine

As of December 2021, the user size of search engine in China had reached 829 million, up 59.08 million from December 2020, taking up 80.3% of the national total.

User Size and Utilization Ratio of Search Engine between Dec. 2017 and Dec. 2021

Unit: 10,000

	Dec. 2017	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021
User size	63956	68132	75015	76977	82884
Utilization ratio	82.8%	82.2%	83.0%	77.8%	80.3%

User size   Utilization ratio

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
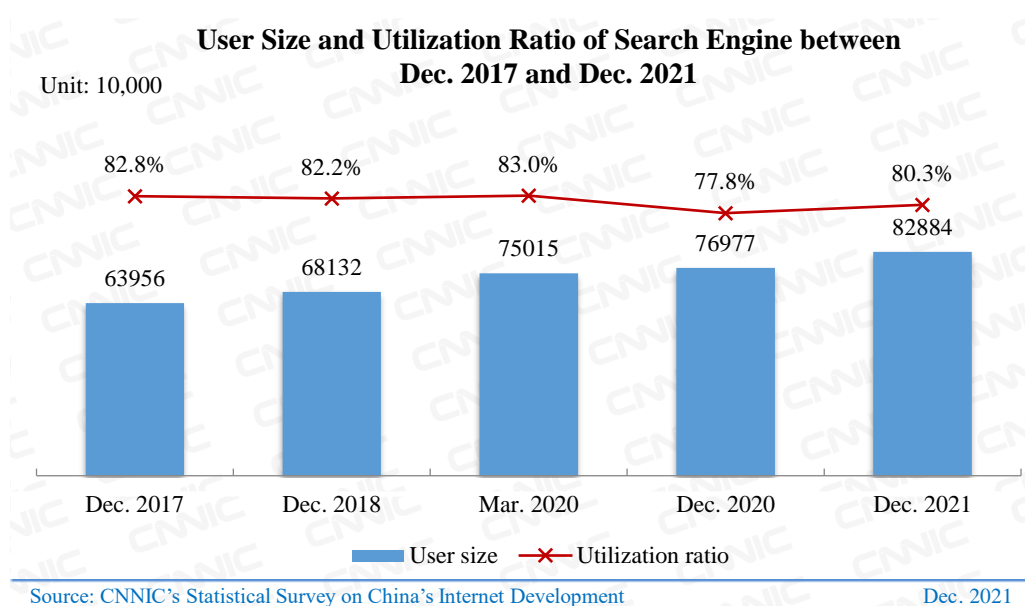
Figure 31 User Size and Utilization Ratio of Search Engine between

Dec. 2017 and Dec. 2021

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[23] Source: DingTalk 2021 Future Organization Conference.
[24] Source: Enterprise WeChat Product Launch 2022.

In 2021, the search engine market was developing steadily and with changes, and the Internet search environment continued to improve.

The search engine market was developing steadily and changing. From a market perspective, search engine companies, first of all, undertook a secondary listing to seek new growth in multiple areas. In March 2021, Baidu completed its secondary listing on the Hong Kong Stock Exchange and used the net capital to continue its technology investments in the further development of Baidu's mobile ecosystem and smart driving. **Second, the WeChat search framework was consolidated.** In September 2021, Sogou announced the completion of the privatization transaction and became a wholly-owned subsidiary of Tencent. While retaining its independent search brand, it has provided search technology and content support for WeChat, enhancing WeChat's content delivery capacity. **Third, new entrants scored achievements.** ByteDance's search products were developed. As of February 2021, monthly active users of Douyin video search had surpassed 550 million [25], with search investment increasing. **Fourth, the computer-based Search has been made more innovative.** In terms of search method, the computer-based application of WeChat's Search upgraded the search method. As such, users can directly search by selecting chat information. Regarding content, new features add to the Search function, including official accounts, mini programs, news, video and other content. They enrich the WeChat search ecosystem, improving competitiveness.

The Internet search environment continued to improve. First, in protecting minors, Baidu Content Security Center, together with Baidu Search, established the Baidu search program for children's green voice through real-time inspection of the online situation, the whole process of monitoring page content and filtering of harmful information in a bid to ensure content safety. Douyin provided stricter protection measures for real-name users aged 14-18 in terms of search and content recommendations. After real-name authentication, underage users can only search in content that has been selected by the platform. **Second, in regulating search advertising,** relevant departments have increased the penalties for illegal medical advertisements. Multiple App markets have removed related applications. Beijing Municipal Administration for Market Regulation has imposed administrative penalties on some search engines.

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[25] Source: Douyin Data Report 2020 by ByteDance.

(III)   Online News

As of December 2021, the user size of online news in China had reached 771 million, up 28.35 million from December 2020, making up 74.7% of the national total.

User Size and Utilization Ratio of Online News between Dec. 2017 and Dec. 2021

Unit: 10,000

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
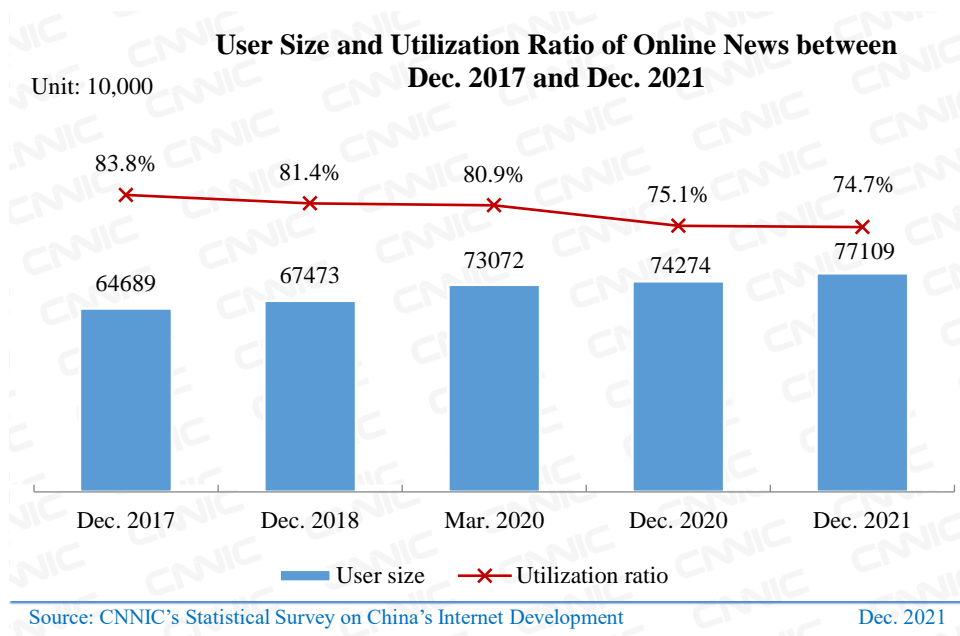
Figure 32 User Size and Utilization Ratio of Online News between Dec. 2017 and Dec. 2021

In 2021, the expedited integration of news media and Internet platforms continued to advance technological breakthroughs and enhance user experiences and communication effects. National authorities stepped up governance efforts for a more standardized online news industry.

The integration of news media and Internet platforms was accelerated to enhance communication effects. News media continued to guide platform users to participate in the discussion of hot topics via social & entertainment and information platforms such as Bilibili, Baidu and Weibo so as to enhance users' awareness of relevant topics and achieve good communication effects. In reports celebrating the centennial of the founding of the CPC, news media, **first of all, released the latest information timely to attract users' attention.** Diyi Shijian, a CCTV news program, continued to release live videos, information and other news content on platforms such as Bilibili and Weibo, with more than 200,000 hits on a video. From the beginning of 2021 to July 1, Sina News pushed the content from the People's Daily, Xinhua News Agency, CCTV and other mainstream media, focusing on the information concerning the founding of the CPC in the past century. In addition, it reposted a total of about 14,000 reports. **Second, topics have been set to**

raise the awareness of users. The online knowledge Q&A platform of the official account of China.com.cn set a question: "The celebration of the 100th anniversary of the founding of the Communist Party of China was held in Tiananmen Square in Beijing on the morning of July 1. Which scene impressed you?" This question received over 2,500 answers and tens of millions of views. **Third, authoritative interpretations were published to enhance the understanding of users.** Xiakedao, the WeChat official account of the overseas edition of the People's Daily, published authoritative interpretation articles on WeChat, which were all read more than 100,000 times. In response to the same incident, the joint efforts of multiple platforms have improved the communication effect and the cohesion of netizens towards the country, promoting positive energy.

Online news media continued to promote new technologies and enhance user experience. First, digital virtual applications were utilized. In June 2021, Xinhua News Agency and China National Space Administration created Xiaozheng, a digital reporter for aerospace themes and scenes. The digital reporter was developed with a new production pipeline and real-time rendering technology to make digital virtual characters more vivid. It can take on tasks that real people cannot or are difficult to complete, including space reports and Mars landings. **Second, production and broadcasting technologies were upgraded**. 5G technology and 4K/8K live streaming empowered the Beijing Winter Olympic and Paralympic Games through a series of new technical means and attempts in producing and broadcasting ultra-definition videos in a smart manner, offering a better viewing experience to audience.

National authorities have stepped up their governance efforts to further standardize the online news industry. In September 2021, the Cyberspace Administration of China, the Ministry of Industry and Information Technology and other seven departments issued the *Guidelines on Strengthening the Comprehensive Management of Internet Information Service Algorithms* to standardize the dissemination and distribution of Internet information. In October 2021, the Cyberspace Administration of China publicly released the latest version of the *List of Internet News Information Source Institutions*, which provided a strong underpinning for netizens to obtain authoritative news and information.

(IV) Online Office

As of December 2021, the user size of online office in China had amounted to 469 million, up 123 million from December 2020, accounting for 45.4% of the national total.

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

Unit: 10,000

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
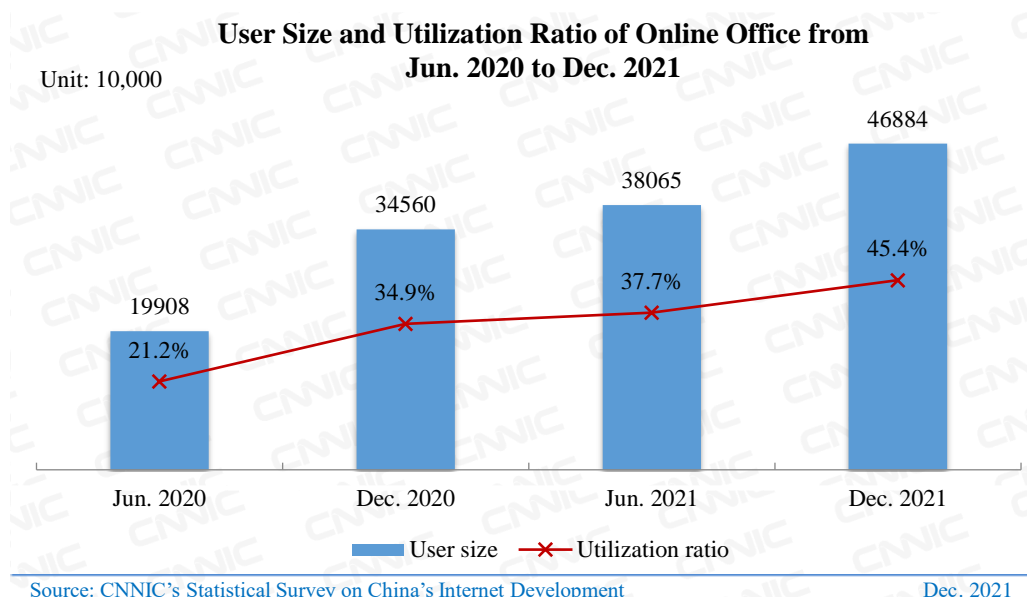
Figure 33 User Size and Utilization Ratio of Online Office from Jun. 2020 to Dec. 2021

In 2021, online office technologies continued to evolve, with online office forms and office concepts being changed.

Online office technology continued to evolve. First, basic technological services for online office accelerated follow-up. Cloud computing, Internet data center (IDC), content delivery network (CDN) and other basic technological services have supported online office. Take CDN as an example. In terms of the number of enterprises, in 2020, there were 44 value-added telecom enterprises that had obtained content delivery network licenses. Another 52 enterprises[26] were added in the first 11 months of 2021. It is expected to maintain fast growth in the future. Regarding technology, multiple operators have proposed SD-WAN[27] solutions to solve the acceleration problems of enterprise mailboxes, video conferencing and other systems by optimizing transmission technology, thus improving user experience. **Second, low-code development[28]**

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[26] Source: The list of Value-added Telecommunications Service License of the People's Republic of China issued by China's Ministry of Industry and Information Technology.
[27] SD-WAN is meant to use software to control the connectivity, management and services between data centers and remote branches or cloud instances to choose the optimal one for transmission between different hybrid links.
[28] 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

services were developed for users. Cloud service manufacturers have launched low-code development services. For example, Huawei Cloud has released the low-code platform AppCube, which has been widely used in government, equipment manufacturing, electronic information, automobiles and other industries to help customers improve development efficiency, work efficiency and save labor costs. In addition, Aliyun and Tencent Cloud have also made expansion. It was predicted that the global low-code development technology market would reach USD13.8 billion in 2021, up 22.6% from 2020[29]. China remains in the stage of popularization of low-code development concepts. Thanks to the increasing requirements for personalization and development efficiency in enterprises' digital transformation, there is a lot of room for development in the future. **Third, the AI technology has been integrated with online office.** For example, Baidu released its Intelligent Knowledge Base. The base uses AI technology to analyze the content of documents, correlate documents with employees and projects, and accurately distribute documents to employees based on the understanding of work scenarios to help enterprises manage knowledge.

