Statistical Report on Internet Development in China

(February 2019)

CNNIC
中国互联网络信息中心
CHINA INTERNET NETWORK INFORMATION CENTER

Preface

In 1997 competent departments in China authorized China Internet Network Information Center (CNNIC) to organize relevant Internet entities to jointly conduct an Internet development survey, and established a practice of regular release of the *Statistical Report on Internet Development in China* ("Report") at the beginning and in the middle of each year. Since then, 42 reports have been published. Utilizing core data, the reports aim to reflect on the process of China's development into an Internet power and provide a significant basis for Chinese government agencies, industry institutions and scholars both in China and overseas, to learn about China's Internet development, and make related decisions.

2018 was the kickoff year for implementing the spirit of the 19th National Congress of the Communist Party of China, the 40th anniversary of the Reform and Opening-up policy and a crucial year for China to secure a decisive victory in building a moderately prosperous society in all aspects, and continue and carry forward a new phase of the "13th Five-Year Plan". The Central Committee of the Party with President Xi Jinping at its core systematically and fully deploys and pushes forward cybersecurity and information technology development, from the strategic perspective of developing socialism with Chinese characteristics and realizing the Chinese dream of great rejuvenation of the Chinese nation. China's Internet development and governance has been making innovative progress, with an increasingly clean cyberspace, billions of people benefiting from informatization, a growing capacity to guarantee cybersecurity and the proposition of a community of shared future in cyberspace being widely recognized in the world. As a recorder of China's development process into an Internet power, CNNIC continues to follow up on Internet development in China and conduct in-depth surveys on a broader range of areas. This report utilizes comprehensive data on multiple perspectives to reflect

Internet development in China in 2018. Specifically, this report contains four parts—development of Internet infrastructure, development of Internet applications, development of government applications, and cybersecurity.

We hereby express our sincere gratitude to the Office of the Central Cyberspace Affairs Commission, Ministry of Industry and Information Technology, National Bureau of Statistics, and Government Information and Affairs Office of General Office of the State Council, who have guided and supported the preparation of the *Report*. We would like to extend our sincere thanks to the enterprises and other related institutions, who have supported the data collection and surveys conducted for this report.

China Internet Network Information Center (CNNIC)

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Contents

Abstract

As of the end of 2018, the number of Internet users in China reached 829 million, an increase of 56.53 million compared to the previous year, and the Internet penetration reached 59.6%, an increase of 3.8 percentage points compared to the previous year.

As of the end of 2018, the number of mobile Internet users reached 817 million, indicating an increase of 64.33 million in 2018.

As of the end of 2018, the number of Internet users in rural areas reached 222 million—a year-on-year growth of 12.91 million or 6.2%—and accounted for 26.7% of the total Internet users in China; Internet penetration rate in rural areas was 38.4%, up by 3.0 percentage points compared to the previous year.

As of the end of 2018, Chinese Internet users who used mobile phones, desktops, laptops and TVs to access the Internet constituted 98.6%, 48.0%, 35.9% and 31.1% of the total Internet user base, respectively.

As of the end of 2018, the number of IPv6 addresses reached 41,079 blocks/32, a year-over-year growth of 75.3%.

As of the end of 2018, "CN" domain names reached 21,243,000, a year-over-year growth of 1.9%, representing 56.0% of the total domain names in China.

As of the end of 2018, China's international Internet bandwidth was 8,946,570 Mbps, an annual growth rate of 22.2%.

As of the end of 2018, the number of instant messaging (IM) users reached 792 million, representing 95.6% of the total Internet user base; the number of mobile phone IM users reached 780 million, representing 95.5% of the total mobile Internet users.

As of the end of 2018, the number of online news users in China was 675 million, with a year-over-year growth of 4.3%, making up 81.4% of total Internet users; the number of people reading news online using mobile phones reached 653 million, making up 79.9%

of total mobile Internet users and indicating an increase of 5.4% compared to the previous year.

As of the end of 2018, the number of online shoppers in China reached 610 million, a year-over-year growth of 14.4% and accounting for 73.6% of the total Internet users; the number of people shopping online using mobile phones reached 592 million, accounting for 72.5% of the total mobile phone Internet users and indicating a year-over-year growth of 17.1%.

As of the end of 2018, the number of online food delivery users in China reached 406 million, growing by 18.2% compared to the previous year and accounting for 49.0% of the total Internet user base; the scale of people ordering food by mobile phones reached 397 million, taking 48.6% of the mobile Internet user base and representing an increase of 23.2% compared to 2017.

