The 52nd Statistical Report on China's Internet Development

China Internet Network Information Center (CNNIC)

August 2023

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 51 reports. The Report has reflected the process of building up China's strength in manufacturing and cyberspace through core data. It has provided an important reference for Chinese government departments, domestic and international industry institutions, experts, scholars, and the general public to understand the development of China's Internet and formulate relevant policies.

The year of 2023 is the first year to fully implement the spirit of the 20th National Congress of the Communist Party of China, and it is also a crucial year to implement the 14th Five-Year Plan. At present, historic achievements in industrialization and informatization have been made in China, the pace of new industrialization has been significantly accelerated, the industrial system and industrial chain are sounder, network infrastructure is leading the world, Internet application has been accelerated from the consumption field to the production field, and the comprehensive industrial strength has reached a new level, laying a solid foundation for opening a new chapter of building a modern socialist country in an all-round way.

As a faithful recorder of the construction of a manufacturing power and network power, CNNIC has been following the development of China's Internet, expanding the scope of research, and subdividing research areas. The Report focuses on the five aspects, including basic Internet development, size of Internet users, Internet applications, industrial Internet, and Internet security. From a multi-pronged perspective, CNNIC has worked to comprehensively demonstrate the development of China's Internet in the first half of 2022 through all-round data.

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

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Core Data

◇ As of June 2023, China had 1,079 million netizens, up 11.09 million over December 2022, and its Internet penetration had reached 76.4%, up 0.8 percentage point over December 2022.

◇ Up to June 2023, the number of mobile Internet users in China had reached 1,076 million, up 11.09 million over December 2022. The proportion of China's netizens accessing the Internet via mobile phones was 99.8%.

◇ As of June 2023, the size of urban Internet users was 777 million or 72.1% of the national total, while that of rural Internet users was 301 million or 27.9% of the national total.

◇ Up to June 2023, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptop computers, TVs and tablet computers were 99.8%, 34.4%, 32.4%, 26.8% and 28.6%, respectively.

◇ As of June 2023, the number of IPv6 addresses had increased to 68,055 blocks / 32, up 1.0% over December 2022.

◇ Up to June 2023, the number of China's domain names totaled 30.24 million.

◇ As of June 2023, the user size of instant messaging in China reached 1,047 million, up 8.86 million from December 2022, making up 97.1% of the national total.

◇ Up to June 2023, the user size of online video in China had reached 1,044 million, up 13.80 million from December 2022, making up 96.8% of all Internet users. Among them, the number of short video users was 1,026 million, an increase of 14.54 million over December 2022, accounting for 95.2% of all Internet users.

◇ As of June 2023, the user size of online payment in China had reached 943 million, up 31.76 million from December 2022, taking up 87.5% of the national total.

◇ As of June 2023, the user size of online shopping in China was 884 million, up 38.80 million from December 2022, taking up 82.0% of all Internet users.

◇ As of June 2023, the number of search engine users in China was 841 million, an increase of 39.63 million compared with December 2022, accounting for 78.0% of all netizens.

◇ As of June 2023, the user size of live streaming in China had reached 765 million, an increase of 14.74 million over December 2022, accounting for 71.0% of all Internet users.

◇ Up to June 2023, the user size of online games in China was 550 million, up 28.06 million from December 2022, making up 51.0% of all Internet users.

◇ As of June 2023, the user size of online literature in China was 528 million, up 35.92 million from December 2022, making up 49.0% of all Internet users.

◇ As of June 2023, the user size of online meal ordering in China reached 535 million, an increase of 13.72 million compared with December 2022, accounting for 49.6% of the total netizen population.

◇ As of June 2023, the user size of online car-hailing services in China was 472 million, up 34.92 million from December 2022, making up 43.8% of all Internet users.

◇ Up to June 2023, the user size of online travel booking services in China was 454 million, up 30.91 million from December 2022, making up 42.1% of all Internet users.

Chapter One
Internet Resources and Access

In the first half of 2023, China's digital infrastructure construction was further accelerated, the application of digital resources was enriched, and the network environment was optimized, pushing the high-quality development of the information and communication industry to a new level. First, the service capacity of digital infrastructure was improved. As of June, China built and opened 2.937 million 5G base stations, with 676 million 5G mobile phone users and 2.123 billion cellular IoT end users developed by three basic telecommunications operators. The number of 10G PON ports with gigabit network service capacity reached 20.29 million; large-scale deployment and application of IPv6 was promoted, with the number of active users reaching 767 million, and IPv6 traffic in mobile networks accounted for more than half of the total[1]. Second, the application of digital resources continued to deepen. As of June, the cumulative traffic of mobile Internet reached 142.3 billion GB, a year-on-year increase of 14.6%[2]; mobile Internet applications were booming, and the number of active apps monitored in the domestic market reached 2.6 million[3], further covering the daily study, work and life of netizens and providing convenient services. Third, the Internet environment continued to be optimized. The Ministry of Industry and Information Technology continued to carry out special rectification actions, and organized third-party inspection agencies to inspect practical tools, mobile Internet applications such as entertainment and third-party software development kits (SDK[4]). As of July 19, a total of 188 apps infringing on users' rights and interests were notified[5].

I Basic Internet Resources

As of June 2023, the number of IPv4 addresses in China was 392.07 million, that of IPv6 addresses was 68,055 blocks/32, and that of active IPv6 users reached 767 million. The total number of domain names in China was 30.24 million, that of mobile phone base stations in China totaled 11.29 million[6], that of Internet broadband access ports was 1.11 billion, and the total length of fiber optic cable lines increased to 61.96 million kilometers.

[1] Source: Ministry of Industry and Information Technology, https://mp.weixin.qq.com/s/glnh12JBpjqpahT9LVVEMg, 19 July 2023.
[2] Source: Ministry of Industry and Information Technology, https://wap.miit.gov.cn/gxsj/tjfx/txy/art/2023/art_75d835dA87d24C13A A5DC 752b 901aca7.html, July 20, 2023.
[3] Source: Ministry of Industry and Information Technology, https://wap.miit.gov.cn/gxsj/tjfx/hlw/art/2023/art_1e078242dee140cb99d 46CC070e717.html, July 31, 2023.
[4] SDK refers to Software Development Kit.
[5] Source: Ministry of Industry and Information Technology, https://mp.weixin.qq.com/s/glnh12JBpjqpahT9LVVEMg, 19 July 2023.
[6] Source: Ministry of Industry and Information Technology, https://wap.miit.gov.cn/gxsj/tjfx/txy/art/2023/art_75d835dA87d24C13A A5DC 752b 901aca7.html, July 20, 2023.

Table 1 Comparison: Basic Internet Resources from Dec. 2022 to June 2023

Category	Dec. 2022	June 2023
IPv4	391,822,848	392,073,728
IPv6	67,369	68,055
Number of active IPv6 users (100 million)	7.28	7.67
Domain name	34,400,483	30,237,084
Mobile phone base stations (10,000)	1,083	1,129
Internet broadband access ports (100 million)	10.71	11.06
Length of fiber optic cable lines (10,000 km)	5,958	6,196

(I) IP Address

As of June 2023, the number of IPv6 addresses was 68,055 blocks/32, up 1.0% over December 2022. Out of the 23 global key public recursive services with IPv6 support, 14 provide IPv6 public recursive services, accounting for about 60.9%.

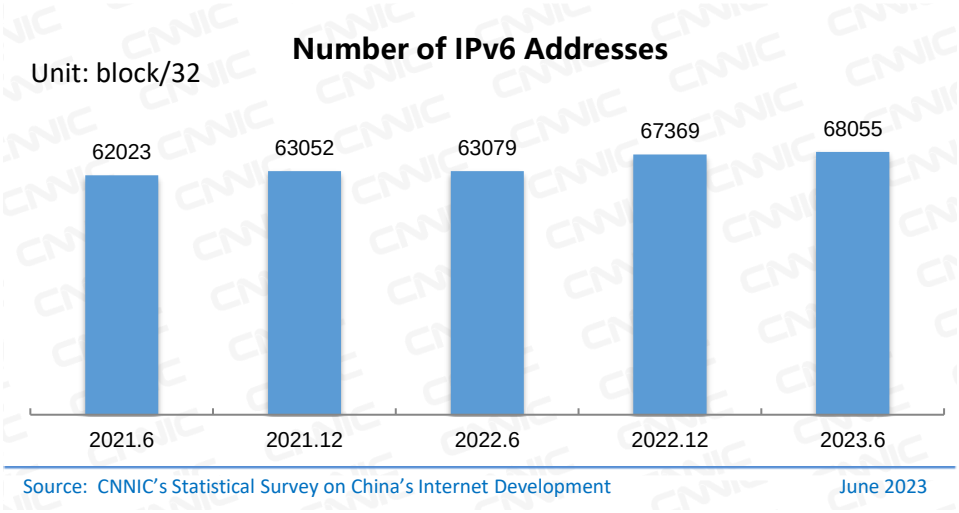


Figure 1 Number of IPv6 Addresses[7]

As of June 2023, the number of active IPv6 users in China reached 767 million.

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

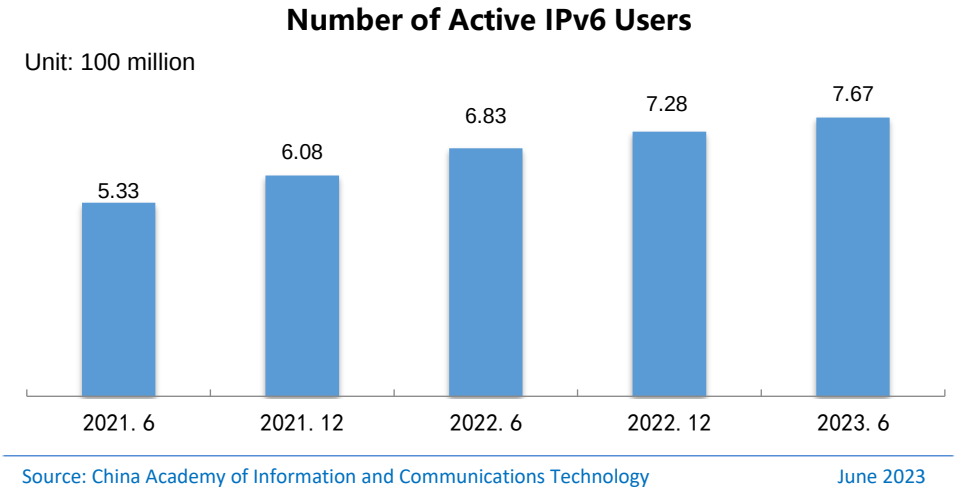


Figure 2 Number of Active IPv6 Users

Up to June 2023, the number of IPv4 addresses in China had amounted to 392.07 million.

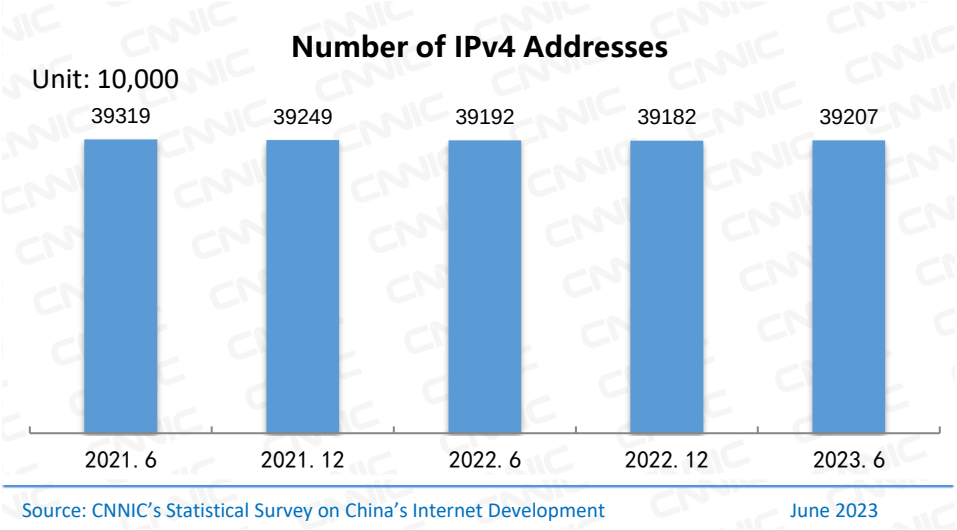


Figure 3 Number of IPv4 Addresses[8]

(II) Domain Name

Up to June 2023, the number of China's domain names totaled 30.24 million. Specifically, 8.22 million or 27.2% ended with ".CN"; 180,000 million or 0.6% ended with ".中国"; and 2.71 million or 9.0% were new generic Top-Level Domains (New gTLDs).

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

(III) International Internet Bandwidth

By December 2022, China's international internet bandwidth was 18,469,972Mbps, an increase of 33.5% compared with December 2021.

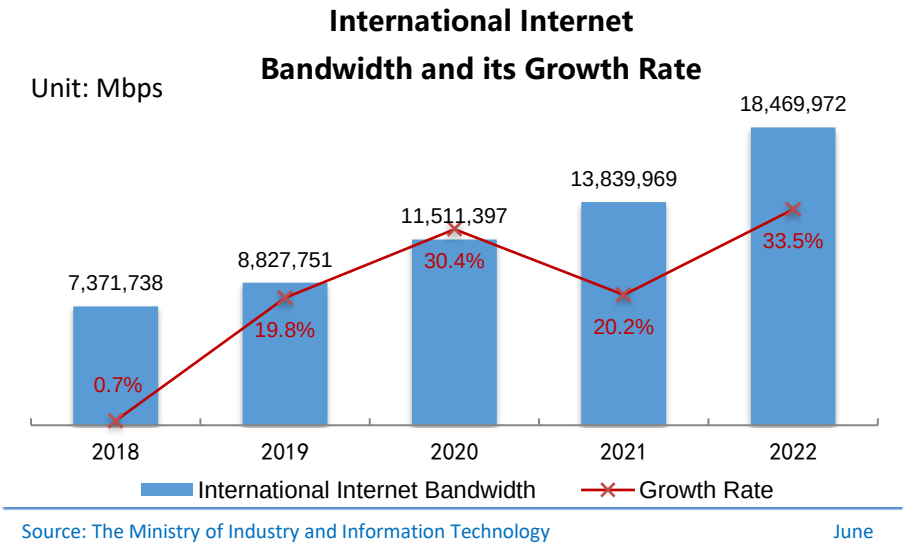


Figure 4 International Internet Bandwidth and its Growth Rate

(IV) Number of Mobile Phone Base Stations

By June 2023, the total number of mobile phone base stations in China reached 11.29 million, a net increase of 452,000 compared with December 2022. Among them, a total of 2.937 million 5G base stations had been built and put into operation, accounting for 26%[9] of the total number of mobile base stations, covering all prefecture-level cities and county towns, and the coverage continued to expand. Co-built and shared 5G base stations exceeded 1.73 million in number, the world's first commercial trial use of cross-network roaming was launched, and the intensive, efficient, green and low-carbon development of 5G networks was accelerated[10].

[9] Source: Ministry of Industry and Information Technology, https://wap.miit.gov.cn/gxsj/tjfx/txy/art/2023/art_75d835dA87d24C13A A5DC 752b 901aca7.html, July 20, 2023.
[10] Source: Ministry of Industry and Information Technology, https://wap.miit.gov.cn/xwdt/gxdt/ldhd/art/2023/art_1ebaa812f69c488d30c4a19e63dec8.html, July 19, 2023.

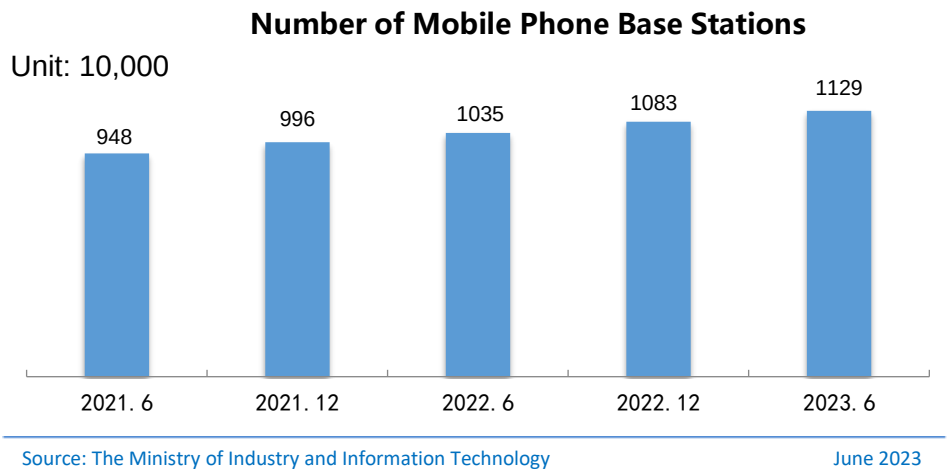


Figure 5 Number of Mobile Phone Base Stations

(V) Number of Internet Broadband Access Ports

As of June 2023, the number of Internet broadband access ports nationwide reached 1.11 billion, a net increase of 34.57 million from December 2022. Among them, FTTH/O ports reached 1.06 billion in number, a net increase of 38.55 million over December 2022, accounting for 96.2% of Internet broadband access ports. The number of 10G PON ports with Gigabit network service capability reached 20.29 million, a net increase of 5.065 million compared with December 2022.

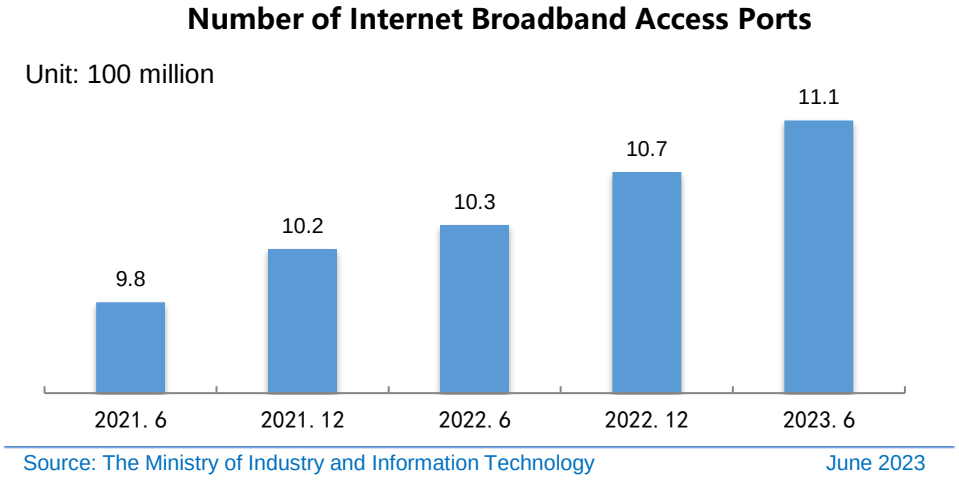


Figure 6 Number of Internet Broadband Access Ports

(VI) Total Length of Fiber Optic Cable Lines

By June 2023, the total length of fiber optic cable lines reached 61.96 million kilometers, a net increase of 2.381 million kilometers compared with December 2022. Of them, access fiber optic cable lines, local relay fiber optic cable lines and long-distance fiber optic cable lines accounted for 62.6%, 35.7% and 1.8% respectively.