Online office forms and office concepts are changing. First, VR technology will promote formal innovation. There are development opportunities for VR conferences. In 2020, VR Mixer, a VR industry networking event, was held online in VR format. In August 2021, Facebook launched a VR teleconferencing test application, which once again attracted the industry's attention to VR office. With the concept of metaverse[30], there is more room for imagination for future online office scenarios, such as the hologram interaction across space and time, which will lead to more innovations in online office forms. **Second, the concept of digital collaborative office has become a trend.** Online office can provide the multi-dimensional collaboration of time and space in organizational communication, business collaboration and ecological conservation. In this way, employees can start from any direction in the business to conduct online discussions, process sharing, service processing and circulation. According to the data, the utilization ratio of

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using drag-and-drop components and model-driven logic.

[29] Source: Gartner, https://www.gartner.com/en/newsroom/press-releases/2021-02-15-gartner-forecasts-worldwide-low-code-development-technologies-market-to-grow-23-percent-in-2021, February 16, 2021.

[30] Metaverse signifies a new type of Internet application and social form that integrates virtual world and reality by combining multiple new technologies. It may provide an immersive experience based on extended reality technology, generate a mirror image of the real world based on digital twin technology, and build an economic system based on blockchain technology. It brings the virtual world and the real world into close integration in the economic system, social system, and identity system and allows each user to produce content and edit the world. Metaverse Development Research Report 2020-2021 released by the Center for New Media Communication Studies under Tsinghua University.

collaborative online document editing, online task management and process approval increased significantly, up 8.1 and 3.4 percentage points respectively from December 2020. The utilization ratio of netizens reached 29.3% and 15.0%, respectively. Online digital collaboration triggers changes in work styles and improves work efficiency, requiring companies to establish a digital management framework to go along with them. This may pose a challenge to traditional companies in their digital transformation.

III   Business Transaction Applications

(I)   Online Payment

As of December 2021, the user size of online payment in China had reached 904 million, up 49.29 million from December 2020, taking up 87.6% of the national total.

User Size and Utilization Ratio of Online Payment from Dec. 2017 to Dec. 2021

Unit: 10,000

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

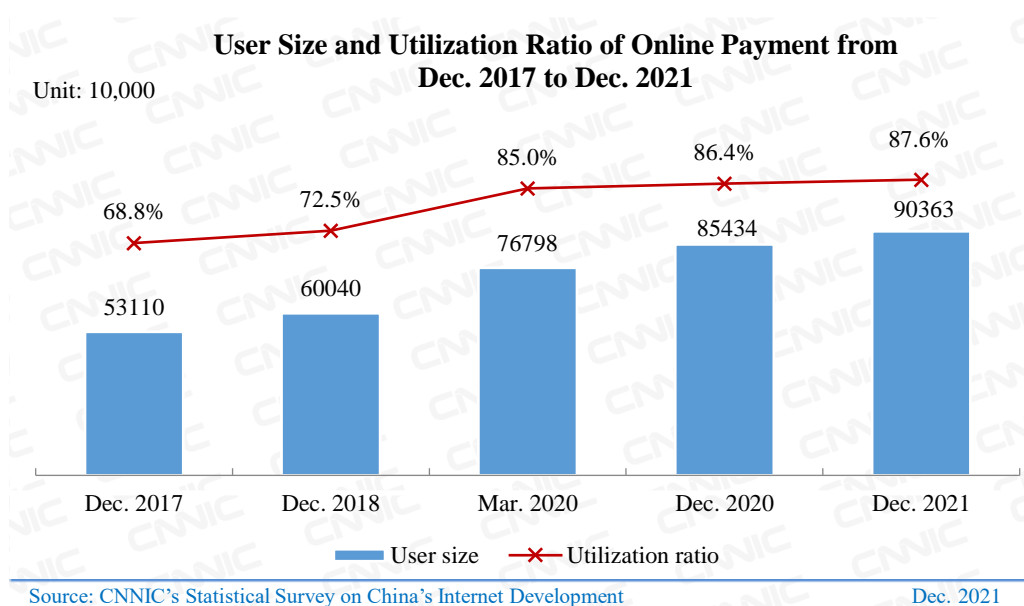Figure 34 User Size and Utilization Ratio of Online Payment from Dec. 2017 to Dec. 2021

Online payments maintained a steady growth trend. According to the data[31], banks processed 74.556 billion online payment transactions amounting to 1,745.9 trillion yuan in the first three quarters of 2021, up 17.3% and 10.5% year-on-year, respectively. China's online payment has

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[31] Source: the People's Bank of China.

grown steadily, providing a strong underpinning for consumption expansion, quality improvement and economic development.

Payment service barriers are being broken, ushering in a new stage of interconnection. In 2021, third-party platforms represented by Alipay and WeChat were the first to be opened to payment agencies such as cloud flash payment. In online and offline scenarios, payment and services were further interconnected. **In offline scenarios,** payment can be made by scanning the same QR code of Alipay, WeChat Pay and Unionpay Quick Pass in multiple cities across the country. Such a model is expected to cover all cities in 2022. **In online scenarios,** Internet platforms such as Meituan and Pinduoduo have supported many mainstream payment channels, such as WeChat Pay, Alipay, Unionpay Quick Pass, Apple Pay, Mi Pay, Huawei Pay, and Samsung Pay. In November, WeChat rolled out the self-service cloud flash payment in its Mini Programs and WeChat Pay has carried out interconnection cooperation with 12 banking institutions.

The promotion of digital yuan has been expedited, with the pilot of Beijing Winter Olympic scenario advanced steadily. Since the end of 2019, the digital yuan pilot has been applied in more fields orderly, boosting the expansion and quality improvement of China's digital economy. According to the data[32], as of December 31, 2021, the pilot scenarios of digital yuan had exceeded 8,085,100, with a total of 261 million personal e-wallets opened and a transaction amount of 87.565 billion yuan. The pilot had verified the technical design of digital yuan, system stability, product usability and scenario applicability. It had enhanced the public's understanding of the design concept of digital yuan. It will promote its application in pilot scenarios such as retail transactions, daily payment and government services. An important part of the R&D pilot of digital yuan and the preparation for the Beijing 2022 Winter Olympics, the digital yuan pilot for Beijing Winter Olympics was advancing in a steady and orderly manner, covering seven types of scenarios including transport, catering & accommodation, shopping & consumption, and tourism & sightseeing. By doing so, the digital currency has achieved full coverage of payment service needs. In addition, the Winter Olympics also piloted the innovative application scenarios such as unmanned vending carts and self-service vending machines, and introduced wearable payment

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[32] Source: Press Conference on Financial Statistics 2021 by the State Council Information Office.

devices such as payment gloves, payment badges, and winter Olympics payment clothing to enhance user experience.

(II) Online Shopping

As of December 2021, the user size of online shopping had reached 842 million, up 59.68 million from December 2020, taking up 81.6% of the national total.

User Size and Utilization Ratio of Online Shopping between Dec. 2017 and Dec. 2021

Unit: 10,000

69.1%	73.6%	78.6%	79.1%	81.6%
53332	61011	71027	78241	84210
Dec. 2017	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021

User size ■   Utilization ratio ✕

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
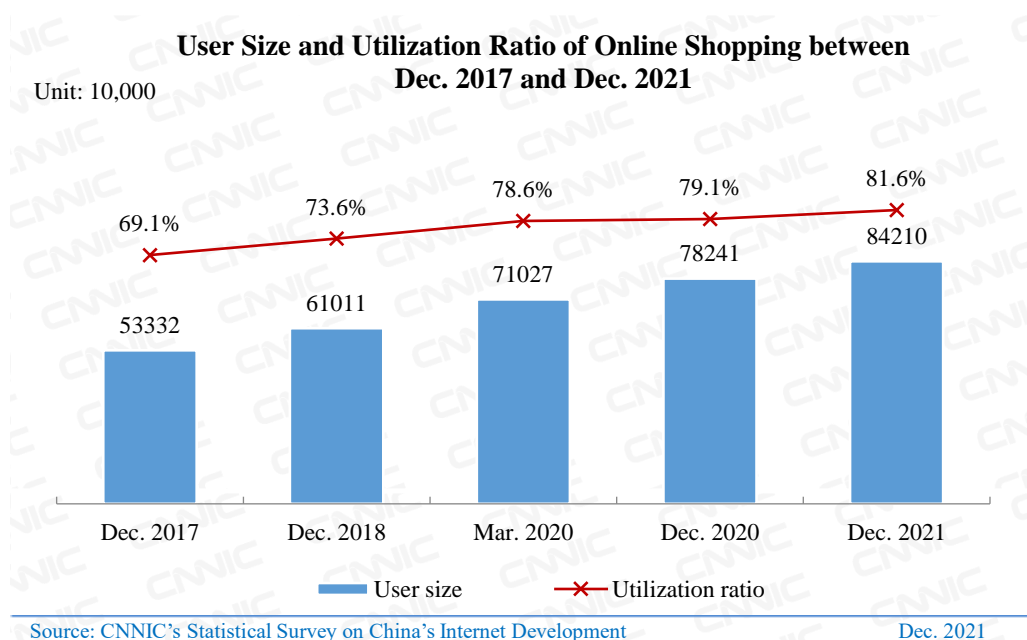
Figure 35 User Size and Utilization Ratio of Online Shopping between

Dec. 2017 and Dec. 2021

A typical representative of new forms of the digital economy, online retail has continued to grow at a faster pace, becoming an important force in driving consumer expansion. Online retail sales reached 13.1 trillion yuan in 2021, a YoY increase of 14.1%. Specifically, online sales of physical goods accounted for 24.5% of the total retail sales of consumer goods.[33] Online retail serves as a key link between production and consumption, online and offline, urban and rural areas, and domestic and international markets, playing an active role in building a new development paradigm.

The industry presents new development and helps foster a new development paradigm with dual circulations. First, the international circulation has been boosted to push the rapid

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

development of cross-border e-commerce so as to underpin the development of foreign trade. In 2021, imports and exports in China's cross-border e-commerce amounted to 1.98 trillion yuan, up 15% year-on-year[34]. In July, the General Office of the State Council issued the *Guidelines on Accelerating the Development of New Business Forms and New Models of Foreign Trade*, proposing a number of measures for the development of cross-border e-commerce to facilitate the development of the industry. During the same period, Business-to-Business (B2B) that is applicable to the national customs was used to implement overseas warehouse supervision model for direct export and cross-border e-commerce export to help enterprises better explore the international market. **Second, the domestic circulation has been advanced to improve rural e-commerce logistics and promote agricultural products to drive farmers' entrepreneurship and employment.** In 2021, more than 80% of the country's rural areas were accessible to express. Jiangsu, Zhejiang and Shanghai and other places gained access to express in each village, with 155,000 villages conducting postal-express cooperation[35]. Poverty alleviation through e-commerce had driven 7.71 million farmers to start their own businesses locally and increase the income of 6.188 million needy people[36].

Consumption demonstrated a new development trend of upgrading and expanding domestic consumption. First, by consumer group, online shopping had the highest popularity among post-80s and -90s and the post-95 had the greatest potential of consumption. The post-80s and -90s netizens born between 1980 and 1995 had the highest utilization of online shopping, amounting to 93%. The post-95 group had the greatest potential for online shopping consumption. 41.9% of the post-95 online shopping users made more than 30% of their daily consumption online. The proportion of online shopping consumption was higher than that of other online shopping groups. **Second, in consumption trends, domestic brands had become more popular in online shopping.** Driven by cultural self-confidence and brand upgrading, the online shopping boom of homemade brands is on the rise, and domestic brands are widely favored by online shopping users. Data show that users who support domestic products and buy homemade brands online account for 65.4% of the total. Domestic brands that this group purchase mainly include sportswear, beauty

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[34] Source: the 2021 press conference on national import and export by the State Council Information Office.
[35] Source: the State Post Bureau of the People's Republic of China.
[36] Source: the press conference themed "Contributing Business Forces and Striving for a Moderately Prosperous Society in All Respects" by the State Council Information Office.

makeup & skin care, household appliances, and mobile phone & digital products, taking up 57.5%, 38.7%, 37.7% and 36.2%, respectively.