As of the end of 2018, the number of online payment users in China reached 600 million, a year-over-year increase of 13.0% and accounting for 72.5% of the total Internet user base. Among them, 583 million users made payments using mobile phones, accounting for 71.4% of the total mobile Internet user base and indicating a year-over-year growth of 10.7%.

As of the end of 2018, the number of online video users reached 612 million, a year-over-year growth of 33.09 million, and accounting for 73.9% of the total Internet users. Among these online video users, 590 million watched videos on mobile phones, a year-over-year increase of 41.01 million, accounting for 72.2% of the total mobile Internet users.

As of the end of 2018, the number of short video users reached 648 million, accounting for 78.2% of the total Internet users.

As of the end of 2018, the number of online governmental service users reached 394 million, accounting for 47.5% of the total Internet users.

Chapter 1 Development of the Internet Infrastructure

1. Basic Internet Resources

1.1 An Overview of Basic Internet Resources

As of the end of 2018, China had 338,924,544 IPv4 addresses and 41,079 blocks/32 of IPv6 addresses.

Total domain names registered in China reached 37.982 million, of which, 21.243 million ended with ".CN", representing 56.0% of the total number of domain names.

International Internet bandwidth was 8,946,570 Mbps, an increase of 22.2% compared to the previous year.

Table 1 Basic Internet Resources as of December 2017 vs. December 2018

	December 2017	December 2018	Annual growth	Annual growth rate
IPv4	338,704,640	338,924,544	219,904	0.1%
IPv6 (block/32)	23,430	41,079	17,649	75.3%
Domain names registered	38,480,355	37,927,527	-552,828	-1.4%
.CN domain names registered	20,845,513	21,243,478	397,965	1.9%
International Internet bandwidth (Mbps)	7,320,180	8,946,570	1,626,390	22.2%

1.2 IP Addresses

By the end of 2018, IPv6 addresses in China reached 41,079 blocks/32, a growth rate of 75.3% compared to 2017.

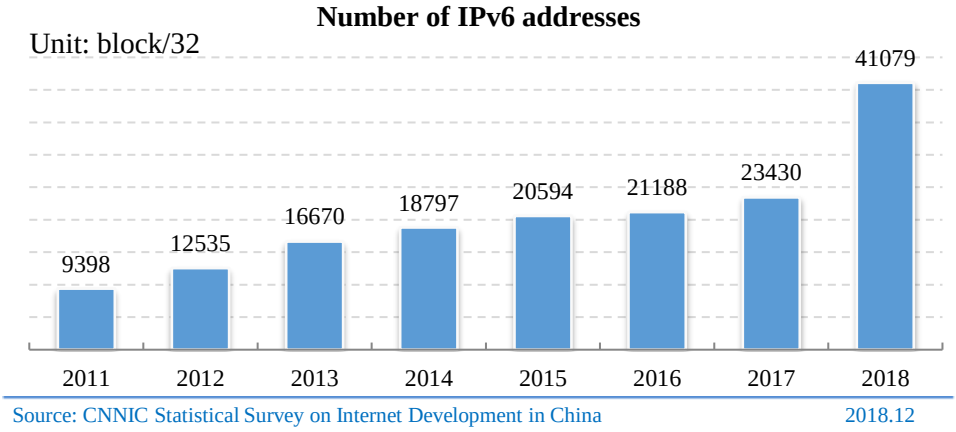


Figure 1 Number of IPv6 Addresses in China

By December of 2018, China had 338.92 million IPv4 addresses.

