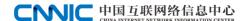
# The 47th Statistical Report on China's Internet Development

(February 2021)





## **Preface**

In 1997, China's competent departments authorized China Internet Network Information Center (CNNIC) to organize relevant Internet entities to jointly carry out the Statistical Survey on Internet Development in China and regularly release the *Statistical Report on Internet Development in China* (hereinafter referred to as the "Report") at the beginning and middle of each year. Ever since then, CNNIC has published 46 reports. The Report has reflected the process of building up China's strength in cyberspace through core data. It has provided an important reference for Chinese government departments, domestic and foreign industry institutions, experts, and scholars to understand the development of China's Internet and formulate relevant policies.

The year of 2020 is an extraordinary year. China's Internet industry has played a positive role in resisting the COVID-19 epidemic and the normalized prevention and control of the epidemic, and made significant contributions to developing China into the only major economy in the world that has achieved economic growth, GDP toping 100 trillion yuan for the first time, and the successful completion of the poverty alleviation task. The year of 2020 also marks the closing year of the "13th Five-year Plan". Over the past five years, China has achieved the full coverage of Internet infrastructure; the size of Internet users has grown steadily; the digital economy has developed prosperously; the high-tech exploration has accelerated; network governance has been gradually improved; and the national strategy for cyber development has made a historic achievement.

As a faithful recorder of implementing the national strategy for 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 of basic Internet development, size and structure of Internet users, development of Internet applications, development of e-government, industrial and technological development, and Internet security. From a multi-pronged perspective, CNNIC has worked to comprehensively demonstrate the development of China's Internet in 2020 through all-round data.

Here, we hereby express our heartfelt thanks to the Office of the Central Cyberspace Affairs Commission, the Ministry of Industry and Information Technology of PRC, 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 the E-Government Research Center of the Party School of the CPC Central Committee (National Academy of Governance) and other institutions and Internet users that have supported this statistical survey on the Internet development.

China Internet Network Information Center (CNNIC)

February 2021





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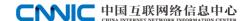


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## **Summary**

- ♦ As of December 2020, China had 989 million netizens, up by 85.4 million over March 2020, and its Internet penetration had reached 70.4%, up 5.9 percentage points over March 2020. <sup>1</sup>
- ♦ Up to December 2020, the number of mobile Internet users in China had reached 986 million, up 88.85 million over March 2020. The proportion of China's netizens accessing the Internet via their mobile phones had amounted to 99.7%, up 0.4 percentage point over March 2020.
- ♦ As of December 2020, the size of rural Internet users was 309 million or 31.3% of China's total netizen population, up 54.71 million over March 2020, while that of urban netizens had reached 680 million or 68.7% of China's total, up 30.69 million from March 2020.
- ♦ As of December 2020, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptops computers, TVs and tablet computers were 99.7%, 32.8%, 28.2%, 24.0% and 22.9%, respectively.
- ♦ Up to December 2020, the number of IPv6 addresses in China had reached 57,634 blocks/32, up 13.3% over the end of 2019.
- ♦ As of December 2020, China had a total of 41.98 million domain names, of which 18.97 million or 45.2% were ended with ".CN".
- ♦ Up to December 2020, the user size of instant messaging was 981 million or 99.2% of China's total netizen population, up 84.98 million over March 2020; the number of mobile instant messaging users had reached 978 million, up 88.31 million from March 2020, making up 99.3% of mobile Internet users.
- ♦ As of December 2020, the user size of online news was 743 million or 75.1% of China's total netizen population, up 12.03 million over March 2020; the number of mobile news users had reached 741 million, up 14.66 million from March 2020, making up 75.2% of mobile Internet users.
- ♦ Up to December 2020, the user size of online shopping was 782 million or 79.1% of China's total netizen population, up 72.15 million over March 2020; the number of mobile shopping users had amounted to 781 million, up 73.09 million from March 2020, taking up 79.2% of mobile Internet users.
- ♦ As of December 2020, the user size of online payment was 854 million or 86.4% of China's total netizen population, up 86.36 million over March 2020; the number of mobile payment users stood at 853 million, up 87.44 million from March 2020, representing 86.5% of mobile Internet users.
- ♦ Up to December 2020, the user size of online video (including video clips) in China had reached 927 million, up 76.33 million from March 2020, making up 93.7% of all Internet users. The number of video clip users amounted to 873 million, accounting for 88.3% of overall Internet users.
- ♦ Up to December 2020, the number of users of China's e-government services was 843 million, making up 85.3% of all Internet users.

<sup>&</sup>lt;sup>1</sup> Due to the COVID-19 epidemic, the deadline for telephone survey of the 45th Report was March 15, 2020, so the data collection ended in March 2020.





# **Chapter One Basic Internet Development**

## I. Basic Internet Resources

#### (I) An Overview of Basic Internet Resources

Up to December 2020, China had 389.23 million IPv4 addresses and 57,634 blocks/32 of IPv6 addresses. China had a total of 41.98 million domain names, of which 18.97 million or 45.2% were ended with ".CN". International Internet bandwidth reached 11,511,397 Mbps, up 30.4% over the end of 2019.

Table 1 Comparison - Basic Internet Resources from Dec. 2019 to Dec. 2020

	December 2019	December 2020
IPv4 <sup>2</sup>	387,508,224	389,231,616
IPv6 (block/32) <sup>3</sup>	50,877	57,634
Domain names <sup>4</sup>	50,942,295	41,977,611
Domain names ending with ".CN"	22,426,900	18,970,054
International Internet bandwidth (Mbps)	8,827,751	11,511,397

#### (II) IP Address

Up to December 2020, the number of IPv6 addresses in China had reached 57,634 blocks/32, up 13.3% over the end of 2019.

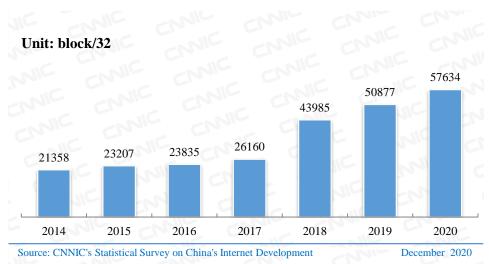


Figure 1 Number of IPv6 Addresses <sup>5</sup>

Up to December 2020, the number of IPv4 addresses was registered at 389.23 million, up 0.4% over the end of 2019.

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<sup>&</sup>lt;sup>2</sup> Data for December 2019 and December 2020 cover Hong Kong, Macau and Taiwan.

 $<sup>^{\</sup>rm 3}\,$  Data for December 2019 and December 2020 cover Hong Kong, Macau and Taiwan.

<sup>&</sup>lt;sup>4</sup> Data for December 2019 and December 2020 include the number of new generic Top-Level Domains (New gTLD).

<sup>&</sup>lt;sup>5</sup> The data in Figure 1 cover Hong Kong, Macau and Taiwan.



Figure 2 Number of IPv4 Addresses <sup>6</sup>

## (III) Domain Name

As of December 2020, China had a total of 41.98 million domain names, of which 18.97 million or 45.2% were ended with ".CN"; 12.63 million or 30.1% were ended with ".COM"; 1.7 million or 4.1% were ended with ".中国"; 7.45 million or 17.7% were new generic Top-Level Domains (New gTLD).



 $<sup>^6\,</sup>$  The data in Figure 2 cover Hong Kong, Macau and Taiwan. The 47th Statistical Report on China's Internet Development



Table 2 Number of Domain Names by Category <sup>7</sup>

	Number	Proportion in total domain names
.CN	18,970,054	45.2%
.COM	12,630,968	30.1%
.中国	1,703,082	4.1%
.NET	938,792	2.2%
.ORG	145,656	0.3%
.INFO	31,445	0.1%
.BIZ	21,583	0.1%
NEW gTLD	7,446,046	17.7%
Others	89,985	0.2%
Total	41,977,611	100.0%

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

	Number	Proportion in total ".CN" domain names
.CN	16,274,907	85.8%
.COM.CN	2,136,939	11.3%
.NET.CN	285,579	1.5%
.ORG.CN	150,474	0.8%
.ADM.CN	85,281	0.4%
.GOV.CN	17,930	0.1%
.AC.CN	12,341	0.1%
.EDU.CN	6,422	0.0%
Others	181	0.0%
Total	18,970,054	100.0%

## (IV) International Internet Bandwidth

Up to December 2020, international Internet bandwidth reached 11,511,397 Mbps, up 30.4% over the end of 2019.

<sup>&</sup>lt;sup>7</sup> Source: Generic Top-Level Domains (gTLD) and new generic Top-Level Domains (New gTLD) are provided by China's domain name registration units.



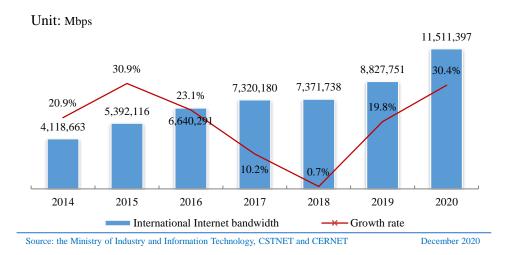


Figure 3 International Internet Bandwidth in China and Its Growth Rate 8

Table 4 International Internet Bandwidths of Backbone Networks

	International Internet bandwidth (Mbps)
China Telecom China Unicom China Mobile	11,243,109
China Science and Technology Network	114,688
China Education and Research Network	153,600
Total	11,511,397

## II. Application of Internet Resources

## (I) Websites

As of December 2020, there were 4.43 million websites in China. <sup>9</sup>



Figure 4 Number of Websites <sup>10</sup>



<sup>8</sup> Data for 2018 are adjusted according to the data of the Ministry of Industry and Information Technology.

<sup>&</sup>lt;sup>9</sup> The websites whose domain name registrants are within the territory of the P.R.C.

 $<sup>^{10}\,</sup>$  The number of websites does not include that of those ending with ".EDU.CN". The 47th Statistical Report on China's Internet Development



Up to December 2020, China had 2.95 million websites with domain names ending with ".CN".

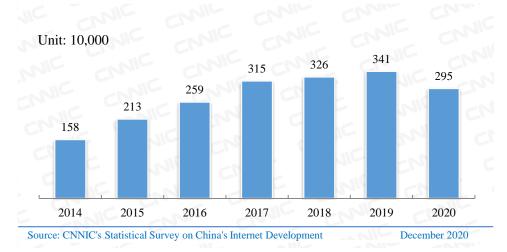


Figure 5 Number of Websites with Domain Names Ending with ".CN" 11

### (II) Web Pages

As of December 2020, there were 315.5 billion web pages in China, up 5.9% from the end of 2019.

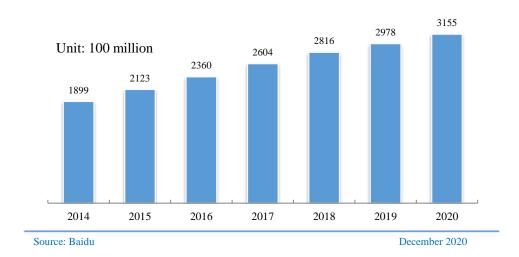


Figure 6 Number of Web Pages

There were 215.5 billion static web pages<sup>12</sup> and 100 billion dynamic web pages<sup>13</sup>, accounting for 68.3% and 31.7% of the total, respectively.

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<sup>&</sup>lt;sup>11</sup> Number of websites ending with ".CN" does not include that of those ending with ".EDU.CN".

<sup>&</sup>lt;sup>12</sup> A static web page means a web page in 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.

<sup>&</sup>lt;sup>13</sup> 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.



#### Table 5 Number of Web Pages

	Unit	December 2019	December 2020	Growth rate
Total web pages	Page	297,829,914,511	315,501,097,812	5.9%
	Page	206,255,312,345	215,529,450,543	4.5%
Static web pages	Proportion in total web pages	69.3%	68.3%	
-	Page	91,574,602,166	99,971,647,269	9.2%
Dynamic web pages	Proportion in total web pages	30.7%	31.7%	
Web page size (total bytes)	KB	20,952,363,890,708	23,618,193,016,465	12.7%
Average number of bytes per page	KB	70	75	7.1%

#### (III) Mobile Internet Access Traffic

From January to December 2020, the cumulative mobile Internet traffic totaled 165.6 billion GB.

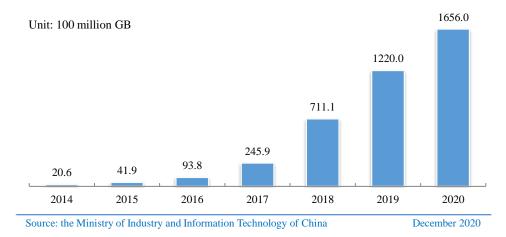


Figure 7 Mobile Internet Access Traffic 14

## (IV) Number and Category of Apps

As of December 2020, the number of Apps (Application, or mobile Internet application) monitored in China's domestic market was 3.45 million, down 220,000 from 2019.

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<sup>&</sup>lt;sup>14</sup> Source: Data for 2014-2018 are from the Annual Report on China's Communications Statistics. Data for 2019-2020 are from the website of the Ministry of Industry and Information Technology.



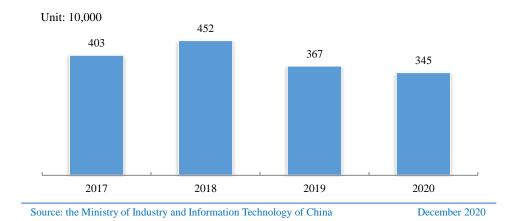


Figure 8 Number of Apps on Shelf

As of December 2020, the proportion of Apps in the top four categories accounted for 59.2% of the total. Specifically, the number of game Apps reached 887,000, accounting for 25.7% of all Apps; that of daily tools, ecommerce and consumer service Apps reached 503,000, 340,000 and 310,000 respectively and ranked second, third and fourth, representing 14.6%, 9.9% and 9.0% of all respectively.

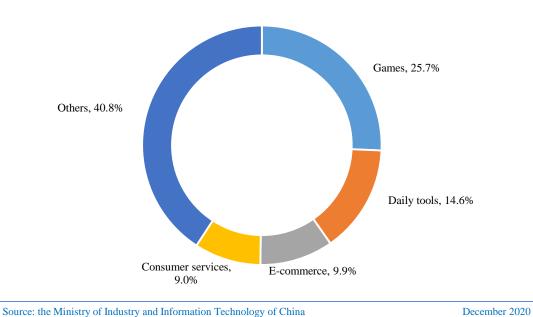


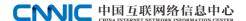
Figure 9 Proportion of Apps by Category

## III. Internet Access Environment

#### (I) Internet Access Devices

As of December 2020, the proportion of Chinese Internet users using mobile phones to access the Internet reached 99.7%, up 0.4 percentage point over March 2020; the proportions of netizens using desktop PCs, laptops, TVs and tablet PCs to do so were 32.8%, 28.2%, 24.0% and 22.9%, respectively, all representing a decrease from that over March 2020.





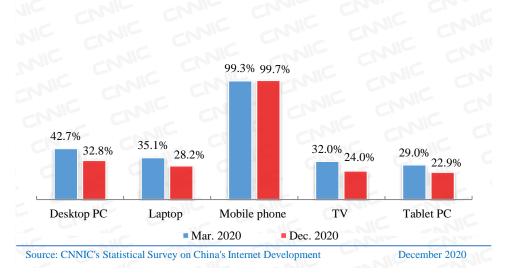


Figure 10 Usage of Internet Access Devices

#### (II) Online Duration

As of December 2020, the per capita weekly online duration of China's Internet users was 26.2 hours, down 4.6 hours over March 2020.

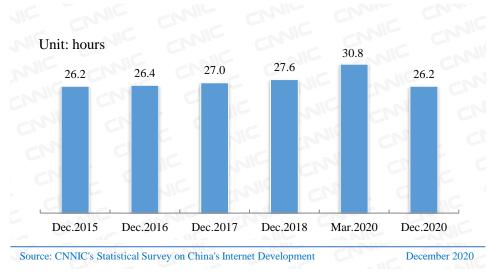


Figure 11 Per Capita Weekly Online Duration of Internet Users

## (III) Proportion of Broadband Subscribers of 100Mbps and Above

As of December 2020, the number of fixed broadband subscribers with the access speed of 100Mbps and above accounted for 89.9% of the total.



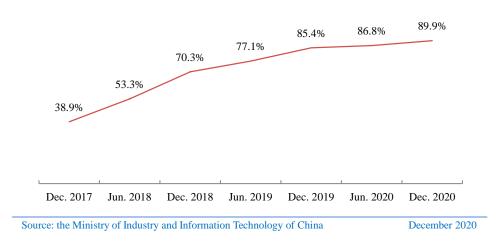


Figure 12 Proportion of Fixed Broadband Subscribers with the Access Speed of 100Mbps and Above

### (IV) Scale and Proportion of Fiber Broadband Users

As of December 2020, the number of FTTH/O<sup>15</sup> users had reached 454 million, accounting for 93.9% of all fixed Internet broadband subscribers, up 1.0 percentage point from the end of 2019.

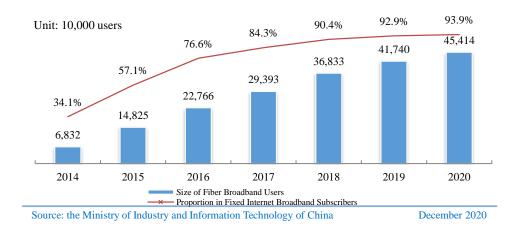


Figure 13 Size and Proportion of Fiber Broadband Subscribers <sup>16</sup>

## (V) Number of Cellular IoT Terminal Users

As of December 2020, the three basic telecom companies developed 1.136 billion cellular IoT terminal<sup>17</sup> users, a net increase of 108 million from the end of 2019. Terminal users specializing in smart manufacturing, smart transportation and smart public utilities accounted for 18.5%, 18.3% and 22.1%, respectively.