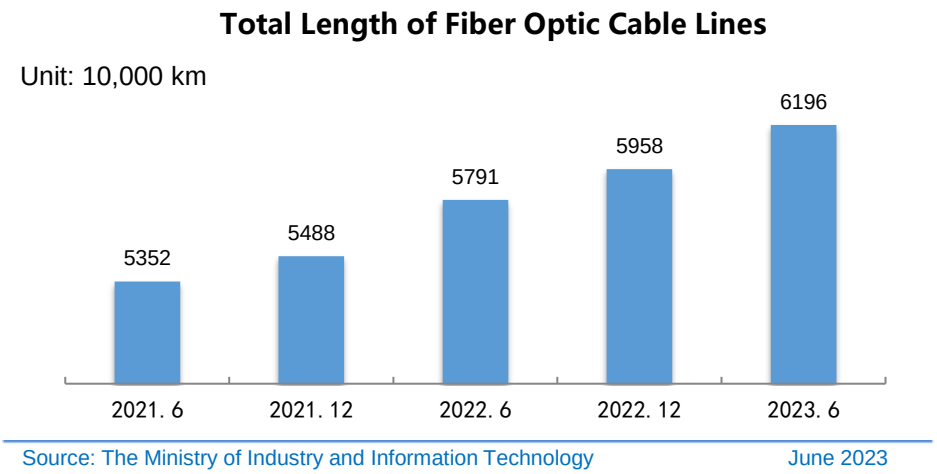


Figure 7 Total Length of Fiber Optic Cable Lines[11]

II Application of Internet Resources

(I) Websites

As of June 2023, there were 3.83 million websites in China[12].

[11] The data of December 2021 was adjusted according to the latest statistics of the Ministry of Industry and Information Technology, https://wap.miit.gov.cn/gxsj/tjfx/txy/art/2023/art_75d835d24c13a5dc752b 901aca7.html, July 20, 2023.

[12] The websites whose domain name registrants are within the territory of the P.R.C.

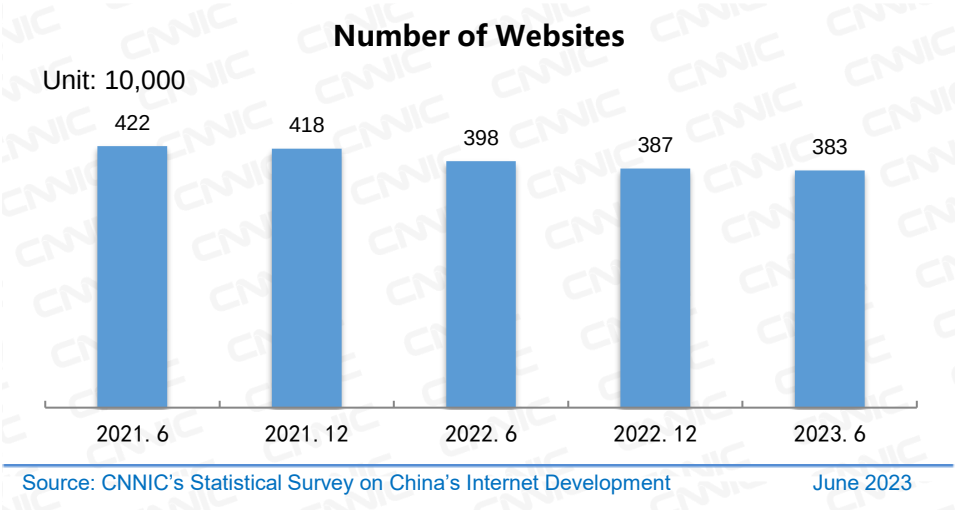


Figure 8 Number of Websites[13]

Up to June 2023, China had 2.25 million websites with domain names ending with ".CN".

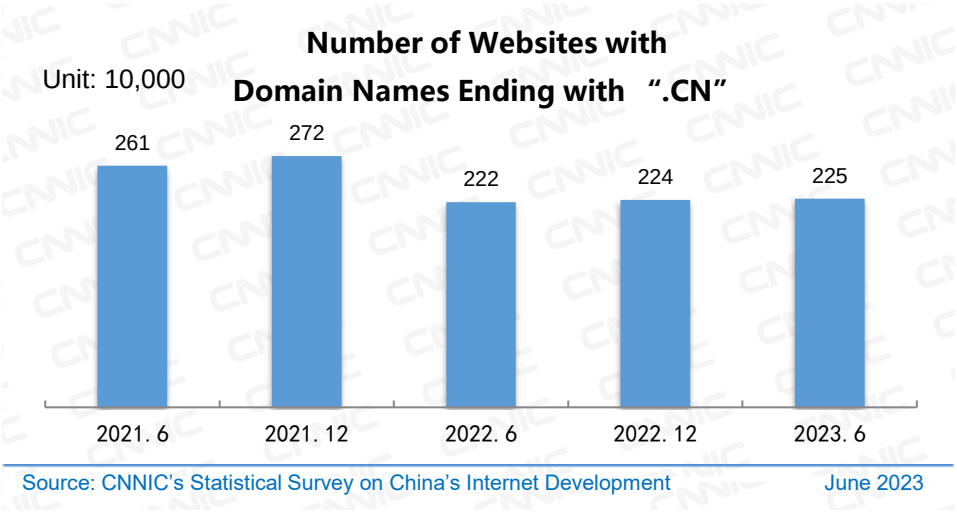


Figure 9 Number of Websites with Domain Names Ending with ".CN"[14]

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

(II) Number of Apps

According to the statistics of the national APP technology testing platform, as of June 2023, the number of active apps[15] monitored in China's domestic market (including Android and Apple stores) was 2.6 million. The number of mobile app developers was 830,000, including 250,000 Android developers and 580,000 Apple developers. By June, there had been 69.6 billion downloads of Android apps cumulatively.

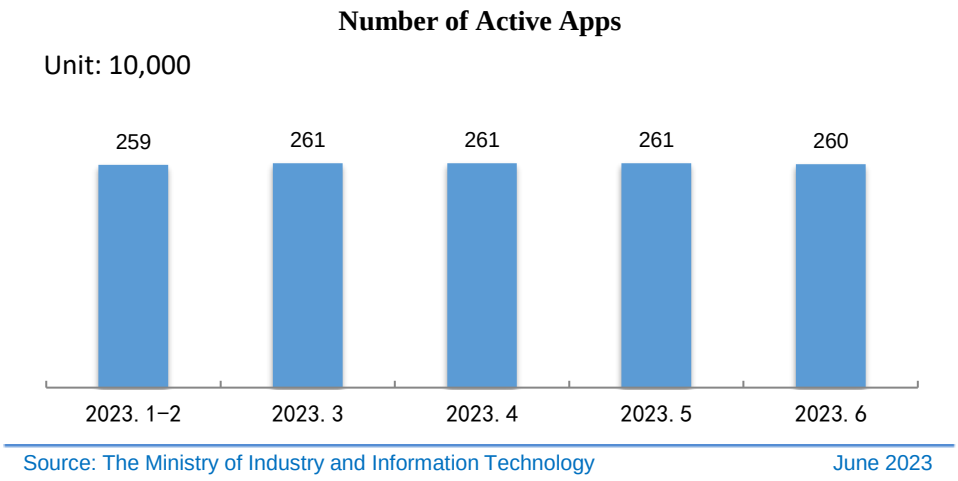


Figure 10 Number of Active Apps

III Internet Access Environment

(I) Internet Access Devices

Up to June 2023, the proportions of Chinese netizens accessing the Internet through mobile phones, desktop computers, laptops computers, TVs and tablet computers were 99.8%, 34.4%, 32.4%, 26.8% and 28.6%, respectively.

[15] The number of active APPs refers to the total number of third-party mobile apps downloaded and installed by users during the reporting period in China, where the number of Android apps was obtained according to the number of installed mobile apps recorded by smart phones after eliminating duplicated ones.

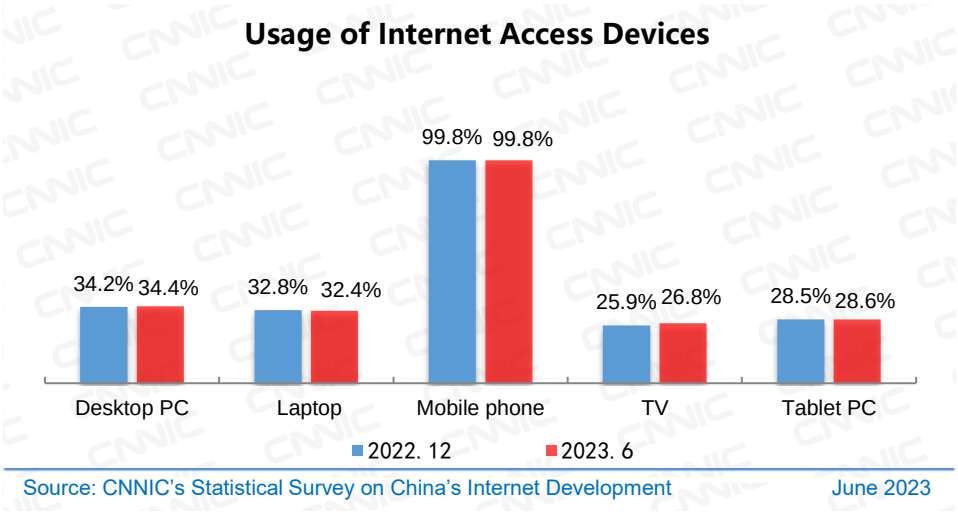


Figure 11 Usage of Internet Access Devices

In the first half of 2023, the shipment of domestic mobile phones amounted to 124 million, down 7% year-on-year. In particular, the shipment of 5G mobile phones was 102 million, down 6.4% year-on-year, taking up 78.9% of the total mobile phone shipment in the same period.

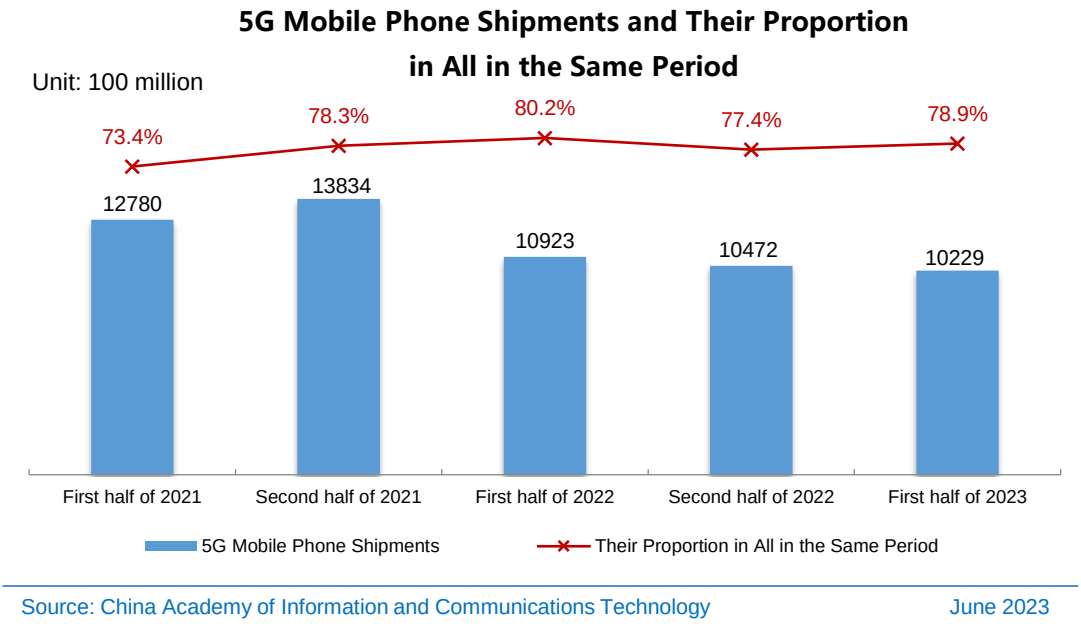


Figure 12 5G Mobile Phone Shipments and Their Proportion in All in the Same Period

(II) Online Duration

As of June 2023, the per capita weekly online duration[16] of China's Internet users was 29.1 hours, up 2.4 hours over December 2022.

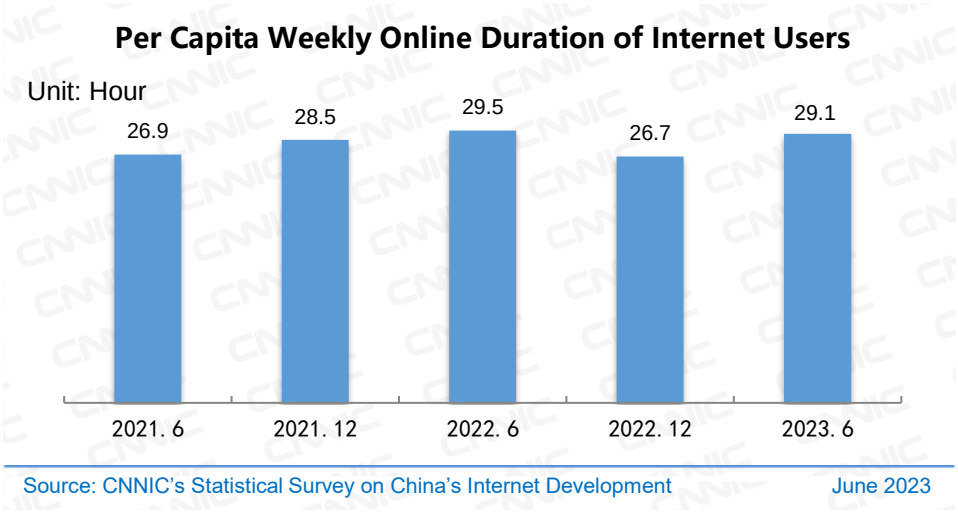


Figure 13 Per Capita Weekly Online Duration of Internet Users

(III) Fixed Broadband Access

As of June 2023, the three basic telecommunications operators had 641 million fixed broadband subscribers, a net increase of 24.68 million from December 2022. Specifically, fixed Internet broadband subscribers enjoying an access rate of 100Mbps or above reached 579 million, accounting for 94.2% of the total, up 0.3 percentage points from December 2022; those enjoying an access rate of 1,000Mbps or above reached 128 million and accounted for 20.8% of all Internet users, with a net increase of 36.12 million from December 2022.

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

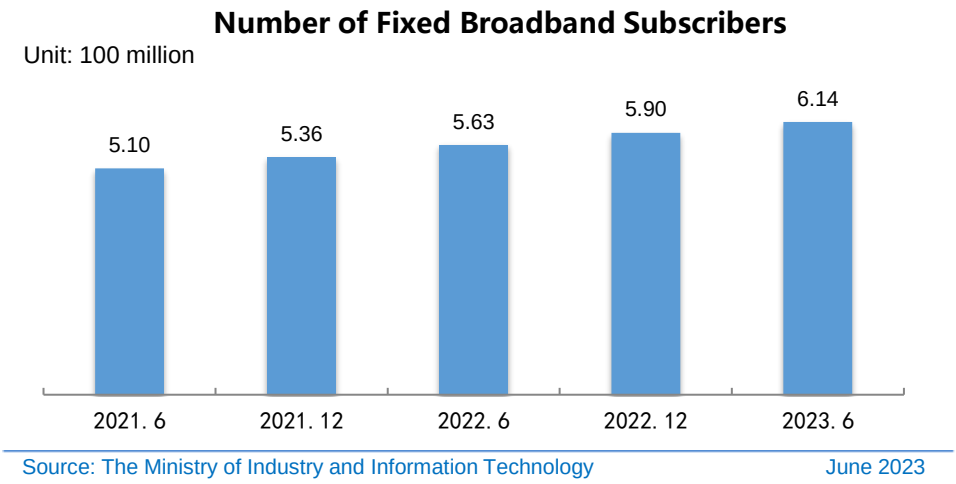


Figure 14 Number of Fixed Broadband Subscribers

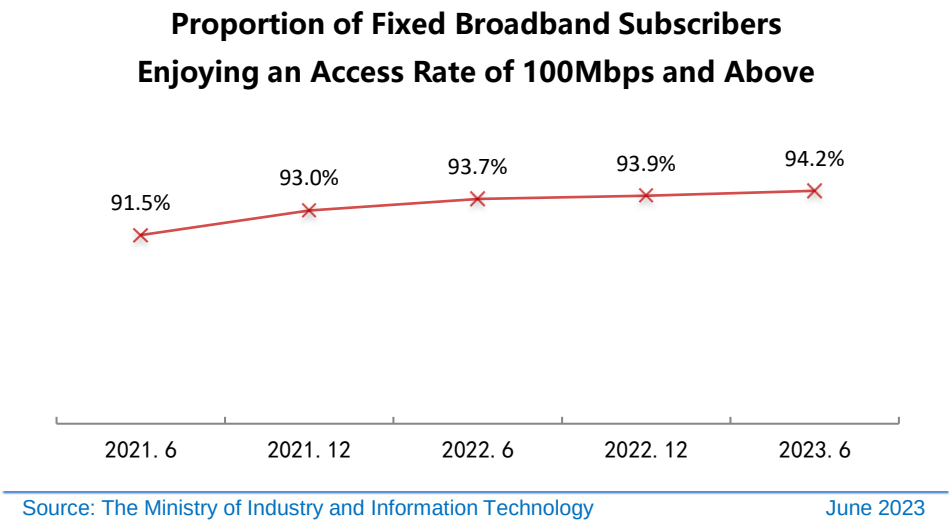


Figure 15 Proportion of Fixed Broadband Subscribers
Enjoying an Access Rate of 100Mbps and Above

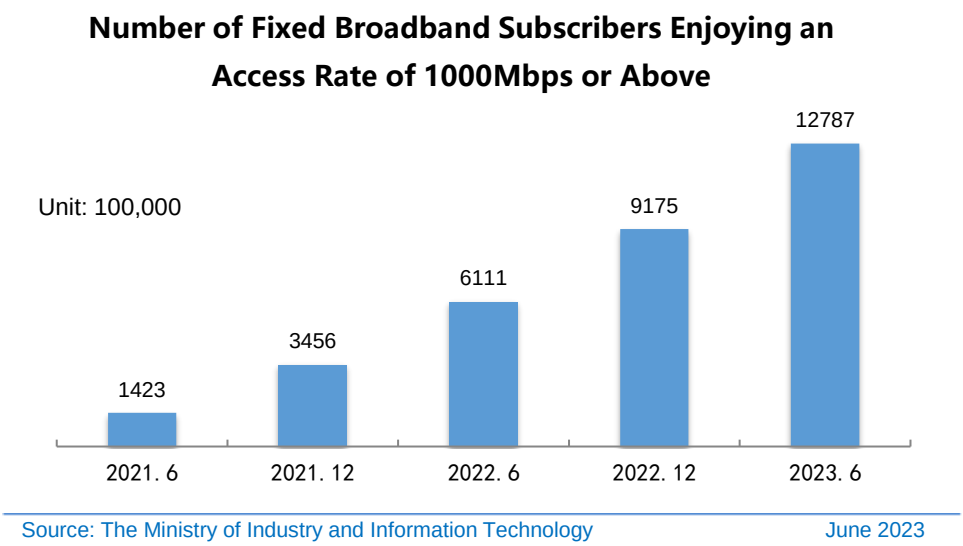


Figure 16 Number of Fixed Broadband Subscribers Enjoying an Access Rate of 1000Mbps and Above

(IV) Mobile Internet Access Traffic and Mobile Phone Subscriber Base

In the first half of 2022, China's mobile Internet access traffic reached 142.3 billion GB, a year-on-year increase of 14.6%.