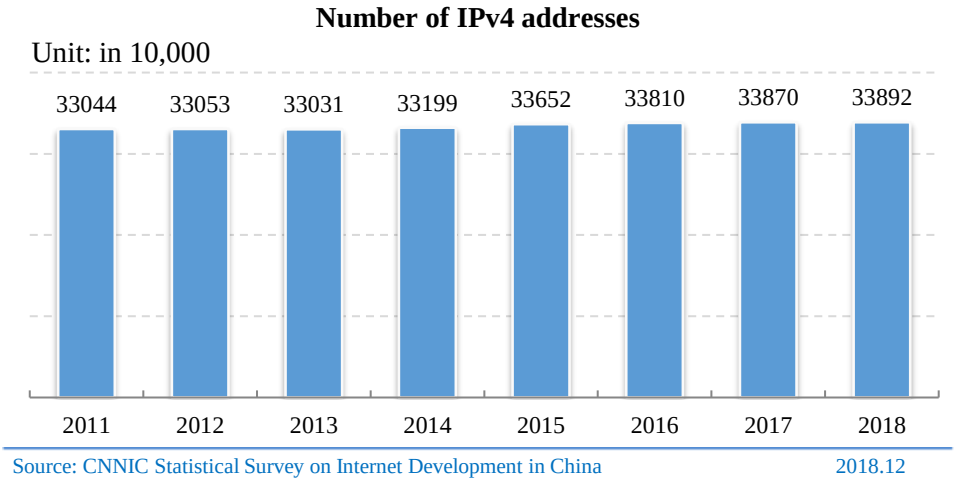


Figure 2 Number of IPv4 Addresses in China

1.3 Domain Names

By the end of 2018, Chinese domain names totaled 37.928 million, a decline of 1.4% compared to 2017. Among them, .CN names were 21.243 million, an increase of 1.9% compared to 2017 and representing 56.0% of the total domain names in China; .COM names 12.783 million, representing 33.7% of the total number; ".中国" names 1.724 million, representing 4.5% of the total number.

Table 2 Number of Domain Names by Type1

	Number	Percentage of Total Domains
.CN	21,243,478	56.0%
.COM	12,783,290	33.7%
.中国	1,723,524	4.5%
.NET	1,112,169	2.9%
.BIZ	468,799	1.2%
.INFO	282,214	0.7%
.ORG	199,631	0.5%
Others	114,422	0.3%
Total	37,927,527	100.0%

Table 3 Number of CN Domain Names by Type

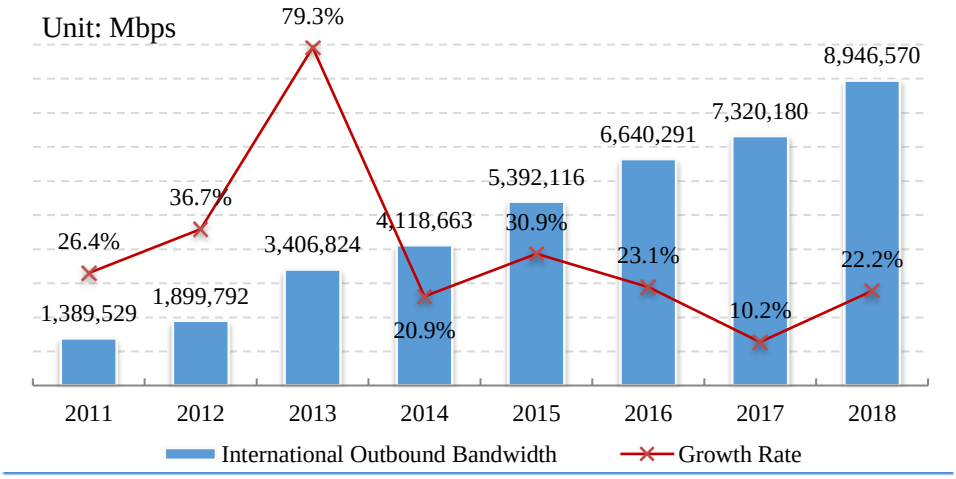
	Number	Percent of .CN Domains
.CN	18,569,565	87.4%
.COM.CN	2,135,978	10.1%
.NET.CN	255,965	1.2%
.ORG.CN	155,793	0.7%
.ADM.CN	70,418	0.3%
.GOV.CN	39,147	0.2%
.AC.CN	10,269	0.0%
.EDU.CN	6,256	0.0%
OTHERS	87	0.0%
Total	21,243,478	100.0%

[1] Data of generic top-level domains (gTLDs) are from Chinese domain registration authorities.

1.4 International Internet Bandwidth

As of the end of 2018, China's international Internet bandwidth was 8,946,570 Mbps, a year-over-year growth rate of 22.2%.

International Internet Bandwidth and its Growth Rate



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 3. International Internet Bandwidth and its Growth Rate