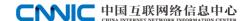
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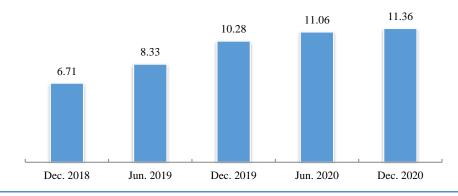
<sup>&</sup>lt;sup>15</sup> FTTH/O refers to FTTH and FTTO. FTTH means Fiber to the home. FTTO stands for Fiber to the office.

<sup>&</sup>lt;sup>16</sup> Source: Data for 2014-2016 are from the "Annual Report on China's Communications Statistics". Data for 2017-2020 are from the website of the Ministry of Industry and Information Technology.

<sup>&</sup>lt;sup>17</sup> 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 IoT includes Narrowband Internet of Things (NB-IOT), Enhanced Machine Type Communication (eMTC), and others.



#### Unit: 100 million users



Source: the Ministry of Industry and Information Technology of China

December 2020

Figure 14 Number of Cellular IoT Terminal Users



# **Chapter Two Size of Internet Users**

## I. Overall Size of Internet Users

As of December 2020, China had 989 million netizens, up by 85.4 million over March 2020, and its Internet penetration had reached 70.4%, up 5.9 percentage points over March 2020.

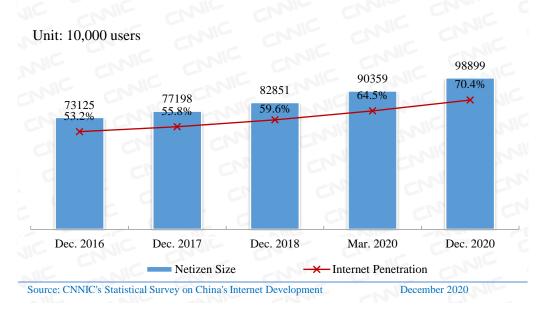


Figure 15 Netizen Size and Internet Penetration

Up to December 2020, the number of mobile Internet users in China had reached 986 million, up 88.85 million over March 2020. The proportion of China's netizens accessing the Internet via their mobile phones had amounted to 99.7%.

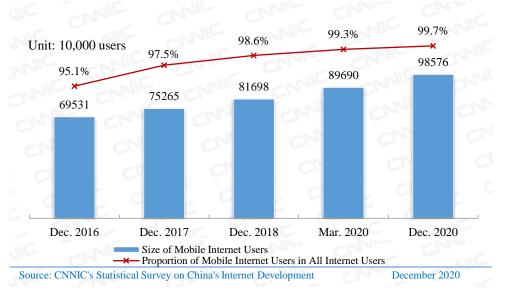


Figure 16 Size of Mobile Internet Users and Its Proportion in Internet Users

Nearly one billion Internet users have formed the world's largest digital society. As of December 2020, the



overall size of Internet users in China had accounted for about one fifth of global Internet users. <sup>18</sup>During the "13th Five-year Plan" period, the size of Chinese Internet users increased from 688 million to 989 million, representing an increase of 43.7% over the last five years. As of December 2020, it had been more and more obvious that minors and the elderly rather than the youth constituted the growth of Internet users. Of Internet users under the net age of one, the proportion of Internet users under the age of 20 was 17.1 percentage points higher than their proportion in the total; the proportion of Internet users at or above the age of 60 was 11.0 percentage points higher than their proportion in the total. With the involvement of minors and the "silver-haired" elderly in the Internet, a large and diverse digital society has been formed.

The COVID-19 epidemic has accelerated the wave of social digital transformation from individuals, enterprises to governments in an all-round way. As to individuals, they were more inclined to use the Internet connection due to epidemic isolation, and users' willingness and habits on Internet access had been formed rapidly. Internet users obtained information by using streaming media platforms and social networking platforms. They solved their needs for daily life via online shopping and online meal ordering, and travelled through e-government applications and health codes, constantly sharing the digital dividends brought by the Internet. As to enterprises, the emergence of the epidemic had pushed the "Accelerator Key" for the digital transformation of enterprises. Online office, online transactions, and other online operation methods had provided support for the normal operation of enterprises during the special period. As to the government, the government's digital emergency capability and e-government service capability were constantly polished amid the epidemic, and China had been ranked from 34th to 9th globally in the online service index, and rated among the world's leading online services. <sup>19</sup>The profound digital transformation is becoming an important gripper for the whole society to deal with future uncertainties.

#### II. Size of Internet Users in Urban and Rural Areas

As of December 2020, the size of rural Internet users was 309 million or 31.3% of China's total netizen population, up 54.71 million over March 2020, while that of urban netizens had reached 680 million or 68.7% of China's total, up 30.69 million from March 2020.

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<sup>&</sup>lt;sup>18</sup> Source: Internet World Stats at https://www.internetworldstats.com/stats.htm, as of December 31, 2020.

<sup>&</sup>lt;sup>19</sup> Source: *United Nations E-Government Survey 2020.* The online service index reflects the level of government's online services provided through government websites and other platforms, including 148 specific evaluation indicators in the aspects of government information disclosure, social networking media applications, and e-government services. The higher the index, the more transactions and services people may handle and enjoy on e-government service platforms.



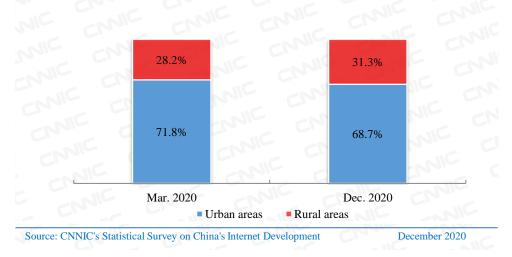


Figure 17 Urban and Rural Structure of Internet Users

Up to December 2020, the Internet penetration in China's urban areas was 79.8%, up 3.3 percentage points over March 2020, while that in rural areas was 55.9%, up 9.7 percentage points over March 2020. The gap of Internet penetration between urban and rural areas was narrowed by 6.4 percentage points over March 2020.

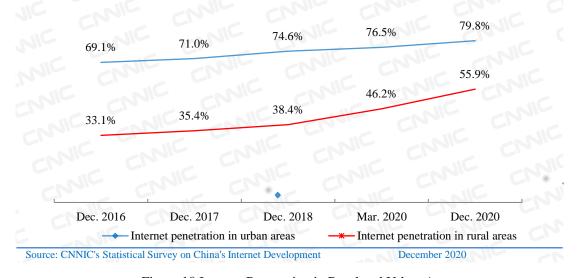


Figure 18 Internet Penetration in Rural and Urban Areas

## III. Achievements in Internet-based Poverty Alleviation

The year of 2020 is the year for realizing the goal of building a moderately prosperous society in all respects and the closing year for winning the battle against poverty. China has made a decisive victory in building a moderately prosperous society in all respects, and the achievement of poverty alleviation has attracted the attention of the world. As an important means in the fight against poverty, the Internet-based poverty alleviation had effectively assisted in the targeted poverty alleviation during the "13th Five-Year Plan" period, so that more disadvantaged people could obtain external information, agricultural products were able to go out of the countryside, and young people in remote areas could get more quality education resources through the Internet, effectively guaranteeing the successful completion of poverty alleviation in 2020.

Firstly, policy guidance has been strengthened to win the closing battle against poverty through the





Internet with high quality. Since the start of the "13th Five-year Plan", the Office of the Central Cyberspace Affairs Commission, in concert with the National Development and Reform Commission and the Office of the Leading Group for Poverty Alleviation and Development of the State Council, has formulated and implemented the Action Plan for Internet-based Poverty Alleviation, and issued key points for implementing the annual Internet-based poverty alleviation for four consecutive years since 2017, reinforcing inter-departmental coordination and linkage between higher and lower levels, promoting the in-depth development of Internet-based poverty alleviation, and ensuring that Internet-based poverty alleviation has achieved substantial progress and significant results.

Secondly, the development foundation has been consolidated and a wide Internet coverage has been achieved in rural areas. As of the end of 2020, the pilot program for universal telecom services had accumulatively supported the fiber optic network access and the construction of tens of thousands of 4G base stations in more than 130,000 administrative villages, with about 1/3 tasks deployed in poverty-stricken villages; the proportion of national poverty-stricken villages with access to fiber optic increased from less than 70% in the initial period of the "13th Five-Year Plan" to 98%, and the proportion of poverty-stricken villages in severely poverty-stricken areas with access to broadband rose from 25% to 98%, exceeding the goal of providing broadband coverage to 90% or more of poverty-stricken villages as required by the Outline of the "13th Five-year Plan" ahead of time. <sup>20</sup>

Thirdly, the consumer market has been activated, and rural e-commerce has been developing rapidly. As of the end of 2020, e-commerce had entered rural areas and achieved full coverage in 832 poverty-stricken counties. The national online retail sales in rural areas had increased from 180 billion yuan in 2014 to 1.79 trillion yuan in 2020. <sup>21</sup>"Live streaming + e-commerce" and other online shopping forms had been booming. Internet-based poverty alleviation had enabled new business forms to extend to rural areas. Mobile phones had become new agricultural tools and e-commerce new farming activities. They had both facilitated consumers and promoted the "going out" of high-quality agricultural by-products, so as to achieve win-win situation.

Fourthly, digital villages have been built, and public services have been gradually improved. The digital level of public services in the fields of rural medical care and education has been continuously improved. Internet-based wisdom fostering has been accelerated constantly. The Internet access rate of primary and secondary schools (including teaching outlets) increased from 79.2% at the end of 2016 to 99.7% in November 2020. <sup>22</sup>The Internet-based poverty alleviation information service system has been basically established, and the information technology-based monitoring and early warning and rescue services for re-poverty population and new poverty population have been continuously improved. Remote medical services have been covered in all county-level hospitals of state-level poverty-stricken counties, and the coverage rate of basic financial services in administrative villages nationwide has reached 99.2%. <sup>23</sup>

**Fifthly, social forces have been brought together, with active participation by Internet users.** With the further promotion of Internet-based poverty alleviation, Internet users' awareness of and participation in Internet-based poverty alleviation have been significantly improved. As of December 2020, the proportion of Internet users who saw the "promotion of distinctive agricultural products from poor areas" on the Internet reached 53.9%, up 5.9 percentage points from March 2020.



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<sup>&</sup>lt;sup>20</sup> Source: the Department of Electronic Commerce and Informatization of the Ministry of Commerce.

<sup>&</sup>lt;sup>21</sup> Source: the Ministry of Commerce.

<sup>&</sup>lt;sup>22</sup> Source: Press Conference of the Ministry of Education, http://www.moe.gov.cn/fbh/live/2020/52692/, December 1, 2020.

<sup>&</sup>lt;sup>23</sup> Source: the State Council Information Office.

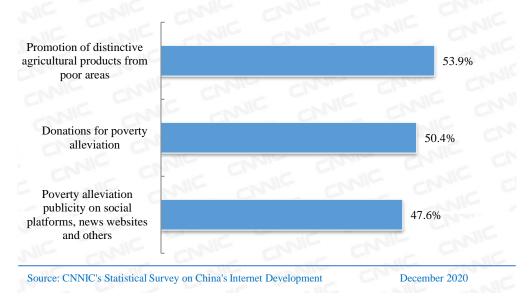


Figure 19 Netizens' Awareness of Various Online Poverty Alleviation Activities

50.8% of Internet users who understood online poverty alleviation activities participated in praising, forwarding and commenting on poverty alleviation campaigns, up 14.5 percentage points from March 2020; 48.5% participated in Internet public welfare activities; the proportions of Internet users who participated in online poverty alleviation donations and purchased distinctive agricultural products reached 48.2% and 39.7%, up 4.3 and 16.7 percentage points over March 2020, respectively.

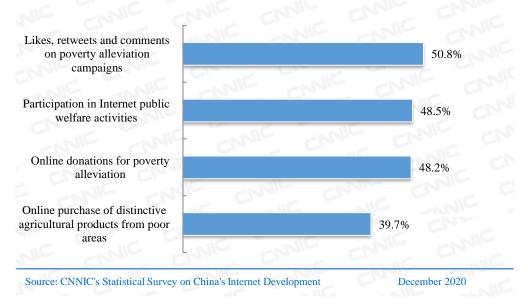
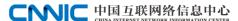


Figure 20 Proportion of Internet Users Who Understand Online Poverty Alleviation Activities Participating in Such Activities

The proportion of Internet users who agree that the Internet can "pool the strength of netizens to help the needy" had reached 80.0%; that of those users who agree that the Internet can "help the poor expand the sales of agricultural products through e-commerce" amounted to 75.2%; that of Internet users who agree that the Internet can "make it easier for needy people to obtain information on job, social security and medical care" reached 74.1%; and that of



Internet users who agree that the Internet can "provide children in poor areas with quality learning resources through distance education" was 71.5%.

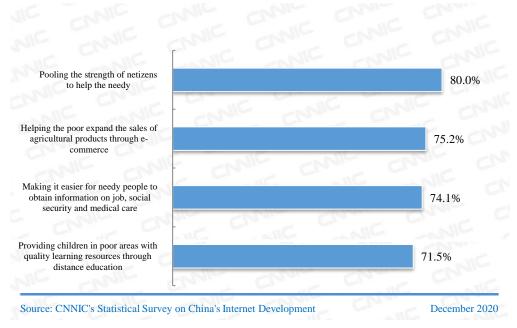


Figure 21 The Role of the Internet in Helping to Lift Poor Areas out of Poverty

#### IV. Size of Non-netizen

As of December 2020, the size of non-netizens in China had reached 416 million, down 80.73 million over March 2020. **In terms of regions**, the majority of non-netizens in China were still in rural areas; the proportion of non-netizens in rural areas had reached 62.7%, 23.3 percentage points higher than that of rural population nationwide. **From the age perspective**, the elderly aged 60 and above are the main group of non-netizens. As of December 2020, the proportion of Chinese non-netizens aged 60 and above accounted for 46.0% of all non-netizens, up 27.9 percentage points from that of the national population aged 60 and above. <sup>24</sup>

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, among the inconvenience in life brought by not accessing the Internet, 27.2% of non-netizens believed that their inability to enter or exit public places due to the lack of "health codes" was ranked first, followed by the inability to make cash payment, as 25.8% of non-netizens believed. The proportion of the inability to buy tickets or handle registration was 24.9%, and the proportions of difficulty in handling affairs due to the reduction of offline service outlets and the inability to promptly obtain information were 24.6% and 22.9%, respectively.

For proportions of the national rural population and the population aged 60 and above, please refer to the *National Statistical Bulletin for National Economic and Social Development of the People's Republic of China for 2019* of the National Bureau of Statistics.
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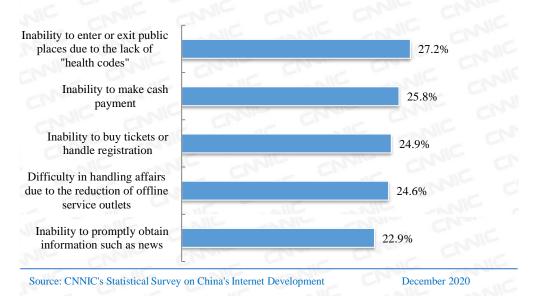


Figure 22 Non-netizens' Inconvenience in Life Brought by Not Accessing the Internet

Shortage of Internet skills, limited literacy level, age, and lack of equipment were major factors preventing non-netizens from accessing the Internet. 51.5% and 21.9% of non-netizens did not access the Internet because they did not master computer/network skill or Pinyin, respectively. 15.1% of non-netizens were too old or too young to surf the Internet. The proportion of non-netizens who did not surf the Internet because they did not have computers or other Internet devices was 13.3%. Less than 10% of non-netizens did not access the Internet because they had no time to surf the Internet or were not interested in doing so.

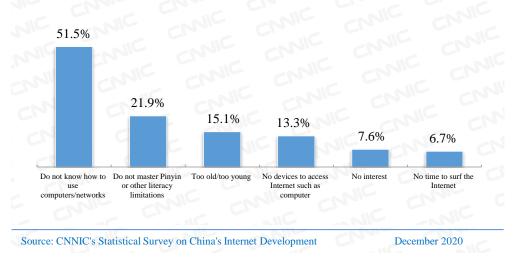


Figure 23 Reasons Why Non-netizens Do not Access the Internet

The primary factor for non-netizens to access the Internet was the convenience of communicating with their family members, accounting for 32.5%, followed by the provision of free relevant training and guidance, taking up 30.3%, and the availability of barrier-free Internet devices, making up 30.0%.



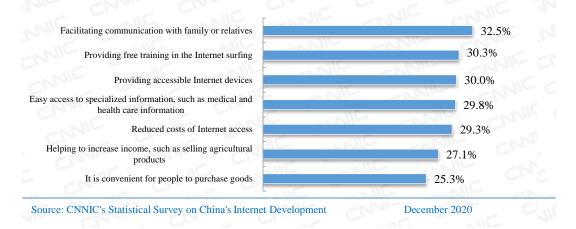


Figure 24 Factors Facilitating Non-netizens to Access the Internet

Based on a comprehensive analysis of the above-mentioned non-netizens' group portraits and the influences and transformation factors of or , reasons for not accessing the Internet, it could be found that the growth of Internet users in China still had large development space, but also 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.



# Chapter Three Development of Internet Applications

## I. Overview of Internet Applications

In 2020, China saw steady growth in personal Internet applications. The most significant growth in user size was found in video clip, online payment, and online shopping applications, with growth rates of 12.9%, 11.2% and 10.2%, respectively. Among basic applications, a steady growth was seen in the user size of instant messaging and search engine, up 9.5% and 2.6%, respectively, from March 2020. Among online entertainment applications, live streaming users maintained a rapid growth rate of 10.2%; the user size of online video and online music increased by 9.0% and 3.6%, respectively from March 2020.