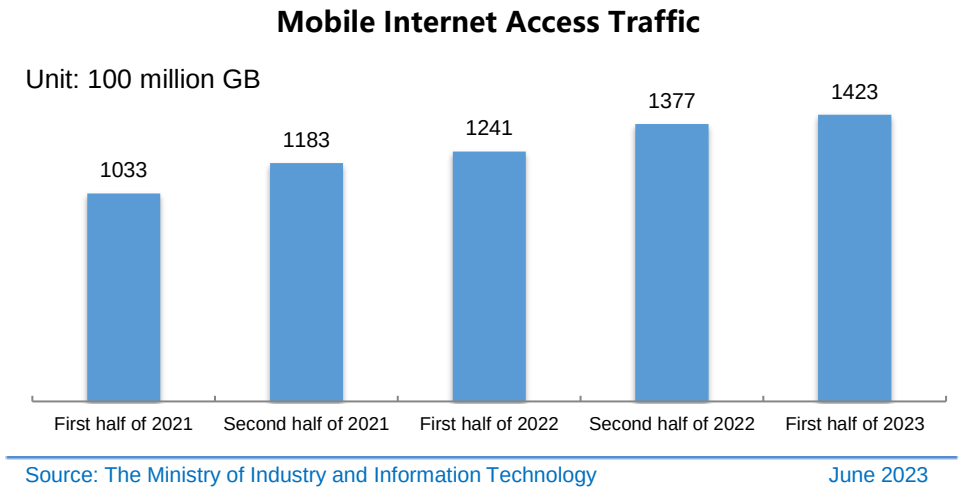


Figure 17 Mobile Internet Access Traffic

As of June 2023, the total number of mobile phone subscribers to the three basic telecommunications operators reached 1.71 billion, a net increase of 26.53 million compared with December 2022. Among them, 5G mobile phone users[17] reached 676 million, a net increase of 115 million compared with December 2022, accounting for 39.5% of mobile phone users, up 6.2 percentage points in six months.

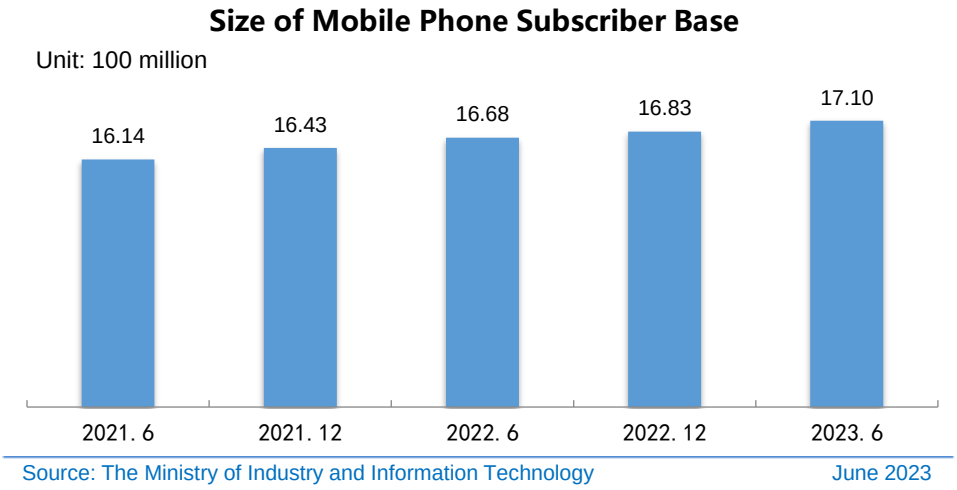


Figure 18 Mobile Phone Subscriber Base

(V) Number of Cellular IoT Terminal Users

By June 2023, the three basic telecommunications operators had developed 2.123 billion cellular IoT terminal users, a net increase of 279 million compared with December 2022, accounting for 55.4% of the total mobile network terminal connections (covering both mobile phone users and cellular IoT terminal users).

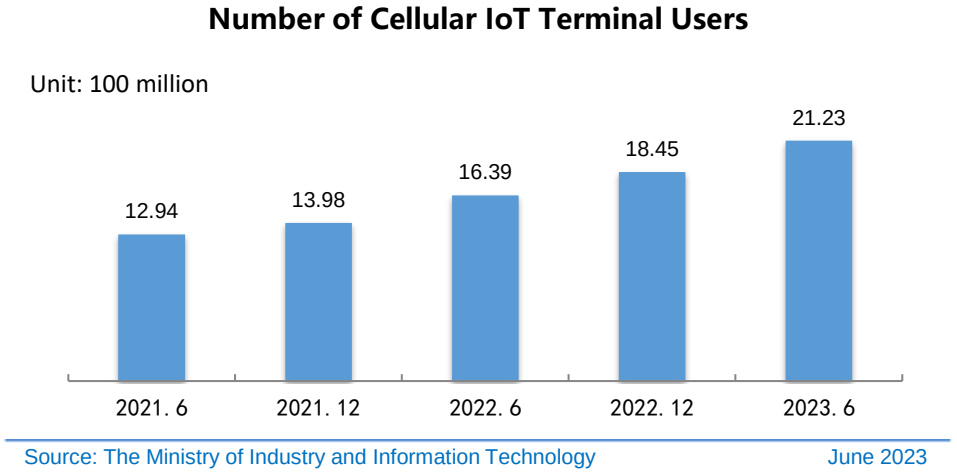


Figure 19 Number of Cellular IoT Terminal Users

[17] 5G mobile phone subscriber base refers to the number of active subscribers who have usage information in the communication billing system and occupy 5G network resources at the end of the reporting period.

Chapter Two
Size and Structure of Internet Users

I Size of Internet Users

(I) Overall Size of Internet Users

Up to June 2023, China had 1.079 billion netizens[18], up by 11.09 million over December 2022, and its Internet penetration had reached 76.4%, up 0.8 percentage point over December 2022.

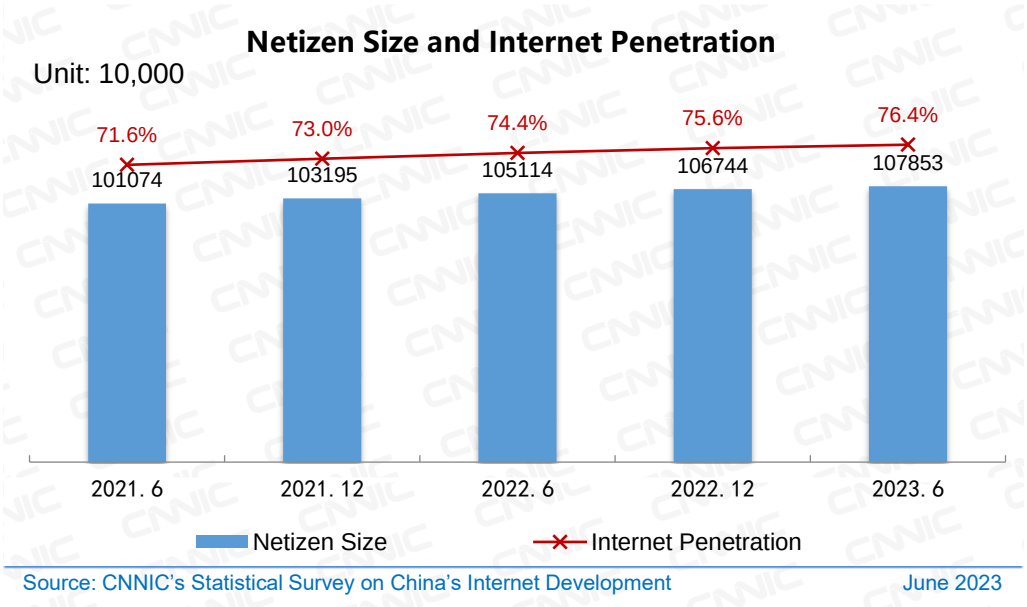


Figure 20 Netizen Size and Internet Penetration

Up to June 2023, the number of mobile Internet users in China had reached 1.076 billion, up 11.09 million over December 2022. The proportion of China's netizens accessing the Internet via mobile phones was 99.8%.

[18] Most of the data in this report are approximate values after rounding and retaining significant digits. The number of netizens in this reporting period is rounded to 1.079 billion.

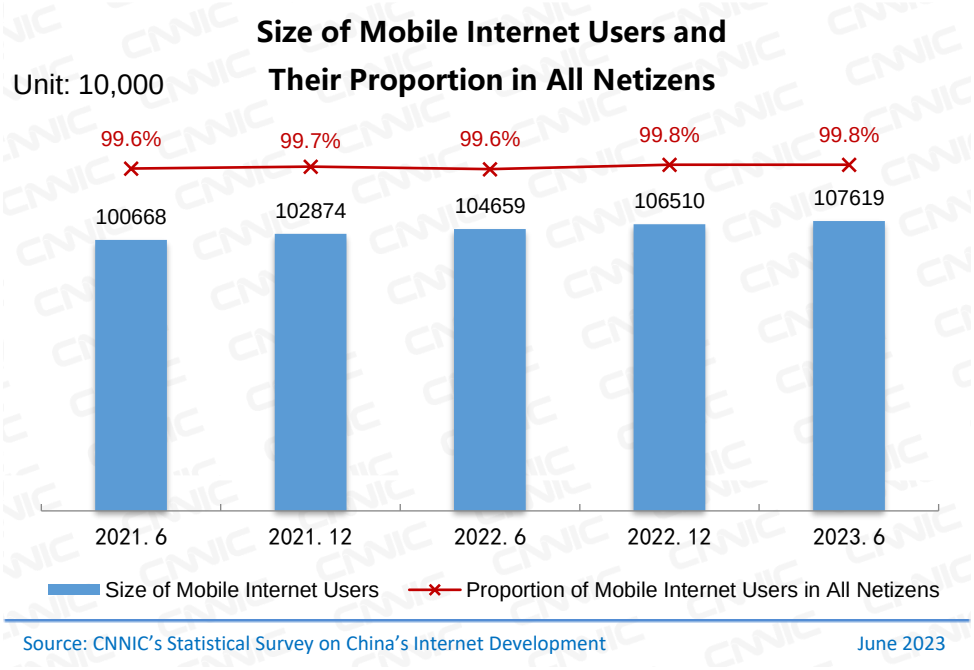


Figure 21 Size of Mobile Internet Users and Their Proportion in All Netizens

China's Internet service experience was better in the first half of 2023, and netizens' sense of gain was enhanced, which promoted the steady growth of Internet penetration. On the one hand, the overall quality of telecommunications services was further improved, and users' sense of gain was enhanced. In the first quarter, China's mobile and fixed broadband download rates increased by 59.9% and 15.1% respectively year-on-year[19], while the mobile data traffic charges continued to decline. On the other hand, the ability of barrier-free information services was continuously enhanced. The elderly-oriented transformation of Internet applications was further promoted. Under the guidance of the Ministry of Industry and Information Technology, 1,735 websites and apps completed elderly-oriented and barrier-free transformation[20]. At the same time, a number of outstanding transformation cases of mainstream websites and mobile apps were promoted throughout the country to make life smarter, happier and more convenient.

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

As of June 2023, the size of urban Internet users in China was 777 million or 72.1% of the national total, while that of rural Internet users was 301 million or 27.9% of the national total.

[19] Source: Ministry of Industry and Information Technology, https://www.miit.gov.cn/gzcy/zbft/art/2023/art_80e67b13cae744d1a21fd481af7cf11f.html, April 20th, 2023.
[20] Source: MIIT Official Weibo and WeChat, https://mp.weixin.qq.com/s/glnh12JBpjqpahT9LVVEMg, July 19, 2023.

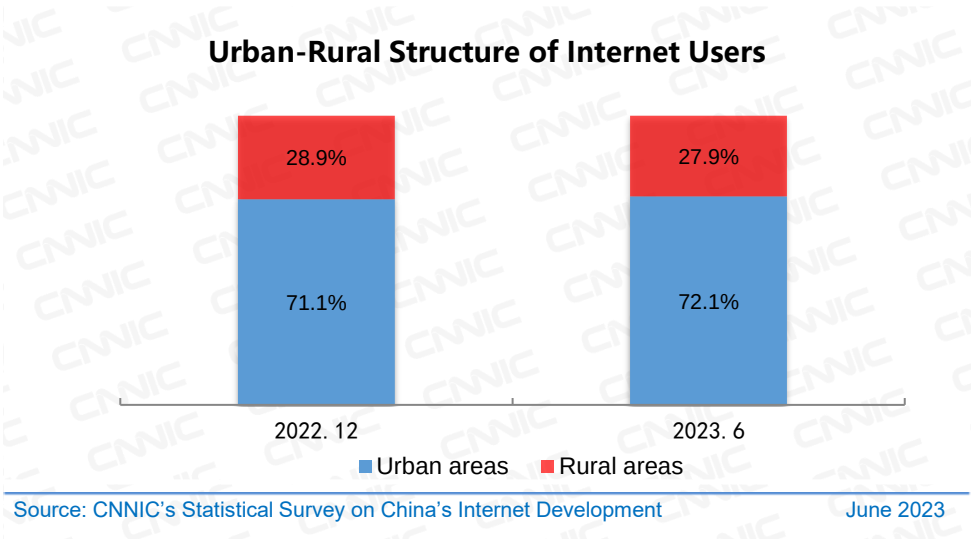


Figure 22 Urban-Rural Structure of Internet Users

Up to June 2023, the Internet penetration in urban China was 85.1%, up 2.0 percentage points over December 2022, while that in rural areas was 60.5%.

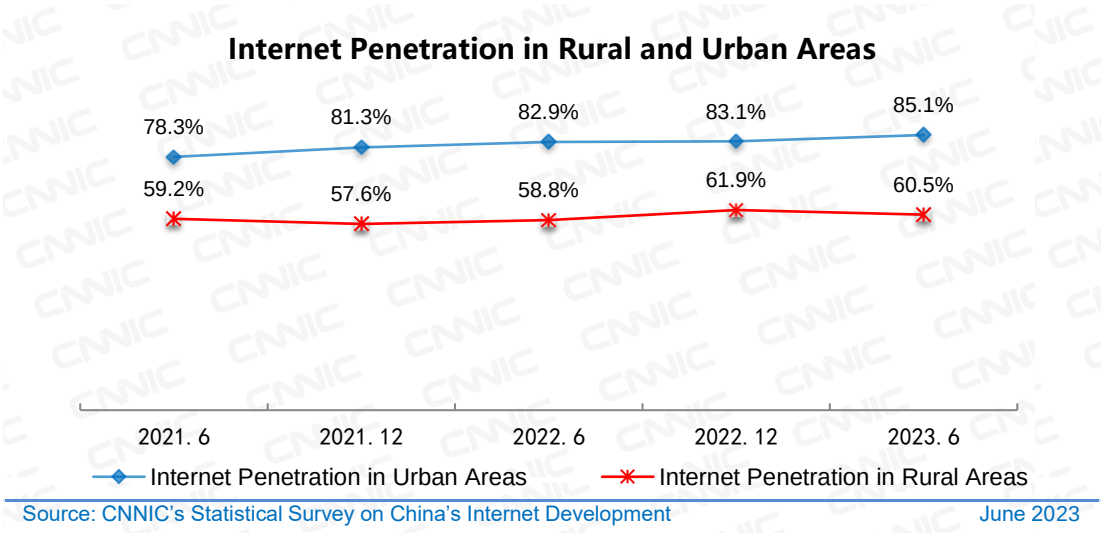


Figure 23 Internet Penetration in Rural and Urban Areas

The Internet continued to help build a new countryside, promote rural digital infrastructure construction and digital economy, and meet the new expectations of farmers with better digital services. First, rural network infrastructure basically achieved full coverage, with 5G network available in all prefecture-level cities and county towns. At the same time, telecom operators continued to provide 28 million rural households that had just been lifted out of poverty with a discount of 50 percent or more on basic communications services, with a cumulative total of more

than 8.8 billion yuan in concessions[21]. Second, new forms and new modes of rural digital economy kept growing. The availability and convenience of rural digital inclusive financial services continued to improve, and rural e-commerce maintained its position as the "bellwether" of rural digital economy. In terms of rural digital inclusive financial services, as of December 2022, the "Credit Through-Train for Agricultural Entrepreneurs" had provided credit matching services to 788,200 agricultural entrepreneurs, successfully granting 316,200 credits with a total amount of more than 100 billion yuan[22]. In terms of rural e-commerce, the national rural online retail sales in the first half of the year reached 1.12 trillion yuan, a year-on-year increase of 12.5%[23]. Third, rural digital services were promoted in earnest. Services such as "Internet + Education" and "Internet + Medical Care" were continuously extended to rural areas, with service quality raised to a higher level. As of June, the number of online education users in rural areas reached 67.87 million, with a penetration of 22.5%; the number of online medical care users in rural areas reached 68.75 million, with a penetration of 22.8%.

(III) Size of Non-Internet Users

As of June 2023, the size of non-netizens in China was 333 million, down 11.09 million from December 2022. By region, the majority of non-netizens in China was still in rural areas; the proportion of non-netizens in rural areas was 59.0%, 23.8 percentage points higher than that of the national rural population. By age, the elderly aged 60 and above were the main group of non-netizens. As of June 2023, the proportion of Chinese non-netizens aged 60 and above accounted for 41.9% of all non-netizens.

Non-netizens are unable to access the Internet, so they cannot fully enjoy the convenience brought by intelligent services in travel, consumption, medical treatment, handling of affairs, and other aspects of daily life. According to statistics, 12.5% of non-netizens said that it was inconvenient to buy things without going online; 11.6% thought that it was difficult to do errands and pay bills; 10.5% reported that it was difficult to register with the hospital and buy medicine; and 9.3% complained that it was difficult to hail a taxi.

[21] Source: China Digital Countryside Development Report (2022), Department of Information Technology Development of the Office of the Central Cyberspace Affairs Commission, and Department of Market and Informatization of the Ministry of Agriculture and Rural Affairs, http://www.cac.gov.cn/2023-03/01/c_1679309718486615.htm, March 1, 2023

[22] Source: Farmers Daily, https://szb.farmer.com.cn/2023/20230103/20230103_002/20230103_002_1.htm, January 3, 2023.

[23] Source: Ministry of Commerce, http://www.mofcom.gov.cn/article/xwfb/xwsjfzr/20230703422646.shtml, July 20, 2023.