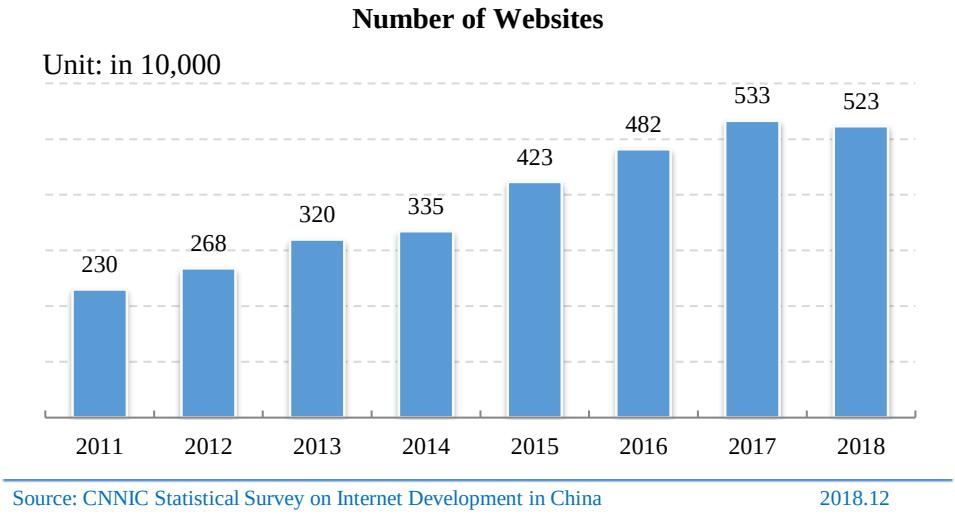
Table 4 International Internet Bandwidth of Backbone Networks

	International Internet Bandwidth (Mbps)
China Telecom	4,537,680
China Unicom	2,234,738
China Mobile	1,997,000
CSTNET	115,712
CERNET	61,440
Total	8,946,570

2. Use of Internet Resources

2.1 Websites

By the end of 2018, China had 5.23 million websites[1], a decline of 1.9% compared to the previous year.

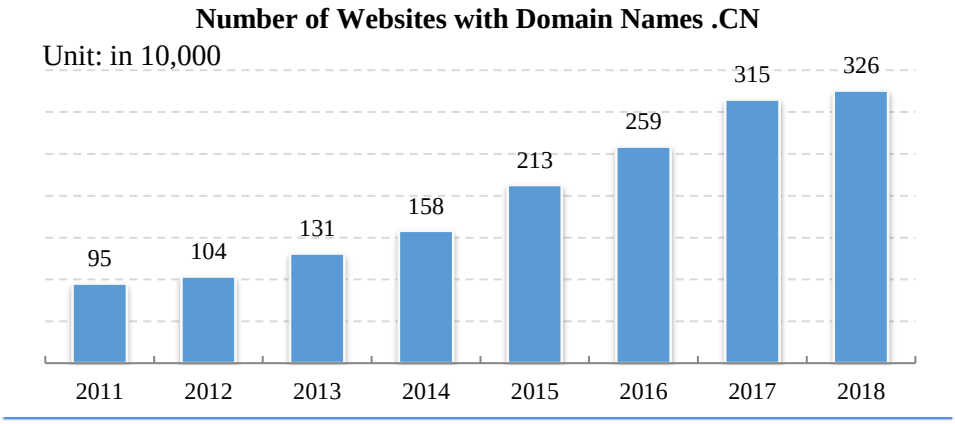


Note: Websites with domain names.EDU.CN are excluded.

Figure 4 Number of Websites

By the end of 2018, websites with domain names ".CN" amounted to 3.26 million, an annual growth rate of 3.4%.

[1] Websites whose domain name registration applicants are within the People's Republic of China



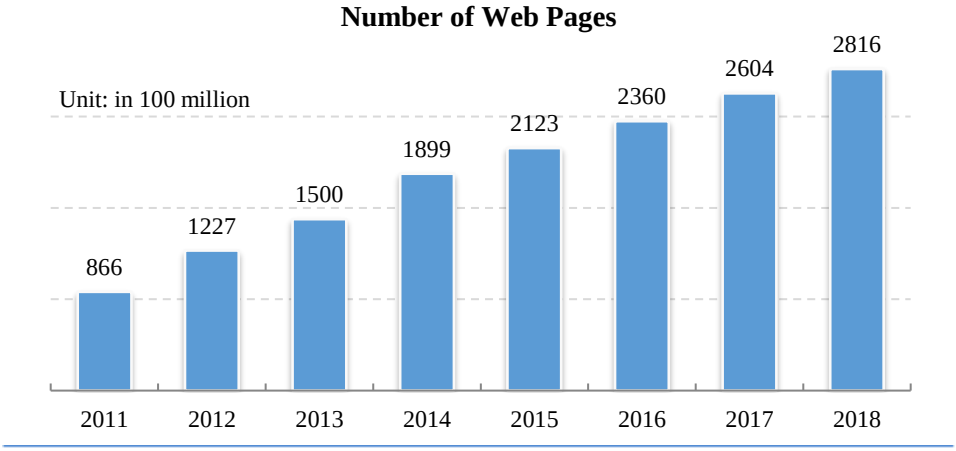
Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Note: Websites with domain names.EDU.CN are excluded.