Governance demonstrated new developments and fair competition made for a pluralistic competitive landscape. In 2021, policies were introduced to strengthen the anti-monopoly efforts of the platform economy and promote fair competition. E-commerce platform enterprises were forced to review monopoly, innovation, efficiency and fairness and boost the development of the industry in the direction of compliance. The regulation of unfair competition such as "making a decision between two options" is being improved so that more platforms can enjoy the market opportunities delivered by fair competition to promote diversified competition in the market. According to financial reports of enterprises, the year of 2021 witnessed a fast growth in e-commerce business for small and medium-sized enterprises and new entrants, such as short video platforms.

(III)   Online Meal Ordering

Up to December 2021, the user size of online meal ordering in China had reached 544 million, up 125 million from December 2020, taking up 52.7% of all Internet users.

User Size and Utilization Ratio of Online Meal Ordering from Dec. 2017 to Dec. 2021

Unit: 10,000

Date	User size	Utilization ratio
Dec. 2017	34338	44.5%
Dec. 2018	40601	49.0%
Mar. 2020	39780	44.0%
Dec. 2020	41883	42.3%
Dec. 2021	54416	52.7%

■ User size ✕ Utilization ratio

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
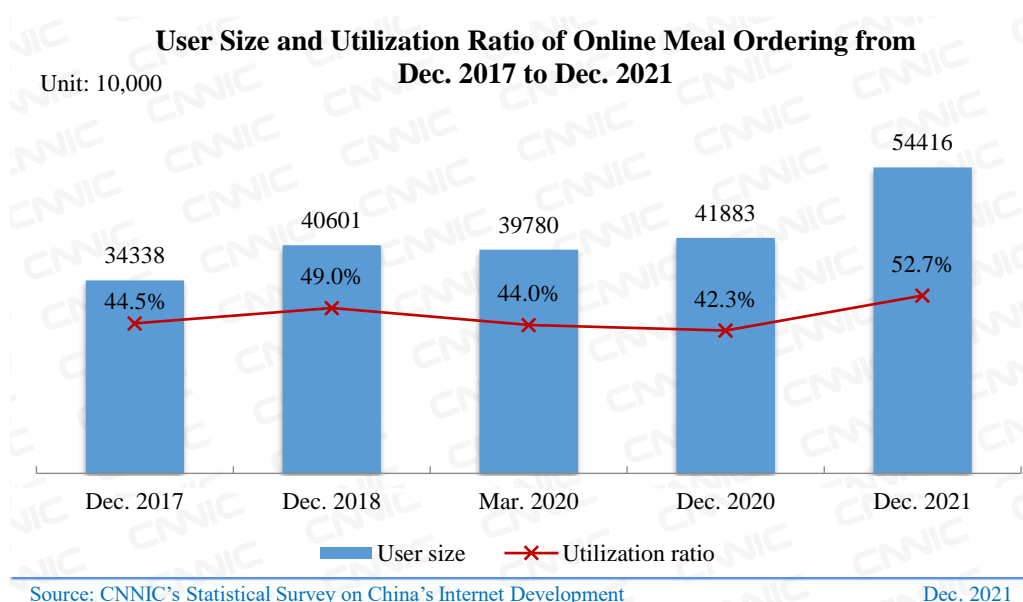
Figure 36 User Size and Utilization Ratio of Online Meal Ordering from

Dec. 2017 to Dec. 2021

In 2021, the online meal ordering market continued to expand, changing the competitive landscape. Platforms scaled up instant retail[37] to advance the innovative application of delivery technology. The policy environment for market development was being refined.

The online meal ordering market expanded, changing the competitive landscape. First, the market size has been gaining momentum. In 2021, the number of online meal ordering users increased by 29.9% year-on-year, and the number of users grew by 125.33 million. In the third quarter, the transaction amount of Meituan's meal ordering division increased by 29.5% year-on-year, and the average number of daily transactions rose by 24.9% year-on-year. The profits continued to improve, and the operating profit margin of 3.3% remained at a relatively stable level[38]. In the same period, ele's orders grew by over 30% year-on-year[39]. **Second, new entrants may join the industry competition.** The competitive landscape of online meal ordering market remained stable for a long time. Against this backdrop, Douyin launched a beta version of "Xindong Takeaway" in July 2021, which may intensify the competition in the online meal ordering market and give offline merchants more channels to reach consumers.

Online meal ordering platforms expanded the instant retail model and improved the delivery technology. First, online meal ordering platforms and retail e-commerce companies competed around instant retail. For one thing, online meal ordering platforms took instant delivery service as their competitiveness, got involved in instant retail, and expanded delivery categories to brings more convenience and choices to consumers. For example, Meituan's "flash purchase" of drugs and flowers had maintained a high growth momentum. For another, traditional e-commerce platforms developed instant delivery and offered instant retail services. For example, JD.com and Dada Express launched hourly purchase and provided retail services of online order, delivering from stores, hourly and minute-based delivery. **Second, new strides have been made in the R&D and application of new delivery technologies.** Enterprises are exploring unmanned delivery scenarios. Unmanned delivery vehicles developed by Alibaba, JD and Meituan have been applied. Meituan is exploring a low-altitude delivery network for its UAVs in cities to ease the

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[37] Instant retail refers to the retail-to-home service that features high time efficiency (typically ranging from 29 minutes to several hours) through instant delivery capacity.
[38] Source: Meituan's results announcement for the three months as of September 30, 2021.
[39] Source: Alibaba Financial Report 2022 Q2.

burden on delivery workers and improve the efficiency. As of June 2021, Meituan's UAVs had completed more than 220,000 flight tests[40].

Policies for the online meal ordering market have been refined. First, the labor security system for meal delivery workers is increasingly sound. After the promulgation of the *Guidelines on Implementing the Responsibility of Online Catering Platforms and Safeguarding Rights and Interests of Meal Delivery Workers*, companies launched a number of plans and measures to improve the overall welfare of delivery workers. For example, ele announced its support for delivery staff with the first 300 million yuan. Meituan continued to promote its "Tongzhou plan" to improve the work experience of delivery members through welfare incentives and hardware upgrading. **Second**, **the anti-monopoly regulation has been improved.** The State Administration for Market Regulation imposed administrative penalties on Meituan's monopoly violations in October 2021, supervising and guiding the delivery industry for fair competition and long-term healthy development.

(IV)　Online Travel Booking

As of December 2021, the number of online travel booking users in China had reached 397 million, up 54.66 million from December 2020, accounting for 38.5% of all Internet users.

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[40]　Source: World Artificial Intelligence Conference.

User Size and Utilization Ratio of Online Travel Booking from Dec. 2017 to Dec. 2021

Unit: 10,000

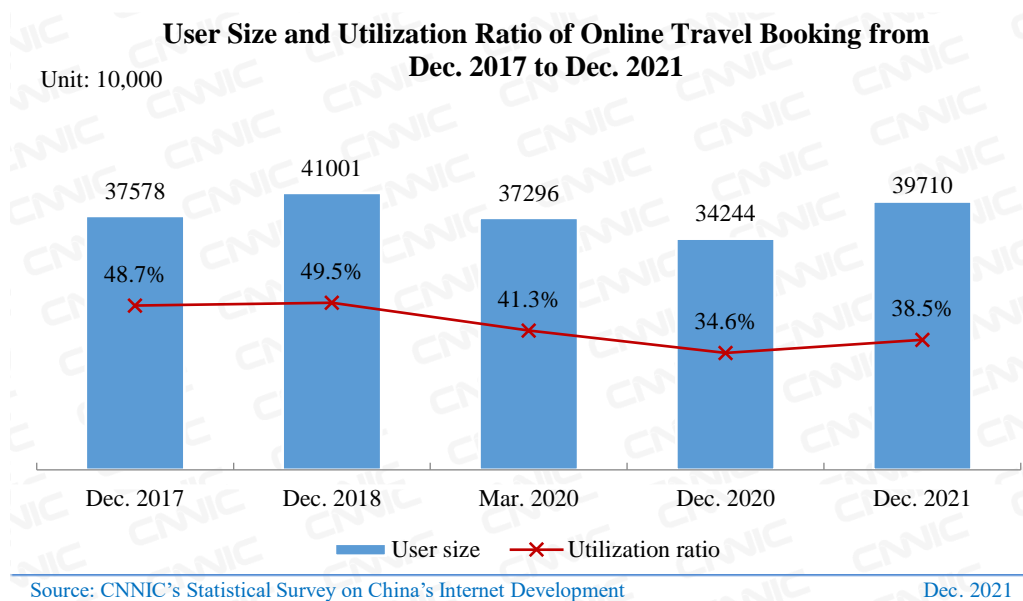Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 37 User Size and Utilization Ratio of Online Travel Booking from

Dec. 2017 to Dec. 2021

In 2021, China's timely and effective efforts to control the COVID-19 had contributed to the orderly recovery of domestic tourism. The development of travel booking segments has enriched domestic tourism products and digitally empowered tourism to change and innovate itself, giving a boost to the high-quality development of the industry.

As the domestic tourism market was recovered in an orderly manner, travel booking companies were developed steadily. According to the data[41], domestic trips and tourism revenue increased by 12.8% and 31.0% year-on-year, respectively, returning to 54.0% and 51.0% of the 2019 levels. During the National Day holiday, domestic trips and tourism revenue returned to 70.1% and 59.9% of the 2019 levels, respectively. Against the backdrop of an effective recovery in the domestic tourism market, the performance of travel booking companies fluctuated slightly and was generally stable due to the recurring epidemic in local areas. In the third quarter of 2021, Ctrip achieved net income of 5.3 billion yuan, down 2.2% YoY and 9.3% QoQ[42].

Travel booking market segments follow the trend, and rural tourism embraces development opportunities. Due to the epidemic flare-ups and the weather, the demand for medium and long-distance tourism has not been fully unleashed. However, there has shown a trend

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[41] Source: The Data Center of China's Ministry of Culture and Tourism.
[42] Source: Ctrip's financial report 2021 Q3.

of short-haul travel booking. Light travel[43], micro-vacation[44] and hotel-based residence[45], characterized by short time, short distance and high frequency, have been popular in the market. Special travel booking products such as red tourism, parent-child tour and study tour continued to gain more popularity. In the meantime, enterprises has continued to develop the tourism market in low-tier cities and given a boost to rural tourism. According to the data[46], as of September 2021, registered users of TravelGo from non-first-tier cities accounted for about 86.8% of the total. In the third quarter, about 62.7% of TravelGo's new paid users on WeChat came from third-tier or lower cities in China.

Digital empowerment has transformed the tourism sector through innovations to boost its high-quality development. First, new forms of travel booking have been emerging. In the context of normalized epidemic control and digital transformation, tourist attractions, museums and cultural centers around the country have adopted new consumption models to improve experiences, launched a variety of online and offline events, and promoted them through sightseeing, exhibition and theater on cloud platforms. According to the data[47], the cumulative number of people starting live travel streaming on Weibo in 2021 increased by 110% over 2020, live streaming sessions grew by 143% and viewers rose by 1,968%. **Second, enterprises have embraced digital transformation to help develop the industry through changes and innovations**. Ctrip, Mafengwo, Tuniu and other enterprises have accelerated the development of live streaming, explored the tourism plus live streaming model through live selling and cloud tourism, and introduced rich and high-quality content to meet the needs of users so as to continue to facilitate the development of a more diversified ecosystem in the industry.

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[43] Light travel refers to an eco-friendly, green tourism type that is light in clothing, travel style, tour itinerary and experience.
[44] Micro-vacation refers to a quality short vacation tour around a city, consisting of medium and high-end hotels, specialties and leisure activities.
[45] Hotel-based residence means that consumers rely on the convenient location and perfect supporting facilities of a hotel to enjoy all kinds of leisure and entertainment items in a one-stop manner.
[46] Source: TravelGo's financial report 2021 Q3.
[47] Source: Weibo.

IV Online Entertainment Applications

(I) Online Video

Up to December 2021, the user size of online video (including video clips) in China had reached 975 million, up 47.94 million from December 2020, making up 94.5% of all Internet users. The number of video clip users amounted to 934 million, an increase of 60.80 million over December 2020, accounting for 90.5% of all Internet users.