Table 6 User Size and Utilization Ratio of Internet Applications of Internet Users from Mar. 2020 to Dec. 2020

	March 2020 December 2020				
Applications	Number of Internet users (10,000)	The percentage of Internet users using the application	Number of Internet users (10,000)	The percentage of Internet users using the application	Grow th rate
Instant messaging	89613	99.2%	98111	99.2%	9.5%
Search engine	75015	83.0%	76977	77.8%	2.6%
Online news	73072	80.9%	74274	75.1%	1.6%
Telecommuti ng	-	-	34560	34.9%	-
Online shopping	71027	78.6%	78241	79.1%	10.2%
Online meal ordering	39780	44.0%	41883	42.3%	5.3%
Online payment	76798	85.0%	85434	86.4%	11.2%
Internet wealth management	16356	18.1%	16988	17.2%	3.9%
Online games	53182	58.9%	51793	52.4%	-2.6%
Online video (including video clip)	85044	94.1%	92677	93.7%	9.0%
Video clip	77325	85.6%	87335	88.3%	12.9%
Online music	63513	70.3%	65825	66.6%	3.6%
Online literature	45538	50.4%	46013	46.5%	1.0%
Live streaming <sup>25</sup>	55982	62.0%	61685	62.4%	10.2%

Live streaming includes live-stream e-commerce, live sport broadcasting, host live show, live game streaming, and live concert

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	March 2020		December 2020		
Applications	Number of Internet users (10,000)	The percentage of Internet users using the application	Number of Internet users (10,000)	The percentage of Internet users using the application	Grow th rate
Online car- hailing services	36230	40.1%	36528	36.9%	0.8%
Online education	42296	46.8%	34171	34.6%	- 19.2%
Online medical services	-	-	21480	21.7%	-

Table 7 User Size and Utilization Ratio of Applications of Mobile Internet Users from Mar. 2020 to Dec. 2020

	March 202	0	December 2020		
Applications	Number of Internet users (10,000)	Utilization ratio of mobile Internet users	Number of Internet users (10,000)	Utilization ratio of mobile Internet users	Grow th rate
Mobile instant messaging	89012	99.2%	97844	99.3%	9.9%
Mobile search engine	74535	83.1%	76836	77.9%	3.1%
Mobile news	72642	81.0%	74108	75.2%	2.0%
Mobile shopping	70749	78.9%	78058	79.2%	10.3 %
Mobile meal ordering	39653	44.2%	41758	42.4%	5.3%
Mobile payment	76508	85.3%	85252	86.5%	11.4
Mobile game	52893	59.0%	51637	52.4%	-2.4%
Mobile music	63274	70.5%	65653	66.6%	3.8%
Cell phone literature	45255	50.5%	45878	46.5%	1.4%
Mobile learning	42023	46.9%	34073	34.6%	- 18.9 %

## II. Basic Apps

## (I) Instant Messaging

Up to December 2020, the user size of instant messaging was 981 million or 99.2% of China's total netizen population, up 84.98 million over March 2020; the number of mobile instant messaging users had reached 978 million, up 88.31 million from March 2020, making up 99.3% of mobile Internet users.



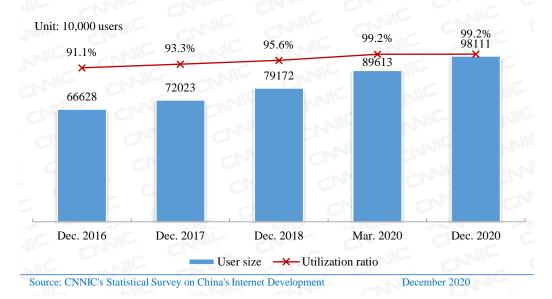


Figure 25 User Size and Utilization Ratio of Instant Messaging from Dec. 2016 to Dec. 2020

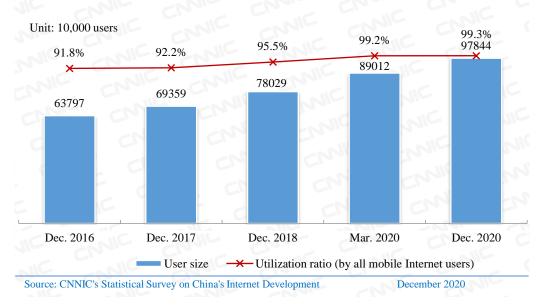


Figure 26 User Size and Utilization Ratio of Mobile Instant Messaging from Dec. 2016 to Dec. 2020

Instant messaging continued to maintain the largest Internet penetration among all Internet apps during the COVID-19 epidemic, and constantly promoted the commercialization of services and specialization of products.

In terms of the commercialization of services, instant messaging enterprises further strengthened the cashability of products through a variety of ways. **Firstly, "Channels" have broadened the content realization forms of the instant messaging platform.** For a long time, as the main content presentation forms of instant messaging, text, pictures, and audio face such problems as high dissemination costs and insufficient contents. As a new form of content communication, video clips provide good solutions to the above-mentioned problems, attracting the launch of the "Channels" function by the instant messaging platform. After half a year's launch of this function, the number of daily active users reached 200 million. <sup>26</sup>Secondly, "WeChat Mini-store" has expanded the online retail capacity of the instant messaging platform. In the second half of 2020, WeChat launched the "WeChat Mini-

Source: Sina Technology, https://tech.sina.com.cn/i/2020-07-09/doc-iirczymm1427272.shtml, July 9, 2020.
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store" function to provide enterprises and individuals with zero-cost online shops without the need for development. In the context of the COVID-19 epidemic, such online "small-store economy" was expected to be a powerful complement to traditional e-commerce platforms. Thirdly, search advertising was expected to become a new source of income for instant messaging platforms. With continuous improvement in the quantity of contents of instant messaging platforms, it is becoming more and more difficult to meet users' demand for massive information by simply relying on the subscription and push mechanism. In this case, WeChat embodied the "Search" function in the dialog box in September, to make it more convenient for users to search contents and services within the platform. In the future, with the sustainable development of instant messaging's advertising business, search advertising is expected to be included in its business ecology.

In terms of the specialization of products, instant messaging enterprises further expanded functions and improved experience for vertical groups. Firstly, instant messaging products and cloud services in the corporate field started to be integrated. Due to the impact of the COVID-19 epidemic, several large-scale science and technology companies launched corporate instant messaging products, driving the explosive growth of the field in the first half of 2020. However, instant messaging products mainly play their role in corporate information exchange, and it is difficult for them to meet enterprises' demand for equipment, technology, and other aspects, so they could not help enterprises complete the comprehensive and in-depth digital transformation. In this case, some large-scale science and technology companies integrated corporate instant messaging with cloud services, making them an intermediate node connecting enterprises' demand and cloud capabilities, thereby providing a more complete digital support for enterprises. Secondly, the customized development of instant messaging products in the field of education has emerged. The contents and entertainment functions of existing instant messaging products may have adverse impact on the study of minors. In response to this pain point of users, instant messaging products such as DingTalk and WeChat start to develop customized products for students and children, optimize such scenes as family-school co-education and online learning, provide simple, pure, and effective learning tools for minors, so that minors are free from interference by bad information during the use of instant messaging. <sup>27</sup>

## (II) Search Engine

As of December 2020, the user size of search engine was 770 million or 77.8% of China's total netizen population, up 19.62 million over March 2020; the number of mobile search engine users had reached 768 million, up 23 million from March 2020, accounting for 77.9% of mobile Internet users.

Family-school co-education refers to the mutual cooperation between the school and the family for the co-education of minors.

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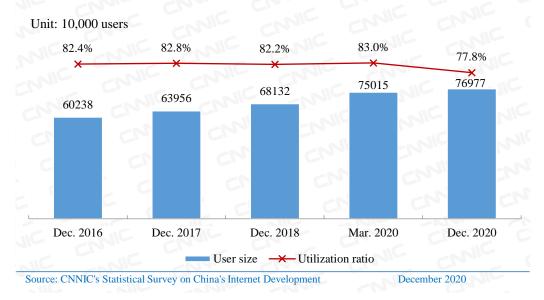


Figure 27 User Size and Utilization Ratio of Search Engine between Dec. 2016 and Dec. 2020

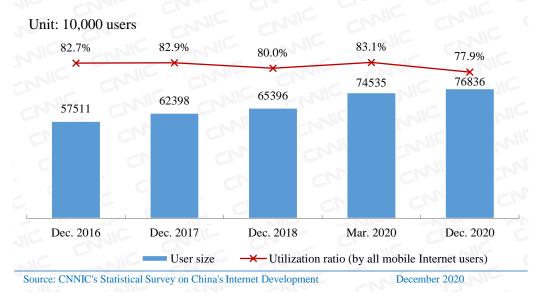


Figure 28 User Size and Utilization Ratio of Mobile Search Engine from Dec. 2016 to Dec. 2020

As the overall revenue of the search engine industry has declined, seeking new growth points is a top priority. In the first three quarters of 2020, due to the COVID-19 epidemic, Baidu's total revenue from online marketing decreased by 9.1% year-on-year<sup>28</sup>, and Sogou's total revenue from search and related business fell by 16.0% year-on-year.<sup>29</sup>The growth of revenue from search advertising has entered the bottleneck period, becoming a challenge restricting the sustainable and healthy development of the industry. Meanwhile, applications for special needs such as social networking and shopping attracted a large amount of traffic, and the entrance advantages of search had been significantly weakened. In order to cope with difficulties, search engine enterprises accelerated the layout of contents and services and the commercialization of AI, explored the market, and entered new development tracks. In 2020, Baidu had an obvious trend towards revenue diversification and maintained growth in the revenue

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<sup>&</sup>lt;sup>28</sup> Source: Baidu's financial reports for 2020 Q1, Q2 and Q3.

<sup>&</sup>lt;sup>29</sup> Source: Sogou's financial reports for 2020 Q1, Q2 and Q3.

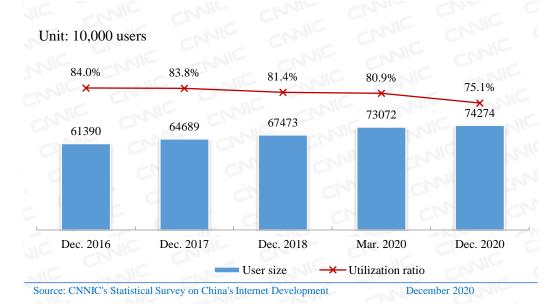


from cloud services, video membership services, and AI business; its automatic driving business had been recognized by the capital market, pushing a market value breakthrough of 60 billion yuan<sup>30</sup>. Sogou's sales revenue from intelligent hardware products also maintained a rapid growth, up 66% year-on-year in the third quarter.<sup>31</sup>

Increasingly fierce competition took place in the search market, advancing the trend towards differentiated functions and positioning of the search business. Firstly, market participants continuously increased their competitiveness. In September 2020, Tencent acquired a 100% stake in Sogou, to introduce external Internet resources for the WeChat content ecology, and enhance Tencent's competitiveness in the search sector; in November, Toutiao Search integrated multiple news and video products of Bytedance, making a comprehensive layout of the search advertising market. In the future, search services will make more innovations in technology research and development, product forms, and user experience. Secondly, the diversified forms of the search business play different functions in the ecological layout of enterprises. Independent search is the content entrance of all networks, mainly responsible for guiding the traffic and revenue and providing traffic and financial support for other business development; the search within applications, which is more targeted for the interior of the ecological system, connects contents and services to form a closed loop, thereby bringing a variety of gains such as the precipitation of big data. In the independent search, the main source of Baidu's revenue is still keyword advertising; the proportion of Sogou's revenue from the search business has been more than 90% for a long term. In the search within applications, mainly serving the internal construction of WeChat, WeChat search provides users with connections to social networking, shopping, and local life services. The advertising revenue takes up a low proportion. The future commercialization direction will be different from that of traditional integrated search engines.

#### (III) Online News

As of December 2020, the user size of online news was 743 million or 75.1% of China's total netizen population, up 12.03 million over March 2020; the number of mobile news users had reached 741 million, up 14.66 million from March 2020, making up 75.2% of mobile Internet users.



<sup>&</sup>lt;sup>30</sup> Source: qq.com, https://new.qq.com/rain/a/20201215A0I3Z600, December 15, 2020.



Source: Sogou's financial report 2020 Q3. The 47th Statistical Report on China's Internet Development



Figure 29 User Size and Utilization Ratio of Online News between Dec. 2016 and Dec. 2020

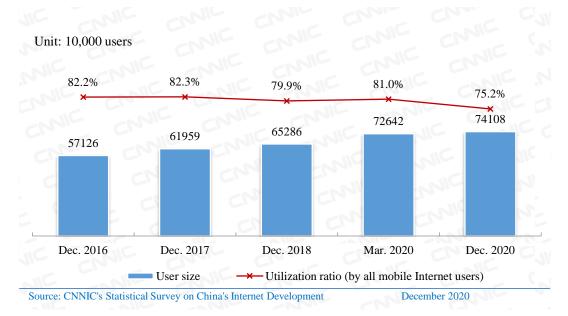


Figure 30 User Size and Utilization Ratio of Mobile Phone News from Dec. 2016 to Dec. 2020

In 2020, keeping abreast of the development needs of the times, online news media constantly innovated reporting forms, to bring users the news experience that was more intuitive and informative. Meanwhile, online news media also further strengthened the integration of the media, enhanced the user viscosity, and improved user experience by creating a video communication matrix or otherwise.

Online news media innovated reporting forms, to bring users the news experience that was more intuitive and informative. In early 2020 when Wuhan fought against the COVID-19 epidemic, CCTV reported the construction of the Fire God Mountain Hospital and the Thunder God Mountain Hospital by means of "live camera broadcasting" (LCB) 32, which led to an upsurge of "cloud supervisors" 33 in all sectors of society, and attracted more than 10 million participants in relevant broadcasting. During the crucial period of flood prevention and flood control in the middle of the year, the people.cn launched "Graphic News", describing the emergency deployments made by the State Flood Control and Drought Relief Headquarters, the Ministry of Emergency Management, and other departments since June, as well as flood situation and disaster mitigation and relief efforts in seven seriously affected provinces, such as Fujian, Guangdong, Guangxi, Hunan, and Jiangxi, with a one-take "long graph". As the prevention and control of the COVID-19 epidemic entered the normalization stage, Tencent News, Baidu, and other commercial websites actively tracked the epidemic situation by setting up a special column on the fight against the COVID-19 epidemic, and establishing a real-time page tracking the epidemic, or otherwise, to provide users with visualized epidemic information services, so that they could effectively respond to the rebound of the epidemic. Sina News launched the "2020 Love a City" regional live streaming plan jointly with the National Public Information Platform for Party Media of People's Daily, China Culture & Tourism, and local media, to show the scene of work and production resumption and economic recovery in various regions by building a regional live

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<sup>&</sup>lt;sup>32</sup> Live camera broadcasting (LCB) refers to a live streaming form recording and displaying the original ecology of real scenes in real time by means of live streaming equipment.

<sup>&</sup>lt;sup>33</sup> Cloud supervisors originated from the CCTV live streaming of the construction of Fire God Mountain Hospital and Thunder God Mountain Hospital at the sites in Wuhan, which attracted Internet users' participation in their capacity as cloud supervisors - persons who "supervise" the construction progress of the hospitals via live cameras - though they could not arrive at the sites.



streaming platform. The plan has aroused constant attention since it was launched, with readings of the Weibo topic "#2020 Love a City#" exceeding 13.83 million. <sup>34</sup>

Keeping abreast of the development needs of the times, online news media have created a news communication matrix. In September 2020, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the Opinions on Accelerating the Deeply Integrated Development of Media, indicating directions for the integrated development of the media. In recent years, with the continuous advancement of the integrated development of media, the transformation pace of online news media has been further accelerated; the demand of online news users has been better met; and user viscosity has been further improved. Several media continuously incubated characteristic columns and created a communication matrix by following up the hot spots in a timely manner according to user preference. Firstly, websites and mobile applications were developed into an information center or a center of views continuously exporting news and views; secondly, by relying on video accounts, hot columns were formed and pushed in real time on such video websites as bilibili.com and such social networking platforms as Weibo, with good results received. Taking guancha.cn as an example, its same-name account on bilibili.com has received over 100 million likes.

### (IV) Telecommuting Apps

As of December 2020, the number of telecommuting APP users in China amounted to 346 million or 34.9% of overall Internet users, up 147 million over June 2020. In the first half of 2020, the market size of telecommuting Apps showed an explosive growth due to the COVID-19 outbreak. In the second half of 2020, the size of the telecommuting App market remained a high-speed growth, and showed a development trend towards ecologicalization. It played an important role in guaranteeing and stabilizing employment and assisting in the establishment of, and improvement in the "new employment form". <sup>35</sup>

The user size of telecommuting Apps maintained a rapid growth. After the explosive growth in the first half of 2020, the number of telecommuting App users still grew rapidly at a semi-annual rate of 73.6% in the second half of the year, reflecting the widespread recognition of telecommuting Apps by corporate users, gradual downward development towards basic applications, and integration into the daily operating activities of enterprises. In the context of normalized prevention and control of the COVID-19 epidemic, more and more enterprises have established a scientific and sound telecommuting mechanism. The number of users of corporate WeChat services increased from 60 million at the end of 2019 to 250 million<sup>36</sup> in May 2020, and further increased to 400 million<sup>37</sup> in December; as of December 2020, the number of enterprises and organizations using DingTalk exceeded 17 million.<sup>38</sup>From September to December 2020, the daily average duration of telecommuting meetings was 108 minutes<sup>39</sup>, roughly unchanged from that in the first half of the year. Such telecommuting Apps have become

https://view.inews.qq.com/a/TEC2020091001155300?tbkt=F&uid=, September 10, 2020.

https://finance.sina.com.cn/tech/2020-12-23/doc-iiznezxs8557657.shtml, December 23, 2020.