Figure 5 Number of Websites with Domain Names .CN

2.2 Web Pages

By the end of 2018, the number of web pages in China totaled 281.6 billion, an increase of 8.2% compared to the previous year.



Source: Baidu Online Network Technology (Beijing) Co., Ltd. 2018.12

Figure 6 Number of Web Pages

Static web pages[1] were 197.1 billion and accounted for 70.0% of the total web pages; while dynamic web pages[2] were 84.6 billion and accounted for 30.0% of the total web pages.

Table 5 Number of Web Pages

	Unit	2017	2018	Growth Rate
Total web pages	pages	260,399,030,208	281,622,406,489	8.2%
Static web pages	pages	196,908,897,175	197,066,105,957	0.1%
	percent of total pages	75.6%	70.0%	--
Dynamic web pages	pages	63,490,133,033	84,556,300,532	33.2%
	percent of total pages	24.4%	30.0%	--
Web page size (total bytes)	KB	17,107,296,355,296	19,061,579,332,918	11.4%
Average number of web pages per website	Pages	48,828	53,810	10.2%
Average number of bytes per page	KB	66	68	3.0%

2.3 Mobile Internet Traffic

In 2018, mobile Internet traffic consumption reached 71.11 billion GB, a 189.1% increase compared to the previous year.

[1] A static web page means a web page in pure HTML format as a standard HTML file whose extension is either .htm or .html and which contains text, images, audio, flash files, client scripts, ActiveX controls and JAVA programs.

[2] A dynamic web page means a web page that displays different content with the time, environment or result of database operation although its code is the same as that used for a static page. This is achieved by a combination of basic HTML language specification with advanced programming languages such as Java, VB, VC, database programming techniques and other techniques.

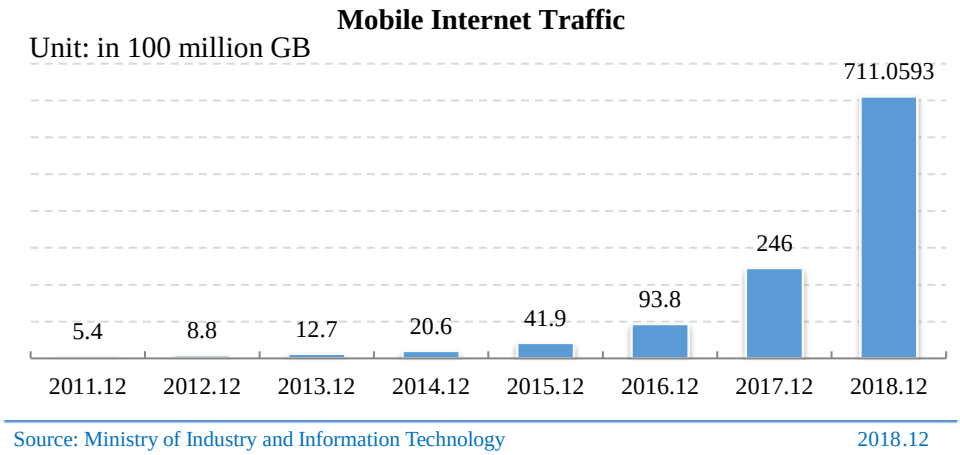


Figure 7 Mobile Internet Traffic Consumption[1]

2.4 Number of APPs

By the end of 2018, 4.49 million mobile applications (APPs) were available in the Chinese market.