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

Unit: 10,000

Date	User size	Utilization ratio
Dec. 2018	72486	87.5%
Mar. 2020	85044	94.1%
Dec. 2020	92677	93.7%
Dec. 2021	97471	94.5%

■ User size ✕ Utilization ratio

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
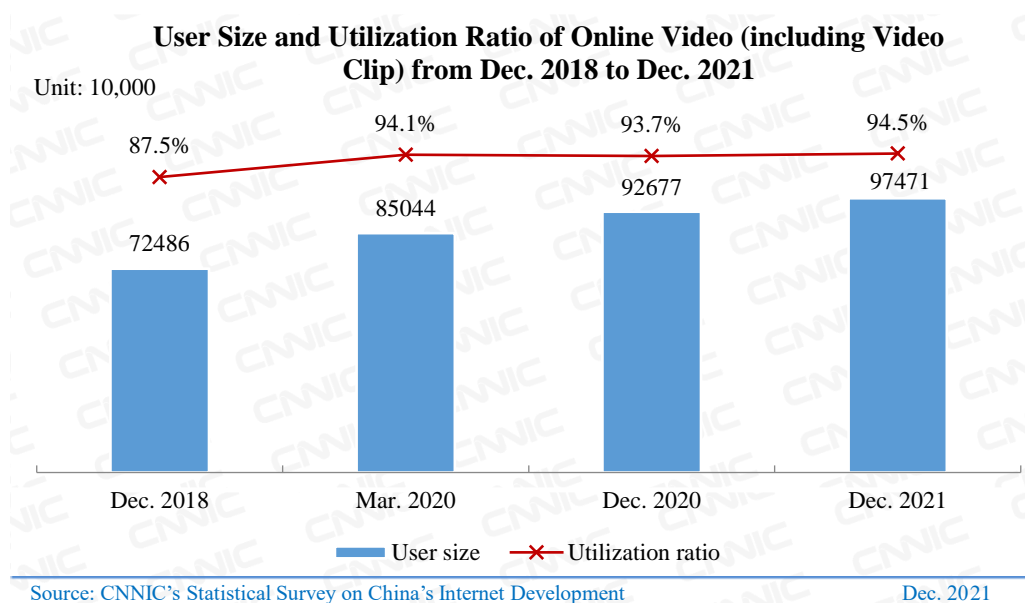
Figure 38 User Size and Utilization Ratio of Online Video (including Video Clip) from Dec. 2018 to Dec. 2021

In 2021, new users of video clip applications contributed to further growth in the overall user size of online video, but the growth rate continued to slow down. The online video market saw an endless stream of high-quality products, expedited exploration and application of new services and technologies, and a clearer and brighter environment.

With regard to communication content, film and TV works in line with mainstream socialist values continued to be broadcast on major video platforms, playing a leading role. The year of 2021 marked the 100th anniversary of the founding of the Communist Party of China (CPC). A great number of works reflecting the century-long struggle of the CPC continued to emerge, with online video platforms serving as important broadcast channels. A lot of excellent works played on online video platforms gained unanimous recognition of users and the market,

sparking lively discussions. For example, *Minning Town*, *Medal of the Republic* and *The Age of Awakening* have focused on poverty alleviation, stories of "medal winners of the Republic" and the glorious history of the founding of the CPC. They have conveyed mainstream socialist values in an audience-friendly narrative. These dramas have been well appreciated by audiences of all ages, emerging as a trendsetter for the creation of domestic TV dramas in the new era.

Technologically, cloud services and new technologies are being explored and applied to facilitate the innovation and development of the online-video culture industry. First, cloud performance and cloud theater continued to be explored. With the new form of entertainment content created by a variety of audiovisual technologies, cloud performances overcame the impact of the epidemic on the offline entertainment industry to meet the demand of users for interactive and immersive experiences. Cloud cinema allowed users to get more immersive and high-quality audiovisual enjoyment online, while providing a new entertainment consumption experience through functions such as watching together, cloud premieres and cloud ticketing. **Second, 3D real scene, virtual idol and other technologies are being applied**. 3D real scene is replacing chroma key as a technology to shoot scenes for self-produced episodes on video sites, giving viewers an immersive experience in terms of visual perception and special effects presentation. A number of influential virtual IP images such as Producer C have been created to be integrated into online variety shows. In addition, they can be used to give live stage performances through holography[48], creating greater value in a wider range of cultural and creative fields.

As for industry management, authorities have strengthened the comprehensive governance of the cultural and recreational sector to enhance the self-regulation of the industry. In 2021, to deal with overpriced film fees of stars, dual contract, tax evasion, hype of vulgar information and bad artists, competent departments have taken a series of measures to strengthen rectification efforts, intensify the integrated reform of the film and television industry, foster its healthy development, and tighten the supervision of network content, achieving good results. In June, the Cyberspace Administration of China carried out a two-month campaign to rectify the fandom nationwide. In September, the Publicity Department of the CPC Central Committee issued the *Notice on Carrying out Comprehensive Management of Recreation and*

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[48] Holography refers to a virtual imaging technology that uses the principles of interference and diffraction to record and reproduce a real three-dimensional image of objects.

Entertainment to call for standardizing the market order, implement the platform responsibility, strictly supervise the content, and strengthen the industry management.

User Size and Utilization Ratio of Video Clip between Dec. 2018 and Dec. 2021

Unit: 10,000

	Dec. 2018	Mar. 2020	Dec. 2020	Dec. 2021
User size	64798	77325	87335	93415
Utilization ratio	78.2%	85.6%	88.3%	90.5%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
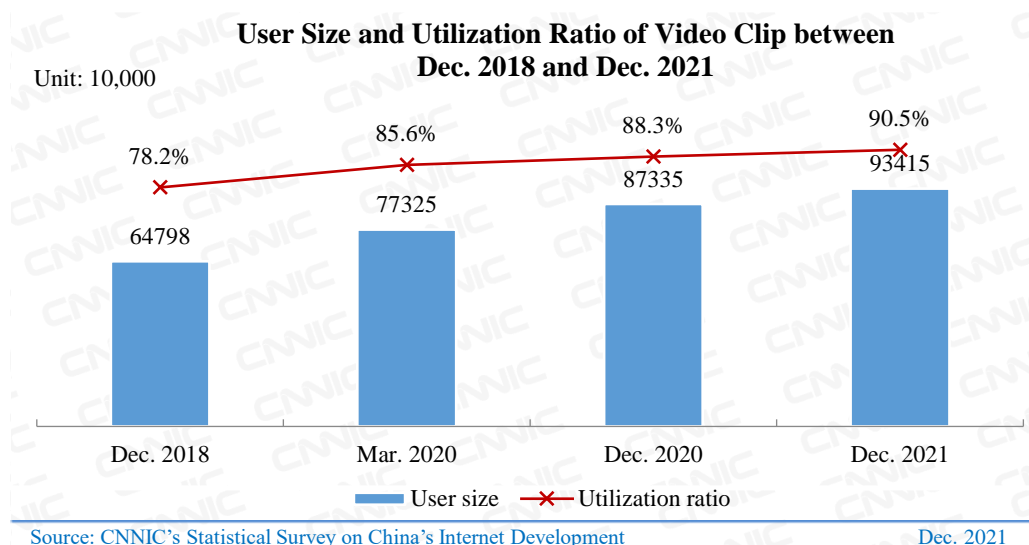
Figure 39 User Size and Utilization Ratio of Video Clip between Dec. 2018 and Dec. 2021

In 2021, the user size of video clip continued to grow, and the industry still sustained steady growth. For one thing, video clip platforms sped up the dissemination of knowledge. For another, they continued to integrate themselves with traditional industries to create greater economic value.

Video clips promoted knowledge and became an important channel for information transmission. Since 2020, video clip platforms have vigorously supported content creators and encouraged the output of pan-knowledge content. They have proactively developed new forms such as live classes and new features of video collections, creating a multi-level and three-dimensional knowledge graph. The knowledge content of platforms has covered life, education, humanities, finance & economy, and military affairs, meeting the diverse needs of users. In addition, these platforms have promoted the systematic dissemination of knowledge and enhanced effects of knowledge learning by introducing functions such as video collections and creating live open classes for famous teachers. In 2021, Douyin launched four phases of Mengzhi Plan, investing tens of billions of traffic in supporting knowledge creators and encouraging the creation of more knowledge content suitable for young people to learn. Kuaishou rolled out two seasons of large-scale live streaming activities with a theme of Kuaishou New Knowledge Broadcast to provide users with a new cognitive perspective and access to knowledge.

Video clips have been integrated with sales of agricultural products and the culture and tourism industry, stimulating economic vitality. First, video clip Apps have boosted agricultural sales. Farmers and merchants at the source of agricultural products have promoted quality agricultural products through video clips and live streaming, opening up the urban market. According to the data[49], Kuaishou sent over 420 million orders for agricultural products from rural areas to other parts of the country through live commerce from January to October 2021. The sales and orders of agricultural products increased by 88% and 99% respectively over 2020. In addition, video clip platforms also provided professional training for farmers and rural entrepreneurs to ensure the sustainable development of the video clip and live selling model for agricultural products. **Second, video clip Apps have stimulated the vitality of the culture and tourism industry. In the cultural industry,** video clip platforms have fostered the understanding and curiosity of the young generation over intangible cultural heritage by strengthening support of traffic, improving realizability, building an open platform and conducting urban cooperation. By doing so, they can help demonstrate the culture and market value of intangible cultural heritage. **In the tourism industry,** video clip platforms continued to strengthen cooperation with cities such as Xi'an, Chongqing and Nanjing, bring in cultural and tourism projects and promote tourist attractions, helping bolster cities' image and boost the development of tourism.

(II) Live Streaming

As of December 2021, the user size of live streaming in China had reached 703 million, up 86.52 million from December 2020, taking up 68.2% of all Internet users. Specifically, the user size of live commerce was 464 million, up 75.79 million from December 2020, accounting for 44.9% of all Internet users. That of live game streaming was 302 million, up 62.68 million over December 2020, making up 29.2% of all Internet users. The user size of live sports was 284 million, up 93.81 million from December 2020, accounting for 27.5% of the total. That of host live show was 194 million, up 2.72 million from December 2020, taking up 18.8% of all Internet users. That of live

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[49] Source: The first China Internet Civilization Conference co-hosted by the Cyberspace Administration of China, the Civilization Office of the Central Communist Party Committee, Beijing Municipal Committee of the Communist Party of China and Beijing Municipal People's Government.

concert streaming was 142 million, up 4.76 million over December 2020, representing 13.8% of all Internet users.

User Size and Utilization Ratio of Live Streaming between Dec. 2017 and Dec. 2021

Unit: 10,000

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
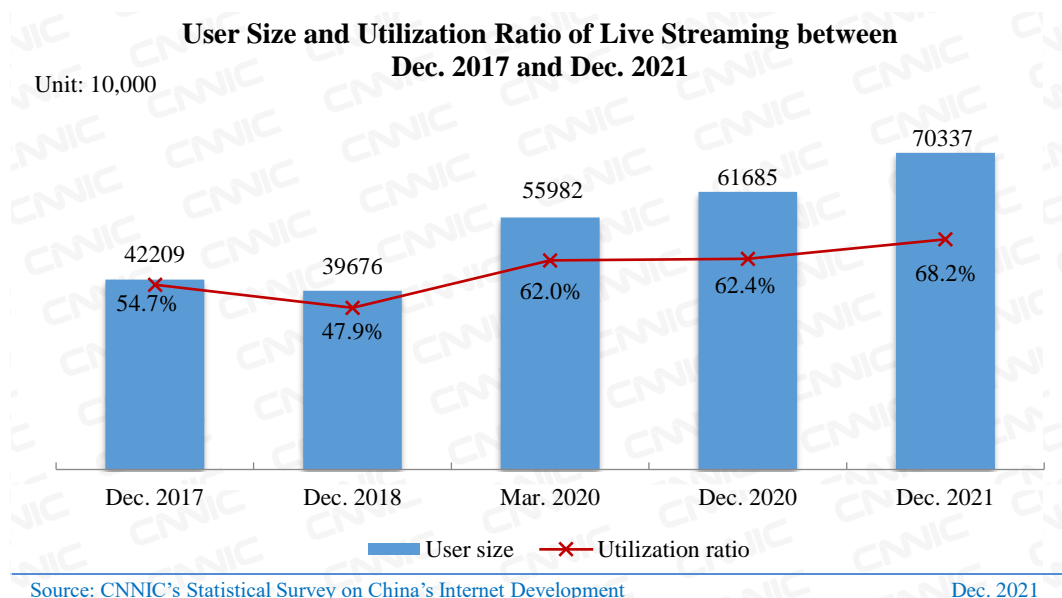
Figure 40 User Size and Utilization Ratio of Live Streaming between

Dec. 2017 and Dec. 2021

Live commerce and live sports broadcasting were the two most prominent types of the live streaming industry in 2021.