<sup>&</sup>lt;sup>39</sup> Source: The data were detected by the Computer Network Information Center, covering 12 cities in 10 provinces. There are a total of 265,189 Internet access devices. Monitoring software includes Zoom, Tencent Meeting, and DingTalk.



<sup>34</sup> Source: Weibo.

<sup>&</sup>lt;sup>35</sup> New employment form refers to a flexible platform-based employment model in which an Internet platform is directly connected to both the supply and consumption sides at the absence of employers. During the Two Sessions in 2020, comrade Xi Jinping pointed out at the meeting of the CPPCC Joint Committee of Economic Commissioners that "The sudden COVID-19 outbreak brings a sudden 'new employment form'. In this regard, we should take the opportunity to make it stand out naturally."

<sup>36</sup> Source: qq.com,

<sup>&</sup>lt;sup>37</sup> Source: sina.com,

<sup>&</sup>lt;sup>38</sup> Source: 2021 DingTalk Product Launch.



normalized applications of enterprises.

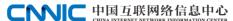
Telecommuting Apps are developing towards eco-platforms. The first was to make basic functions available free of charge, cultivate user habits, and lay a market foundation for ecological development. As of December 2020, the utilization ratios of video or telephone meetings, online collaborated document editing, online task management or process examination and approval, and corporate cloud disks were 22.8%, 21.2%, 11.6%, and 9.4%, respectively. The utilization ratios of different sub-divisional functions varied significantly. The stable expansion of user size and the growth in industry personalized demand will jointly promote the availability of telecommuting Apps on platforms, accommodate the access of more vertical functions, and realize ecological interconnection. The second was to rapidly enhance the processing capacity and lay a hardware and software foundation for ecological development. In the process of production and work resumption, enterprises' demand for telecommuting Apps had increased dramatically, which greatly promoted the continuous improvement in telecommuting services and the processing capacity. In addition, the construction of new infrastructure in China such as 5G network, big data center, artificial intelligence, and industrial Internet has been accelerated, so that the basic hardware and software capabilities of corporate-level applications have been greatly improved, and the key capabilities such as massive data processing, cloud storage and computing, multi-program access have been strengthened for eco-construction of telecommuting Apps.

Telecommuting Apps helped the formation of, and improvement in the "new employment form". Telecommuting Apps provided guarantee for the development of the "new employment form" by increasing the employment elasticity of the whole society and improving the participation by labor force, and played an important role in securing and stabilizing employment. Firstly, telecommuting Apps promoted innovation in traditional employment modes. Compared to traditional employment forms, telecommuting has significant cost and efficiency advantages. During the COVID-19 epidemic, telecommuting Apps helped enterprises break restrictions on traditional employment forms and realize "remote working" and "mobile working", so that enterprises could maintain normal internal operation and maintain contact and coordination with external parties. According to research, the total factor productivity of enterprises using telecommuting Apps increased by 20% to 30%. Meanwhile, each employee using telecommuting Apps could save about 14,000 yuan a year for the enterprise. <sup>40</sup>With technology upgrade and improvement in user acceptance, the role of telecommuting Apps in improving efficiency and saving costs will be enhanced constantly. Secondly, telecommuting Apps provided important support for new, digital technology-based jobs. During the COVID-19 outbreak, new professions such as online distributors featuring great dispersity, flexibility, and autonomy and heavily dependent on digital technology, emerged. Telecommuting Apps could break the geographical constraints, enrich the methods of collaboration with organizations' members, reconstruct the organizations' operation process, provide convenient and efficient digital tools for new posts, and promote the development of the "new employment form" and help digital transformation and upgrading.

## III. Business Transaction Applications

(I) Online Shopping

<sup>&</sup>lt;sup>40</sup> Source: Nicholas Bloom, James Liang, John Roberts, Zhichun Jenny Ying, Does Working from Home Work? Evidence from a Chinese Experiment, The Quarterly Journal of Economics, Volume 130, Issue 1, February 2015.



Up to December 2020, the user size of online shopping was 782 million or 79.1% of China's total netizen population, up 72.15 million over March 2020; the number of mobile shopping users had amounted to 781 million, up 73.09 million from March 2020, taking up 79.2% of mobile Internet users.

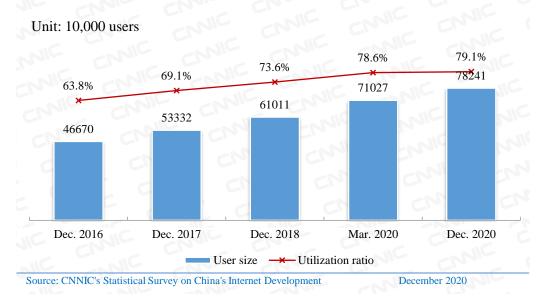


Figure 31 User Size and Utilization Ratio of Online Shopping between Dec. 2016 and Dec. 2020

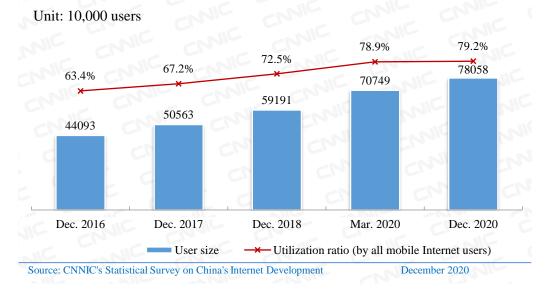
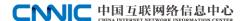


Figure 32 User Size and Utilization Ratio of Mobile Shopping from Dec. 2016 to Dec. 2020

In 2020, as China accelerated the establishment of a "dual circulation" development pattern in which domestic economic cycle plays a leading role while international economic cycle remains its extension and supplement. Online retail continued to cultivate new energy of the consumption market, transformed consumption capacity into production and innovation capacity, and promoted the "dual circulation" of consumption by boosting consumption in quantity and quality.

Firstly, in terms of domestic consumption circulation, e-commerce activated the circulation of urban and rural consumption and idle commodities. With the continuous improvement in e-commerce infrastructure and services in the sinking market, the commodity and information flows of industrial products and agricultural products between urban and rural areas were further efficient and smooth. On the one hand, e-commerce platforms



accelerated the downward infiltration through mini programs, live streaming, or otherwise to meet the basic consumption needs of middle- and low-income groups; on the other hand, sale of agricultural products could be accelerated by e-commerce models such as "warehouse at the place of origin + warehouse at the market place", live streaming of the place of origin, and channel linkage. In addition, the COVID-19 outbreak accelerated the reform of consumption patterns represented by second-hand consumption, and the development of idle economy provided new impetus for the circulation of commodities. As of October 2020, the number of registered new enterprises related to idle goods in China had reached 130,000, up 50% from last year<sup>41</sup>; as of December 2020, the size of second-hand e-commerce users had reached 52.66 million. Second-hand e-commerce accelerated the secondary circulation of commodities by attracting more consumers to participate in the internal circulation system of consumption.

Secondly, in terms of international and domestic dual circulation, cross-border e-commerce played a stable foreign trade role, and free trade agreements boosted the new opening-up pattern. In 2020, cross-border e-commerce rose amid the reverse market tendency, and became important capillaries for facilitating trade. According to the data, imports and exports in China's cross-border e-commerce in 2020 amounted to 1.69 trillion yuan, up 31.1%. <sup>42</sup>A total of 46 comprehensive cross-border e-commerce pilot zones were added nationwide, and the "9710" and "9810" cross-border e-commerce B2B export trade modes are added, to promote customs clearance facilitation. The Regional Comprehensive Economic Partnership (RCEP) was signed in November 2020 and has become a free trade agreement involving the world's biggest economic size. RCEP has reached comprehensive and high-level e-commerce rules in the Asia-Pacific region for the first time, including promoting e-commerce cooperation among countries, protecting the rights and interests of online consumers, improving regulatory policies, etc. While providing significant benefits for cross-border e-commerce, it will further promote the formation of a dual circulation pattern in which both international and domestic markets are opened up.

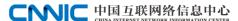
Thirdly, online retail has become the first step in the digital transformation of enterprises, enabling industrial belts to realize the integration of products and sales. <sup>43</sup>The realization of "dual circulation" not only needs to activate the potential of consumer demand, but also needs to promote industrial upgrading to form a pattern in which supply matches demand. Online retail has played a positive role in eliminating domestic industry development obstacles featuring "strong production but weak sales; strong manufacturing but weak brands". On the one hand, online retail has become an important gripper for the transformation and upgrading of traditional industries by helping enterprises achieve sales growth; on the other hand, e-commerce platforms accelerated the integration of industrial belt resources, and promoted the flexible manufacturing and their development into brands. In the context of domestic sales of commodities originally produced for exports and industry upgrading, small and medium-sized enterprises in many industry belts of China use the reverse customization model of online retail to guide the product design and production through e-commerce consumption data, achieve rapid delivery and small-batch production, and promote the rise of local new brands and the industry digital upgrading.

# (II) Online Meal Ordering

<sup>&</sup>lt;sup>41</sup> Source: Tianyancha.

<sup>&</sup>lt;sup>42</sup> Source: the Ministry of Commerce.

<sup>&</sup>lt;sup>43</sup> Integration of products and sales refers to the sales effect driven by brand development, the popularity of the brand brought by promotion of sales, and the organic integration of the brand and sales assisting each other.



Up to December 2020, the user size of online meal ordering was 419 million or 42.3% of China's total netizen population, up 21.03 million over March 2020; the number of mobile meal ordering users had reached 418million, up 21.06 million from March 2020, accounting for 42.4% of mobile Internet users.

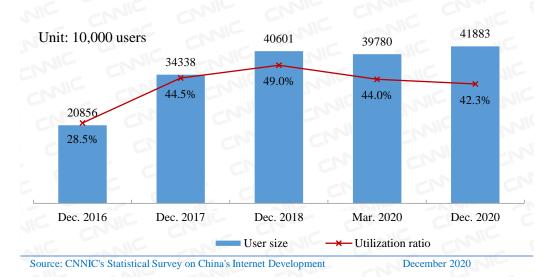


Figure 33 User Size and Utilization Ratio of Online Meal Ordering between Dec. 2016 and Dec. 2020

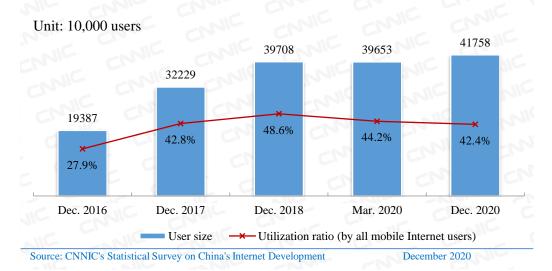


Figure 34 User Size and Utilization Ratio of Mobile Meal Ordering between Dec. 2016 and Dec. 2020

Due to the COVID-19 epidemic, the meal ordering business in 2020 had become an important guarantee of income for Meituan, and its strategic position had become more and more obvious. Meanwhile, ele.me continued to input subsidies of 10 billion yuan to accelerate its expansion in the sinking market, and competition in the meal ordering market was heating up, thus driving the market to present a series of new changes.

The first was to accelerate the further formation of an ecological system for local life services. Tens of millions of users, millions of merchants, distribution systems, and other important assets accumulated in the meal ordering business have been gradually becoming the cornerstones for a platform to build an ecological system of local life services. In 2020, Meituan continued the development strategy of "high frequency driving low frequency" and used meal ordering services to drive hotel, travel, and other business, while speeding up the strategic investment

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in the field of local life services, gradually forming a scale effect; in July 2020, ele.me also announced that the platform was upgraded from a takeaways platform into a life service platform "providing instant needs", with scope of instant distribution services extended to cover several categories including fresh food, general merchandise and flowers. <sup>44</sup>It could be predicted that a platform started with a meal ordering application and realized the full-range digital life service ecology, which helped promote the digital service industry as a new driving force for economic growth.

The second was to activate the innovation in business modes in the sinking market. Since March 2020, ele.me has accelerated the layout in more than 100 third- and fourth-tier cities across the country, and Meituan also regarded the sinking market as a strategic focus. The platform competition accelerated the cultivation of users in the sinking market. According to the data, during the Nov. 11 online shopping carnival of 2020, the meal orders of ele.me in many three-to-five-tier cities increased by over 100% year-on-year, and those in nearly 40 prefecture-level cities increased by more than 50% year-on-year. <sup>45</sup>Meanwhile, the structure of meal ordering users also changed: as of December 2020, the user size of meal ordering in third-tier market and in markets below third-tier increased by 7.7% over March 2020, significantly higher than the growth in the first-tier and second-tier markets (1.1%). The orderly competition of platforms in the sinking market was helpful for promoting the innovation in and digital upgrading of local service models while meeting the differentiated needs of local market users.

The third was to drive the upstream catering enterprises in the industry to accelerate the digital transformation. In 2020, the COVID-19 outbreak accelerated the digitization process of the catering industry, and meal ordering had become an important means for contributing to the transformation of the industry. In addition to fierce user-side competition, meal ordering platforms attempted to empower catering enterprises via technology and innovation in models, and seek new development opportunities for corporate services. For example, Meituan, by frequently acquiring catering SaaS (Software-as-a-Service) service providers, and ele.me, through a set of tools and systems such as the middle platform, customer relationship management, mini programs and QR codes, helped catering enterprises realize the digitalization of business. <sup>46</sup>The meal ordering platforms accelerated the penetration and service expansion of the upstream of the industry, which was conductive to promoting the further development of the catering industry towards standardization and branding.

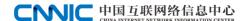
# (III) Online Payment

As of December 2020, the user size of online payment was 854 million or 86.4% of China's total netizen population, up 86.36 million over March 2020; the number of mobile payment users stood at 853 million, up 87.44 million from March 2020, representing 86.5% of mobile Internet users.

<sup>&</sup>lt;sup>46</sup> Middle platform refers to the architecture of packaging and integrating the general capacities of a system and empowering the same to the external system in the form of an interface, so as to rapidly support the business development.



<sup>&</sup>lt;sup>44</sup> High frequency driving low frequency refers to the demand for online meal ordering and intra-city distribution that is used at a high frequency drives the demand for online air ticket booking and online hotel booking that is used at a low relatively.
<sup>45</sup> Source: Platform data on ele.me.



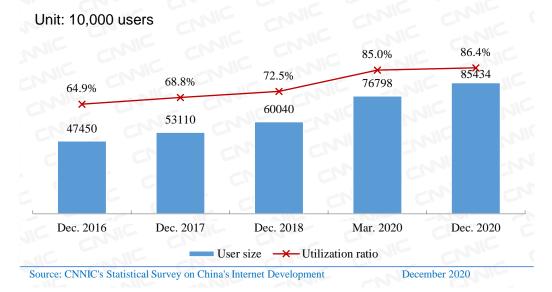


Figure 35 User Size and Utilization Ratio of Online Payment between Dec. 2016 and Dec. 2020

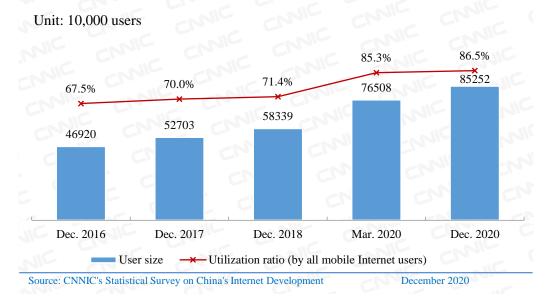


Figure 36 User Size and Utilization Ratio of Mobile Payment from Dec. 2016 to Dec. 2020

In 2020, online payment highlighted a huge potential for development. Through the aggregation of supply chain services, online payment assisted merchants in accurately pushing information to help Chinese small and medium-sized enterprises achieve digital transformation, having vigorously promoted the development of digital economy. The integration of mobile payment and inclusive finance has reduced the gap between eastern and western areas and between urban and rural areas through universal application, and brought digital dividends to the general public, having vigorously promoted the availability of financial services. The pilot program for digital RMB has been carried out comprehensively. At present, the progress of the pilot program in China is in a world-leading place, which will be helpful for providing the people with digital life convenience.

Online payment has assisted in the digital transformation of small and medium-sized enterprises. Due to the COVID-19 epidemic, China's small and medium-sized enterprises accelerated their digital transformation process, in which online payment played a crucial role. Firstly, online payment provided surply chain access to



assist small and medium-sized enterprises in their digital construction. Due to the limitation of their own strength and resources, the digital transformation of 89% small and medium-sized enterprises in China is still in the exploratory stage. <sup>47</sup>Online payment provides small and medium-sized enterprises with information flow, physical flow, and capital flow services, such as mini program access, logistics information connection, and supply chain finance. By improving their digital viability, small and medium-sized enterprises could overcome the difficulties caused by the COVID-19 outbreak, and improve their quality and efficiency by digitalization. Secondly, online payment offers accurate marketing interfaces to assist merchants in digital operation. With the active progress in epidemic prevention and control, to promote offline consumption, physical merchants introduced the online traffic through the online payment platform, pushed promotional information to consumers accurately, and provided convenient digital services to realize the integration of online and offline consumption. Taking the issuance of consumer vouchers as an example, the online payment system is connected to the merchants 'settlement system. Through the monitoring and algorithm analysis of customer traffic, the groups to be issued vouchers and the scope are subject to adjustment at any time, which greatly improves the proportion of offline consumption by online users.