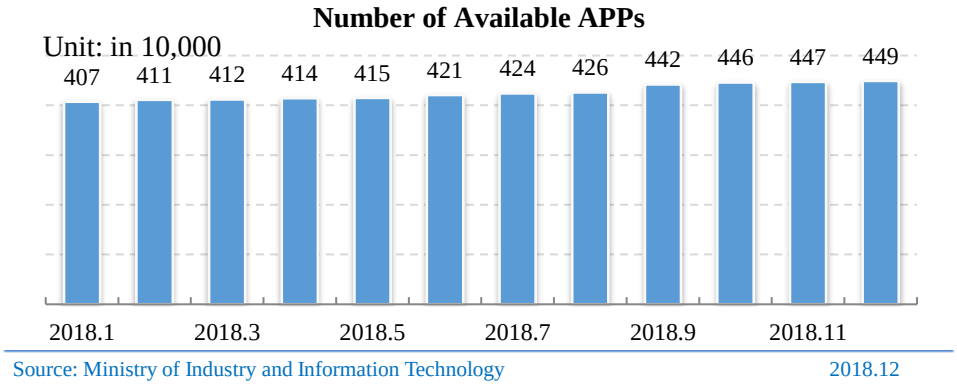
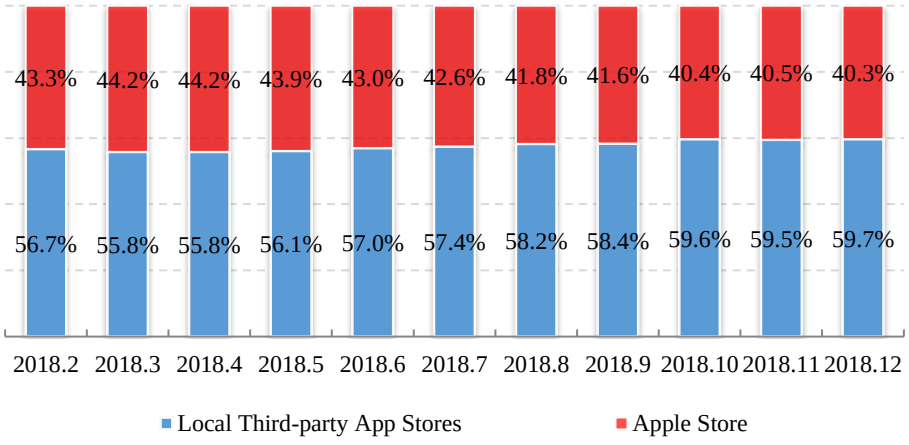


Figure 8 Number of APPs Available to Users

[1] Data of 2011 to 2016 are from *Annual Reports of China's Communication Industry Statistics*; and data of 2017 and 2018 are from tables of Major Performance Indicators of Communication Industry published on the website of the Ministry of Industry and Information Technology.

As of the end of 2018, over 2.68 million APPs were available in local third-party app stores, accounting for 59.7% of the total number; there were 1.81 million apps in Apple Store (China), accounting for 40.3% of the total number.

Number of APPs available in Third Party App Stores vs Apple Store (Percent)

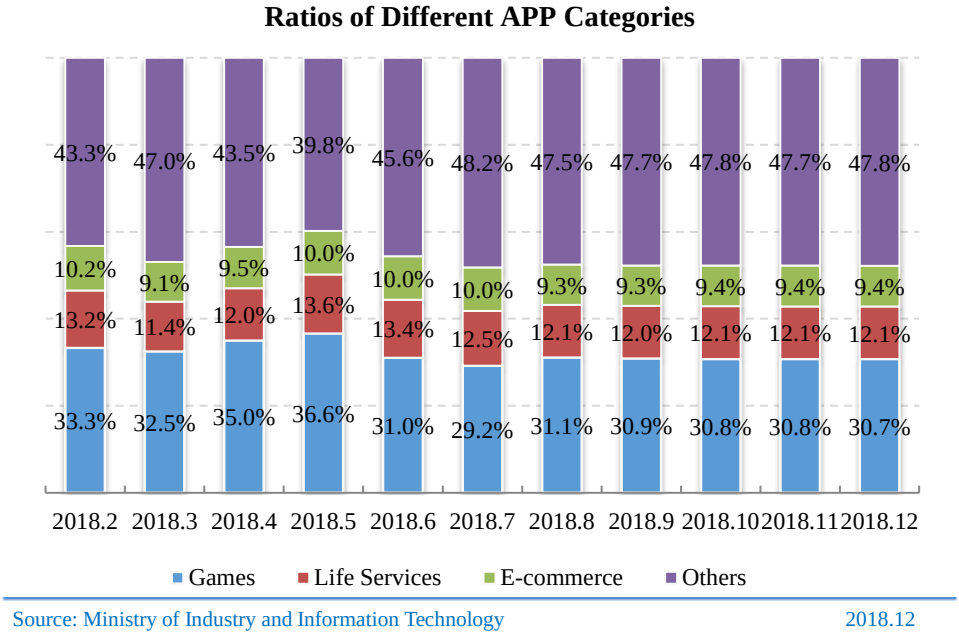


Source: Ministry of Industry and Information Technology 2018.12

Figure 9 Number of APPs available in Third Party App Stores vs Apple Store

2.5 Classification of APPs

By the end of December 2018, the number of APPs that fell into games category was around 1.38 million and represented 30.7% of the total number; APPs in the life services category were 542,000, ranking second and represented 12.1%; followed by that of e-commerce category, which was 421,000 and represented 9.4% of the total number.