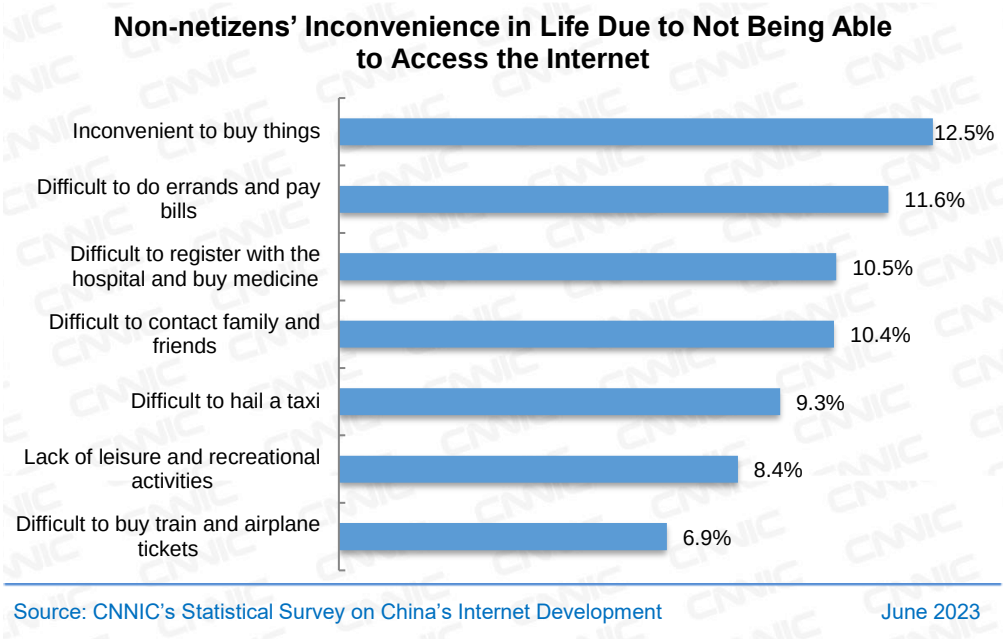


Figure 24 Non-netizens' Inconvenience in Life Due to Not Being Able to Access the Internet

Lack of skills, limited literacy, inadequate devices and age factors are the main reasons why non-netizens are unable to use the Internet. 56.1% of non-netizens were unable to access the Internet because they did not know how to use the computer/Internet; 28.4% because they did not master Pinyin or due to limited literacy; 19.0% because they did not have computers or related devices; and 15.1% because they were too old or too young to use the Internet.

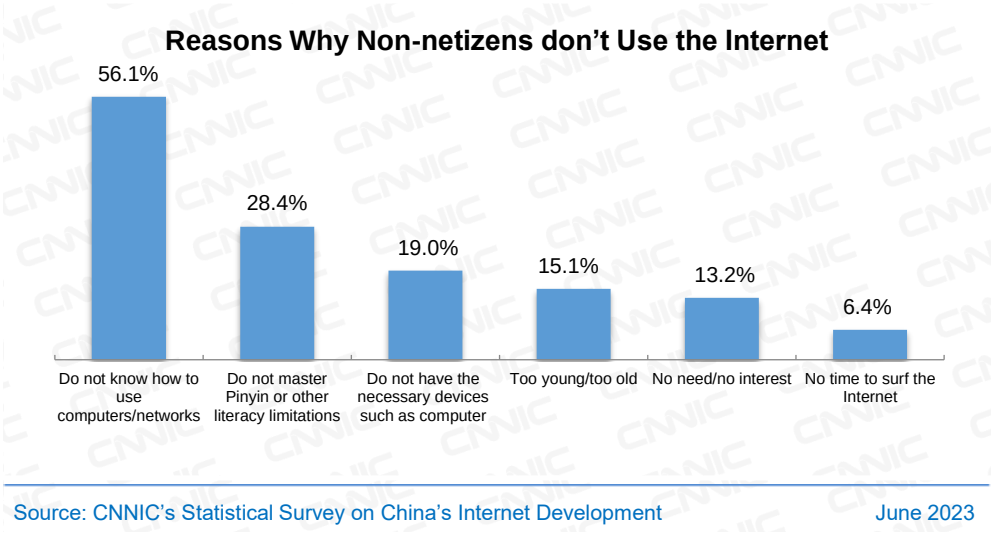


Figure 25 Reasons Why Non-netizens don't Use the Internet

For 28.1%, 26.2% and 24.6% of non-netizens, the primary factor to drive them to use the Internet

was: convenience of keeping contact with their family; availability of barrier-free Internet access devices; provision of free Internet training or guidance, respectively.

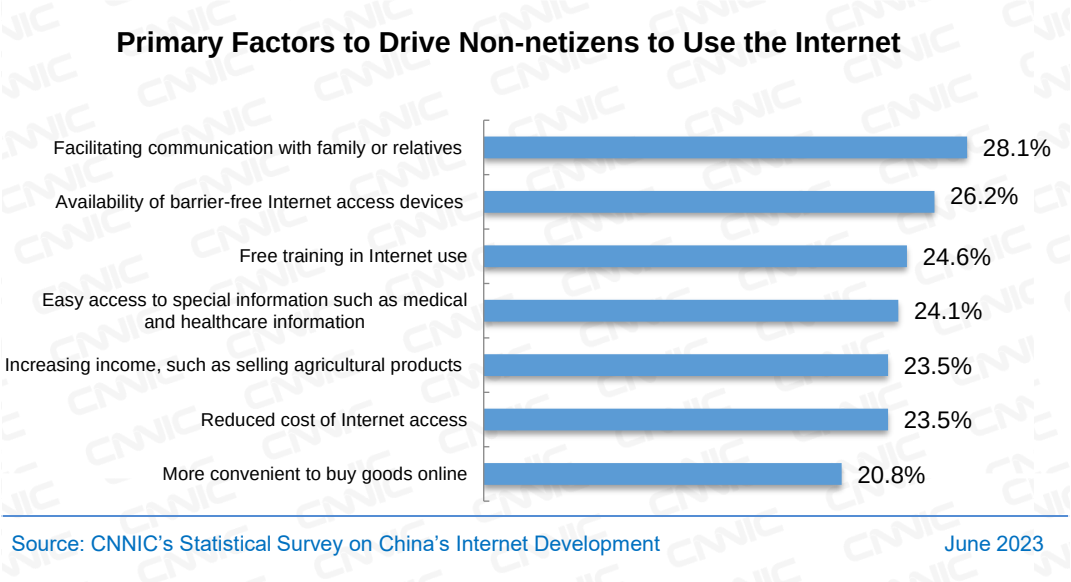


Figure 26 Primary Factors to Drive Non-netizens to Use the Internet

II The Attribute Structure of Internet Users

(I) Gender Structure

As of June 2023, the male-to-female ratio of Chinese netizens was 51.4:48.6, roughly the same as that of China's overall population.

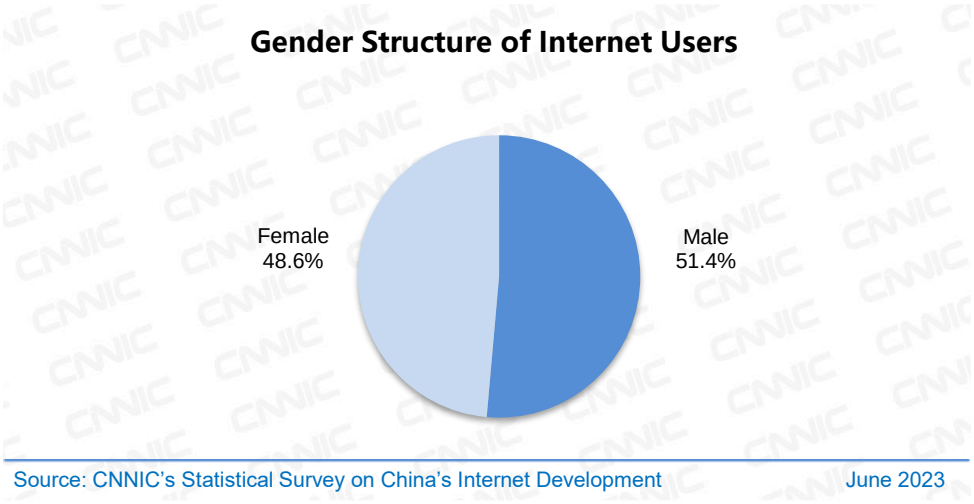


Figure 27 Gender Structure of Internet Users

(II) Age Structure

As of June 2023, the proportions of Internet users aged 20-29, 30-39 and 40-49 were 14.5%, 20.3% and 17.7% respectively. In particular, the proportion of the Internet user group aged 40-59 increased from 33.2% in December 2022 to 34.5%, showing that the Internet further penetrated into the middle-aged group.

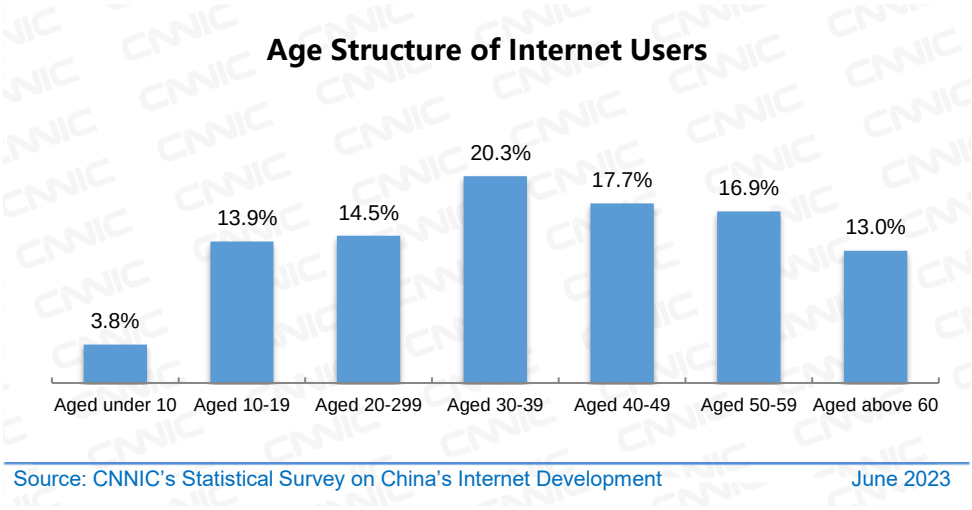


Figure 28 Age Structure of Internet Users

Chapter Three Development of Internet Applications

I Overview of Internet Applications

In the first half of 2023, China's personal Internet applications continued to develop, and the number of users of various applications increased. Among them, the number of users of online car-hailing, online travel booking, online literature and online music increased by 34.92 million, 30.91 million, 35.92 million and 41.63 million respectively compared with December 2022, with growth rates of 8.0%, 7.3%, 7.3% and 6.1% respectively.

Table 2 User Size and Utilization Ratio of Internet Applications from December 2022 to June 2023

Applications	December 2022 **User size (10,000)**	December 2022 **Utilization Ratio**	June 2023 **User size (10,000)**	June 2023 **Utilization Ratio**	Growth rate
Instant messaging	103,807	97.2%	104,693	97.1%	0.9%
Online video (including short video)	103,057	96.5%	104,437	96.8%	1.3%
Short video	101,185	94.8%	102,639	95.2%	1.4%
Online payment	91,144	85.4%	94,319	87.5%	3.5%
Online shopping	84,529	79.2%	88,410	82.0%	4.6%
Search engine	80,166	75.1%	84,129	78.0%	4.9%
Online news	78,325	73.4%	78,129	72.4%	-0.3%
Live streaming	75,065	70.3%	76,539	71.0%	2.0%
Online music	68,420	64.1%	72,583	67.3%	6.1%
Online game	52,168	48.9%	54,974	51.0%	5.4%
Online literature	49,233	46.1%	52,825	49.0%	7.3%

Applications	December 2022 **User size (10,000)**	December 2022 **Utilization Ratio**	June 2023 **User size (10,000)**	June 2023 **Utilization Ratio**	Growth rate
Online meal ordering	52,116	48.8%	53,488	49.6%	2.6%
Online office	53,962	50.6%	50,748	47.1%	-6.0%
Online car-hailing	43,708	40.9%	47,199	43.8%	8.0%
Online travel booking	42,272	39.6%	45,363	42.1%	7.3%
Online medical service	36,254	34.0%	36,416	33.8%	0.4%
Online audio[24]	31,836	29.8%	32,081	29.7%	0.8%

II Basic Apps

(I) Instant Messaging

As of June 2023, the user size of instant messaging in China reached 1,047 million, an increase of 8.86 million compared with December 2022, accounting for 97.1% of all netizens in the country.

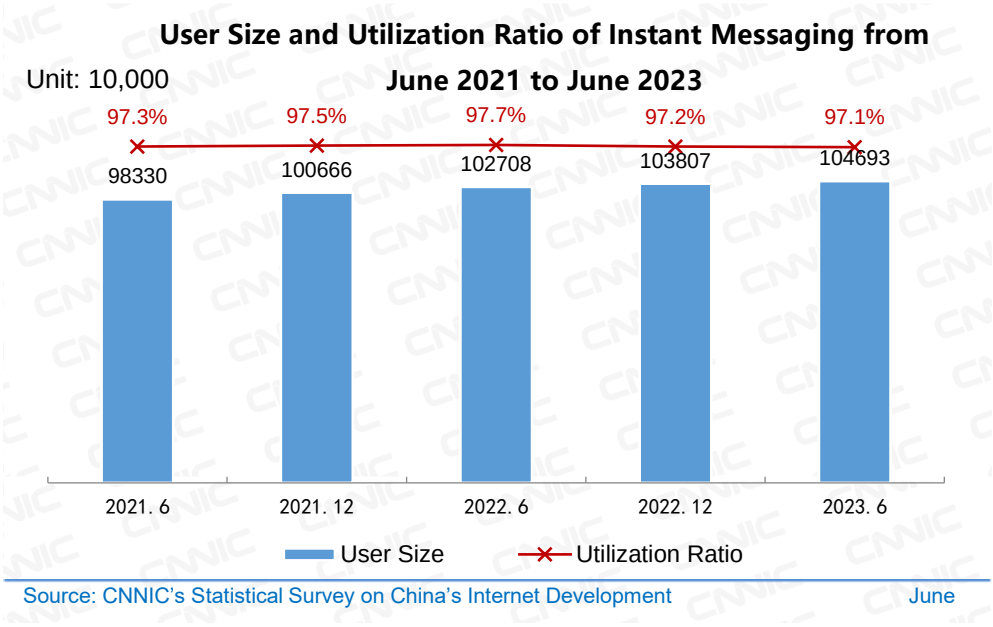


Figure 29 User Size and Utilization Ratio of Instant Messaging from June 2021 to June 2023

[24] Online audio includes online audio books and Internet radio.

The integration and competition between instant messaging and short video is the main trend of industry development at present, and emerging technologies such as generative artificial intelligence[25] are also expected to bring new development opportunities to the industry. First, the integration of instant messaging and short video has brought new market competition. On the one hand, instant messaging products represented by WeChat actively expand the short video function. By strengthening support for creators, providing creative tools and traffic incentives, the number of daily active creators on WeChat video platform and the average number of daily video uploads have more than doubled year-on-year[26], and the number of creators with over 10,000 followers has more than tripled year-on-year. On the other hand, short video vendors represented by Douyin Group are also trying to develop instant messaging services. Douyin launched PC-end chat software "Douyin Chat" in January, and used its user base in the short video field to penetrate into the instant messaging service, which is expected to bring new impacts to the already stable instant messaging market. Second, the rapid development of generative artificial intelligence will have an important impact on the development of enterprise-side instant messaging products. Generative AI optimizes the human-computer interaction experience, improves the program's ability to understand and respond to users, and shows obvious potential in the field of enterprise instant messaging. In the first half of the year, domestic Internet companies successively launched such products as "SparkDesk" and "Tencent Cloud MaaS[27] Service Solution". The integration of these products and enterprise-side instant messaging will hopefully play an important role in various application scenarios such as intelligent customer service and offline service.

(II) Search Engine

As of June 2023, the number of search engine users in China was 841 million, a increase of 39.63 million compared with December 2022, accounting for 78.0% of all netizens.

[25] Generative artificial intelligence refers to models and related technologies with the ability to generate text, pictures, audio, video and other content. This definition comes from the Interim Measures for the Management of Generative Artificial Intelligence Services jointly promulgated by the Cyberspace Administration of China and other six departments.

[26] Source: Tencent's financial report for the first quarter of 2023, https://static.www.tencent.com/uploads/2023/05/17/3af50f4fe769884b A9acd9520637fa36.pdf, May 17, 2023.

[27] MaaS is short for “Model as a Service”.

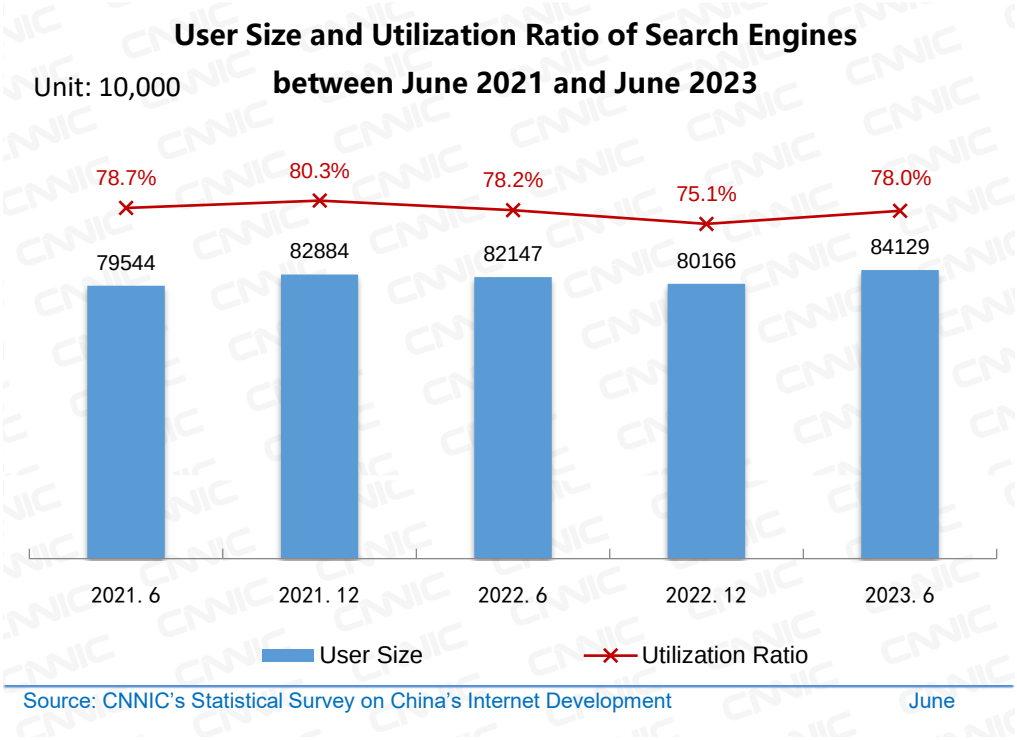


Figure 30 User Size and Utilization Ratio of Search Engines between June 2021 and June 2023

In the first half of 2023, search engines introduced generative AI technology, which will greatly improve user experience and change the way of search engine marketing.