Mobile payment in inclusive development has narrowed the gap in geographical distribution. With the rapid development of a new generation of information technology such as artificial intelligence, big data, and 5G, the integration of digital technology and inclusive finance continues to deepen. As an important tool carrier of digital inclusive finance, mobile payment has improved the convenience and accessibility of inclusive financial services, narrowing the imbalance in regional development and the digital divide between urban and rural areas. Firstly, the gap between eastern and western regions in the utilization ratios of mobile payment has been narrowed. From 2011 to 2018, mobile payment was breaking the traditional "black river - Tengchong division line" 48, and the gap between the accessibility of financial services in eastern and western areas was narrowed by 15%. 49Up to December 2020, the utilization ratio of mobile payment by mobile Internet users in China's eastern region was 86.5%, up 1.1 percentage points over March 2020, while that in western region was 85.9%, up 2.2 percentage points over March 2020. The gap between the utilization ratios of mobile payment in eastern and western regions was further reduced by 1.1 percentage points. Secondly, the gap between the utilization ratios of mobile payment in urban and rural areas has been narrowed. Up to December 2020, the utilization ratio of mobile payment by mobile Internet users in China's urban areas was 89.9%, up 0.5 percentage point over March 2020, while that in rural areas was 79.0%, up 4.2 percentage points over March 2020. The gap between the utilization ratios of mobile payment in urban and rural areas was reduced by 3.7 percentage points.

The pilot program for digital RMB was carried out via the mobile payment technology. The Proposals of the Central Committee of the Communist Party of China for the Formulation of the 14th Five-year Plan for National Economic and Social Development and the Long-range Objectives through the Year 2035 put forward the prudent advancement of the research and development of digital currency. The Circular on Issuing the Master Plan for Comprehensively Deepening the Pilot Program on the Innovative Development of Trade in Services issued by the

<sup>&</sup>lt;sup>48</sup> The Black River - Tengchong division line was proposed in 1935 by Professor Hu Huanyong, a well-known geographical economist, and also known as "Huhuanyong Line". The north of this line stretches from the Black River through the southwest until Yunnan Tengchong, dividing China into two major sectors - the densely populated southeast and the sparsely populated northwest. Population distribution determines the degree of economic activity. This line is not only a geographical and demographic division line, but also brings the gap between economic growth and social development in the eastern and western regions.





<sup>&</sup>lt;sup>47</sup> Source: Analysis Report on Digital Transformation of Small and Medium-sized Enterprises (2020) of the China Electronic Standardization Institute.



Ministry of Commerce explicitly provides that pilot program for digital RMB should be carried out in eligible pilot regions in the Beijing-Tianjin-Hebei region, the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay, and the central and western regions. **At the circulation level,** the digital RMB issued by the People's Bank of China is used for replacing the cash in circulation, and the double-layer release mode is adopted to effectively maintain the stability of the financial market. <sup>50</sup>**At the application level,** the progress of the pilot program for digital RMB in China is in a world-leading place. The test content focuses on retail payment scenarios, covers many areas of daily life, and is compatible with barcode payment, near-field payment, and other diversified payment methods. Two pilot cities Shenzhen and Suzhou took the lead in carrying out a lucky packet test for digital RMB and achieved phased results.

# (IV) Online Travel Booking

As of December 2020, the number of online travel booking users in China had reached 342 million, down 30.52 million from March 2020, up 55.96 million over June 2020, accounting for 34.6% of all Internet users.

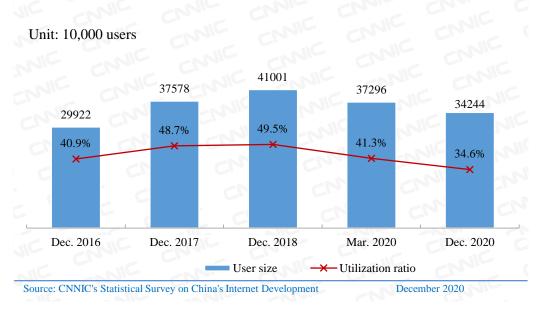


Figure 37 User Size and Utilization Ratio of Online Travel Booking from Dec. 2016 to Dec. 2020

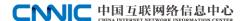
In 2020, China's timely and effective prevention and control of the COVID-19 epidemic had promoted the gradual recovery of the domestic tourism industry. As part of the tourism business restarts, domestic tourism demand has been released to a certain extent. In order to minimize the impact of the epidemic, the government and enterprises have taken various measures to boost the tourism economy, and the entire tourism industry has constantly changed and innovated in the adjustment.

The COVID-19 prevention and control has entered a normalized stage, and domestic tourism demand needs to be gradually released. According to the data on the Qingming Festival holiday, the May Day holiday and the Nov. 11 online shopping carnival, the domestic tourism market has recovered strongly. According to the data, during the Qingming Festival in 2020, a total of 43.254 million tourists were received nationwide, and tourism revenue of 8.26 billion yuan was achieved. <sup>51</sup>During the May Day holiday, the tourism market had basically



<sup>&</sup>lt;sup>50</sup> Double-layer release mode: double-layer refers to the "Central Bank-Commercial Agency"; the upper layer is the People's Bank of China and commercial agencies, and the lower layer is commercial institutions and the general public. Under this mode, the People's Bank of China first converts the digital RMB to the bank or any other institution, which will convert the same to the general public.

<sup>51</sup> Source: the Data Center of the Ministry of Culture and Tourism.



recovered to 50% of the level in the same period of last year. During the National Day holiday, the total number of domestic tourists nationwide was 618 million, representing a year-on-year recovery of 79.0%; the domestic tourism revenue was 454.33 billion yuan, representing a year-on-year recovery of 69.9%.

In order to alleviate the impact of the COVID-19 epidemic, the government and enterprises made more efforts to boost tourism consumption. With the gradual liberalization of trans-provincial tourism business in China, the work and production resumption process in the tourism market was accelerated. On the one hand, the government intensified policy support, and optimized resource supply to support enterprise development by reducing the enterprises' operating costs, increasing financial credit support, and creating hot spots and publicity topics. On the other hand, airlines and online travel booking enterprises had launched preferential subsidies to stimulate the consumer demand of platform users. China Eastern and China Southern launched "willful flight" products to boost market confidence with limited costs. During the Golden Week of the National Day holiday, online travel booking platforms such as Tongcheng, Ctrip, and Feizhu, through high subsidies, instructed users to make consumption decisions and facilitated the recovery of tourism economy.

The COVID-19 outbreak promoted the innovation in the tourism industry, and the digital application improved service quality. Firstly, artificial intelligence technology was adopted to enable the promotion and application of "contactless services". In response to the COVID-19 outbreak, the hotel industry offered "contactless services". Hotels under Huazhu Group and BTG Homeinn could not only achieve the self-service renewal, check-out and other formalities, but also provide robot-assisted delivery services. Secondly, the tourism industry tried to stimulate the vitality of the tourism market by adopting the "live selling" mode. Driven by live streaming economy, tourism enterprises, tourist attractions, and tourist celebrities carried out the live marketing business. As of the third quarter of 2020, Ctrip's total accumulative turnover from the live streaming matrix exceeded 2.4 billion yuan, and the number of viewers was more than 170 million. <sup>52</sup>In 2020, more than 40,000 tourism live streaming events were held on Weibo platform, with more than 2 billion viewers attracted. <sup>53</sup>Thirdly, the reservation system was adopted to bring new experience at tourist attractions. In order to take into account the prevention and control of the COVID-19 epidemic and tourists' experience, the tourist attractions accelerated popularization of the reservation system, made dynamic adjustment to visitor traffic depending on the overall economy, safety, and experience, thus improving the intelligent management of tourist attractions and promoting the high-quality development of the tourism industry.

# IV. Online Entertainment Applications

# (I) Online Games

As of December 2020, the user size of online games was 518 million or 52.4% of China's total netizen population, down 13.89 million over March 2020; the number of mobile game users had reached 516 million, down 12.55 million from March 2020, accounting for 52.4% of mobile Internet users.

<sup>&</sup>lt;sup>52</sup> Source: Ctrip's financial report 2020 Q3.





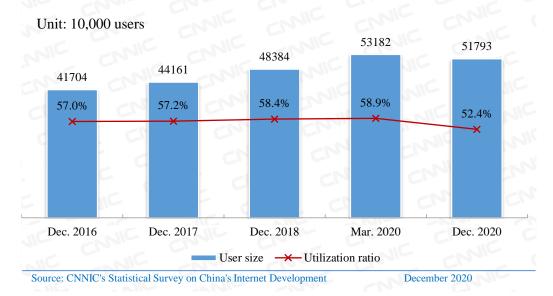


Figure 38 User Size and Utilization Ratio of Online Games from Dec. 2016 to Dec. 2020

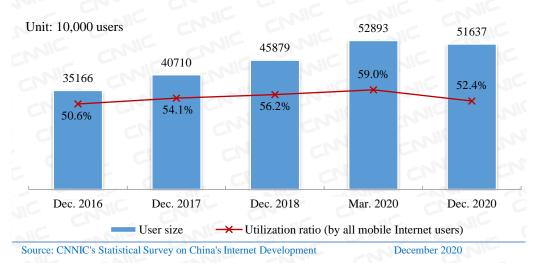


Figure 39 User Size and Utilization Ratio of Mobile Games between Dec. 2016 and Dec. 2020

In 2020, China's online game industry continued to maintain a rapid development momentum. The COVID-19 outbreak in early 2020 restricted the development of offline activities, but drove the growth of revenue from online games to certain extent. According to the data, in 2020, the actual sales revenue of the game market in China amounted to 278.687 billion yuan, an increase of 47.81 billion yuan over 2019 or 20.71% year-on-year. <sup>54</sup>Among the major online game manufacturers, NETEASE's net revenue from online game services in the third quarter of 2020 was 13.86 billion yuan, up 20.2% year-on-year. <sup>55</sup>; and Tencent's revenue from online games in the third quarter reached 41.422 billion yuan, up 45% year-on-year. <sup>56</sup>On the one hand, driven by the huge mobile game market, China accelerated the pace of innovation in mobile games, with new products of high popularity springing up. On the other hand, the potential of our host games was expected to be further stimulated with the realization of several

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<sup>&</sup>lt;sup>54</sup> Source: China Gaming Industry Report 2020 of the Game Publishing Commission of the CADPA.

<sup>&</sup>lt;sup>55</sup> Source: qq.com, https://xw.qq.com/amphtml/20201120A00W7500, November 20, 2020.

<sup>56</sup> Source: sina.com, http://finance.sina.com.cn/roll/2020-11-12/doc-iiznctke1099815.shtml, November 12, 2020.



host-type games going viral. 57

The pace of innovation in mobile games was accelerated, with new products of high popularity springing up. In recent years, mobile games have maintained a leading position in terms of occupancy and revenue in China's online game market. In 2020, the actual sales revenue of the mobile game market in China amounted to 209.676 billion, an increase of 51.565 billion yuan over 2019 or 32.61% year-on-year, accounting for 75.24% of the total revenue of the game market, creating favorable conditions for online game enterprises to make breakthroughs and innovations. <sup>58</sup>Since 2020, new products of various types of mobile games, including the game *Wan Guo Jue Xing* under the operation and strategy class and the adventure game *Original God* in the open world<sup>59</sup>, have been newly offered, bringing a better game experience and more choice space for mobile game users at home and abroad. Among others, the Original God, which introduces the concept of "open world" and combines itself with anime, comics, and games (ACG) culture<sup>60</sup>, performs well on both domestic and foreign markets. Ten days after its publication, the Original God had achieved nearly USD90 million of revenue at the global applications Apple Store and Google Store<sup>61</sup>, and was ranked first on the best-seller list of the Chinese, American and Korean markets and second on Japan's best-seller list in October 2020<sup>62</sup>.

Host games have gradually "gone viral". Their development potential urgently needs to be stimulated. Since 2020, multiple host games including the *Ring Fit Adventure* and *Animal Crossing: New Horizons* have aroused the enthusiasm of all people, and gradually gone viral beyond their own circles. Among others, the fitness-type game *Ring Fit Adventure* has greatly satisfied the needs for fitness activities at home due to the COVID-19 outbreak. In August, nearly 30,000 people subscribed for the game on the e-commerce platform within half a day. <sup>63</sup>The simulated operation game *Animal Crossing: New Horizons* made up for the social networking needs to certain extent as restricted by the COVID-19 epidemic. As of December 2020, the super topic of Weibo "Animal Crossing: New Horizons" was viewed 4.13 billion times; the number of posters reached 588,000; and the number of fans amounted to 243,000. <sup>64</sup>However, China's host game market still has great potential for development. According to the data, the proportion of revenue from host games in the revenue of global markets in 2020 reached 28% <sup>65</sup>, while that in China's game market was less than 2%. <sup>66</sup>Increasing the research and development of host games will facilitate the development of relevant industries in China, expand our cultural export channels, and further enhance the international awareness, influence and profitability of China's online game industry. In the future, with the improvement in the living standards of our people and the production level of Chinese game manufacturers, the potential of our host games will be further stimulated.

### (II) Online Music

<sup>&</sup>lt;sup>57</sup> Go viral: a popular Internet word, meaning that the popularity of a star or an incident is not only spread in his or her own fixed fan circle but also known by people outside the circle.

<sup>&</sup>lt;sup>58</sup> Source: China Gaming Industry Report 2020 of the Game Publishing Commission of the CADPA.

<sup>&</sup>lt;sup>59</sup> Open world refers to a game gateway design in which players can freely roam in a virtual world and freely choose the time and way to complete the game tasks.

<sup>60</sup> ACGN originates from "にじげん" from Japanese, which means "two-dimensional". The cartoons, comics, games and other works in Japan in early phase were composed of two-dimensional images, and the images were planes, so the virtual world created through these vectors is called the "ACGN World" or briefly the "ACGN".

<sup>61</sup> Source: sohu.com, https://www.sohu.com/a/423687542\_258858, October 10, 2020.

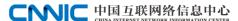
<sup>&</sup>lt;sup>62</sup> Source: GAMELOOK, http://www.gamelook.com.cn/2020/10/401176, October 22, 2020.

<sup>&</sup>lt;sup>63</sup> Source: GAMELOOK, http://www.gamelook.com.cn/2020/08/394871, August 21, 2020.

<sup>64</sup> Source: Weibo.

<sup>&</sup>lt;sup>65</sup> Source: Global Games Market Report 2020 of the NEWZOO

<sup>&</sup>lt;sup>66</sup> Source: China Gaming Industry Report 2020 of the Game Publishing Commission of the CADPA.



As of December 2020, the user size of online music was 658 million or 66.6% of China's total netizen population, up 23.11 million over March 2020; the number of mobile music users had reached 657 million, up 23.79 million from March 2020, accounting for 66.6% of mobile Internet users.

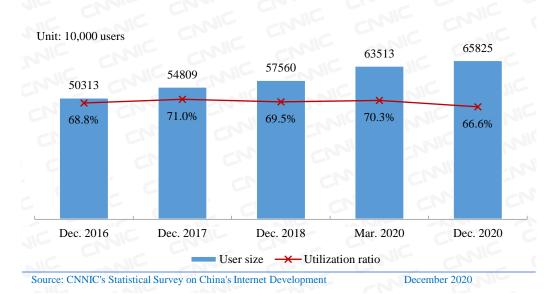


Figure 40 User Size and Utilization Ratio of Online Music from Dec. 2016 to Dec. 2020

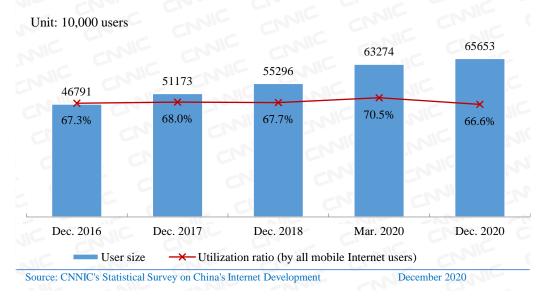


Figure 41 User Size and Utilization Ratio of Mobile Music from Dec. 2016 to Dec. 2020

In 2020, China's online music market gradually entered the stock competition stage; users' content payment habits were gradually developed; copyright had become an important source of income for online music platforms; and original support had become the focus in the new order for platform building.

Firstly, our online music industry has accelerated technological integration and expanded the application scenarios. In the context of accelerated advancement of new technologies such as 5G and block chains, online music platforms accelerated technological innovation, accelerated the integration with cutting-edge science and technology, injected new impetus into the development of the industry, and expanded the application scenarios. In terms of the application of 5G technology, in September 2020, China Audio-video and Digital Publishing Association issued the first 5G digital music industry standards - Ultra-HD and Sound Quality Technical



Requirements based on 5G Digital Music, aiming to meet the requirements for innovative development of digital music markets; Migu Music held a "5G+VR" panorama live streaming at the world's highest elevation in Mount Qomolangma, realizing the technical application of linkage virtual idols and off-site interconnections. **In terms of the application of block chain technology,** Tencent Music has established the dual system of "Central Information Library + Platform Information Base", so as to realize the process of procurement, management and distribution of copyright resources, and try to use block chain technology to effectively carry out the assessment of digital music copyright.

Secondly, the users' content-paying habits have been gradually developed, and platforms have entered the stock competition stage. On the one hand, the size of paid online music users continues to grow, and the users' habits have been gradually developed. In 2020, online music platforms continued to transform from the free mode to the payment mode, improve the degree of content diversification by expanding social networking entertainment, performance entertainment and other methods, and cultivate users' paid habits. According to the data, as of October 2020, China's online music paid users exceeded 70 million, accounting for 10.9% of the overall network music users, 0.2 percentage point higher than the 10.7% in the end of 2019, and the paid song subscription had been gradually accepted by our online music users. <sup>67</sup>On the other hand, the growth of new online music users slowed down and platforms entered the stock competition stage. According to the data, the growth rate of China's online music users in 2020 was 3.6%, a significant decline from 10.3% in 2019. The user size of platforms has gradually remained stable. The industry has shifted from the era of incremental dividends to the era of stock dividends. The focus of platforms continues to be transfered to the in-depth cultivation of users and improvement in user viscosity.