Source: Ministry of Industry and Information Technology 2018.12

Figure 10 Ratios of Different APP Categories

3. Access Environment

3.1 Internet Access Devices

As of December 2018, 98.6% of all Chinese Internet users accessed the Internet through mobile phones, 1.1 percentage points higher compared to the previous year; 31.1% through TVs, 2.9 percentage points higher compared to the previous year; and 48.0% through desktops, 5 percentage points lower compared to the previous year.

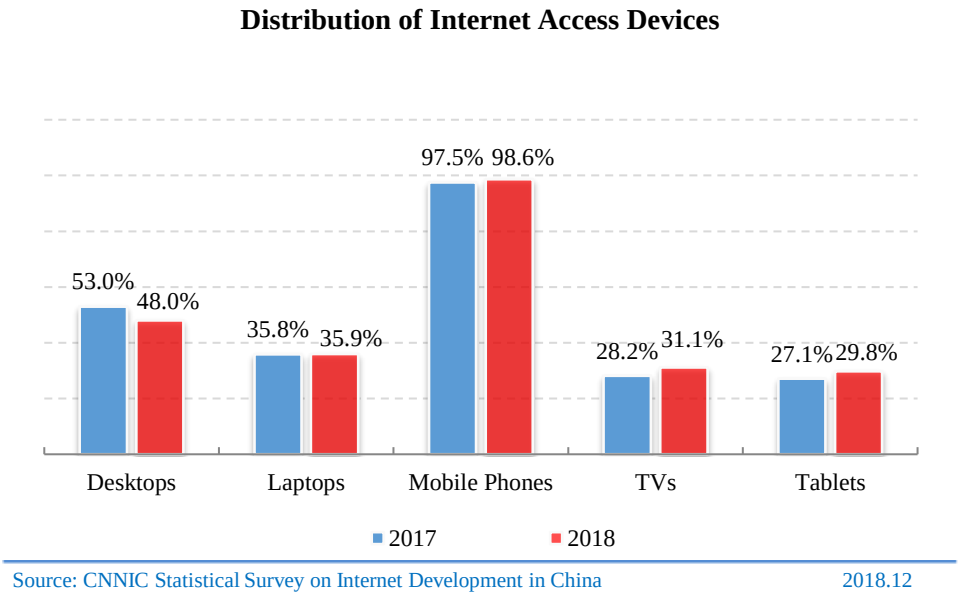
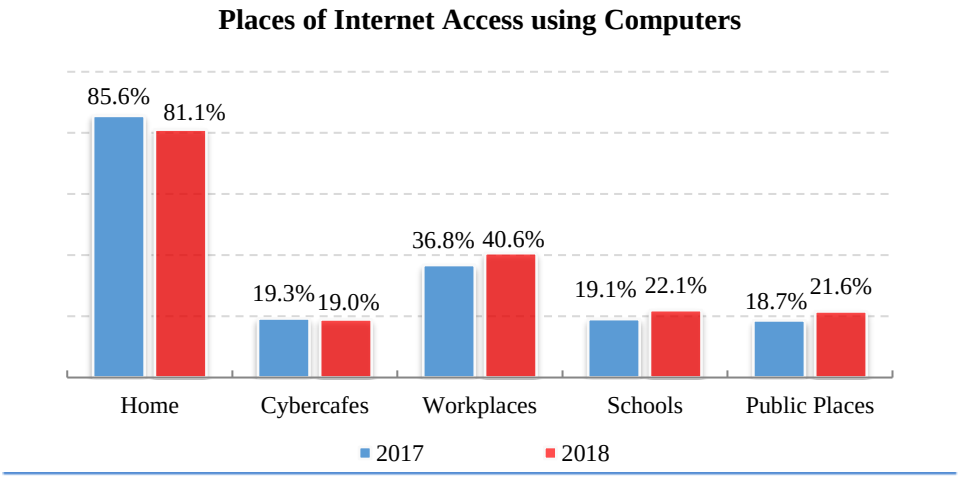


Figure 11. Distribution of Internet Access Devices

3.2 Internet Access Places

As of December 2018, people who accessed the Internet at home using computers represented 81.1% of total Chinese Internet users, a decline of 4.5 percentage points compared to the previous year; those who accessed in cyber-cafes was 19.0%, with a marginal change compared to the previous year; those who accessed in workplaces, schools and public places were 40.6%, 22.1% and 21.6%, an increase of 3.8 percentage points, 3.0 percentage points and 2.9 percentage points, respectively.