Search engine companies successively launched generative AI search services. Microsoft integrated ChatGPT with search engines and launched "New Bing", which showed the application and development prospect of generative AI in the search field for the first time. Baidu launched ERNIE Bot, an AI chatbot service product, and integrated it into the search service; 360 Search released "ChatGPT360" and opened product testing to the public. In addition to traditional search engine companies, Internet companies in e-commerce and other fields were also actively developing related products. For example, JD.COM integrated the generative AI technology into the "Yan Xi" platform, providing an intelligent knowledge base that can meet the needs of employees in business information retrieval and acquisition.

The development of generative AI will have a profound impact on the search engine industry. In terms of user experience, search engines based on generative AI can display the answers to questions in an interactive manner through reasoning and information integration, providing users more diversified content and more efficient information collection methods. With the gradual improvement of the reliability of the model, the user experience of search service will be greatly improved in the future. In enterprise marketing, generative AI will promote innovation in search engine algorithm recommendation, assist enterprises to plan marketing activities and create copywriting, and drive the search engine market to achieve new development. Data shows that after the release of generative AI products, Microsoft's advertising revenue including search in the first and second quarters increased by 10% and 8% respectively[28], and the number of potential customers

[28] Source: Microsoft's financial report for the third quarter of fiscal year 2023, https://www.microsoft.com/en-

in Baidu's online marketing and cloud services increased by more than 400% in March[29].

(III) Online News

As of June 2023, the user size of online news in China was 781 million, making up 72.4% of all Internet users.

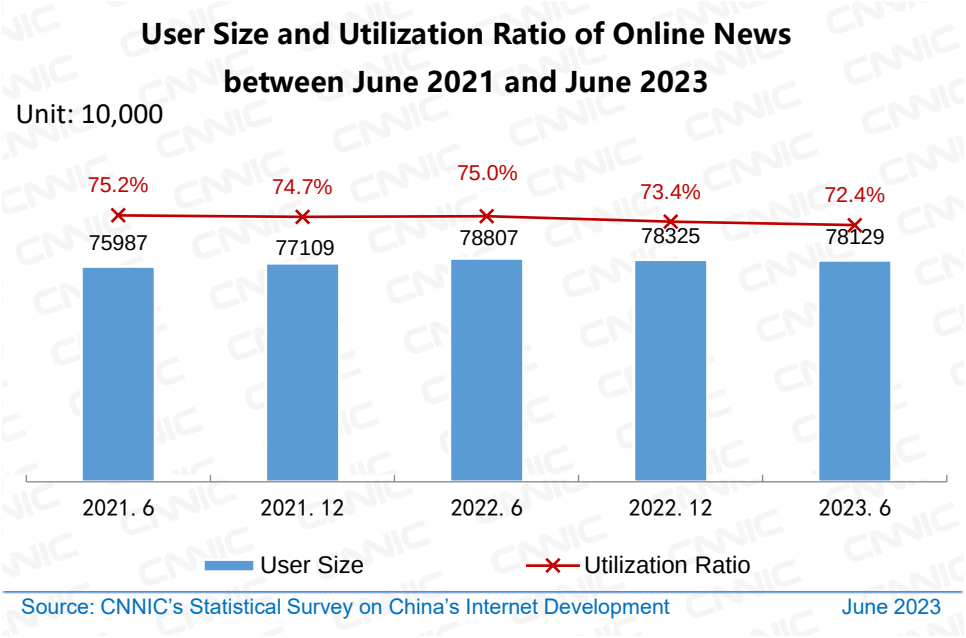


Figure 31 User Size and Utilization Ratio of Online News between June 2021 and June 2023

At present, cloud computing, AI, virtual reality and other new technologies are developing rapidly, which provides strong support for media integration. The characteristics of full media, holographic media, all-staff media and full-effect media[30] are gradually emerging.

In the first half of 2023, breakthroughs were made in generative AI technology, and online news media followed up actively. In terms of in-depth detection of synthesized content, the People's Daily released AIGC-X, a platform for in-depth detection of synthesized content. It is capable of accurately identifying AI-generated text, graphics and video content, preventing the risks of counterfeiting and promoting the construction of a healthy, safe AI ecosystem. In terms of assisting content production, Xinhua News Agency released Xinhua Rongyi, a next-generation integrated media production cloud service project, which focuses on the three key points of "zero/low code,

us/investor/years/fy-2023-Q3/press-release-webcast, April 25, 2023; Microsoft's financial report for the fourth quarter of fiscal year 2023, https://www.microsoft.com/en-us/investor/Earnings/FY-2023-Q4/press-release-webcast, July 25, 2023. The third quarter of fiscal year 2023 is from January 1, 2023 to March 31, 2023; the fourth quarter of fiscal year 2023 is from April 1, 2023 to June 30, 2023.

[29] Source: Baidu Q1 2023 Financial Report Conference Call, https://seekingalpha.com/article/4605067-baidu-inc-bidu-q1-2023-earnings-call-transcript, May 16, 2023.

[30] Source: Speech by General Secretary Xi Jinping at the 12th Collective Study Session of the Political Bureau of the 19th CPC Central Committee.

collaborative management, and AI-enabled efficiency", and solves the problem of integrated interactive content production and distribution of non-media organizations through technological empowerment. Weibo launched a generative AI creation assistant to help creators improve content quality and creation efficiency. In addition, in terms of upgrading production and broadcasting technologies, China Media Group (CCTV) announced an XR[31] fusion ultra-high-definition production technology research project, which relies on new media technologies such as XR fusion production and VR[32] three-dimensional image mapping to build an ultra-high-definition, mobile, immersive, interactive and intelligent XR production platform[33].

(IV) Online Office

Up to June 2023, the user size of online office in China was 507 million, accounting for 47.1% of all Internet users.

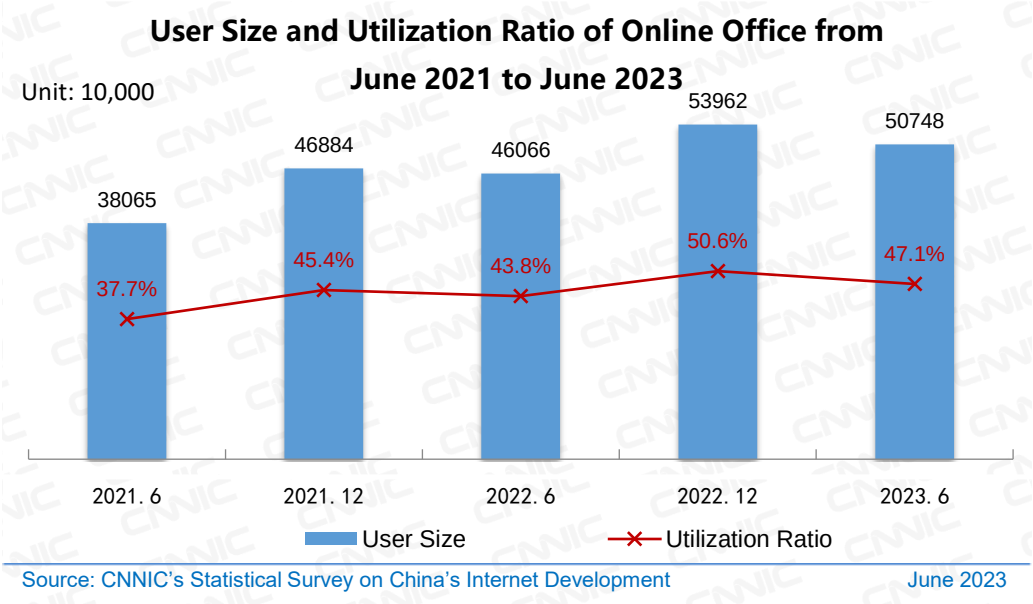


Figure 32 User Size and Utilization Ratio of Online Office from June 2021 to June 2023

In the first half of 2023, the online office market became more mature, and new technologies brought new opportunities for the development of the industry.

The online office market became more mature. First, product functions were further improved. Online office enterprises acquired new users and retained old users by continuously refining services.

[31] XR refers to the combination of the real world and virtual reality through computers to create a virtual environment that allows for human-computer interaction. XR is a collective term for a wide range of technologies such as AR, VR, and MR.

[32] VR is an acronym for virtual reality. It is a virtual world with realistic, three-dimensional, visual, tactile, olfactory and other sensory experiences produced with the help of computers and other equipment, thus making people in the virtual world feel immersive.

[33] Source: Website of the Cyberspace Administration of China, http://www.cac.gov.cn/2023-04/23/c_1683892469510233.htm, April 23, 2023.

For individual users, Dingtalk broke the barriers between devices to use more convenient. For corporate users, Feishu launched a "three-piece business toolkit", which comprises three products - multidimensional form, application engine and integrated platform, to help enterprises improve their business capabilities, reduce cost and improve efficiency. Second, the business model continues to iterate. With the continuous expansion of online office users, the paid services were becoming the development trend of online office industry. In the first half of the year, Dingtalk and Tencent Conference further promoted the transformation of free services to paid services and launched more value-added products.

New technologies continued to empower online office. First, generative AI brings new opportunities for the industry. Based on the advantages of generative AI in creating text, audio and video, online office enterprises actively deployed artificial intelligence technology, developed new functions of products, and further improved the intelligence level of online office products. In the first half of the year, Dingtalk was officially connected to the big model of "Tongyi Qianwen", launching its AI strategy in an all-round way; Feishu released the intelligent assistant "My AI"; Kingsoft Office released the generative AI application "WPS AI". Second, AR[34] technology is expected to bring new office experience. Apple introduced Vision Pro, an AR headset, which realized gesture, eye movement and voice interaction, and provided diversified applications for office scenarios. In the future, the deep integration of generative artificial intelligence, AR technology and online office products will enhance the interactive experience in multiple dimensions, create a wider range of workplace scenarios, and make online office more intelligent, convenient and efficient.

III Business Transaction Applications

(I) Online Payment

As of June 2023, the user size of online payment in China had reached 943 million, up 31.76 million from December 2022, taking up 87.5% of all Internet users.

[34] AR is an acronym for augmented reality

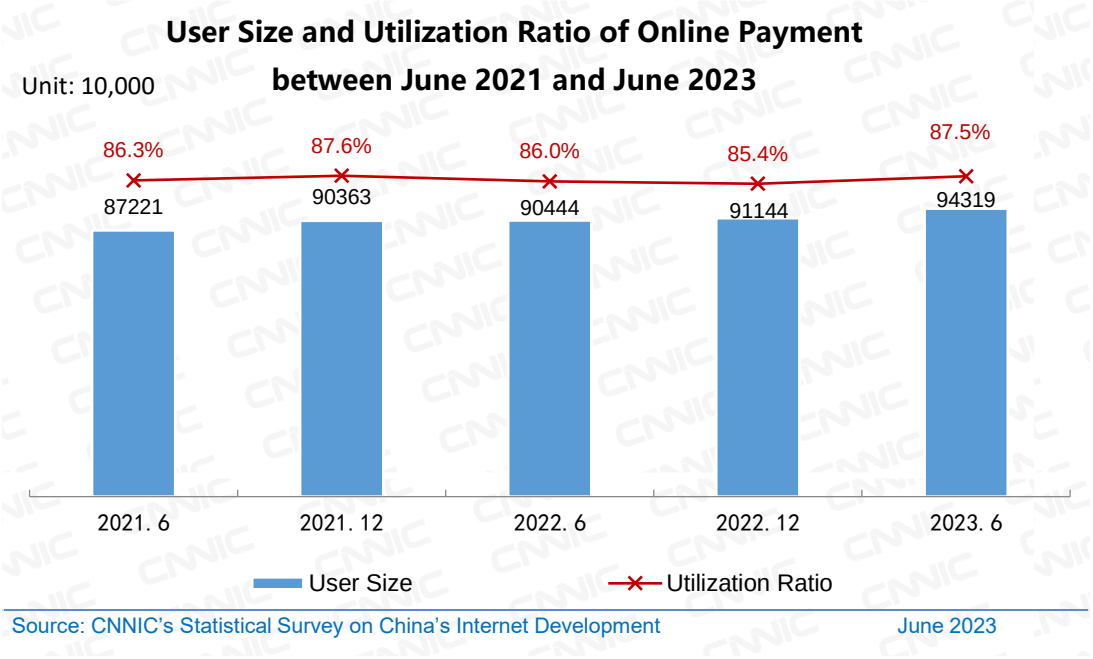


Figure 33 User Size and Utilization Ratio of Online Payment between June 2021 and June 2023

In the first half of 2023, China's online payment further penetrated into various fields. In terms of livelihood payments, the breadth and depth of application scenarios continued to increase, and the network of inclusive livelihood services became denser; in terms of digital RMB payment, the scope of the pilots continued to expand, extending to the international payment system.

The rapid development of online payment benefited people's livelihood. First, the volume of banks' electronic payment business[35] increased. In the first quarter, banks handled 67.584 billion electronic payments, amounting to 831.82 trillion yuan, up 6.8% and 12.4% year-on-year respectively. Among them, the number of mobile payment business transactions reached 41.284 billion, amounting to 144.60 trillion yuan, representing a year-on-year increase of 19.1% and 9.9%[36] respectively. Second, the urban-rural gap in online payment further narrowed. By June 2023, the difference in the utilization rate of online payment between urban and rural areas was 11.4%, which was 0.5 percentage point lower than that in June 2022. Third, there was a deep integration of mobile payment and convenient service scenarios. Mobile payment was being piloted to access the basic medical insurance system, realizing real-time settlement of outpatient registration and payment, and completing one-click settlement of medical insurance fund reimbursement, personal account and personal out-of-pocket payment with the help of mobile phones. For example, Jiangxi, Sichuan, Hubei, Yunnan and other provinces intensified the upgrading of medical insurance information

[35] Banks' electronic payment business: The volume of electronic payment operations handled by banks refers to the number and amount of operations of the account change type initiated by customers from settlement-type accounts through online banking, telephone banking, mobile banking, ATMs, POS and other electronic channels. Among them, online payment refers to the number and amount of operations initiated by customers through bank settlement accounts using computers and other electronic devices. Mobile payment refers to the number and amount of operations initiated by customers through bank settlement accounts using mobile devices such as cell phones.

[36] Source: People's Bank of China, "General Payment System Operation in the First Quarter of 2023," http://www.pbc.gov.cn/zhifujiesuansi/128525/128545/128643/index.html, June 20, 2023.

systems to accelerate the launch of medical insurance mobile payment services.

The promotion and application of digital RMB entered the fast lane. First, the trial of digital RMB was promoted in many places. By December 2022, the pilot scope of digital RMB had been expanded to 26 regions in 17 provinces (municipalities)[37], and several pilot regions had made progress in stages[38]. For example, as of December 2022, Shenzhen had opened a total of 28,407,500 digital RMB wallets and realized 1,299,000 application scenarios, with a cumulative transaction volume of 37.685 billion yuan[39]. Second, new application scenarios of digital RMB were being explored. Since the State Taxation Administration piloted the function of collecting taxes and fees in digital RMB, a total of 12,000 taxes and fees have been collected digitally, amounting to 25.9 billion yuan[40]. The Bank of China designed the scheme of a third-generation social security card loaded with a digital RMB hardware wallet, and was accelerating its application. Third, positive progress was made in cross-border settlement of digital RMB. Multilateral central banks such as the Bank for International Settlements, the Hong Kong Monetary Authority, the Central Bank of Thailand, the Central Bank of the United Arab Emirates and the People's Bank of China are vigorously promoting Project mBridge[41], a new international cross-border digital currency payment infrastructure.

(II) Online Shopping

As of June 2023, the user size of online shopping in China was 884 million, up 38.8 million from December 2022, taking up 82.0% of all Internet users.

[37] Source: China Daily, https://caijing.chinadaily.com.cn/a/202307/19/WS64b78149a3109d7585e458d0.html, July 19, 2023

[38] Source: Economic Daily, https://baijiahao.baidu.com/s?id=1762554880517434761&wfr=spider&for=pc, April 8, 2023.

[39] Source: SZNews, https://wxd.sznews.com/BaiDuBaiJia/20230424/content_1250167.html, April 24, 2023.

[40] Source: China Economic Network, http://bgimg.ce.cn/xwzx/gnsz/gdxw/202307/05/t20230705_38617344.shtml, July 5, 2023.

[41] Project mBridge was originally a bilateral pilot project jointly developed by the Central Bank of Thailand and the Hong Kong Monetary Authority. In February, 2021, with the participation of Digital Currency Research Institute of the People's Bank of China and the Central Bank of the United Arab Emirates, the project entered the third stage, and was renamed from Inthanon-LionRock to mBridge. Project mBridge is the world's first cross-border settlement platform built for digital currency.

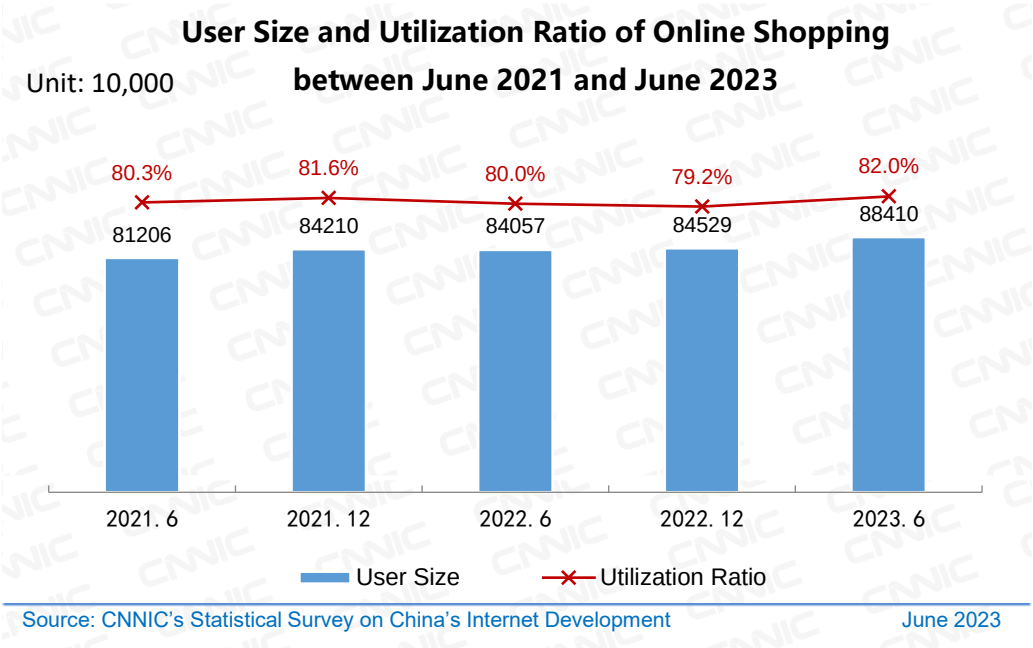


Figure 34 User Size and Utilization Ratio of Online Shopping between June 2021 and June 2023

As an important format of digital economy, online shopping continued to play an active role in boosting consumption growth. In the first half of 2023, the national online retail sales reached 7.16 trillion yuan, a year-on-year increase of 13.1%. Among them, the online retail sales of physical goods reached 6.06 trillion yuan, up by 10.8%, accounting for 26.6%[42] of the total retail sales of consumer goods.