Thirdly, platforms are committed to building the "new order" of contents, with support for original works becoming the focus. In addition to speeding up the pursuit of inherent copyright resources, online music platforms have continuously launched various original plans, which is not only the support for the original power of the Chinese music circle, but also online music platforms' focus for the construction of "new order" of contents. The platforms support musicians in the amount of million yuan or even 100 million yuan, offer all-round and multi-dimensional services for original musicians, and provide them with online exclusive home pages, original lists, song recommendation, offline live tours, album production and other multi-dimensional promotion and support programs. Unlike traditional commercial recording companies, independent music is more attached to online music platforms, which also creates platform advantages for online music platforms. According to the data, as of April 2020, the total number of original musicians that have been settled in the Netease Cloud Music Platform exceeded 160,000, and the total number of original works uploaded by musicians was over 1.5 million<sup>68</sup>; the support programs such as "S Manufactured" and "The Force Plan" of Tencent Music also brought significant improvement in original force.

## (III) Online Literature

As of December 2020, the user size of online literature was 460 million or 46.5% of China's total netizen population, up 4.75 million over March 2020; the number of cell phone literature users had reached 459 million, up 6.22 million from March 2020, accounting for 46.5% of mobile Internet users.

<sup>67</sup> Source: 2020 Report on China Online Music Industry of Fastdata





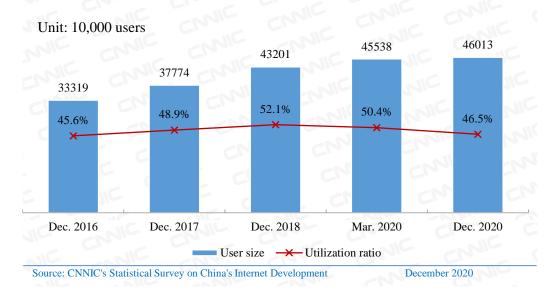


Figure 42 User Size and Utilization Ratio of Online Literature from Dec. 2016 to Dec. 2020

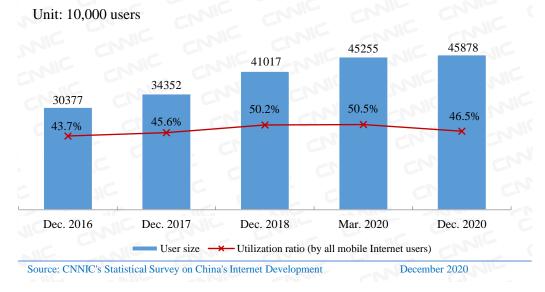


Figure 43 User Size and Utilization Ratio of Cell Phone Literature from Dec. 2016 to Dec. 2020

In 2020, the continuous development of domestic online literature industry had injected new vitality into this traditional online entertainment business. The changes were mainly reflected in industry development and market competition.

In terms of industry development, users' willingness to pay and the authors' creation environment continue to improve, jointly promoting a new step of the industry. Firstly, users' willingness to pay has been significantly improved. With the continuous strengthening of content creation support and optimization of the work recommendation system, the online literature users' willingness to pay for high-quality works has been further improved. According to the data, the monthly average payment by a single user of Yuewen Group increased from 22.5 yuan in the first half of 2019 to 34.1 yuan in the first half of 2020, with a year-on-year increase of up to 51.6%. <sup>69</sup>The growth of users' willingness to pay pushed the online business revenue up by 101.9% year-on-year. Secondly,



 $<sup>^{69}\,</sup>$  Source: Yuewen Group Interim Results 2020. The 47th Statistical Report on China's Internet Development

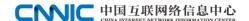


the cooperation mode between platforms and authors has been more flexible. Although the online literature industry has developed more and more mature, the cooperation mode between platforms and authors is very rigid, which is not conducive to stimulating the creative vitality of upstream authors. For this reason, some online literature platforms with industry influence have cancelled the single standard contract that has been used ever since. Various optional contracts are provided to meet different authors' development demands, so that the authors can choose the way of authorization or realization of the works, and authors' rights and interests are expanded, and authors are encouraged to make content creation. Thirdly, the copyright protection mechanism has been continuously improved. In August, the Wording Copyright Protection Working Committee of the Copyright Society of China was formally established. Relevant practitioners jointly launched a joint declaration of "cooperation on wording copyright protection" and established a genuine content protection mechanism to further guarantee the rights and interests of authors of online literature. With the improvement in the rights and interests of the authors of online literature, the rights and responsibilities between the platforms and the authors are clearer, laying a foundation for the healthy development of the industry on the basis of equality and mutual benefit and harmonious coexistence.

In terms of market competition, the involvement of large-scale Internet enterprises has further promoted the fierce competition in the online literature industry. With the increasingly close linkage between the online culture and entertainment industries, the online literature business has become more and more important to the large-scale Internet enterprises. In April, Yuewen Group announced to have a more profound linkage with Tencent in the aspects of film and television, animation and games in the future. In November, Bytedance acquired 11.23% stake of IREADER TECHNOLOGY (a mobile reading and distribution platform) through a subsidiary, and thus became the third largest shareholder of IREADER TECHNOLOGY, which marked the beginning of Bytedance's layout for online literature business. <sup>70</sup>In addition, the "Book Flag Novel" was launched on Taobao, and entered the free digital reading market based on the user traffic on the Taobao platform. In the future, it is expected that large-scale Internet companies represented by Tencent and Bytedance will further expand the resource investment in online literature business, thus promoting the continuous innovation of the industry and the upstream and downstream coordination of the industrial chain.

### (IV) Online Video

Up to December 2020, the user size of online video (including video clips) in China had reached 927 million, up 76.33 million from March 2020, making up 93.7% of all Internet users. The number of video clip users amounted to 873 million, up 100 million from March 2020, accounting for 88.3% of overall Internet users.



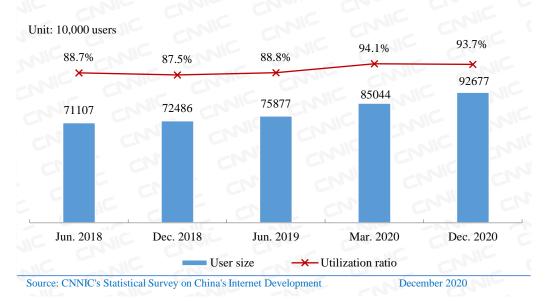


Figure 44 User Size and Utilization Ratio of Online Video (including Video Clip) from June 2018 to Dec. 2020

In 2020, the quality of online video programs was improved rapidly, and the business model of each platform had been gradually mature, and the business of long video and video clip platforms showed a trend of integrated development.

By relying on high-quality contents, the business models of online video platforms have been further mature. In recent years, the manufacturing concept of ingenuity has gradually been recognized and implemented by the online video industry, and the quality of the programs has increased significantly. In the field of online dramas, the major platforms began to set up innovative forms of dramas such as short play, vertical screenplay and interactive dramas, and their users' age range gradually was extended to the whole age range; in the field of online comprehensive arts, each platform was designed to deepen vertical users and improve the programs as its focus of development, and some programs formed a larger social influence; in the field of online films, the cinema films will be distributed through online channels, which have become new exploration directions, and the box-office returns shared will increase significantly. <sup>71</sup>With the support of quality contents, video websites began to try to raise membership prices and optimize business models. In November, iQiyi adjusted its consecutive monthly membership price from 15 yuan per month to 19 yuan per month, up 27%. This was the first time a domestic video platform adjusted the price. At present, major video websites have faced great revenue pressure. On the premise of attracting loyal users by high-quality contents, the increased membership price is one of the ways to increase the platform's revenue. For example, Netflix, the U.S. streaming media video website, has raised the membership price six times around the world.

Long video and video clip platforms' operations are mutually permeable and integrated. Firstly, long video platforms vigorously develop video clip business to attract users and traffic. Major long video platforms encourage the output of high-quality video clip contents through various ways, to enhance the proportion of video clip contents and increase user viscosity. For example, iQiyi launched a video clip content community "Suike",

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<sup>&</sup>lt;sup>71</sup> Sharing of box-office returns refers to the sharing of box-office returns from a movie by three parties, namely, the film projection party, the issuer and the producer.



using its rich IP<sup>72</sup> content advantages to fully empower creators; Tencent Video added the Channels to WeChat, to deploy the video clip business by relying on the huge user base and social networking advantages of WeChat. Secondly, video clip platforms began to get involved in the integrated video business and piloted the business by launching "micro drama" and "micro comprehensive arts" that were more matched to their platforms, and then gradually entered the long video field. Video clip platforms improve users' retention time by constantly adjusting the maximum length of videos shot by users and launching long video programs in cooperation with professional teams, which is also conducive to the output of high-quality contents. For example, following the 15-second, 1-minute and 3-minutes videos, Douyin has granted the video shooting permit of 15 minutes; Kuaishou also launched long video programs produced by the online professional teams in 2020, focusing on the social theme documentaries, online films and other aspects.



Figure 45 User Size and Utilization Ratio of Video Clip between June 2018 and Dec. 2020

In 2020, the user size of video clip grew rapidly; video clip platforms, on the one hand, made more efforts to develop the payment business, forming their own closed loop of e-commerce transactions, and on the other hand, actively expanded overseas markets, achieving good results by virtue of their first-mover advantages, but also faced policy and regulatory risks.

Video clip platforms develop the payment business to further improve their ecological layout. In 2020, Bytedance and Kuaishou successively obtained payment licenses through acquisitions, forming a closed loop of ecommerce business. Firstly, the good development momentum of e-commerce puts forward higher requirements for the cooperation among payment, products and operations. For platforms such as Kuaishou, e-commerce business is one of their core business, while payment is an important part of e-commerce business. The use of third-party payment services by video clip platforms not only increases compliance costs, but also affects user experience. Expanding own payment business is a guarantee for future development of video clip platforms. Secondly, the payment business is conducive to the subsequent refined operation and business expansion of platforms. Based on the payment business, platforms can accumulate a large amount of user data, based on which they can better describe the portraits of users and merchants, and carry out targeted product push and marketing. In addition, relying on the payment business, video clip platforms are expected to convert single payment transaction

<sup>&</sup>lt;sup>72</sup> IP: an abbreviation of Intellectual Property, refers to film and television literature, games, and animations suitable for secondary or multiple adaptation.



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users into users of other financial products, enhancing user stickiness while increasing operating income.

Video clip applications quickly occupy overseas markets, but also face policy and regulatory risks. Since 2016, video clip platforms have begun to try to go global, starting from emerging markets such as East Asia and Southeast Asia, and gradually expanding to North America and Europe, with rapid progress. Data shows that in the first half of 2020, TikTok ranked first in the world with 626 million downloads worldwide, and third in the world with the income of USD421 million generated in Apple and Google systems. <sup>73</sup>Kuaishou has launched different video clip applications such as Kwai and Snack Video for different overseas markets that are performing prominently in markets such as South Korea, Russia, and Vietnam. While developing rapidly in overseas markets, video clip applications also face certain policy risks. In the future, video clip companies in China need to adjust their going-global strategies accordingly in light of the international situation and laws and regulations of the host country.

# (V) Live streaming

As of December 2020, the user size of live streaming in China had reached 617 million, up 57.03 million from March 2020, taking up 62.4% of all Internet users. Specifically, the user size of livestream e-commerce was 388 million, up 123 million from March 2020, accounting for 39.2% of all Internet users. That of live game streaming was 191 million, down 68.35 million from March 2020, making up 19.3% of all Internet users. That of host live show was 239 million, up 31.68 million from March 2020, taking up 24.2% of all Internet users. That of live concert streaming was 190 million, up 39.77 million from March 2020, representing 19.2% of all Internet users. That of live sports broadcasting was 138 million, down 74.88 million from March 2020, accounting for 13.9% of all Internet users.

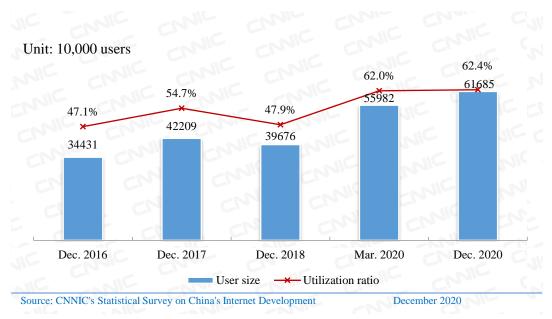


Figure 46 User Size and Utilization Ratio of Live Streaming from Dec. 2016 to Dec. 2020

In 2020, the live streaming industry represented by livestream e-commerce vigorously developed, which is reflected in the following two aspects.

In terms of consumption promotion, live streaming has become an effective way to stimulate the domestic

Nource: Sensor Tower, https://tech.ifeng.com/c/7xkkXNKhpCh, July 1, 2020.
The 47th Statistical Report on China's Internet Development

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economic flow. Under the background of the COVID-19 epidemic and the decisive stage of poverty alleviation in 2020, "crossing the information gap, realizing safe transactions, and forming a healthy cycle" has become an important goal of the government and enterprises. As a new digital economy mode featuring "online flow attraction + physical consumption", live streaming perfectly meets the above-mentioned needs, so it has become a new hot spot for development. Firstly, great importance attached by the government lays a solid foundation for the development of the industry. In order to thoroughly implement the strategies of targeted poverty alleviation and rural revitalization of the CPC Central Committee and the State Council, local governments have actively played the role of "matchmaking", promoted the development of the "livestream e-commerce +" industry by establishing livestream e-commerce associations, building livestream e-commerce bases, cultivating livestream e-commerce talents, and creating livestream e-commerce industry belts, and helped the revitalization of traditional industries. Secondly, active development of enterprises provides technical support for the development of the industry. E-commerce enterprises represented by JD.com and Suning.com, video clip platforms represented by Douyin and Kuaishou, and even Internet social networking APPs such as WeChat and Weibo have begun to take livestream ecommerce as a strategic focus for driving the growth of operating income. The massive influx of talents in enterprises has enabled the rapid development of livestream e-commerce technologies, including significant progress in terms of access rate, fluency, and latency. Thirdly, extensive participation of Internet users brings strong impetus to the development of the industry. With the accelerated forming of users' online consumption habit during the epidemic, livestream e-commerce has become an emerging shopping method widely loved by users. Data shows that users who have purchased products in livestream e-commerce account for 66.2% of all livestream e-commerce users, and 17.8% of users have livestream e-commerce consumption accounting for more than 30% of their total online shopping consumption. Take Weibo as an example. Many themed live streaming events such as "Meeting Good Domestic Products Together # This Is Very Chinese Style #" organized by People's Daily, CCTV News and other official Weibo accounts have attracted more than tens of millions of users. <sup>74</sup>

In terms of strengthened management, rectification measures for inappropriate contents and industry norms have been introduced one after another. Firstly, the management of inappropriate contents on live streaming platforms has been further strengthened. In June 2020, the Cyberspace Administration of China, in conjunction with the relevant departments, comprehensively inspected the content ecology of 31 major live streaming platforms, and took measures such as stopping the content update of major channels, suspending the registration of new users, and rectifying within a specified time limit against the relevant platforms depending on the circumstances of violations. In August 2020, the special rectification and standardized management of the live streaming industry was rearranged, focusing on improving the cultural taste of live streaming platforms, instructing users to give rewards rationally, regulating the sale behavior of anchors, and promoting the high-quality development of the live streaming industry. Secondly, the norms for the live streaming industry have been issued in an intensive manner. In June 2020, the China Advertising Association issued the Code of Conduct for Live Streaming Promotion, the first national regulations on the livestream e-commerce industry. In November 2020, the National Radio and Television Administration issued the Circular on Strengthening the Administration of Online Show Live Streaming and Livestream E-commerce; the Cyberspace Administration of China, in conjunction with the relevant departments, drafted the Administrative Provisions on Live Streaming Marketing Information Content



Services (Draft for Comment) for public comments. Those normative documents will help to eliminate disorderly practitioners in and achieve long-term prosperity and development of the live streaming industry.

# V. Public Service Applications

# (I) Online car-hailing services

As of December 2020, the number of online car-hailing users in China reached 365 million, up 2.98 million from March 2020, accounting for 36.9% of all Internet users.

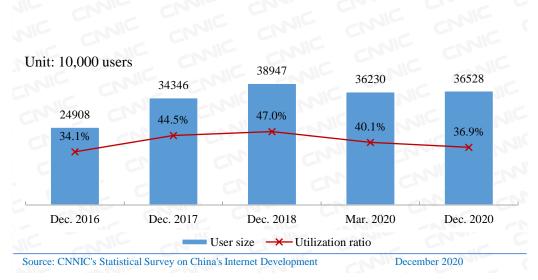


Figure 47 User Size and Utilization Ratio of Online Car-hailing Services between Dec. 2016 and Dec. 2020 In 2020, with the positive progress made in the prevention and control of the epidemic, the demand of online car-hailing users rebounded and the market gradually recovered and entered a state of orderly development. As new technologies mature increasingly, the control over auto-driving business of online car-hailing is gradually lifted, leading the lifestyle of smart travel. Based on technology empowerment, in order to implement the concept of green and intensive development, the comprehensive application of new energy in online car-hailing is put on the agenda, and the entire industry continues to explore high-quality development paths.

In terms of user size, the demand for online car-hailing rebounds, accelerating the market recovery. Affected by many uncertain factors caused by the COVID-19 epidemic, such as the centralized telecommuting of office workers, and the lack of public confidence in the safety of online car-hailing, the user size of online car-hailing services drops significantly. As of June 2020, the user size of online car-hailing services in China decreased to 340 million, equivalent to 84.1% of that in the same period in 2019. As the positive progress is made in the prevention and control of the epidemic, the public's demand for online car-hailing rises again. In the second half of 2020, the user size of online car-hailing services in China rebounded rapidly, up 7.4% from the first half of 2020.