Live commerce has been changed in the three aspects of live streaming subject, commodity source and operation rules. First, the diversification of market players. With the booming of live commerce, a growing number of small and medium-sized merchants have focused on developing their own live streaming channels. According to the data, of the nearly 1,000 live streaming rooms on Taobao, live commerce accounted for over 55%[50], which was higher than that of stars' live rooms. In the second quarter of 2021, the vast majority of e-commerce transactions came from private domain traffic[51]. **Second, the localization of commodities.** The positive impact of live commerce on local merchants' promotion was embodied in 2021. Time-honored brands and distinctive agricultural products were marketed well through live commerce channels. According

[50] Source: Taobao Live's 2021 Annual Report.
[51] Source: Kuaishou's Interim Report 2021. Private domain traffic refers to the traffic that is owned by a brand or an individual, freely controlled, free of charge and used for many times. The usual presentation forms include personal WeChat accounts, WeChat groups and Mini Programs. In this context, it means that brands or individuals use self-operated live rooms to sell their products.

to the data[52], 180-plus time-honored brands started live streaming during the Singles' Day, with the turnover of multiple brands exceeding one million yuan. In addition, CCTV collaborated with Pinduoduo to launch a large live selling session during the period, vigorously promoting high-quality national and agricultural brands. **Third, the standardization of operation.** The *Guidelines on Strengthening the Standardized Management of Live Streaming*, the *Live Streaming Management Measures (Trial)* and other policies were issued in 2021. With the implementation of the rules and regulations, the live commerce supervision system has been refined, enhancing the protection of consumer rights and interests.

The upgrading of live sports broadcasting model continued to improve user experience, thanks to the weakened negative impact of the pandemic on events. First, the recovery of events put copyright trading back on track. With the continuous recovery of sports events across the world, companies also resumed competition for copyright resources, with live copyright transactions of important sports events done frequently. Live streaming channels for the Tokyo Olympics, Beijing Winter Olympics, the Chinese Super League, Premier League and Copa America were established in 2021. The rebound of copyright trading of live sports broadcasting, one of all live streaming that has given top priority to copyright resources, signaled a good future for live sports broadcasting. **Second, new technologies represented by cloud services and 5G have facilitated the upgrading of the live sports broadcasting model.** At the Olympics, the Olympic Broadcasting Cloud, co-developed by Aliyun and the Olympic Broadcasting Service Company, was put into use for the first time to provide broadcasting support for global broadcasting institutions. Based on this platform, broadcasters can not only broadcast and edit remotely but also use the athlete-tracking technology to allow viewers to watch real-time information about each athlete's running speed in sprint events[53]. **Third, the live voice of athletes after a match has enriched the watching experience of users.** On social media platforms, live voice has become a new form of interaction between athletes and viewers, providing users with a new way to understand athletes and events. According to the data[54], 103 sports stars participated in 144 live voice sessions on Weibo in 2021, receiving 328 million views.

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[52] Source: Beijing Business Today, https://www.bbtnews.com.cn/2021/1108/418156.shtml, November 8, 2021.
[53] Source: People's Daily Online, http://finance.people.com.cn/n1/2021/0723/c1004-32168076.html, July 23, 2021.
[54] Source: Weibo.

(III) Online Games

Up to December 2021, the user size of online games had reached 554 million, up 35.61 million from December 2020, making up 53.6% of the national total.

User Size and Utilization Ratio of Online Games from Dec. 2017 to Dec. 2021

Unit: 10,000

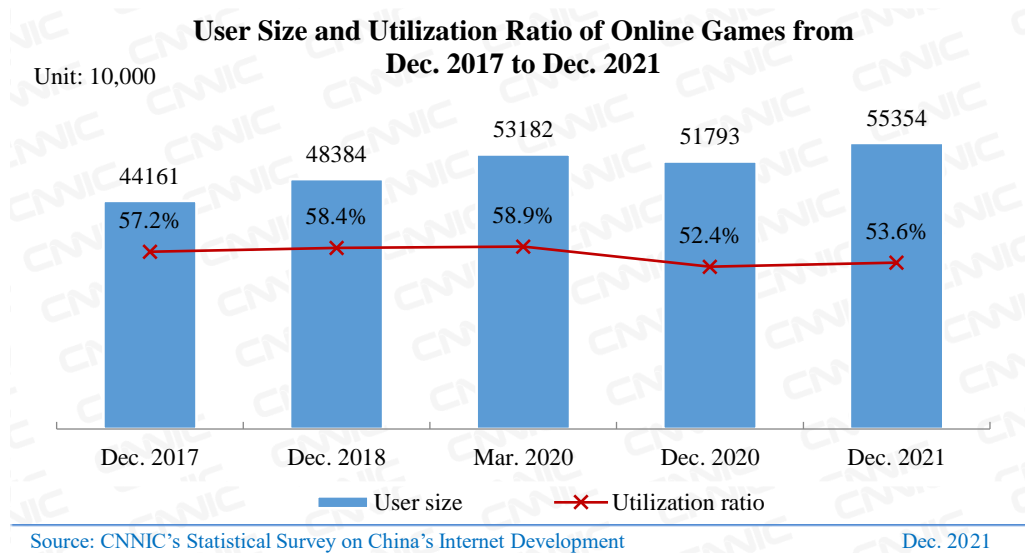Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 41 User Size and Utilization Ratio of Online Games from Dec. 2017 to Dec. 2021

In 2021, national authorities stepped up governance efforts for a more standardized online game industry in a bid to protect the healthy growth of minors.

National authorities governed the regulation of the online game industry to protect the healthy growth of minors. The newly amended *Law of the People's Republic of China on the Protection of Minors* came into effect in June 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. After August 2021, the National Press and Publication Administration, the General Office of the Ministry of Education and other competent departments issued policy documents such as the *Notice on Further Strict Management of Preventing Minors from Being Addicted to Online Games* and the *Notice on Further Strengthening the Management of Preventing Primary and Secondary School Students from Being Addicted to Online Games* to require strict control of minors' online game time, prevent minors from being addicted to online games and promote minors' healthy growth.

The online game industry continued to develop, expanding overseas steadily. First, domestic indie games made new progress. The domestic indie games released in 2021 were

favored by online game users for their high quality, receiving high sales and ratings on internationally renowned game distribution platforms and online stores. **Second, overseas markets were expanded.** Overseas markets have become an important revenue source for China's online game manufacturers, providing a good opportunity for cultural products to go global. According to the data[55], in the third quarter of 2021, mobile games developed by China's online game manufacturers ranked second, fifth and seventh respectively in the global best-selling list of mobile games.

(IV) Online Music

Up to December 2021, the user size of online music had reached 729 million, up 71.21 million from December 2020, making up 70.7% of the national total.
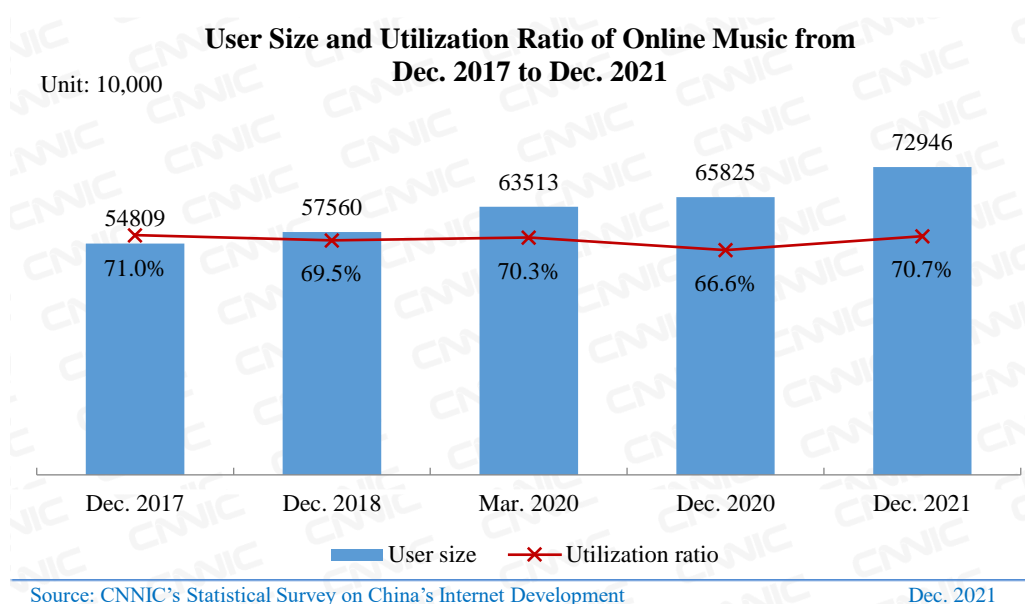
Figure 42 User Size and Utilization Ratio of Online Music from Dec. 2017 to Dec. 2021

China's online music industry in 2021 focused on copyright environment and business innovation.

First, the reshaping of the copyright environment shifted the focus of competition back onto products. Since 2018, relevant departments have guided main online music service providers to improve their licensing models, coordinate cooperation among all parties and facilitate the open

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[55] Source: App Annie's Handheld Games Report 2021 Q3.

licensing of more than 99% of exclusive music works. In July 2021, the State Administration for Market Regulation legally ordered Tencent and its affiliates to release exclusive rights, stop high prepayments and other methods of copyright fee payment and restore market competition. Through such an action, the competition order of domestic online music market was reshaped and the barriers to market entry were lowered. By doing so, competitors were given more equitable access to upstream copyright resources. Also, such efforts helped shift the focus of market competition onto business innovation and user experience.

Second, multi-field business innovation helped drive the sustained growth of revenue. Along with the improvement in copyright environment, online music platforms began to devote more efforts to exploring new business. Various forms of innovative business were developing, increasing platforms' revenue. Data show that, in the first three quarters of 2021, Tencent Music Entertainment Group's revenue grew 13.5% year-on-year[56]; NetEase Cloud Music's revenue rose 52% year-on-year[57]. **Regarding offline performances**, NetEase Cloud Music's bar opened in Shanghai in October to provide live performance opportunities for artists while serving as a venue for offline exchange activities for music community users. **In terms of virtual services**, QQ Music cooperated with the metaverse game company Roblox to launch the game QQ Music Starlight Town and hold virtual concerts to expand the virtual immersive entertainment experience through the music and game integration.

(V) Online Literature

Up to December 2021, the user size of online literature had reached 502 million, up 41.45 million from December 2020, making up 48.6% of the national total.

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[56] Source: Tencent Music Group's Q3 financial report.
[57] Source: *Post-Hearing Document of NetEase Cloud Music for the First Revised Edition* by Hong Kong Stock Exchange.

User Size and Utilization Ratio of Online Literature from Dec. 2017 to Dec. 2021

Unit: 10,000

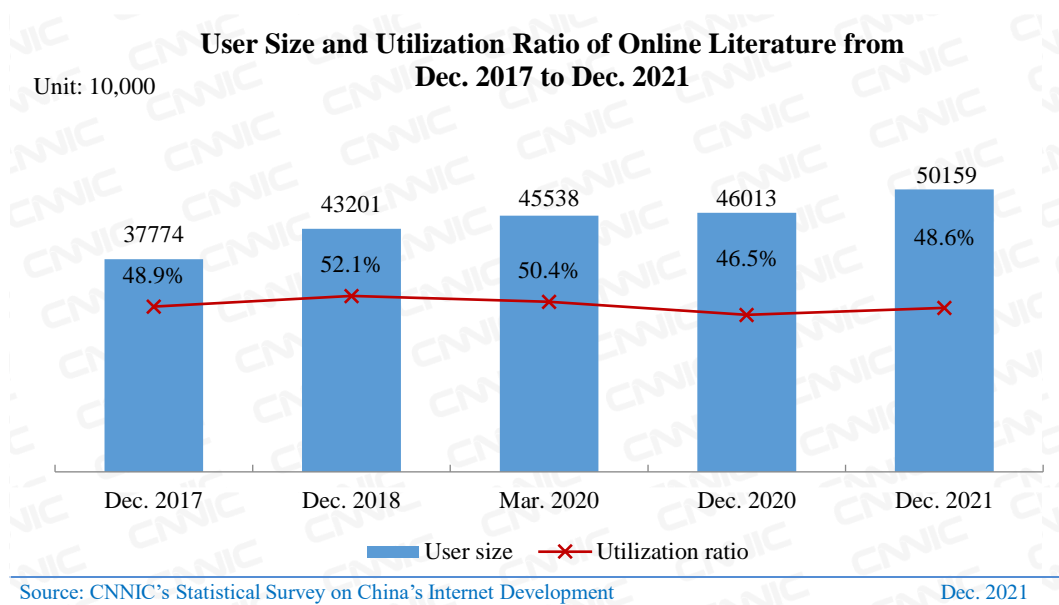Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 43 User Size and Utilization Ratio of Online Literature from Dec. 2017 to Dec. 2021

In 2021, the online literature industry continued to grow steadily. Online literature focused more on realistic themes, with the quality of works improved. In the meanwhile, digital products based on online literature were diversified, with audio products and short plays becoming new growth points. Moreover, online literature platforms explored new models of going global, offering a path to tell Chinese stories in the global context.