Cross-border e-commerce maintained rapid growth and became a new growth point of foreign trade. First, cross-border e-commerce became an important new force in foreign trade. In the first half of 2023, the import and export volume of cross-border e-commerce in China reached 1.1 trillion yuan, a year-on-year increase of 16%[43]. The proportion of import and export through cross-border e-commerce in total foreign trade increased from less than 1% five years ago to about 5%. The number of cross-border e-commerce entities exceeded 100,000, and the number of independent sites[44] exceeded 200,000. Cross-border e-commerce trading partners were all over the world, and bilateral e-commerce cooperation memorandums were signed with 29 countries[45]. Second, the construction of cross-border e-commerce comprehensive experimental zones was further promoted. 165 cross-border e-commerce comprehensive experimental zones had been established nationwide, and the import and export volume of cross-border e-commerce in these zones accounted for over 90%[46] of

[42] Source: National Bureau of Statistics, http://www.stats.gov.cn/SJ/zxfb/202307/T20230715_1941269.html, July 17, 2023.
[43] Source: The State Council Information Office, http://www.scio.gov.cn/xwfb/gwyxwbgsxwfbh/wqfbh_2284/49421/50133/wz50135/202307/t20230724_729250.html, July 13, 2023.
[44] Independent sites are cross-border e-commerce websites independently established by cross-border e-commerce enterprises by purchasing servers, domain names, etc.
[45] Source: Chinese government website, https://www.gov.cn/GovWeb/yaowen/liebiao/202307/content_6895581.htm, July 31, 2023.
[46] Source: Chinese government website, https://www.gov.cn/xinwen/2023-02/24/content_5743076.htm, February 24, 2023.

the national import and export volume of cross-border e-commerce. At the same time, the cross-border e-commerce comprehensive experimental zones actively promoted the construction of integrated online service platforms, serving more than 60,000 or about 60%[47] of cross-border e-commerce enterprises nationwide, and various integrated services continued to benefit cross-border e-commerce enterprises.

The logistics foundation of rural e-commerce was consolidated, and new models such as direct purchase from the origin[48] boosted the development of rural e-commerce. Data shows that in the first half of 2023, the nationwide rural online retail sales reached 1.12 trillion yuan, a year-on-year increase of 12.5%. The online retail sales of agricultural products nationwide reached 270 billion yuan, up 13.1% year-on-year[49], reflecting the good growth momentum of rural e-commerce. First, the delivery networks covering counties, townships and villages were gradually improved. Data shows that China has built 990 county-level delivery and distribution centers and 278,000 village-level delivery stations, covering 95%[50] of the administrative villages in the country. The continuous improvement of rural logistics system has provided strong support for the smooth circulation of urban and rural commerce, driving industrial products to the countryside[51] and agricultural products to urban areas[52]. Second, various modes of agricultural e-commerce developed innovatively. Live commerce became an important way to sell agricultural products to urban areas. The data shows that the number of rural online merchants and online stores has reached 17.303 million, of which 5.732 million or 33.1%[53] sell agricultural products through live streaming. The mode of direct purchase from the origin makes it easier to control the quality of agricultural products from the source. A number of e-commerce platforms took the initiative to build production bases in and sign contracts with the origin of agricultural products, and empower the supply chain of agricultural products by means of digitalized management and operation. The "e-commerce + tourism + picking" model helps farmers to increase income and get rich based on local conditions. Many localities have explored and developed the integration of agricultural e-commerce with rural life experiencing, leisure, vacation, learning and research according to their own agricultural and regional characteristics, effectively enhancing the value chain of agricultural products.

(III) Online Meal Ordering

As of June 2023, the user size of online meal ordering in China reached 535 million, an increase of 13.72 million compared with December 2022, accounting for 49.6% of the total netizens.

[47] Source: Chinese government website, https://www.gov.cn/xinwen/2023-04/23/content_5752800.htm?eqid=b5b36c0100000c56000000066486f0e0, April 23, 2023.
[48] Direct purchase from the origin refers to the mode of directly purchasing agricultural products from their origin.
[49] Source: Ministry of Commerce, http://www.mofcom.gov.cn/article/xwfb/xwsjfzr/202307/20230703422646.shtml, July 20, 2023.
[50] Source: People's Daily, http://finance.people.com.cn/n1/2023/0522/c1004-32691812.html, May 22, 2023.
[51] "Driving industrial products to the countryside" means that industrial or urban enterprises directly transport industrial products to rural areas for sale.
[52] "Driving agricultural products to urban areas" means that agricultural products are sold from agricultural production sites to various parts of the country, especially in urban (town) markets.
[53] Source: The State Council Information Office, http://www.scio.gov.cn/xwfb/gwyxwbgsxwfbh/wqfbh_2284/49421/49661/wz49663/202307/t20230704_724787.html, March 2, 2023.

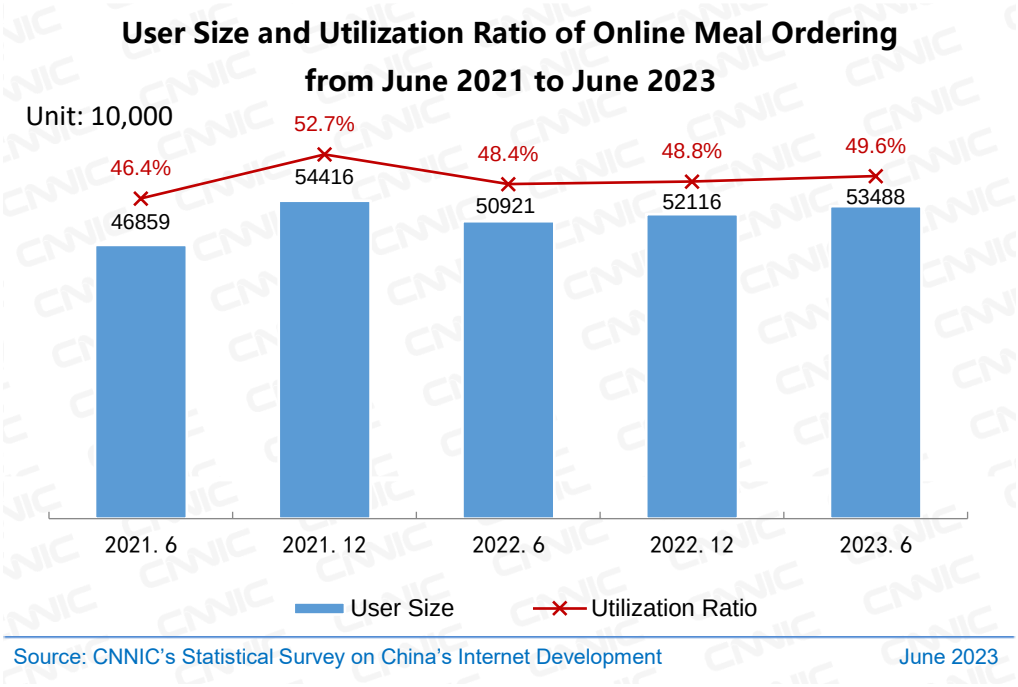


Figure 35 User Size and Utilization Ratio of Online Meal Ordering from June 2021 to June 2023

Online meal ordering services grew steadily and expanded to the field of instant delivery. First, the recovery of consumer market boosted the business growth of online meal ordering. With the good momentum of the recovery of consumer market in the first half of the year, online meal ordering platforms improved the operation solutions and marketing tools to help businesses optimize their marketing strategies and promote revenue growth. Data shows that Meituan's distribution service revenue[54] in the first quarter increased by 18.8% year-on-year[55]; in the first quarter, Alibaba's local life service revenue[56] increased by 17% year-on-year, and the number of orders increased by more than 20%, among which, the GMV[57] of meal ordering business and order volume both achieved steady growth[58]. Second, online meal ordering services continued to expand into the field of instant delivery. Relying on the advantages of instant delivery system, online meal ordering platforms expanded the scope of instant delivery from restaurant food to fresh food, daily necessities, flowers and other categories, thus bringing new business growth points. Taking Meituan as an example, the number of instant delivery transactions in the first quarter increased by 14.9% year-on-year, the "flash purchase" business achieved growth both in the number of users and in transaction frequency, and the order volume increased by about 35% year-on-year[59].

[54] Online meal ordering is listed as core business in the category of "delivery service" in the financial report of Meituan.
[55] Source: Meituan's financial report for the first quarter of 2023, https://media-meituan.todayir.com/20230525172943174250463 2_tc.pdf, May 25, 2023.
[56] Online meal ordering is listed as core business in the category of "local life service" in Alibaba's financial report.
[57] GMV is an acronym for gross merchandise volume.
[58] Source: Alibaba's financial report for the first quarter of 2023, https://data.alibabagroup.com/ecms-files/1508695866/3c9bbcdd-1b9e-4525-87cf-6eb2d5a9c66a/March%20Quarter%202023%20and%20Full%20Fiscal%20Year%202023%20Results.pdf, May 18, 2023.
[59] Source: Meituan's financial report for the first quarter of 2023, https://media-

(IV) Online Travel Booking

As of June 2023, the number of users of online travel booking in China was 454 million, up 30.91 million from December 2022, accounting for 42.1% of all Internet users.

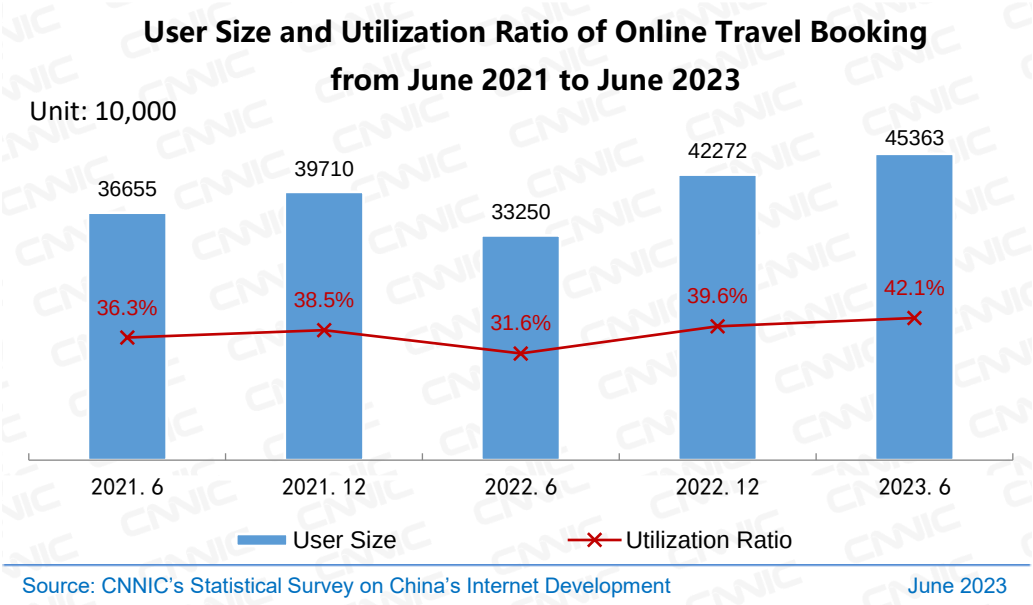


Figure 36 User Size and Utilization Ratio of Online Travel Booking from June 2021 to June 2023

In the first half of 2023, China's travel booking market recovered strongly, and the performance of related enterprises improved significantly. Enterprises seized new opportunities, further enhanced their core competitiveness and boosted the high-quality development of the industry.

The domestic tourism market recovered strongly, and the performance of travel booking enterprises improved significantly. First, the tourism market accelerated its recovery, and the number of tourists and their consumption activity hit a new high. According to statistics, during the May Day holiday in 2023, the number of domestic tourists increased by 70.8% year-on-year, equivalent to 119.1% of the level in the same period in 2019[60]; domestic tourism revenue increased by 128.9% year-on-year, equivalent to 100.7% of the level in the same period of 2019. Second, online travel booking companies ushered in development opportunities and their performance increased significantly. In the first quarter, Ctrip Group's net operating income rose by 124% year-on-year, of which the income from hotel booking, transport ticketing and tourism increased by 140%, 150% and 211% respectively[61]. In addition, the Q1 performance of Tongcheng Travel, Fliggy and Tuniu Tourism also achieved rapid growth.

Travel booking companies steadily enhanced their core competitiveness and boosted the high-

meituan.todayir.com/20230525172943174250463 2_tc.pdf, May 25, 2023.

[60] Source: Ministry of Culture and Tourism, https://www.mct.gov.cn/whzx/whyw/202305/t20230503_943504.htm, May 3, 2023.

[61] Source: Ctrip Group's financial report for the first quarter of 2023, https://investors.trip.com/static-files/8544ECDA-57E4-4995-B317-53A5F357B921, June 8, 2023.

quality development of the industry. First, enterprises enriched their products and services, leading to greater user stickiness. For example, Tongcheng Travel connected the booking of hotel rooms, air tickets, train tickets, scenic spot tickets, and other services to WeChat search, and opened up multi-scene services such as WeChat official account, applet, search, and video platform, through which the user base was continuously expanded. In the first quarter, the average number of monthly active users (MAUs) of Tongcheng Travel registered a year-on-year increase of 16.9%[62]. Second, enterprises deeply cultivated the tourism industry chain and digitally empowered rural tourism to upgrade. For example, Fliggy and Alibaba Foundation launched the "Yiqi Digital Travel Plan" to create a one-stop cultural travel service platform by integrating the county's characteristic agricultural, cultural and tourism resources, and help the transformation and upgrading of rural tourism. Third, enterprises promoted overseas business layout and enhanced their international development capabilities. For example, Ctrip Group has established cooperation networks with more than 600,000 hotels in more than 200 countries around the world, and its overseas layout and international development capabilities have been continuously strengthened, as a result of which ticket bookings on Ctrip's international OTA[63] platform increased by over 200% year-on-year[64].

IV Online Entertainment Applications

(I) Online Video

Up to June 2023, the user size of online video in China had reached 1.044 billion, up 13.80 million from December 2022, making up 96.8% of all Internet users. The number of short video users increased to 1.026 billion, up 14.54 million from December 2022, accounting for 95.2% of all Internet users.

[62] Source: Tongcheng Travel's financial report for the first quarter of 2023, https://NP-sNotice-hd.eastmoney.com/pdf/H2_an202305241587136985_1.pdf? 1684946001000.pdf, May 24, 2023.
[63] OTA stands for "online travel agency", a collective term for online booking platforms for hotels, tourism and ticketing.
[64] Source: Ctrip Group's financial report for the first quarter of 2023, https://investors.trip.com/static-files/8544ECDA-57E4-4995-B317-53A5F357B921, June 8, 2023.

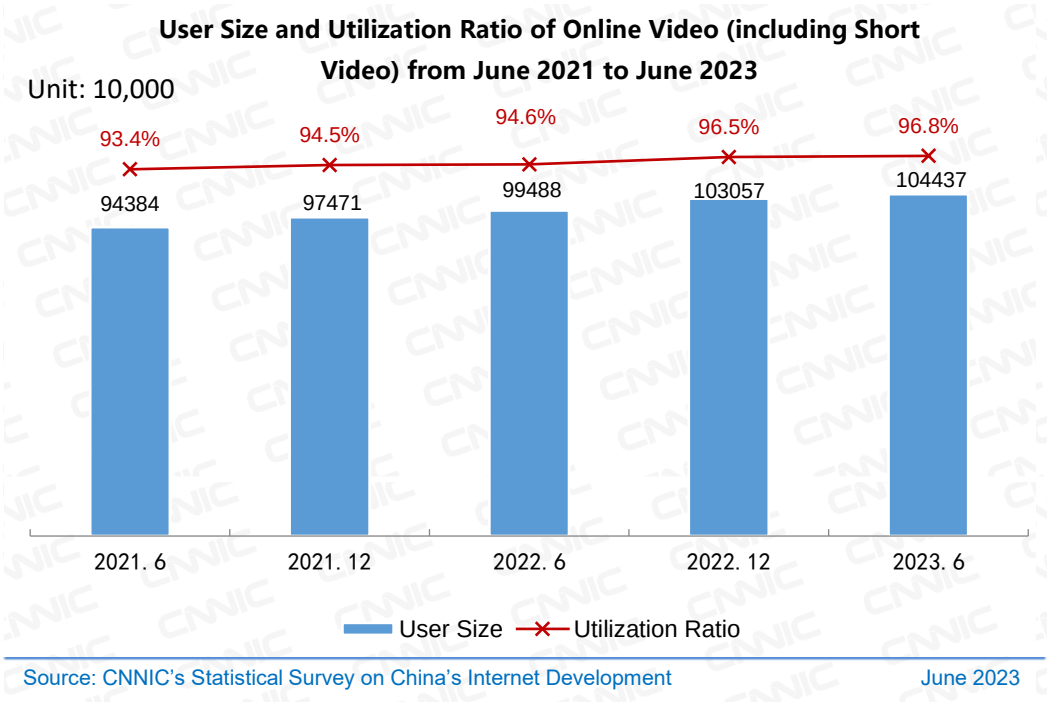


Figure 37 User Size and Utilization Ratio of Online Video (including Short Video) from June 2021 to June 2023

In the first half of 2023, online video platforms adhered to high-quality content creation and explored the industrialization of film and television[65]. The competition between long and short video platforms gradually turned into win-win cooperation.

Online video platforms insisted on high-quality content creation and continued to explore the path to film and television industrialization. First, they continued to strengthen the supply of high-quality content and build a good content ecosystem. In recent years, various online video platforms have strengthened the creation of high-quality content, improved the quality of programs and built their core competitiveness. In the first half of the year, online video programs such as "The Springs of Life", "Become a Farmer" and "Look Up and See Joy" received good market response, giving full play to the exemplary and leading role of outstanding works[66]. Second, online video platforms continued to explore the industrialization of film and television, and promote the industry to reduce costs and increase efficiency. In terms of technology, the platforms applied virtual shooting[67] technology to drama production, which solves the difficulty of shooting extreme scenes such as ocean and desert. In terms of production process, the platforms applied digital management tools to approval, schedule management and other links to improve the overall production efficiency. In terms of assets, the platforms systematically managed physical assets such as props and costumes and virtual assets such as scenes by establishing a film and television asset sharing platform to

[65] Industrialization of film and television refers to the industrialized production of film and television works by establishing an industrial assembly line for film and television works, creating film and television contents in a standardized way and managing the production process in a modern way.
[66] Source: National Administration of Radio and Television, http://www.nrta.gov.cn/art/2023/7/5/art_113_64802.html, July 5, 2023.
[67] Virtual shooting refers to projecting the pre-made 3D digital scene onto the LED display screen to realize real-time visual preview of the scene, modify the scene parameters in real time and improve shooting efficiency.

reduce production costs.

The competition between long and short video platforms has turned to cooperation, gradually realizing mutual complementation and common prosperity of the industry. With the gradual stabilization of the user size and usage duration of long video and short video platforms, the competition between them has gradually turned to win-win cooperation. Sohu Video, Iqiyi Video and Tencent Video have successively reached cooperation with Douyin Group to explore the secondary creation of long video content and the joint promotion of long and short videos. The rich content reserves of long-video platforms provide resources for the derivative creation of short videos which have become an important form of publicity and promotion of film and television works. The cooperation between the two will promote a win-win situation for platforms, users and content creators.