In terms of technology development, the application of auto-driving technology in online car-hailing services ushers in a period of development opportunities. Along with the maturity of driverless technology, the application of such technology by online car-hailing enterprises has entered the stage of testing and experiment. In the past two years, many policies have been introduced to support the development of the auto-driving industry, and online car-hailing enterprises have actively made and implemented the development arrangement. In 2020, Guangzhou, Shanghai, Wuhan, Beijing and other cities gradually lifted the control over auto-driving manned test



permits, and AutoNavi Taxi, Didi Travel, and Baidu tested auto-driving taxis for the public in Guangzhou, Shanghai, Beijing and other places.

In terms of social benefits, online car-hailing enterprises help cities save energy and reduce emissions by a variety of ways. Studies have shown that cities adopting automated, electrified, and shared travel ways can reduce up to 80% of traffic pollutant emissions. <sup>75</sup>Under the policy guidance, the online car-hailing service industry in China has started comprehensive application of new energy from the end of 2020. For example, Shenzhen City stipulates that pure electric vehicles must be used for online car-hailing services from 2021<sup>76</sup>, while Dalian City stipulates that new energy vehicles must be adopted for online car-hailing services in the whole city by 2025. <sup>77</sup>Meanwhile, under the concept of intensive development, online car-hailing service platforms innovate travel modes and adjust pricing strategies, such as optimizing car-sharing routing algorithms to reduce detour time, to increase car sharing rates, optimize urban transport capacity, and reduce exhaust emissions.

## (II) Online education

As of December 2020, the user size of online education in China was 342 million, down 81.25 million from March 2020, accounting for 34.6% of all Internet users; the user size of mobile learning was 341 million, down 79.50 million from March 2020, making up 34.6% of mobile Internet users. In the second half of 2020, with the positive progress made in the prevention and control of the epidemic, the user size of online education declined as primary and secondary schools and universities resumed their classes in an orderly manner, but it still increased by 109 million compared with that before the epidemic (June 2019), and the development trend of the industry was good.

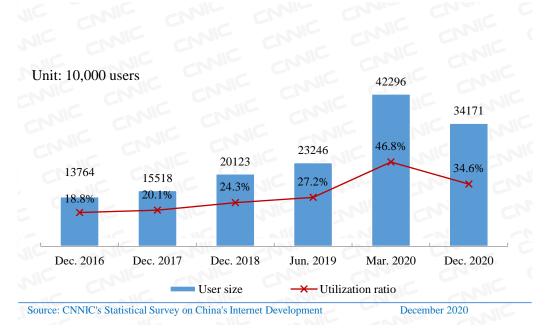


Figure 48 User Size and Utilization Ratio of Online Education from Dec. 2016 to Dec. 2020

<sup>&</sup>lt;sup>75</sup> Source: 2020 White Paper of Didi Platform on Green Travel.

<sup>&</sup>lt;sup>76</sup> Source: Newly revised Interim Administrative Measures of Shenzhen City for Online Car-hailing Services.

<sup>&</sup>lt;sup>77</sup> Source: Guiding Opinions of the General Office of the People's Government of Dalian Municipality on Accelerating the Innovative Development of the New Energy Vehicle Industry.

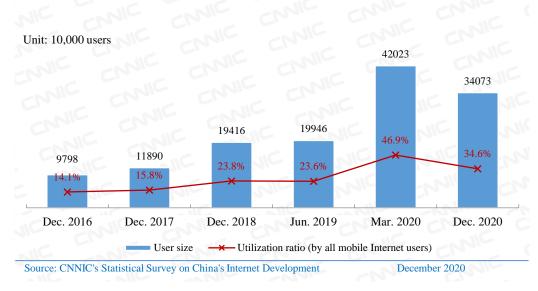


Figure 49 User Size and Utilization Ratio of Mobile Learning between Dec. 2016 and Dec. 2020

In 2020, affected by the COVID-19 epidemic, education informatization was further implemented, and many institutions and capital entered the field of online education, promoting more users to obtain fair and personalized teaching and services.

Education informatization has entered a stage of integration and innovation to better promote educational equity and support educational modernization. Firstly, the full coverage of schools by Internet has been basically achieved. By the end of November 2020, the Internet penetration rate of primary and secondary schools (including teaching points) nationwide was 99.7%, and 98.7% of schools had the Internet bandwidth of 100M. 52 poverty-stricken counties have achieved the full coverage of schools by Internet, and 99.7% of schools have achieved 100M bandwidth. <sup>78</sup>Secondly, the supply of high-quality resources and the level of teaching application have been greatly improved. The Ministry of Education has implemented the program of "full coverage of digital educational resources in rural teaching points", deeply promoted the application of "three classes" (special class, famous teacher's class and famous school's online class), carried out the activity of "One Teacher with One Excellent Class, One Class with One Outstanding Teacher" for six consecutive years, and basically formed an effective mechanism for expanding the coverage of high-quality education resources by use of information technologies. Thirdly, large-scale online teaching activities have been carried out smoothly. In the face of the impact of the COVID-19 epidemic, the Ministry of Education has launched the work on "stopping classes without stopping learning", and opened the national online cloud platform for primary and secondary schools to facilitate students' learning at home, promoting the whole society to further enhance the understanding of education informatization.

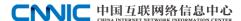
Institutions accelerate their business development, and the online education industry shows fierce competition. In 2020, the online education industry obtained good development opportunities, attracting many institutions and capital. Data shows that from January to October 2020, the number of online education enterprises in China increased by 82,000, accounting for 17.3% of the entire education industry. <sup>79</sup>From January to the end of

<sup>79</sup> Source: china.com, http://finance.china.com.cn/roll/20201211/5451925.shtml, December 11, 2020. The 47th Statistical Report on China's Internet Development



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<sup>&</sup>lt;sup>78</sup> Source: Press Conference of the Ministry of Education, http://www.moe.gov.cn/fbh/live/2020/52692/, December 1, 2020.



November 2020, the online education industry disclosed a total of 89 financing events, with the total financing amount of approximately RMB38.8 billion, up 256.8% year on year. <sup>80</sup>On the one hand, the potential of the online education industry continues to attract large-scale Internet companies; on the other hand, more traditional education and training institutions gradually expand their online business. For example, DingTalk has opened its live streaming system for free, and carried out strategic cooperation with "Songshui AI" to deepen online teaching; "OneSmart Education", an offline education and training institution, has integrated its online assets, and launched "OneSmart Online", to provide users with course products and services by online and offline modes.

Users obtain fair and personalized teaching and services through online education. Firstly, the development of primary and secondary education in lower-tier cities accelerates, promoting users in Tier 4 and Tier 5 cities to obtain fair education opportunities. In the first half of 2020, online education platforms developed the market in lower-tier cities by launching free courses and opening live streaming platforms, and realized online and offline integration through the localization of teaching and research design and the cooperation with local schools, enabling users in Tier 4 and Tier 5 cities and towns to get access to high-quality teacher and course resources, and truly benefit from educational equity. Secondly, technologies empower online education and help users obtain personalized teaching. With the development of technologies, many online education brands use artificial intelligence technology to assist teachers in personalized teaching, ensuring that students can get a good learning experience and high-quality learning contents. For example, "Banma English" adopts the "intelligent + interactive" method to complete the entire process of teaching evaluation, and accumulates feedback of each interaction as learning data, allowing users to obtain more targeted teaching contents at the next stage of learning.

# (III) Online medical services

As of December 2020, the user size of online medical services was 215 million, accounting for 21.7% of all Internet users. In 2020, affected by the COVID-19 epidemic, the advantages of online medical services were highlighted, and the industry ushered in important development opportunities.

The government continues to encourage the expansion of online medical services and promotes the coordinated development of online and offline medical services. In recent years, the National Health Commission, the National Healthcare Security Administration and other relevant entities have issued a number of circulars and guiding opinions to promote the accelerated application of Internet medical services, presenting the broad prospect of the industry. At the medical service level, efforts are made to explore and promote the first inquiry system and the appointment and triage system for Internet medical services and medical insurance<sup>81</sup>, and through the innovation of service model, improve the service efficiency and meet the growing needs of medical and health care; at the medicine level, prescription drugs are allowed to be sold on third-party platforms<sup>82</sup> to ensure the continuity of online drug purchase after remote inquiry; at the medical insurance level, it is stipulated that eligible Internet medical institutions can voluntarily "sign a contract" to be included into the scope of designated medical insurance entities via physical medical institutions they rely on, and "Internet +" medical insurance payment is subject to the

<sup>&</sup>lt;sup>81</sup> Source: Implementation Plan for Promoting the Program on "Rollout of Cloud Services, Utilization of Big Data and Pursuit of Intelligent Transformation" and Fostering the Development of New Economy.





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<sup>80</sup> Source: guancha.cn, https://www.guancha.cn/ChanJing/2020 12 21 575309.shtml, December 21, 2020.

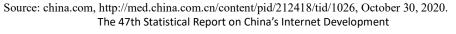


consistent reimbursement policy online and offline. <sup>83</sup>By the end of October 2020, there have been more than 900 Internet hospitals in China; the telemedicine collaboration network has covered all prefecture-level cities; and more than 5,500 second-level or higher hospitals can provide online services. <sup>84</sup>

Major Internet companies actively develop online medical services and build a complete medical service ecosystem. While providing existing products and services on the market, major companies, in combination with their own advantages, increase the participation of hospitals and the government, and cooperate to open up the online "medical services-medicine-insurance" channel, realizing the linkage of medical services, medicine and insurance. Firstly, with medicine e-commerce as the core, the upstream and downstream layout in the medical service field is expanded. Enterprises represented by JDH rely on the advantages of e-commerce resources to develop medicine retail business, and use technological advantages to extend their business lines and direct user groups to online medical services. Secondly, online and offline medical resources are revitalized by making use of the "connection" function and using the flow advantage. Enterprises represented by Tencent Healthcare make medical products penetrate into segmented application scenarios through foreign investment and cooperation, and at the same time, develop online medical services by virtue of WeChat ecological resources. Thirdly, online medical services are provided by relying on commercial insurance user groups. Enterprises represented by Ping An Good Doctor, relying on insurance resources of Ping An, conduct close cooperation with offline medical institutions with a professional doctor team, giving their platforms more advantages in online medical services such as inquiry and registration.

The penetration rate of online medical service users continues to increase, and use behaviors tend to be diversified. Firstly, user groups extend to all ages. A wider range of users begin to accept online medical service forms, and users extend from young people to all ages. As of December 2020, users above the age of 40 accounted for 40.4% of all online medical service users. Secondly, inquiry areas extend to Tier 3 and Tier 4 cities. As of December 2020, the utilization rate of online medical services by Internet users in Tier 3 and Tier 4 cities was 19.8% and 20.8% respectively, up more than 5.5 percentage points from June 2020, showing the fastest growth. Thirdly, types of diseases in inquiry tend to be diversified. As online medical services have been recognized by users as an aid to and a triage of offline medical services, the public trust in online medical services has increased, and types of diseases in inquiry have shown a diversified trend. At present, online medical services mainly play a role in health consultation, further consultation of chronic diseases, and disease triage. It is the future development trend to create a closed loop of online and offline integrated medical services.

<sup>&</sup>lt;sup>83</sup> Source: Guiding Opinions of the National Healthcare Security Administration on Actively Promoting Medical Insurance Payment for "Internet Plus" Medical Services.





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# **Chapter Four Internet Security**

# I. Cybersecurity Incidents

# (I) Proportion of types of cybersecurity problems

The proportion of Chinese Internet users who had not encountered any cybersecurity problems further increased. As of December 2020, 61.7% of Internet users said they had not experienced any cybersecurity problems in the past six months, up 5.4 percentage points from March 2020. The proportion of Internet users experiencing all kinds of cybersecurity problems decreased. Specifically, the proportion of Internet users who had suffered from cyber fraud decreased by 4.6 percentage points compared with March 2020; that of Internet users who had suffered from account or password stolen also dropped by 4.3 percentage points over March 2020.

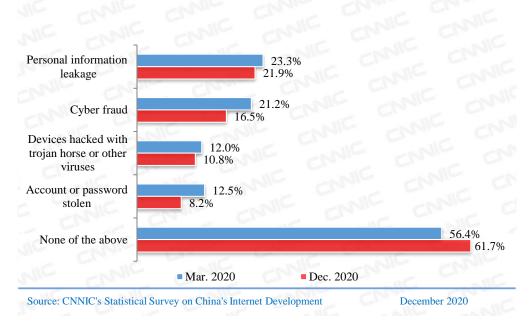


Figure 50 Proportion of Types of Cybersecurity Problems

# (II) Proportion of types of cyber fraud

Through a further survey of Internet users who had encountered cyber fraud, it was found that bonus-winning fraud was still the most common type of cyber fraud, accounting for 47.9%, down 4.7 percentage points from March 2020; fake friends fraud made up 31.4%, down 9.8 percentage points from March 2020; and phishing website fraud took up 24.7%, down 3.6 percentage points from March 2020.

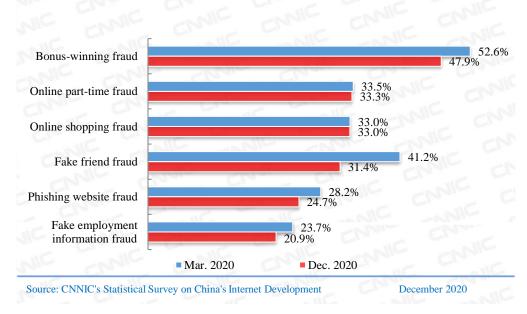


Figure 51 Proportion of Types of Cyber Fraud

# II. Website Security Incidents and information System Vulnerabilities

# (I) Number of websites tampered with by hackers in China

In 2020, the National Computer Network Emergency Response Technical Team/Coordination Center of China (CNCERT for short) monitored that the number of websites tampered<sup>85</sup> with by hackers in China was 243,709, down 22.7% from 315,302 in the same period of 2019.<sup>86</sup>

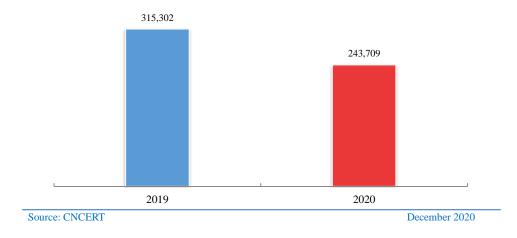


Figure 52 Number of Websites Tampered with by Hackers in China

<sup>&</sup>lt;sup>85</sup> Tampered means that malicious destruction or change of webpage content leads to the fact that a website is unable to work properly or inserted with abnormal webpage content by hackers.

<sup>&</sup>lt;sup>86</sup> The data is the sum of monthly data in the CNCERT Internet Security Threat Report, without de-duplication, the same below.

The 47th Statistical Report on China's Internet Development



In 2020, CNCERT monitored 1,030 tampered government websites in China, up 30.9% from 787 in the same period of 2019. <sup>87</sup>

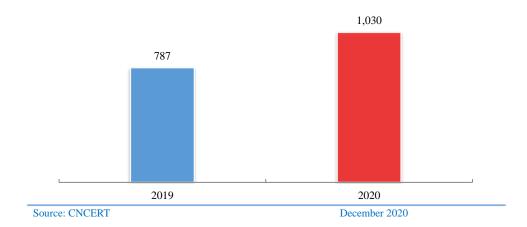


Figure 53 Number of Tampered Government Websites in China

# (II) Number of websites implanted with backdoor malware in China

In 2020, CNCERT monitored 61,948 websites implanted with backdoor malwares in China, down 39.7% from 102,783 in the same period of 2019.

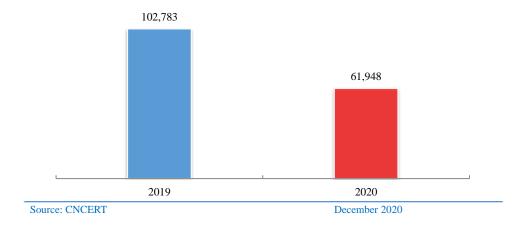


Figure 54 Number of Websites Implanted with Backdoor Malware in China

In 2020, CNCERT monitored 276 government websites implanted with backdoor malwares in China, down 73.6% from 1,045 in the same period in 2019.

Government websites refer to the websites ended with ".GOV.CN".

The 47th Statistical Report on China's Internet Development

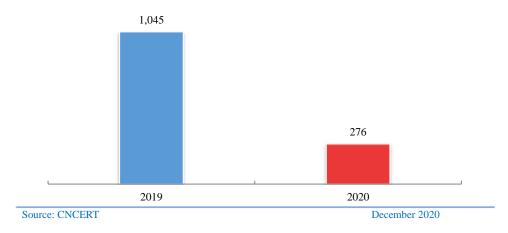


Figure 55 Number of Government Websites Implanted with Backdoor Malware in China

# (III) Number of information system vulnerabilities

In 2020, China National Vulnerability Database (CNVD) collected 20,721 information system vulnerabilities, up 28.0% from 16,193 in the same period of 2019. <sup>88</sup>

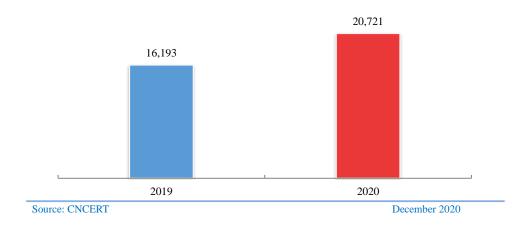


Figure 56 Number of Information System Vulnerabilities Recorded by CNVD

Specifically, 7,422 high-risk vulnerabilities in information systems were collected and recorded, up 52.2% over the same period in 2019 (4,877).