As positive themes have become a trend of literary work, the quality of realistic works has been improving. First, the trend of positive energy was obvious. Under the guidance of national policies and platforms, online literature heightened concerns about reality. The year of 2021 marked the 100th anniversary of the founding of the Communist Party of China. There were a number of positive energy works on themes such as celebrating the 100th anniversary and achieving moderate prosperity and poverty eradication. **Second, the quality of realistic works gained the public recognition.** The works on realistic subjects, such as *Heavy Industry for Strong Country*, *Chaoyang Police*, *The Great Doctor Ling Ran* and *Live Surgery Room*, have been selected for the permanent collection of the National Library of China. *Heavy Industry for Strong Country* won the fifth China Publishing Government Award, which was the first time for an online literature work to win the highest award in China's publishing industry.

The diversified online literature was flourishing. First, the online literature plus audio became the focus of IP[58] development. Relying on original online literature content, the audio book market incubated by online novels is growing faster. Online literature platforms and audio platforms seek strong cooperation, while many Internet companies also speed up the development of audio products. Audio has become an important part of the multi-disciplinary development of online literature. For example, ByteDance launched Tomato Listening, NetEase Cloud Music rolled out Voice Theater, and Tencent Music acquired all the shares of Lanren Audio Book. **Second, online literature plus short play has become popular for IP adaptations.** The content of online literature is easy-to-understood, which matches the pace of short plays. Short plays feature a short incubation period and low production costs. Online literature platforms and short video platforms have entered the industry one after another, forming a model where online literature platforms provide literature IP and short video platforms produce and broadcast.

Online literature abroad presented the development of ecosystem to expand international influence. First, the model of going global shifted its focus from content to ecosystem. In 2021,online literature going abroad was changing from the model of platforms exporting domestic works to that of an ecosystem exporting works and operation. Online literature platforms began to export content creation skills and foster overseas creators, localizing their operation overseas. **Second, the international dissemination of online literature achieved remarkable results.** According to the data[59], China published more than 10,000 Internet literature works overseas. Websites and Apps had over 100 million subscribers, covering most countries and regions across the world. Online literature works published overseas enhanced the influence of Chinese culture, contributing to telling Chinese stories on the world stage.

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[58] IP refers to intellectual property. In online literature, IP refers to a cultural property carrier that has core value and unique appeal in content creation, can be intensively developed, and boasts a considerable number of fan audiences, and is able to achieve cross-media operation outside the limitation of a single platform.
[59] Source: Guangming Daily, https://epaper.gmw.cn/gmrb/html/2021-10/05/nw.D110000gmrb_20211005_5-03.htm, October 5, 2021.

V   Public Service Applications

(I)   Online Car-Hailing Services

As of December 2021, the user size of online car-hailing services in China reached 453 million, up 87.33 million from December 2020, making up 43.9% of all Internet users.

User Size and Utilization Ratio of Online Car-Hailing Services between Dec. 2017 and Dec. 2021

Unit: 10,000

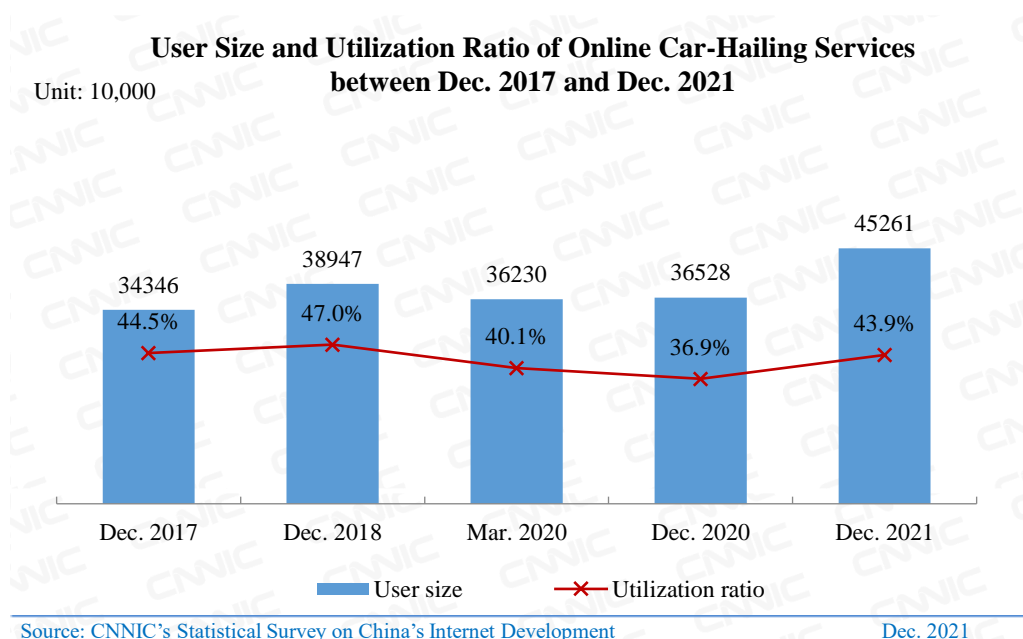Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 44 User Size and Utilization Ratio of Online Car-Hailing Services between

Dec. 2017 and Dec. 2021

In 2021, increased investment in the online car-hailing industry intensified competition among companies. New technological developments such as smart Internet of Vehicles provide new opportunities for the industry. Also, the compliance of online car-hailing services were steadily advancing.

In terms of market operation, industry investment and financing were heating up, leading to a fierce competition. First, higher market confidence in travel sparked a new financing boom. In September, CaoCao and T3 Go announced the completion of their huge financing of 3.8 billion yuan and 7.7 billion yuan, respectively. In November, Hello Inc. announced the completion of a new round of financing for USD280 million. **Second, companies were focused on the development of online car-hailing services, increasing market competition.** Meituan's car-hailing App was launched again in all major App stores, covering 100-plus cities. In addition to

the aggregation platform, Gaode established a car-hailing company and registered with the brand Huojian Travel.

Regarding technological development, new technologies bring new opportunities for online car-hailing services. First, the further development of the smart technology Internet of vehicles. Shougang Park for Beijing Winter Olympics held a demonstration of 5G plus BeiDou services for smart Internet of vehicles. Based on 5G, BeiDou and other smart Internet of vehicles technologies, Shougang Park offered L4-level services, including driverless[60] shuttle, formation driving, unmanned retail and autonomous parking[61]. **Second, autonomous driving technology was steadily advancing.** Beijing Yizhuang Economic Development Zone was open for pilot commercialization of self-driving travel services. The self-driving technologies of some enterprises have been verified through road testing and demonstration applications in the zone, laying a solid foundation for the development of the self-driving industry[62].

The industry ecosystem has been improved. First, the compliance of online car-hailing industry was steadily advancing. In early July 2021, the Cybersecurity Review Office launched a review of "Didi Chuxing", taking down 25 apps, including Didi's enterprise edition. On July 16, the Cyberspace Administration of China and other six departments conducted a cybersecurity investigation at Didi Chuxing. In July and August, online car-hailing platforms intensified competition to seize the industry's window. In September, the General Office of the Ministry of Transport issued the *Notice on Maintaining Fair Competition Market Order and Accelerating the Compliance of Online Car-Hailing Services*, requiring local transportation authorities to strengthen the full chain and all-field supervision of online car-hailing platforms in advance, during and after an event. **Second, the support system for the online car-hailing industry was refined.** The Ministry of Human Resources and Social Security and other seven departments issued the *Guidelines on Safeguarding the Labor Rights and Interests of Workers in New Forms of Employment*, which identifies online car-hailing drivers as workers in the new employment situation under the digital economy. The Ministry of Transport and other seven departments issued

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[60] According to the Society of Automotive Engineers (SAE), the autonomous driving technology is divided into five categories including L0 (no automation), L1 (driver assistance), L2 (partial automation), L3 (conditional automation), L4 (high automation) and L5 (complete automation).
[61] Source: Beijing Daily, https://news.bjd.com.cn/2021/10/22/201192t100.html, October 22, 2021.
[62] Source: Beijing Evening, https://news.bjd.com.cn/2021/11/25/10009268.shtml, November 25, 2021.

the *Guidelines on Strengthening the Protection of the Rights and Interests of Employees in New Business Forms of Transport*, requiring platform companies to improve the benefit distribution mechanism for employees and set a reasonable cap on the percentage of dividend.

(II) Online Medical Services

Up to December 2021, the user size of online medical services in China had amounted to 298 million, up 83.08 million from December 2020, accounting for 28.9% of all Internet users.

User Size and Utilization Ratio of Online Medical services from Jun. 2020 to Dec. 2021

Unit: 10,000

- Jun. 2020: User size 27602, Utilization ratio 29.4%
- Dec. 2020: User size 21480, Utilization ratio 21.7%
- Jun. 2021: User size 23933, Utilization ratio 23.7%
- Dec. 2021: User size 29788, Utilization ratio 28.9%

■ User size ✕ Utilization ratio

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
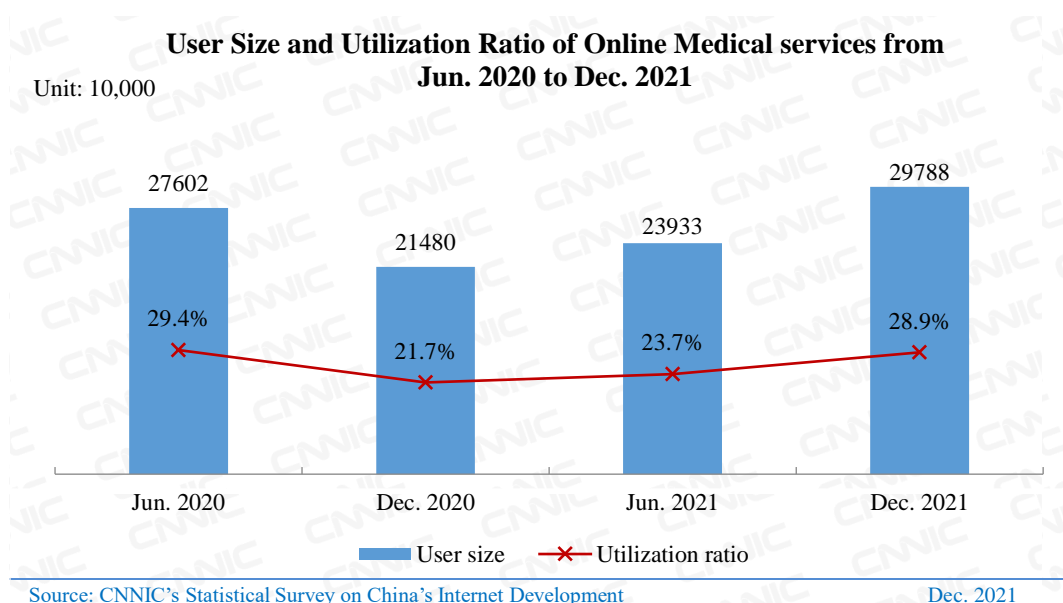
Figure 45 User Size and Utilization Ratio of Online Medical Services from

Jun. 2020 to Dec. 2021

In 2021, the online medical industry continued to grow at a fast pace. Supported by AI and other cutting-edge technologies, major breakthroughs have been made in virus tracking and drug development. Meanwhile, national authorities issued relevant policies to further regulate the online medical industry.

The online medical industry continued to grow at a fast pace, with more Internet companies joining the competition. First, Internet hospitals were growing by leaps and bounds. As of June 2021, Internet hospitals in China had surpassed 1,600, including 500 new ones in the first half of 2021[63]. **Second, Internet companies continued to increase revenue in the**

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[63] Source: Xinhua News Agency,http://www.xinhuanet.com/politics/2021-07/31/c_1127717626.htm, July 31, 2021.

medical sector. In the first half of 2021, JD Health's revenue totaled 13.64 billion yuan, up 55.4% year-on-year[64]. Ping An Health's revenue in the first half of 2021 was 3.82 billion yuan, up 39% year-over-year[65]. **Third, more Internet companies are joining the online medical competition.** ByteDance has invested in a number of medical platforms and upgraded its brand Xiaohe Health to expand its business. Meituan has rolled out the Baishou Health website to build a comprehensive medical and healthcare platform. Kuaishou has established a new medical brand and explored the offline medical market.

Cutting-edge technologies are pushing for the healthcare industry and driving the digital healthcare to take solid steps. With the further development and application of cutting-edge technologies represented by AI in the medical industry, the medical digitization continued to accelerate. **First, technology helps virus tracking.** In October 2021, the National Microbiology Data Center and other domestic institutions released the AI-based Assessment and Early Warning System for Novel Coronavirus Variation. It is the first system across the world to provide multidimensional risk assessment and early warning for known and virtual variations in the genome of SARS-CoV-2 (the name of the virus)[66]. **Second, technology is helpful to drug development.** In the field of new drug development, drug companies can utilize quantum physics, AI and cloud computing technologies to accurately predict a variety of important characteristics of drugs, accelerating the efficiency and success of preclinical drug research. **Third, technology is conducive to clinical care.** In the field of intelligent image recognition, AI fundus image analysis has been widely used to help alleviate the imbalance between supply and demand for treatment and improve the accuracy and efficiency of eye disease diagnosis, playing a significant role in offering the auxiliary judgment of other conditions other than eye diseases.