(II) Live Streaming

As of June 2023, the user size of live streaming in China had reached 765 million, up 14.74 million from December 2022, accounting for 71.0% of all Internet users. Among them, 526 million were e-commerce live streaming users, up 11.94 million from the end of 2022, taking up 48.8% of the total netizens; 298 million were game live streaming users, up 31.88 million in six months, accounting for 27.6% of the total netizens; 194 million were users of live streaming of reality shows, up 6.57 million in half a year, accounting for 18.0% of the total netizens; 187 million were users of live streaming of concerts, down 20.66 million from December 2022, representing 17.3% of all Internet users; and 323 million were users of sports live streaming, down 50.72 million in six months, accounting for 29.9% of all Internet users.

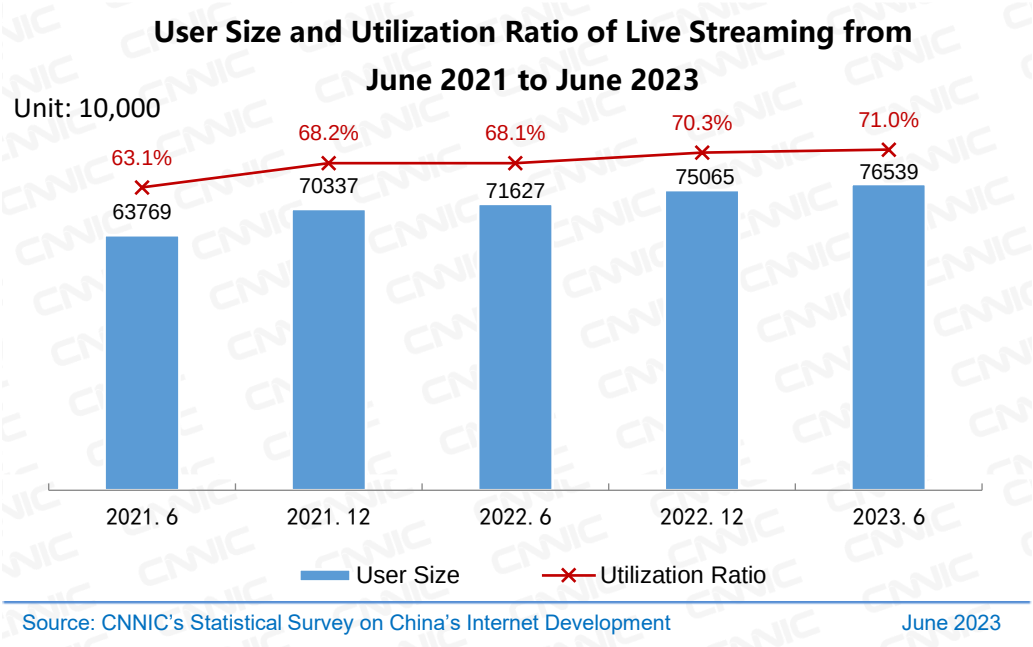


Figure 38 User Size and Utilization Ratio of Live Streaming from June 2021 to June 2023

In the first half of 2023, the live streaming industry continued its benign development trend, and

emerging products and technologies represented by digital-human[68] virtual anchors helped to reduce costs and increase efficiency in the industry. In addition, live streaming has become a powerful tool to promote local culture and stimulate local economy.

In terms of product and technology, digital-human virtual anchor realizes cost reduction and efficiency improvement in the industry. A number of Internet companies released related products in the first half of the year, which effectively reduced costs while improving production efficiency. Baidu, Tencent Cloud and other companies launched digital human virtual anchor products, allowing users to submit a small amount of sample data for training, and within 24 hours, they can produce a virtual anchor similar to a real person. Iflytek launched "Xunfei Zhizuo", a content creation platform that relies on AI technology to build a virtual live studio and completes live streaming after the manuscript is inputted.

In terms of social benefits, live streaming helps to publicize local culture and stimulate local economy. In March, the first "Beautiful Countryside" basketball league in Guizhou Province was broadcasted through a live streaming platform, after which 120,000 visitors and tourists were drawn to the locality, directly contributing over 10 million yuan[69] in consumption to the local service industry. Data shows that on March 25 and 26, the frequency of search queries for tourism in Southeast Guizhou Miao-Dong Autonomous Prefecture increased by 276%[70] compared with the previous weekend. In addition, in the first half of the year, Zibo City, Shandong Province also actively promoted tourism through live streaming, short video and other platforms, which boosted local economic growth. According to statistics, the city held 47,833[71] live streaming activities from January to May, helping 1,288 local barbecue shops to receive about 4 million people every month from March, and the retail sales of consumer goods in accommodation and catering industry increased by 10% year-on-year[72]. These live steaming activities with local characteristics have promoted the development of local tourism, catering, accommodation and other industries and become a powerful propellant for the high-quality development of local economy.

(III) Online Games

Up to June 2023, the user size of online games in China was 550 million, up 28.06 million from December 2022, making up 51.0% of all Internet users.

[68] Digital human refers to any virtual character created by digital technology that looks like a real person.
[69] Source: Guizhou Provincial Sports Bureau, https://www.sport.gov.cn/n14471/n14495/n14543/c25382433/content.html, March 29, 2023.
[70] Source: Xinhuanet, http://m.news.cn/gz/2023-04/03/c_1129490604.htm, April 3, 2023.
[71] Source: Zibo Municipal Bureau of Commerce, http://boftec.zibo.gov.cn/art/2023/6/29/art_380_2719082.html, June 29, 2023.
[72] Source: China Economic Net, http://www.ce.cn/culture/GD/202306/05/T20230605_38576304.shtml, June 5, 2023.

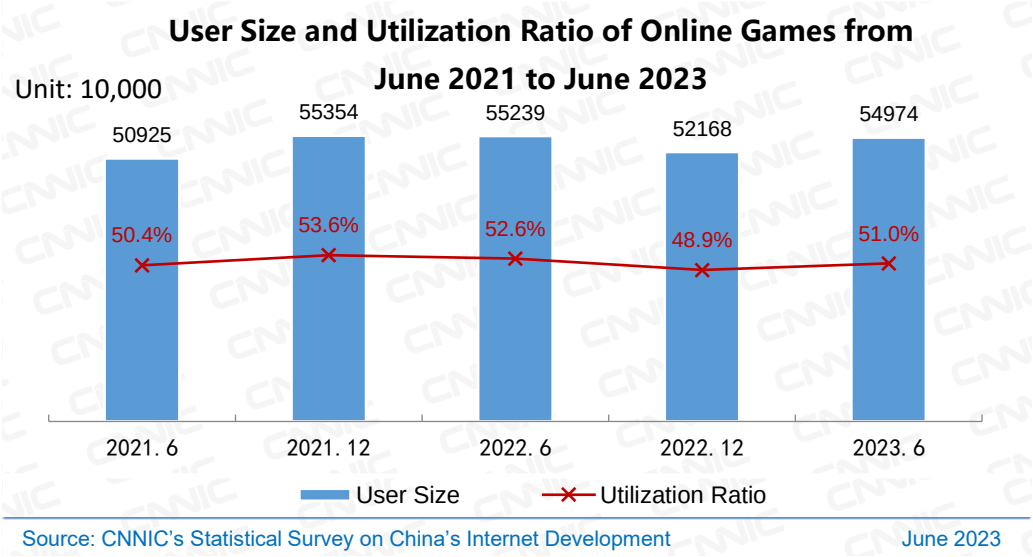


Figure 39 User Size and Utilization Ratio of Online Games from June 2021 to June 2023

In the first half of 2023, the policy environment for China's online game industry continued to improve, and the ability to resist external risks grew stronger, which promoted the steady increase of online game enterprises' revenue. At the same time, breakthroughs in AI technology provided more opportunities for online game production.

Game version numbers continued to increase, helping online game enterprises to increase their revenue. As of June, the General Administration of Press and Publication had released a total of 521 domestic game version numbers, covering mobile terminals, clients, and game consoles, an increase of 11.3%[73] compared with the whole year of 2022 (468). The continuous increase of game version numbers has played a positive role in improving the market expectation of online game industry and promoting the revenue growth of online game enterprises. In the first quarter, Tencent's game revenue in the Chinese market increased by 6.0% year-on-year[74], and the net income of Netease games and related value-added services increased by 7.6% year-on-year[75].

China's online game enterprises have strengthened their ability to resist external risks and respond to market changes. In recent years, the R&D and operation capabilities of online game enterprises in China have been continuously improved, and self-developed business has become the main source of revenue. The contribution of acting as an agent for foreign games to revenue has decreased year by year. In January 2023, Blizzard Entertainment announced the termination of its cooperation with Netease in game agency business, but this had little impact on Netease's game revenue. Data shows that acting as an agent for Blizzard games had lower single-digit contributions to NetEase's

[73] Source: General Administration of Press and Publication, https://www.nppa.gov.cn/bsfw/jggs/yxspjg/, June 21, 2023.
[74] Source: Tencent's financial report for the first quarter of fiscal year 2023, https://static.www.tencent.com/uploads/2023/05/17/29B622f47130fd062e299b4635b.pdf, May 17, 2023.
[75] Source: Netease's financial report for the first quarter of fiscal year 2023, https://ir.netease.com/system/files-encrypted/nasdaq_kms/assets/2023/05/25/4-21-36/SC-2023%E5%B9%B4%E4%B8%80%E5%AD%A3%E6%8A%A5.pdf, May 25, 2023.

net revenue and net profit for the whole year of 2021 and the first nine months of 2022[76].

The rapid development of AI technology has brought more opportunities for game production. In terms of game development, Tencent is actively investing in the AI tool chain for game development. Generative AI start-ups such as MiniMax have received investment from Tencent; Perfect World also uses more generative AI tools such as Stable Diffusion[77] for rendering and composition in game design. In terms of cost reduction, CMGE Technology Group Limited fully introduced AI technology in copywriting, 2D art, translation and dubbing to reduce outsourcing costs[78].

(IV) Online Literature

As of June 2023, the size of online literature users in China reached 528 million, an increase of 35.92 million compared to December 2022, accounting for 49.0% of the total number of netizens.

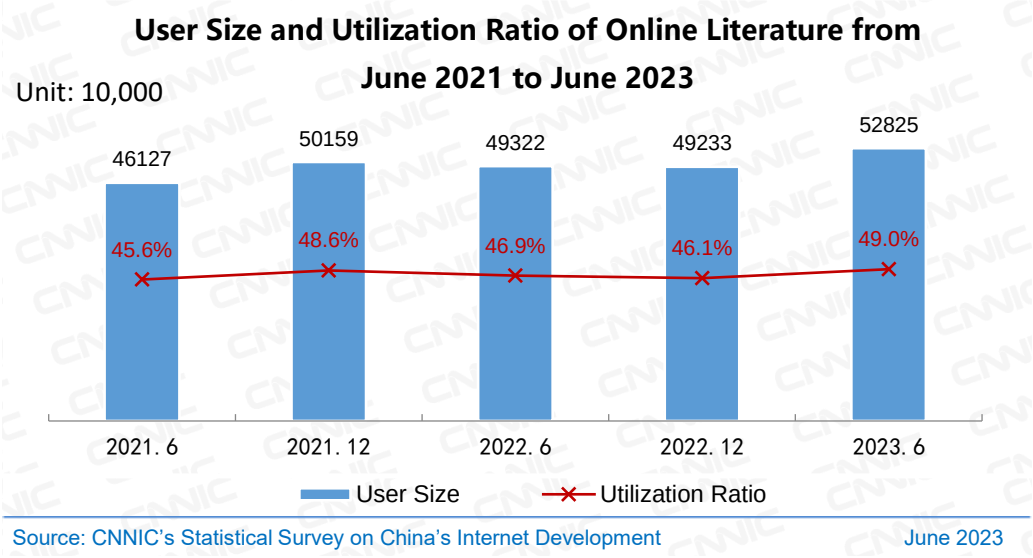


Figure 40 User Size and Utilization Ratio of Online Literature from June 2021 to June 2023

In the first half of 2023, China's online literature industry continued to develop steadily, and the improvement of industrial ecology and the introduction of AI technology were the main characteristics of industry development.

The industrial ecology for online literature copyright has been improved. First, the cooperation between online literature platforms and video websites in copyright content has been further deepened. In January, Jinjiang Original, an online literature platform, entered into a framework agreement with the video website Bilibili to cooperate on video adaptation of online literature works. Deepened integration of online literature and video industry, on the one hand, promotes the video adaptation of online literature works, which further encourages authors' creation; on the other hand,

[76] Source: Netease's financial report for the third quarter of fiscal year 2022, https://ir.netease.com/system/files-encrypted/nasdaq_kms/assets/2022/11/17/3-22-43/2022%E5%B9%B4%E4%B8%89%E5%AD%A3%E6%8A%A5-SC.pdf, November 17, 2022.
[77] Stable Diffusion is a text and image generation model based on Latent Diffusion Models, which can generate high-quality, high-resolution and high-fidelity images according to any text input.
[78] Source: Guangming Net, https://m.gmw.cn/2023-06/20/content_36641481.htm, June 20, 2023.

it also enables video platforms to diversify their own content categories and enhance the ability to innovatively create their own content. Second, initial results have been achieved in adapting online literary works into comics, games and other forms. Data shows that China Literature Limited has published and put online more than 230 comic works[79] based on the copyright of online literary works. These works rely on high-quality online literature content and have complete and mature characters, stories and world views, thus having more commercial potential in the subsequent content copyright derivation and game development. Relying on high-quality online literature content, these works show mature characters, complete stories and correct world outlook, thus having more commercial potential in subsequent content copyright derivation and game development.

Generative artificial intelligence has brought many new changes to the network literature industry. First, strengthening the layout of generative AI technology in online literature enterprises is expected to create a new situation in the industry. In June, iReader Technology announced that its first AI product, "YUEAILIAO" (read, love and chat), was ready for internal testing. It uses generative AI technology to empower digital reading scenarios, providing users with an innovatively interactive way of reading. Second, generative AI tools are expected to bring new ways to create literary works. Such tools can help online literature in many aspects, such as frame construction, details supplement and creative tips, and effectively reduce the workload of creators, so that authors can focus on content innovation and improve the way of writing. Third, the introduction of generative AI technology has necessitated new regulatory requirements. Developers of generative AI technology may use unauthorized online literary works to train their models, which may lead to copyright disputes. This will give rise to new requirements for the copyright governance system of online literature and other content.

V Public Service Applications

(I) Online Car-hailing Services

As of June 2023, the user size of online car-hailing services in China was 472 million, up 34.92 million from December 2022, making up 43.8% of all Internet users.

[79] Source: China Literature Limited's 2022 financial report, https://IR-1253177085.cos.ap-hongkong.myqcloud.com/investment/20230418/643E7C87D5Af3.pdf, March 16, 2023.

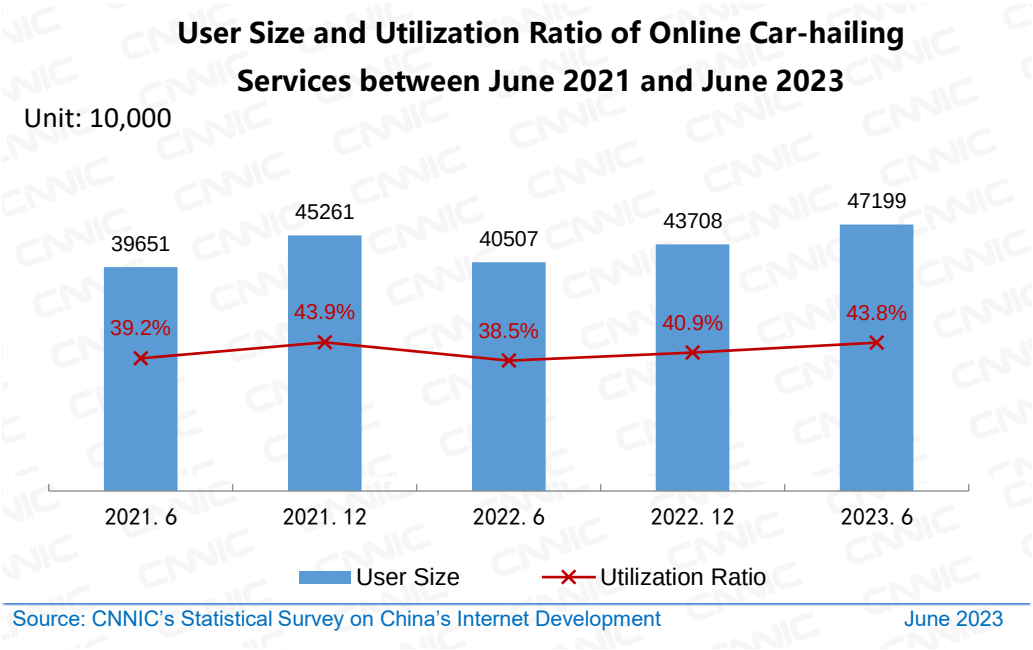


Figure 41 User Size and Utilization Ratio of Online Car-hailing Services between June 2021 and June 2023

In the first half of 2023, the aggregation model[80] brought development opportunities to the online car-hailing industry. At the same time, the industry's standardization level continued to improve.

The aggregation model creates opportunities for the development of the online car-hailing industry. First, it helps small and medium-sized enterprises to expand customer acquisition channels and achieve a significant improvement in customer acquisition capabilities. The aggregation platform has the advantage of user diversion, which helps small and medium-sized online car-hailing platforms reach more users and significantly improve customer acquisition ability. For example, a small online car-hailing platform broke the all-time record for the number of orders on the same day it connected to AutoNavi and its revenue in the first quarter increased by 195%[81] year-on-year. Second, the aggregation model has broadened the service scenario and created a one-stop service experience. For example, Meituan Taxi utilizes its traffic advantage in the field of local life services to provide users with a one-stop service experience covering clothing, food, housing, transportation, etc. In February, AutoNavi launched an integrated travel service platform, which offers all kinds of travel-related services based on the aggregation model, aiming at improving users' travel efficiency in one stop.

The standardization of the online car-hailing industry continues to improve. In terms of industry regulation, in April, the General Office of the Ministry of Transport and other four departments jointly issued the Notice on Effectively Regulating and Managing Online Car-hailing Aggregation Platforms, requiring strengthened supervision over and guidance for the operating of online car-

[80] Aggregation model is an operation model in which the aggregation platform distributes its own traffic to the connected online car-hailing platform, and the latter provides passenger service.
[81] Source: Wuhan Municipal People's Government website, https://www.wuhan.gov.cn/sy/whyw/202306/t20230615 _2217017.shtml, June 15, 2023.

hailing aggregation platforms, and clarifying the boundaries of their operation and the division of their responsibilities. The Notice reflects the great importance the State's great attention to safeguarding the lawful rights and interests of passengers and drivers, as well as to promoting the standardization and healthy development of the online car-hailing industry. In terms of the protection system, the Ministry of Transport issued the 2023 Work Plan for Cutting Excessive Sharing of Operating Income by Platform Enterprises in the Transport Industry", which requires all major online car-hailing platforms to gradually reduce the excessive sharing of income, so as to ensure a reasonable level of remuneration for drivers.