0

<sup>&</sup>lt;sup>88</sup> China National Vulnerability Database (CNVD) is a shared knowledge database for information security vulnerabilities established by CNCERT in cooperation with China's important information system units, basic telecom carriers, cybersecurity vendors, software vendors, and Internet companies.

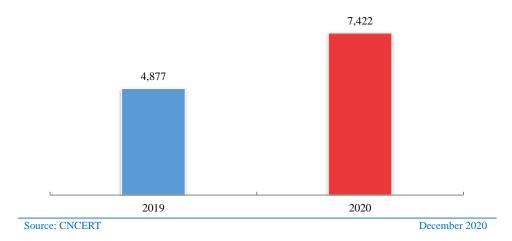


Figure 57 Number of High-risk Information System Vulnerabilities Collected by CNVD

# III. Reporting and Handling of Cybersecurity Incidents

# (I) Number of reported cybersecurity incidents received by CNCERT

In 2020, CNCERT received 103,109 reports of cybersecurity incidents, down 4.4% from 107,801 reports in the same period of 2019.

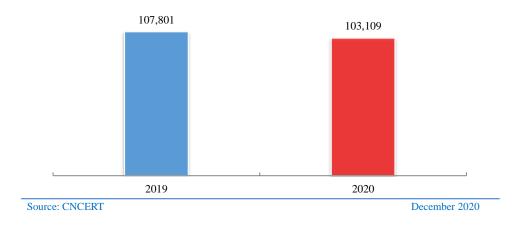


Figure 58 Number of Reported Cybersecurity Incidents Received by CNCERT

# (II) Number of reports received by China's network reporting departments at all levels

In 2020, network reporting departments at all levels received 163.192 million reports nationwide, up 17.4% from 138.986 million in the same period of 2019.



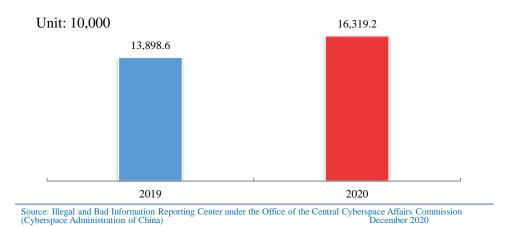
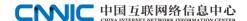


Figure 59 Number of Reports Received by Network Reporting Departments at All Levels Nationwide



# **Appendix 1 Survey Methodology**

# I. Survey Methodology

# (I) Survey on Individual Internet Users

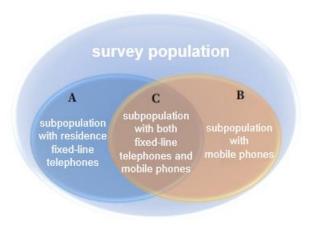
#### 1.1 Survey Population

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),  $C=A\cap B$ .

#### 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.

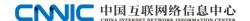
For the survey population with fixed-line telephones, stratified two-stage sampling is adopted. To ensure the sufficient representativeness of samples, the whole country is divided into 31 tiers according to the province, autonomous region and municipality directly under the central government and the 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, 0.5 percentage points is the estimated maximum allowable absolute error of the proportional target quantity (e.g. the popularity rate of netizens) among the individual netizen survey results, when the confidence is 95%. From this, we can deduce the error range of estimating other kinds of target quantities, such as the scale of netizens.

#### 1.4 Survey Method

The computer-assisted telephone interviewing (CATI) system is adopted for the survey.

#### 1.5 Differences between survey population and targeted population

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

# (II) Automatic Online Search and Data Report

Automatic online search is used to conduct technical statistics about the quantity of websites.

Statistical data for reporting mainly includes the number of IP addresses.

#### 2.1 Total 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 Total Number of Websites

It is worked out by CNNIC according to the lists of domain names.

The lists of domain names with .CN and .中国 come from the CNNIC database, while the lists of gTLD names come from relevant international domain name registries.

#### 2.3 Total Number of Domain Names

The numbers of domain names with ".CN" and ".中国" come from the database of CNNIC, and those of gTLD names and New gTLD names are provided by domestic domain name 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, 2020.



# **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	340,668,416	20A+82B+53C
Taiwan	35,686,400	2A+41B+186C
Hong Kong SAR	12,540,160	168B+207C
Macau SAR	336,640	5B+33C

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

Organization Name	Number of Addresses	Equivalence
China Telecom	125,763,328	7A+126B+255C
China Unicom	69,866,752 <sup>Note1</sup>	4A+42B+21C
IP Address Allocation Alliance of CNNIC	62,021,376 <sup>Note2</sup>	3A+178B+95C
China Mobile	35,294,208	2A+26B+140C
China Education and Research Network	16,649,728	254B+14C
China Mobile Tietong	15,796,224 <sup>Note3</sup>	241B+8C
Others	15,276,800	233B+27C
Total	340,668,416	20A+82B+53C

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 85.17 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, 2020.

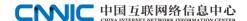


Table 3 The Number of IPv6 Addresses in Different Regions of China (unit: /32note1)

Region	Number of Addresses
Chinese mainland	54,593
Taiwan	2,555
Hong Kong SAR	479
Macau SAR	7

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

Organization Name	Number of IPv6 Addresses	
China Telecom	16,387	
IP Address Allocation Alliance of CNNIC	21,065 <sup>Note2</sup>	
China Education and Research Network	6,162	
China Unicom	4,097	
China Mobile	4,097	
China Mobile Tietong	2,049 <sup>Note3</sup>	
China Science and Technology Network	17 <sup>Note4</sup>	
Others	719	
Total	54,593	

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  $2^{(128-32)} = 2^{96}$ .

Note 2: At present, the number of IPv6 addresses held by the members of IP Address Allocation Alliance of CNNIC is 23121/32. The IPv6 addresses held by the 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, 2020.

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

Province / Autonomous Region / Municipality	Proportion	
Directly under the Central Government	τ τοροι ασπ	
Beijing	25.49%	
Guangdong	9.54%	
Zhejiang	6.47%	
Shandong	4.89%	
Jiangsu	4.76%	
Shanghai	4.52%	
Liaoning	3.33%	
Hebei	2.85%	
Sichuan	2.77%	
Henan	2.63%	
Hubei	2.40%	
Hunan	2.36%	
Fujian	1.95%	
Jiangxi	1.73%	
Chongqing	1.68%	
Anhui	1.65%	
Shaanxi	1.63%	
Guangxi	1.38%	
Shanxi	1.28%	
Jilin	1.21%	
Heilongjiang	1.21%	
Tianjin	1.05%	
Yunnan	0.98%	
Inner Mongolia	0.77%	
Xinjiang	0.60%	
Gansu	0.47%	
Hainan	0.47%	
Guizhou	0.44%	
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, 2020.



Table 6 The Numbers of Domain Names, .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
Guangdo ng	5,346,783	12.7%	2,070,714	10.9%	18,556	1.1%
Beijing	3,732,094	8.9%	1,773,379	9.3%	26,785	1.6%
Fujian	3,248,988	7.7%	727,383	3.8%	1,514,316	88.9%
Henan	2,730,478	6.5%	988,593	5.2%	4,426	0.3%
Sichuan	2,190,256	5.2%	1,055,125	5.6%	11,758	0.7%
Jiangsu	2,067,359	4.9%	1,065,376	5.6%	10,186	0.6%
Hunan	1,848,104	4.4%	823,000	4.3%	2,969	0.2%
Shandon g	1,819,854	4.3%	1,016,736	5.4%	24,928	1.5%
Hubei	1,803,868	4.3%	870,055	4.6%	3,685	0.2%
Zhejiang	1,674,963	4.0%	551,434	2.9%	8,169	0.5%
Anhui	1,548,329	3.7%	770,569	4.1%	3,162	0.2%
Shanghai	1,406,862	3.4%	744,246	3.9%	8,195	0.5%
Jiangxi	1,306,663	3.1%	626,370	3.3%	4,388	0.3%
Guangxi	1,120,564	2.7%	587,300	3.1%	2,095	0.1%
Guizhou	1,100,691	2.6%	426,082	2.2%	3,255	0.2%
Hebei	1,002,094	2.4%	441,864	2.3%	5,922	0.3%
Shaanxi	987,462	2.4%	500,866	2.6%	6,210	0.4%
Yunnan	898,742	2.1%	388,646	2.0%	5,272	0.3%
Chongqi ng	865,720	2.1%	380,629	2.0%	5,499	0.3%
Shanxi	827,945	2.0%	589,708	3.1%	1,950	0.1%
Liaoning	795,084	1.9%	478,529	2.5%	6,242	0.4%
Jilin	558,134	1.3%	265,041	1.4%	1,652	0.1%
Heilongji ang	536,146	1.3%	320,857	1.7%	3,023	0.2%
Gansu	426,902	1.0%	245,302	1.3%	1,082	0.1%
Hainan	417,704	1.0%	287,014	1.5%	606	0.0%
Tianjin	336,567	0.8%	139,999	0.7%	1,568	0.1%
Inner Mongoli a	195,208	0.5%	104,379	0.6%	1,214	0.1%
Xinjiang	131,705	0.3%	51,219	0.3%	935	0.1%
Ningxia	77,404	0.3%	47,171	0.3%	414	0.176

Qinghai	45,350	0.1%	33,737	0.2%	193	0.0%
Tibet	16,238	0.0%	9,115	0.0%	486	0.0%
Others	913,350	2.2%	589,616	3.1%	13,941	0.8%
Total	41,977,611	100.0%	18,970,054	100.0%	1,703,082	100.0%

Data sources: CNNIC

Note: The deadline for the above statistical data is Dec. 31, 2020.



**Table 7 Web Pages Categorized by Suffix** 

Web page suffix	Proportion
html	44.13%
/	16.89%
php	6.23%
htm	3.89%
shtml	2.88%
aspx	1.56%
asp	0.92%
jsp	0.33%
Other suffixes	23.17%
Total	100.00%

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

**Table 8 The Number of Web Pages by Province** 

	Total web pages			Proportion of
	after duplication			Static to
	removed	Static	Dynamic	Dynamic
Beijing	116,177,916,577	74,735,522,214	41,442,394,363	1.80
Guangdong	41,676,134,904	28,214,202,591	13,461,932,313	2.10
Zhejiang	37,042,493,046	26,364,891,564	10,677,601,482	2.47
Shanghai	22,390,881,534	16,194,399,449	6,196,482,085	2.61
Henan	18,664,879,830	14,723,651,038	3,941,228,792	3.74
Jiangsu	14,163,095,838	8,339,448,756	5,823,647,082	1.43
Hebei	12,121,793,938	9,184,681,846	2,937,112,092	3.13
Fujian	8,876,718,592	6,642,724,437	2,233,994,155	2.97
Shandong	5,988,471,914	4,010,707,558	1,977,764,356	2.03
Sichuan	5,469,599,972	3,762,271,227	1,707,328,745	2.20
Tianjin	5,226,554,834	3,435,021,659	1,791,533,175	1.92
Shanxi	3,323,554,569	2,443,378,091	880,176,478	2.78
Hubei	2,925,230,758	1,853,494,024	1,071,736,734	1.73
Liaoning	2,819,834,895	2,001,500,945	818,333,950	2.45
Anhui	2,759,101,217	2,136,412,041	622,689,176	3.43
Jiangxi	2,544,963,874	2,081,743,977	463,219,897	4.49
Guangxi	2,327,709,726	1,736,696,500	591,013,226	2.94
Jilin	1,895,540,526	1,333,833,648	561,706,878	2.37
Hunan	1,759,748,601	1,191,364,195	568,384,406	2.10
Yunnan	1,726,903,016	1,192,548,826	534,354,190	2.23
Shaanxi	1,581,451,034	1,028,683,987	552,767,047	1.86
Heilongjiang	1,480,509,029	1,158,925,039	321,583,990	3.60
Hainan	1,418,587,523	1,073,361,040	345,226,483	3.11
Chongqing	527,923,909	334,100,967	193,822,942	1.72
Inner	195,461,632	115,648,043	79,813,589	1.45
Mongolia	193,401,032	113,040,043	79,013,309	1.43
Gansu	163,444,244	78,766,034	84,678,210	0.93
Guizhou	119,491,373	80,522,022	38,969,351	2.07
Xinjiang	80,898,402	43,530,458	37,367,944	1.16
Qinghai	33,816,788	24,401,257	9,415,531	2.59
Ningxia	14,878,690	10,515,897	4,362,793	2.41
Tibet	3,507,027	2,501,213	1,005,814	2.49
The whole country	315,501,097,812	215,529,450,543	99,971,647,269	2.16

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



**Table 9 Web Page Bytes by Province** 

	Total Page Size	Average Page Size (KB)
Beijing	10,101,271,027,365	86.95
Guangdong	2,867,651,345,953	68.81
Zhejiang	2,580,876,080,514	69.67
Shanghai	2,062,664,797,263	92.12
Henan	1,082,140,717,498	57.98
Jiangsu	888,466,673,221	62.73
Hebei	1,005,648,321,464	82.96
Fujian	539,080,130,883	60.73
Shandong	340,044,727,170	56.78
Sichuan	285,294,825,189	52.16
Tianjin	324,708,353,069	62.13
Shanxi	370,753,271,086	111.55
Hubei	153,149,585,143	52.35
Liaoning	122,866,023,142	43.57
Anhui	119,395,724,961	43.27
Jiangxi	91,233,601,379	35.85
Guangxi	123,879,330,798	53.22
Jilin	74,341,121,194	39.22
Hunan	103,702,633,370	58.93
Yunnan	86,234,403,650	49.94
Shaanxi	75,625,944,208	47.82
Heilongjiang	97,000,952,500	65.52
Hainan	51,524,373,034	36.32
Chongqing	35,386,617,121	67.03
Inner Mongolia	10,944,267,663	55.99
Gansu	12,043,270,637	73.68
Guizhou	5,519,702,094	46.19
Xinjiang	3,242,671,189	40.08
Qinghai	2,824,576,816	83.53
Ningxia	552,010,080	37.10
Tibet	125,936,811	35.91
The whole country	23,618,193,016,465	74.86

Data source: 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 on basic resources. (Not listed in any particular order)

The Ministry of Industry and Information Technology National Bureau of Statistics

China Organizational Name Administration Center

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

National Computer Network Emergency Response Technical Team/Coordination Center of China (CNCERT)

China Center for Reporting Illegal and Inappropriate Internet Information (12377), Office of the Central Cyberspace Affairs Commission (Cyberspace Administration of China)

Computer Network Information Center, Chinese Academy of Sciences

Beijing Ucap Information Technology Co., Ltd.

Baidu Online Network Technology (Beijing) Co., Ltd.

Beijing Micro Dream Network Technology Co., Ltd. (Micro-blog)

Beijing Bytedance Technology Co., Ltd.

Alibaba Communication Technology (Beijing) Co., Ltd.

Alibaba Cloud Computing Co., Ltd.

Beijing Oriental Wangjing Information Technology Co., Ltd. Beijing XDNS Network Technology Co., Ltd.

Beijing HuaRui Wireless Technology Co., Ltd.

Beijing Shouxinwangchuang Network Information Co., Ltd.

Beijing Wanweitonggang Technology Co., Ltd.

Beijing DNS Technology Co., Ltd. Beijing Xin Net Technology Co., Ltd.

Beijing ZhongWan Network Technology Co., Ltd.

Beijing BrandCloud International Network Technology

Co., Ltd.

Beijing Zhuoyueshengming Technology Co., Ltd. Beijing Zihai Technology Co., Ltd.

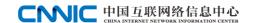
Chengdu Feishu Technology Co., Ltd. Chengdu 51web Network Communication Co., Ltd.

Chengdu West Dimension Digital Technology Co., Ltd Daqing Zhuochuang Multi-media Production Co., Ltd.

Fanxi Corporation Service (Shanghai ) Co., Ltd Panasia Info&Tech JiangSu 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.

Guangzhou Mingyang Information Technology Co., Ltd.

Hefei Juming Network Technology Co., Ltd.

Heilongjiang E-link Network Co., Ltd.

Jiangsu Bangning Science & technology Co., Ltd.

Xiamen Dianmei Network Technology Co., Ltd.

Xiamen 35.Com Technology Co., Ltd.

Xiamen ChinaSource Internet Service Co., Ltd

Xiamen Zhong.top Internet Technology Co., Ltd

Shanghai Chinafu.com Co., Ltd.

Shanghai Yovole Network Co., Ltd.

Shenzhen Yingmaisi Information Technology Co., Ltd.

Tencent Cloud Computing (Beijing) Co., Ltd.

WJ Brands Co., Ltd.

Yantai DNSpod Network Technology Co., Ltd.

Zhejiang 22net Inc.

Grow Force Technology Co., Ltd.

Knet Registrar (Tianjin) Co., Ltd

Zunyi zhongyuzhike Network Technology Co., Ltd.

Guangdong Now.cn Technology Co., Ltd.

Vipinternet Co., Ltd.

Henan Weichuang Network Technology Co., Ltd.

Internet DNS Beijing Engineering Research Center

Maoming City Qunying Network Co., Ltd.

Xiamen Nawang Technology Co., Ltd

Xiamen Shangzhong Online Technology Co., Ltd.

eName Technology Co., Ltd.

Shanghai Oray.com Co., Ltd.

Shanghai Meicheng Technology Information

Development Co., Ltd.

Shenzhen Idcicp.com Co., Ltd.

Sichuan Yuqu Network Technology Co., Ltd.

Tianjin Zhuiri Technology Development Co., Ltd.

Xi'an Qianxinet Technology Co., Ltd.

Ejee Group Beijing Co., Ltd.

Zhengzhou Shijichuanglian Electronic Technology

Development Co., Ltd.

ChinaNet (Suzhou) Co., Ltd.

Chongqing Zhijia Information Technology Co. Ltd.

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