National authorities have introduced policies and measures to further regulate the development of the online medical industry. In October 2021, the National Health Commission issued the *Rules on the Regulation of Internet Medical Treatment (Draft for Comments)*, stating that provincial health authorities should incorporate Internet medical treatment into their local system for controlling medical quality, carry out integrated online and offline supervision, ensure medical

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[64] Source: JD Health's 2021 interim results announcement.
[65] Source: Ping An Health's 2021 semi-annual report.
[66] Source: China's Ministry of Science and Technology,http://www.most.gov.cn/gnwkjdt/202110/t20211021_177426.html, October 21, 2021.

quality and safety, and establish systems for network security, personal information protection, and data use management. Relevant policies will play a positive role in regulating the development of the online medical industry, protecting patients' personal information and data security, and promoting the long-term development of the industry.

CHAPTER Four
Internet Security

I   Cyber Incidents

(I)   Proportion of Types of Cybersecurity Problems

As of December 2021, 62.0% of Internet users said they had not experienced cybersecurity issues in the past six months, largely in line with December 2020. In addition, the proportion of Internet users who experienced personal information leakage was the highest at 22.1%; that of Internet users who encountered Internet fraud was 16.6%; that of Internet users who experienced viruses or Trojan horses in their devices was 9.1%; and that of Internet users whose accounts or passwords were stolen was 6.6%.

Proportion of Types of Cybersecurity Problems

Category	Dec. 2020	Dec. 2021
Personal information leakage	21.9%	22.1%
Cyber fraud	16.5%	16.6%
Devices hacked with trojan horse or other viruses	10.8%	9.1%
Account or password stolen	8.2%	6.6%
None of the above	61.7%	62.0%

Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021
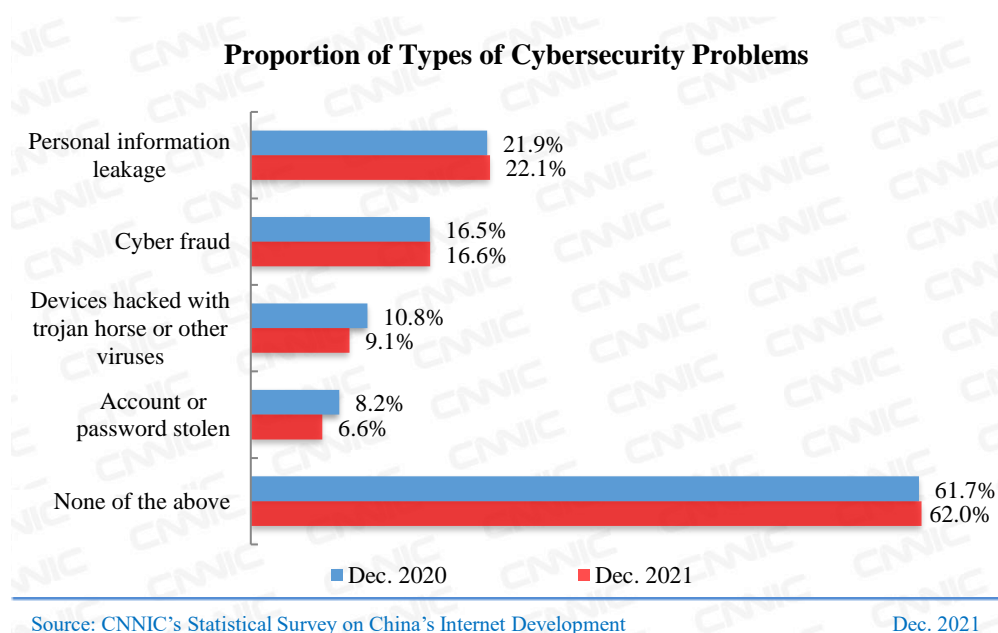
Figure 46 Proportion of Types of Cybersecurity Problems

(II) Proportion of Types of Cyber Fraud

According to a survey of Internet users who experienced online fraud, the proportion of Internet users encountering other online frauds but excluding online shopping fraud had decreased. Specifically, bonus-winning fraud was still the most common type of online fraud, accounting for 40.7%, down 7.2 percentage points from December 2020; online shopping fraud took up 35.3%, up 2.3 percentage points from December 2020; the proportion of Internet users who had suffered online part-time fraud was 28.6%, down 4.7 percentage points over December 2020; fake friend fraud made up 25.0%, down 6.4 percentage points from December 2020; that of Internet users who had encountered phishing website fraud was 23.8%, down 0.9 percentage points over December 2020; and the proportion of those who had encountered fake employment information fraud was 19.8%, down 1.1 percentage points from December 2020.

Proportion of Types of Cyber Fraud

Type	Dec. 2020	Dec. 2021
Bonus-winning fraud	47.9%	40.7%
Online shopping fraud	33.0%	35.3%
Online part-time fraud	33.3%	28.6%
Fake friends fraud	31.4%	25.0%
Phishing website fraud	24.7%	23.8%
Fake employment information fraud	20.9%	19.8%

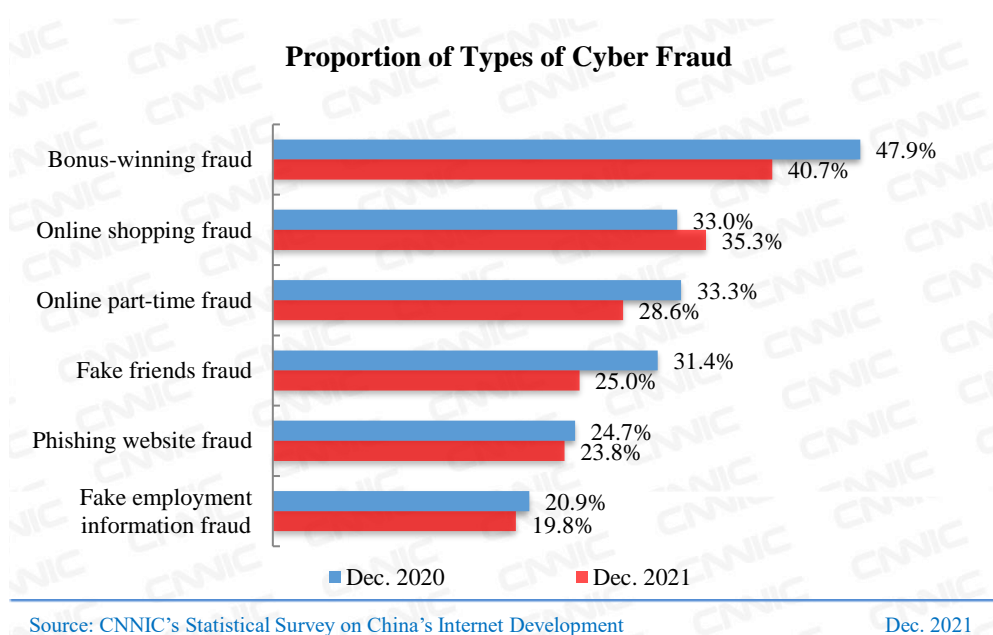Source: CNNIC's Statistical Survey on China's Internet Development   Dec. 2021

Figure 47 Proportion of Types of Cyber Fraud

II Cybersecurity Attacks and Information System Vulnerabilities

(I) Number of Distributed Denial-of-Service Attacks

In 2021, China Telecom, China Mobile and China Unicom monitored 753,018 distributed denial-of-service (DDoS for short) attacks, down 43.9% from 2020.

Number of Distributed Denial-of-Service Attacks

Source: China Telecom, China Mobile and China Unicom   Dec. 2021
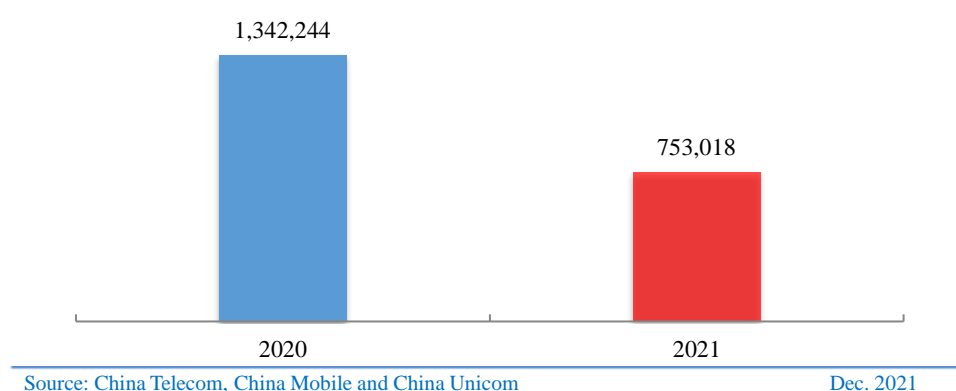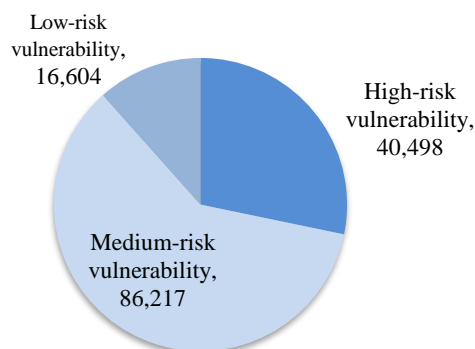
Figure 48 Number of Distributed Denial-of-Service Attacks

(II) Number of Information System Vulnerabilities

In 2021, the information sharing platform for cybersecurity threat and vulnerability under the Ministry of Industry and Information Technology collected 143,319 information system vulnerabilities. Of these, 40,498 were high-risk vulnerabilities, while 86,217 medium-risk ones.

Number of Information System Vulnerabilities

Source: the information sharing platform for cybersecurity threat and vulnerability under the Ministry of Industry and Information Technology   Dec. 2021
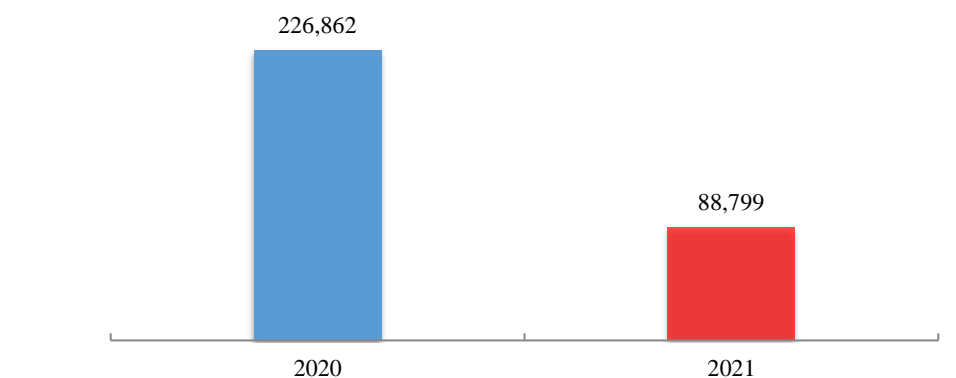
Figure 49 Number of Information System Vulnerabilities

III   Reporting and Handling of Cybersecurity Incidents

(I)   Number of Cybersecurity Incidents Received

In 2021, the information sharing platform for cybersecurity threat and vulnerability under the Ministry of Industry and Information Technology received 88,799 incidents[67], down 60.9% over the same period of 2020.

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[67]   A cybersecurity incident refers to network security incidents such as zombie Trojan control, webpage tampering, webpage counterfeiting, and data leakage found based on the Ministry of Industry and Information Technology's information sharing platform for cybersecurity threat and vulnerability and the technical capability of cybersecurity monitoring by basic telecommunication enterprises.

Number of Cybersecurity Incidents Received

Source: the information sharing platform for cybersecurity threat and vulnerability under the Ministry of Industry and Information Technology   Dec. 2021
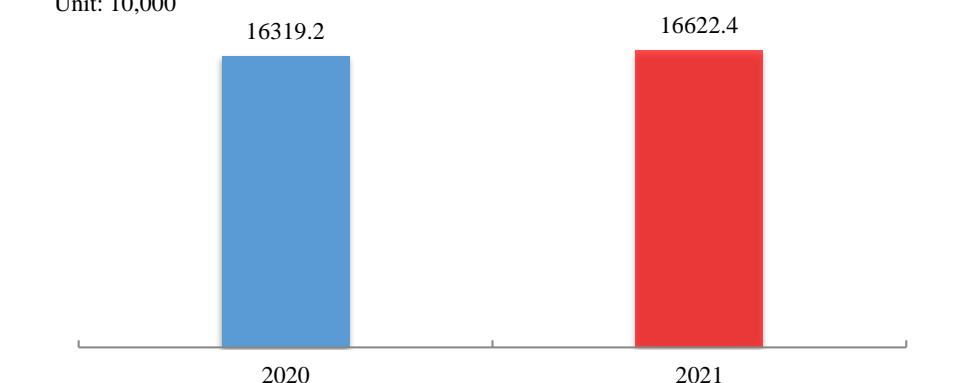
Figure 50 Number of Cybersecurity Incidents Received

(II) Number of Reports Received by China's Network Reporting Departments at All Levels

Up to December 2021, network reporting departments at all levels had received 166.224 million reports nationwide[68], up 1.9% over 2020.