(II) Online Medical Services

As of June 2023, the user size of online medical services in China had reached 364 million, an increase of 1.62 million over December 2022, accounting for 33.8% of the total Internet users.

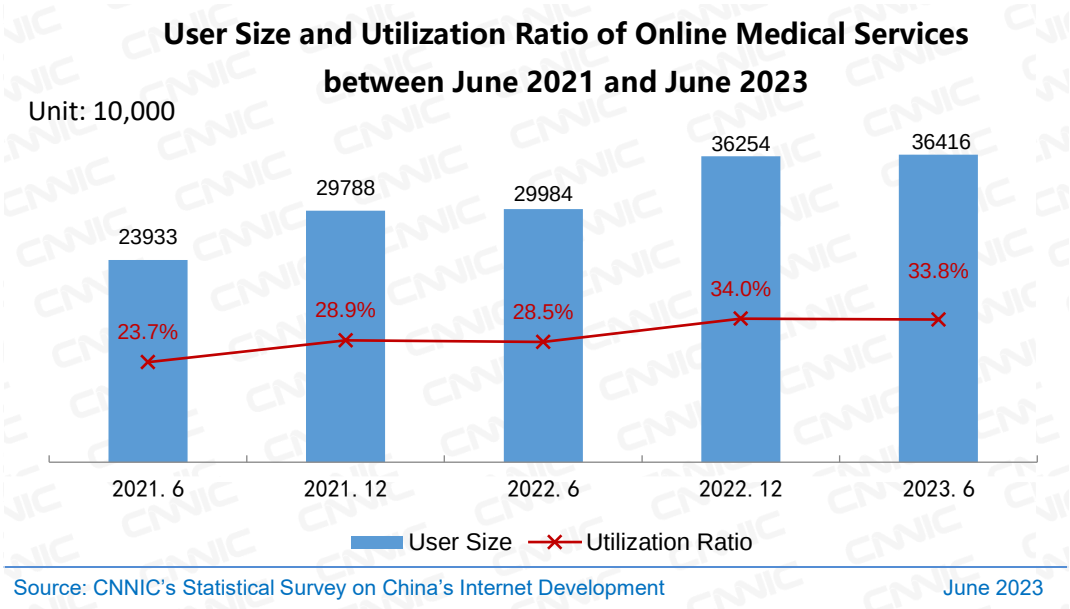


Figure 42 User Size and Utilization Ratio of Online Medical Services between June 2021 and June 2023

The industry of online medical services develops rapidly. First, the number of Internet hospitals continues to increase. Thanks to the empowerment of information and communication technology, online medical resources represented by Internet hospitals are increasing continuously. At present, there are more than 3,000[82] Internet hospitals in China, an increase of 1,300[83] compared with the end of 2021, providing online diagnosis and treatment services to more than 25.9 million patients[84]. Second, large online medical platforms enjoy strong development momentum. JD Health, for example, achieved revenue of 13.95 billion yuan in the first quarter of 2023, a year-on-year increase

[82] Source: People's Daily Health Client, http://www.jksb.com.cn/index.php?m=content&c=index&a=show&catid=788&id=200853, May 29, 2023.
[83] Source: Digital China Development Report (2021) by the Cyberspace Administration of China, http://www.cac.gov.cn/2022-08/02/c_1661066515613920.htm, August 2, 2022.
[84] Source: Digital China Development Report (2022) by the Cyberspace Administration of China, http://www.cac.gov.cn/2023-05/22/c_1686402318492248.htm, May 23, 2023.

of 54.2%[85]. Ali Health's total revenue in fiscal year 2023[86] was 26.76 billion yuan, a year-on-year increase of 30.1%[87]. Third, remarkable results have been achieved in the construction of telemedicine cooperation network[88]. At present, medical resources continue to sink to the grassroots level, telemedicine services cover 100%[89] counties and districts, and the telemedicine cooperation network has covered more than 24,000[90] medical institutions in all prefecture-level cities. Fourth, policies and regulations promote the upgrading of online medical services. In February, the Office of National Healthcare Security Administration issued Notice on Further Integrating Designated Retail Pharmacies into the Overall Management of Outpatient Services, emphasizing the need for designated retail pharmacies to open overall outpatient services. At present, Jiangsu, Gansu, Fujian and other places have realized the automatic flow of electronic prescriptions and "dual-channel[91]" instant settlement of drug costs, which has enhanced the convenience and accessibility of medical treatment and drugs for insured patients.

[85] Source: JD Health's performance announcement for the first quarter of 2023, https://manager.wisdomir.com/files/586/2023/0511/2023051170001_03328107_tc.pdf, May 11, 2023.
[86] Ali Health's fiscal year 2023 is from April 1, 2022 to March 31, 2023.
[87] Source: Ali Health's performance announcement for financial year 2023, https://cloudpharmacistpictures.oss-cn-zhangjiakou.aliyuncs.com/alihealth_official_website_manager/financial_files/c_00241ar-20230710%20 (1) - fd04e021c646.pdf, May 23, 2023.
[88] Telemedicine cooperation network is a telemedicine service network established by the lead unit and medical institutions in grassroots, remote and underdeveloped areas.
[89] Source: Digital China Development Report (2022) by the Cyberspace Administration of China, http://www.cac.gov.cn/2023-05/22/c_1686402318492248.htm, May 23, 2023.
[90] Source: National Health Commission, http://www.nhc.gov.cn/wjw/jiany/202301/aaf87ed5bced4685bf800b02ec20066f.shtml, January 13, 2023.
[91] "Dual channel" is a mechanism led by the National Healthcare Security Administration and the National Health Commission. It ensures the supply of negotiated drugs through two channels: designated medical institutions and designated retail pharmacies, meets reasonable clinical needs, and incorporates the drugs into the medical insurance payment system.

Appendix 1 Survey Methodology

I. Survey Methodology

(I) Telephone Survey

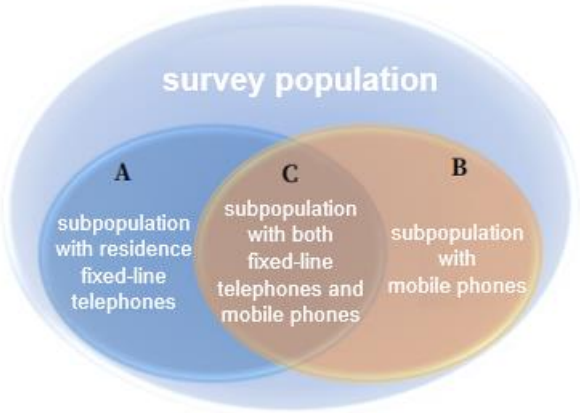
1.1 Survey Population

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

◇ Sample scale

30,000 samples were included, covering 31 provinces, autonomous regions and municipalities in Chinese mainland, excluding Chinese Hongkong, Macao and Taiwan.

◇ Division of survey population



The survey population can be divided into three categories:

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

Subpopulation B: Survey subpopulation with mobile phones;

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

1.2 Sampling Method

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

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

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

Sampling in subpopulation B is 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. The data published by statistical bureaus are annual census data projections or annual population sample survey projections. Such data are used in this report as the basis for adjusting the weights of the semi-annual survey data, ignoring the differences between survey periods.

1.3 Sampling Error

Based on the design, analysis and calculation of sampling, 0.69 percentage point is the estimated maximum allowable absolute error of the proportional target quantity (e.g. the popularity rate of netizens) among the individual netizen survey results, when the confidence is 95%. From this, we can deduce the error range of estimating other kinds of target quantities, such as the scale of netizens.

1.4 Survey Method

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

1.5 Differences between Survey Population and Targeted Population

A study for the subpopulation who are not covered by telephones, conducted by CNNIC at the end of 2005, shows that Internet users are very few in this subpopulation. Currently, the subpopulation is downsizing gradually with the development of our telecom industry. In this survey,

there is an assumption, i.e., Internet users who are not covered by fixed-line telephones or mobile phones are negligible.

(II) Automatic Online Search and Statistical Data Reporting

Automatic online search mainly makes technical statistics on the number of websites, and the reported data mainly includes the number of IP addresses and domain names.

2.1 Number of IP Addresses

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

2.2 Number of Websites

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

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

2.3 Number of Domain Names

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

II. Definitions of Terms in the Report

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

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

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

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

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

◇ **IP Address:** As the basic resource on the Internet, the IP address functions to identify

computers, servers and other devices connected to the Internet. Connection with the Internet can be realized only when an IP address (in any form) is acquired.

◇ **Website:** It refers to a web site with a domain name itself or "www. + domain name". Such domain names include those, which are registered under China's ccTLDs, namely .CN and .中国, or gTLDs, and whose registrants are within the territory of P.R.C. For example, the domain name of "cnnic.cn" 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 Chinese mainland, excluding Hong Kong, Macao and Taiwan.

◇ **Deadline of Survey Data:** The deadline of the statistical survey data is Jun. 30, 2023**.**

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

Appendix 2 Attached Tables of Basic Internet Resources

Table 1 Number of IPv4 Addresses in Different Regions of China

Region	Number of Addresses	Equivalence
Chinese mainland	343,171,584	20A+116B+98C
Hong Kong	12,870,400	196B+99C
Macau	337,408	5B+38C
Taiwan	35,694,336	2A+32B+167C

Table 2 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 note 1	4A+42B+21C
IP Address Allocation Alliance of CNNIC	63,889,856 note 2	3A+206B+192C
China Mobile	35,294,208	2A+26B+140C
China Education and Research Network	16,649,984	254B+16C
China Mobile Tietong	15,796,224 note 3	241B+8C
Others	15,911,232 note 4	242B+201C
Total	343,171,584	20A+116B+98C

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 86 million, equivalent to 5.1A. The IPv4 addresses of the IP Address Allocation 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: Others refer to enterprises and institutions that apply for IPv4 addresses directly from APNIC.

Note 5: The deadline for the above statistical data is Jun. 30, 2023.

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

Region	Number of Addresses
Chinese mainland	64,387
Hong Kong	1,074
Macau	8
Taiwan	2,586

Table 4 Allocation of IPv6 Addresses among Organizations in Chinese mainland

Organization Name	Number of IPv6 Addresses
IP Address Allocation Alliance of CNNIC	26,677 note 2
China Telecom	16,387
China Education and Research Network	10,258
China Unicom	4,097
China Mobile	4,097
China Mobile Tietong	2,049 note 3
Others	822 note 4
Total	64,387

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 28726/32. The IPv6 addresses held by the members of IP Address Allocation Alliance listed in the above table do not include those IPv6 addresses already assigned to China Mobile Tietong.

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

Note 4: Others refer to enterprises and institutions that apply for IPv6 addresses directly from APNIC.

Note 5: The deadline for the above statistical data is Jun. 30, 2023.

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

Province / Autonomous Region / Municipality Directly under the Central Government	Proportion
Beijing	25.19%
Guangdong	9.43%
Zhejiang	6.39%
Shandong	4.83%
Jiangsu	4.70%
Shanghai	4.46%
Liaoning	3.29%
Hebei	2.81%
Sichuan	2.74%
Henan	2.60%
Hubei	2.37%
Hunan	2.33%
Fujian	1.92%
Jiangxi	1.71%
Chongqing	1.66%
Anhui	1.63%
Shaanxi	1.61%
Guangxi	1.36%
Shanxi	1.26%
Jilin	1.20%
Heilongjiang	1.19%
Tianjin	1.04%
Yunnan	0.96%
Inner Mongolia	0.77%
Xinjiang	0.60%
Hainan	0.47%
Gansu	0.47%
Guizhou	0.44%
Ningxia	0.27%
Qinghai	0.17%
Tibet	0.13%
Others	10.01%
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: Others refer to countries or regions other than the Chinese mainland.

Note 3: The deadline for the above statistical data is Jun 30, 2023.

Table 6 Number of Domain Names in Each Province / Autonomous Region / Municipality Directly under the Central Government

Province / Autonomous Region / Municipality Directly under the Central Government	Total Domain Names		".中国" Domain Names	
	Number	Proportion in total domain names	Number	Proportion in ".中国" domain names
Guangdong	6350719	21.0%	14569	8.1%
Beijing	5942570	19.7%	24877	13.9%
Fujian	2036203	6.7%	5528	3.1%
Guizhou	1769413	5.9%	3144	1.8%
Shandong	1569282	5.2%	28594	16.0%
Jiangsu	1269521	4.2%	7987	4.5%
Shanghai	1243309	4.1%	6984	3.9%
Zhejiang	1212317	4.0%	6962	3.9%
Sichuan	951233	3.1%	11701	6.5%
Anhui	884568	2.9%	3209	1.8%
Henan	835564	2.8%	3886	2.2%
Hunan	734985	2.4%	2242	1.3%
Hubei	673552	2.2%	3099	1.7%
Hebei	499987	1.7%	5528	3.1%
Guangxi	483348	1.6%	1484	0.8%
Jiangxi	436690	1.4%	2155	1.2%
Shaanxi	384024	1.3%	7309	4.1%
Chongqing	359509	1.2%	5232	2.9%
Liaoning	342098	1.1%	5305	3.0%
Shanxi	307747	1.0%	1729	1.0%
Yunnan	290228	1.0%	4859	2.7%
Heilongjiang	244137	0.8%	2097	1.2%
Tianjin	203647	0.7%	1229	0.7%
Jilin	176368	0.6%	1246	0.7%
Hainan	146660	0.5%	760	0.4%
Gansu	134726	0.4%	1204	0.7%
Inner Mongolia	134661	0.4%	1592	0.9%
Xinjiang	81847	0.3%	676	0.4%
Ningxia	42763	0.1%	519	0.3%
Qinghai	16106	0.1%	279	0.2%
Tibet	14405	0.0%	493	0.3%
Others	464897	1.5%	12339	6.9%
Total	30237084	100.0%	178817	100.0%

Data sources: CNNIC

Note 2: Others refer to countries or regions other than the Chinese mainland, or the location of domain name registrants can not be identified.
Note: The deadline for the above statistical data is Jun 30, 2023.

Table 7 Number of Internet Users and Internet Penetration Rate in Each Province / Autonomous Region / Municipality Directly under the Central Government in 2022

Province / Autonomous Region / Municipality Directly under the Central Government	Number of Internet Users (10 thousands)	Internet Penetration Rate
Shanghai	2224	89.8%
Beijing	1959	89.7%
Tianjin	1145	84.0%
Liaoning	3488	83.1%
Hebei	5978	80.6%
Inner Mongolia	1933	80.5%
Shanxi	2770	79.6%
Heilongjiang	2436	78.6%
Jilin	1845	78.6%
Xinjiang	2015	77.9%
Anhui	4737	77.3%
Guangdong	9709	76.7%
Fujian	3208	76.6%
Zhejiang	5030	76.5%
Shandong	7714	75.9%
Henan	7476	75.7%
Jiangsu	6426	75.5%
Hunan	4929	74.6%
Shaanxi	2941	74.3%
Chongqing	2378	74.0%
Guangxi	3730	73.9%
Hubei	4247	72.7%
Ningxia	520	71.5%
Sichuan	5958	71.1%
Jiangxi	3200	70.7%
Qinghai	417	70.1%
Hainan	716	69.7%
Tibet	252	69.2%
Guizhou	2617	67.9%
Yunnan	3135	66.8%
Gansu	1612	64.7%

Data sources: CNNIC

Note: The deadline for the above statistical data is Dec 31, 2022.

Appendix 3 Supporting Organizations

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

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

China Organizational Name Administration Center
E-governance Research Center of Party School of the Central Committee of C.P.C (National Academy of Governance)
China Academy of Information and Communications Technology
Reporting Center for Illegal and Inappropriate Internet Information of Cyberspace Administration of China（12377）
Computer Network Information Center of Chinese Academy of Sciences

China Mobile
China Unicom
Baidu Online Network Technology (Beijing) Co., Ltd.
Beijing Micro Dream Network Technology Co., Ltd. (Micro-blog)
Alibaba Cloud Computing (Beijing) Co., Ltd.
Beijing Baidu Netcom Technology Co., Ltd.
Beijing Guoxu Network Technology Co., Ltd.
Beijing Shouxinwangchuang Network Information service Co., Ltd.
Beijing Xinnet.com Co., Ltd.
Beijing ZW.cn Co., Ltd.
Beijing Zhuoyueshengming Technology Co., Ltd.
Chengdu Feishu Technology Co., Ltd.
Chengdu West Digital Technology Co., Ltd.
Doumai (Shanghai) Network Technology Co., Ltd.
Foshan Yidong Network Co., Ltd.
Guangdong HUYI Internet & IP Services Co., Ltd.
Guangdong Now.cn Co., Ltd.
Guangzhou Yunxun Information Technology Co., Ltd.
Hefei Juming Network Technology Co., Ltd.
Heilongjiang E-link Network Co., Ltd.
Global Business Domain Technology Co., Ltd.

China Telecom
Beijing Ucap Information Technology Co., Ltd.
Tencent Cloud Computing (Beijing) Co., Ltd.
Beijing ByteDance Technology Co., Ltd.
Alibaba Cloud Computing Co., Ltd.
Beijing Oriental Wangjing Information Technology Co., Ltd.
Beijing Huarui Wireless Technology Co., Ltd.
Beijing Wanweitonggang Technology Co., Ltd.
Beijing SFN Network Technology Co., Ltd.
Beijing BrandCloud.cn Co., Ltd.
Beijing Zihai Technology Co., Ltd.
Chengdu 51web.com Co., Ltd.
Daqing dqzc.com Co., Ltd.
Fanxi Corporation Service (Shanghai) Co., Ltd.
Fujian Litian Network Technology Co., Ltd.
Guangdong Jinwanbang Technology Investment Co., Ltd.
Guangzhou Mingyang Information Technology Co., Ltd.
Guest Internet Industry Co., Ltd.
Henan Weichuang Network Technology Co., Ltd.
ZDNS Beijing Engineering Research Center Co., Ltd.
Jiangsu Bangning Science & Technology Co., Ltd.

MarkMonitor Information Technology (Shanghai) Co., Ltd.
Xiamen 35.Com Technology Co., Ltd.
Xiamen Shusheng QYT Technology Co., Ltd.
Shangzhong Online Technology Co., Ltd.
Shanghai Chinafu.com Co., Ltd.
Shanghai Yovole Network Co., Ltd.
Shenzhen Internet Works Online Co., Ltd.
Sichuan Cloud Yuqu LLC Co., Ltd.
WangJu Brands Management Co., Ltd.
Yantai DNSpod Network Technology Co., Ltd.
Zhejiang 22net Inc.
Zhengzhou Shijichuanglian Electronic Technology Co., Ltd.
Knet Registrar (Tianjin) Co., Ltd
Xiamen Nawang Technology Co., Ltd.
Xiamen ZZY.cn Co., Ltd.
Xiamen eName Technology Co., Ltd.
Shanghai Oray Co., Ltd.
Shanghai CNDNS.com Co., Ltd.
Shenzhen idcicp.com Co., Ltd.
Shenzhen EIMS Information Technology Co., Ltd.
Vantage of Convergence (Chengdu) Co., Ltd.
Xi'an Qianxinet Technology Co., Ltd.
Ejee Group Beijing Co., Ltd.
Zhengzhou REG.CN Co., Ltd.
Grow Force Co., Ltd.

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