Number of Reports Received by Network Reporting Departments at All Levels Nationwide

Source: Illegal and Bad Information Reporting Center under the Office of the Central Cyberspace Affairs Commission (Cyberspace Administration of China)   Dec. 2021

Figure 51 Number of Reports Received by Network Reporting Departments

at All Levels Nationwide

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[68] The data is calculated by adding up the monthly data of the Illegal and Bad Information Reporting Center under the Cyberspace Administration of China for the whole year of 2021.

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

The samples cover 31 provinces, autonomous regions and municipalities in Chinese mainland.

◇ Division of survey population
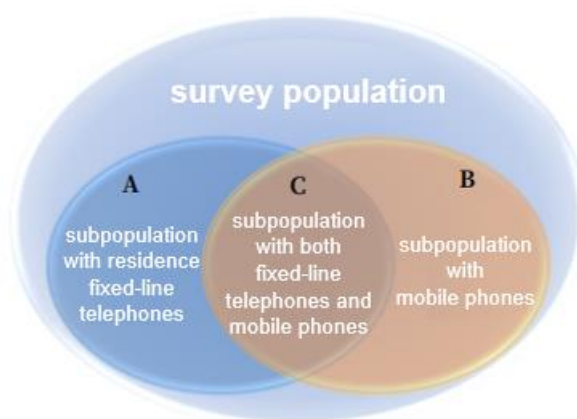
The survey population can be divided into three categories:

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, 0.37 percentage point 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) 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.

2.1 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.

2.2 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.

2.3 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 Dec. 31, 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	343,880,704	20A+131B+57C
Taiwan	35,690,496	2A+41B+202C
Hong Kong SAR	12,578,816	169B+102C
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	69,866,752note 1	4A+42B+21C
IP Address Allocation Alliance of CNNIC	63,259,136note 2	3A+197B+32C
China Mobile	35,294,208	2A+26B+140C
China Education and Research Network	16,649,984	254B+16C
China Mobile Tietong	15,796,224note 3	241B+8C
Others	17,251,072	1A+7B+59C
Total	343,880,704	20A+131B+57C

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 85.40 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 Dec. 31, 2021.

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

Region	Number of Addresses
Chinese mainland	59,995
Taiwan	2,566
Hong Kong SAR	484
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	22,380 注 2
China Telecom	16,387
China Education and Research Network	10,258
China Unicom	4,097
China Mobile	4,097
China Mobile Tietong	2,049 注 3
China Science and Technology Network	17 注 4
Others	710
Total	59,995

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 24446/32. 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 Mobile Tietong and China Science and Technology Network (CSTNET).

Note 3: The IPv6 addresses of China Mobile Tietong 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 Dec. 31, 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	25.49%
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	0.97%
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 Dec 31, 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
Beijing	5660070	15.8%	3362973	16.5%	28231	13.6%
Guangzhou	4967104	13.8%	2460972	12.1%	18402	8.9%
Fujian	4330709	12.1%	3547203	17.4%	13394	6.4%
Guizhou	2302622	6.4%	2169203	10.6%	3372	1.6%
Shangdong	1934395	5.4%	1105883	5.4%	28023	13.5%
Jiangsu	1724628	4.8%	766741	3.8%	9657	4.6%
Shanghai	1484185	4.1%	660657	3.2%	8096	3.9%
Anhui	1334340	3.7%	429165	2.1%	4007	1.9%
Zhejiang	1308115	3.6%	418610	2.1%	8730	4.2%
Henan	1300817	3.6%	666788	3.3%	4496	2.2%
Sichuan	1262114	3.5%	540981	2.7%	12494	6.0%
Hunan	994120	2.8%	498275	2.4%	2985	1.4%
Hubei	859294	2.4%	480219	2.4%	3541	1.7%
Hebei	813126	2.3%	342381	1.7%	7096	3.4%
Guangxi	663104	1.8%	387688	1.9%	1971	0.9%
Shaanxi	592558	1.6%	280259	1.4%	6812	3.3%
Jiangsu	572587	1.6%	330172	1.6%	2572	1.2%
Chongqing	545001	1.5%	258387	1.3%	5527	2.7%
Yunnan	425727	1.2%	216882	1.1%	5293	2.5%
Liaoning	425146	1.2%	195847	1.0%	6069	2.9%
Shanxi	349239	1.0%	185683	0.9%	2178	1.0%
Tianjin	302823	0.8%	92542	0.5%	1513	0.7%
Heilongjiang	251146	0.7%	125818	0.6%	2834	1.4%
Jilin	216116	0.6%	106133	0.5%	1565	0.8%
Hainan	174662	0.5%	81158	0.4%	789	0.4%
Gansu	146412	0.4%	78461	0.4%	1145	0.6%
Inner Mongolia	124015	0.3%	53623	0.3%	1164	0.6%
Xinjiang	116876	0.3%	67380	0.3%	801	0.4%
Ningxia	46938	0.1%	24012	0.1%	502	0.2%
Qinghai	23155	0.1%	14367	0.1%	256	0.1%
Tibet	13411	0.0%	6994	0.0%	481	0.2%
Others	666508	1.9%	454682	2.2%	13775	6.6%
Total	35931063	100.0%	20410139	100.0%	207771	100.0%

Data sources: APNIC and CNNIC

Note: The deadline for the above statistical data is Dec 31, 2021.

Table 7 Web pages classified by suffix form

Web Suffix Form	Proportion
html	46.79%
/	19.20%
php	6.42%
htm	4.06%
shtml	3.41%
aspx	1.70%
asp	1.06%
jsp	0.32%
Other suffix forms	17.04%
Total	100.00%

Data sources: Baidu Online Network Technology (Beijing) Co., Ltd

Table 8 The Number of Webpages by Province

	Total Number of Webpages after Duplicated Ones Are Removed	Static Webpages	Dynamic Webpages	Static-to-dynamic Ratio
Beijing	123216991794	77640468052	45576523742	1.70
Guangdong	43690139663	29145005268	14545134395	2.00
Zhejiang	39910272717	27993884735	11916387982	2.35
Shanghai	23803561436	17051923554	6751637882	2.53
Henan	20093602269	15743122305	4350479964	3.62
Jiangsu	14914435769	8701894501	6212541268	1.40
Hebei	12773455395	9499087725	3274367670	2.90
Fujian	9459758863	7027806397	2431952466	2.89
Shandong	6451523794	4266410755	2185113039	1.95
Sichuan	5738115919	3878615872	1859500047	2.09
Tianjin	5557705451	3653649577	1904055874	1.92
Shanxi	3583710236	2642247626	941462610	2.81
Hubei	3050969496	1913680365	1137289131	1.68
Liaoning	3020759656	2151590747	869168909	2.48
Anhui	2892425208	2210528855	681896353	3.24
Jiangxi	2675655222	2183921723	491733499	4.44
Guangxi	2453212859	1815193678	638019181	2.85
Jilin	1950893077	1357860804	593032273	2.29
Hunan	1882042140	1270572575	611469565	2.08
Yunnan	1776645068	1210390961	566254107	2.14
Heilongjiang	1681489198	1331372978	350116220	3.80
Shaanxi	1674138844	1062151875	611986969	1.74
Hainan	1514075932	1153070023	361005909	3.19
Chongqing	549321649	342728196	206593453	1.66
Inner Mongolia	201503032	116141423	85361609	1.36
Gansu	176587366	82727950	93859416	0.88
Guizhou	126637631	84735809	41901822	2.02
Xinjiang	86753163	46076152	40677011	1.13
Qinghai	34637317	24709711	9927606	2.49
Ningxia	18898747	14315278	4583469	3.12
Tibet	3793691	2708243	1085448	2.50
The Whole Country	334963712602	225618593713	109345118889	2.06

Data sources: Baidu Online Network Technology (Beijing) Co., Ltd

Table 9 The Number of Webpage Bytes by Province

	Total Webpage Size	Average Webpage Size (KB)
Beijing	10938964805988	88.78
Guangdong	3040199712710	69.59
Zhejiang	2899423987651	72.65
Shanghai	2276482322200	95.64
Henan	1245883566521	62.00
Jiangsu	974126257199	65.31
Hebei	1117780323290	87.51
Fujian	578787694864	61.18
Shandong	387919587513	60.13
Sichuan	297994998758	51.93
Tianjin	357456226569	64.32
Shanxi	456363304422	127.34
Hubei	162006451017	53.10
Liaoning	133017076209	44.03
Anhui	130316253228	45.05
Jiangxi	100191501895	37.45
Guangxi	131627052885	53.65
Jilin	77909683749	39.94
Hunan	111179249568	59.07
Yunnan	89718577918	50.50
Heilongjiang	115244122253	68.54
Shaanxi	83651777816	49.97
Hainan	55272541860	36.51
Chongqing	36624994657	66.67
Inner Mongolia	11380087804	56.48
Gansu	13329399461	75.48
Guizhou	5848839281	46.19
Xinjiang	3497166908	40.31
Qinghai	2874751638	83.00
Ningxia	626270537	33.14
Tibet	139946606	36.89
The Whole Country	25835838532975	77.13

Data sources: Baidu Online Network Technology (Beijing) Co., Ltd

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

E-governance Research Center of Party School of the Central Committee of C.P.C (National Academy of Governance)

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 Telecom
China Unicom	Beijing Ucap Information Techonology Co., Ltd.
Baidu Online Network Technology (Beijing) Co., Ltd.	Tencent Cloud Computing (Beijing) Co., Ltd.
Beijing Micro Dream Network Technology Co., Ltd. (Micro-blog)	Beijing ByteDance Technology Co., Ltd.
Alibaba Cloud Computing (Beijing) Co., Ltd.	Alibaba Cloud Computing Co., Ltd.
Beijing Baidu Netcom Technology Co., Ltd.	Beijing Oriental Wangjing Information Technology Co., Ltd.
Beijing Guoxu Network Technology Co., Ltd	Beijing HuaRui Wireless Technology Co., Ltd.
Beijing Jinluoshen E-commerce Co., Ltd	Beijing Shouxinwangchuang Network Information service Co., Ltd.
Beijing Wanweitonggang Technology Co., Ltd	Beijing DNS.com Co., Ltd.
Beijing Xinnet.com Co., Ltd.	Beijing ZW.cn Co., Ltd.
Beijing BrandCloud.cn Co., Ltd.	Beijing Zhuoyueshengming Technology Co., Ltd.
Beijing Zihai Technology Co., Ltd.	Chengdu Feishu Technology Co., Ltd.
Chengdu 51web.com Co., Ltd.	Chengdu West Dimension Digital Technology Co., Ltd
Fanxi Corporation Service (Shanghai) Co., Ltd.	Foshan Yidong Network Co., Ltd.

Fujian Litian 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.

Guangzhou Mingyang Information Technology Co., Ltd.

Guangzhou Yunxun Information Technology Co., Ltd.

Guest Internet Industry 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 Co., Ltd.

Global Business Domain Technology Co., Ltd.

Jiangsu Bangning Science & technology Co., Ltd.

Maoming City Qunying Network Co., Ltd.

Xiamen Nawang Technology Co., Ltd

Xiamen 35.Com Technology Co., Ltd.

Xiamen ChinaSource Internet Service Co., Ltd.

Xiamen Shushengqi Youtong Technology Co., Ltd

eName Technology Co., Ltd.

Shangzhong Online Technology Co., Ltd.

Shanghai Oray Co., Ltd.

hanghai Meicheng Technology Information Development Co., Ltd.

Shanghai Yovole Network Co., Ltd.

Shenzhen idcicp.com Co., Ltd.

Shenzhen Works Online Co., Ltd.

Shenzhen Yingmaisi Information Technology Co., Ltd.

Sichuan Yuqu Network Technology Co., Ltd.

Tianjin Zhuiri Technology Development Co., Ltd.

Vantage of Convergence (Chengdu) Co., Ltd.

WangJu Brands Management Co., Ltd.

Xi'an Qianxinet Technology Co., Ltd.

Yantai DNSpod Network Technology Co., Ltd.

Ejee Group Beijing Co., Ltd.

Zhejiang 22net Inc.

Zhengzhou Shanglu Technology Co., Ltd.

Zhengzhou Shijichuanglian Electronic Technology Development Co., Ltd.

Grow Force Co., Ltd.

ChinaCC.Net (Suzhou) Co., Ltd.

Knet Registrar (Tianjin) Co., Ltd

Chongqing Zhijia Information Technology Co. Ltd.

Zunyi zhongyuzhike Network Technology Co., Ltd.