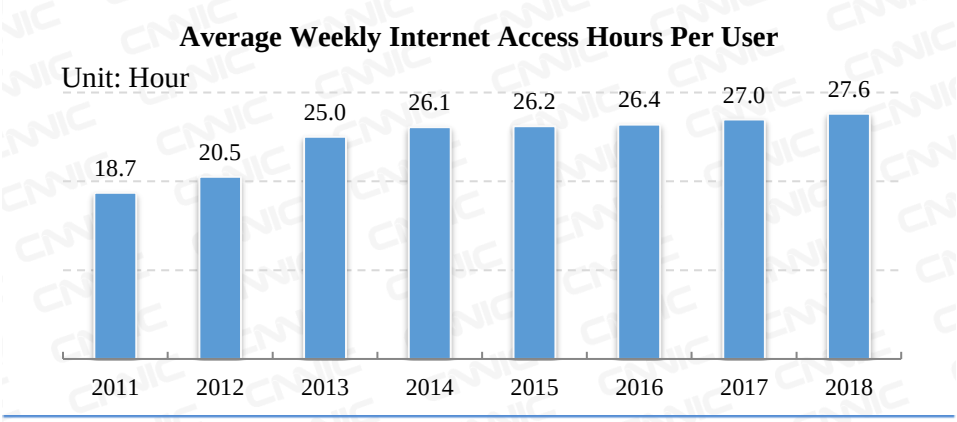
Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 12 Places of Internet Access using Computers

3.3 Internet Access Duration

3.3.1 Internet Access Duration per Week per User

In 2018, Internet access duration per week per Chinese Internet user was 27.6 hours, 0.6 hour longer compared to 2017.

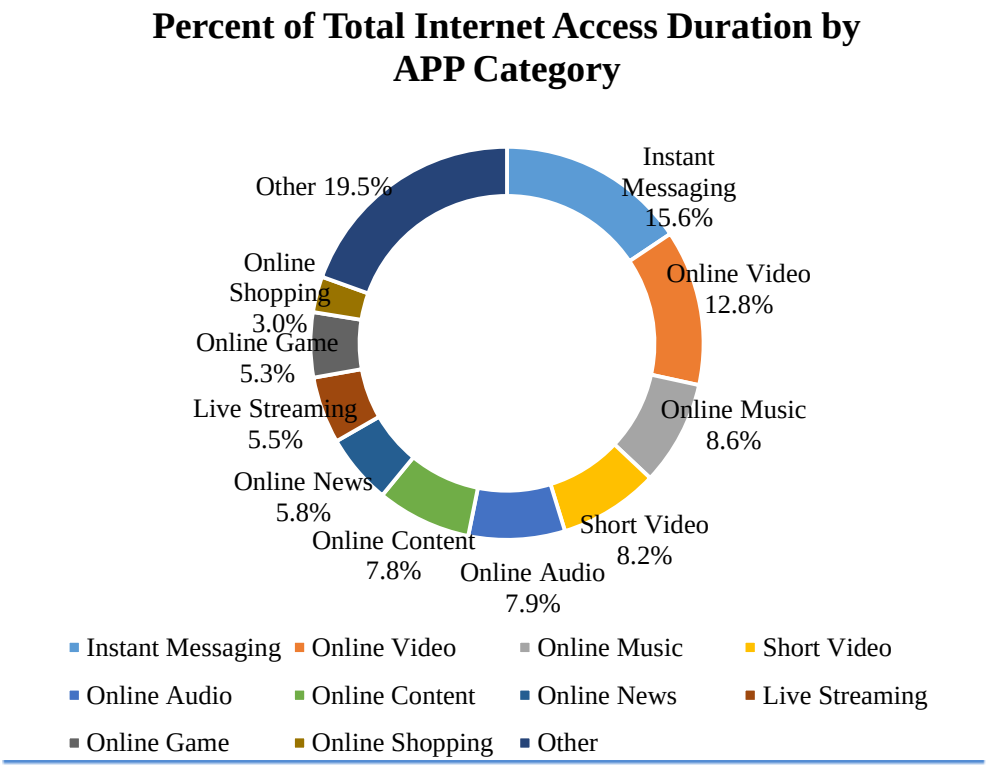


Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 13 Average Weekly Internet Access Hours per User

3.3.2 Time Spent on Different APP Categories

In 2018, in terms of the time spent on the most popular APP categories, the IM category ranked first representing 15.6% of the total Internet access hours, followed by online video, online music, short video, online audio [1] and online content categories, representing 12.8%, 8.6%, 8.2%, 7.9% and 7.8% of the total hours, respectively.



Source: China Telecom

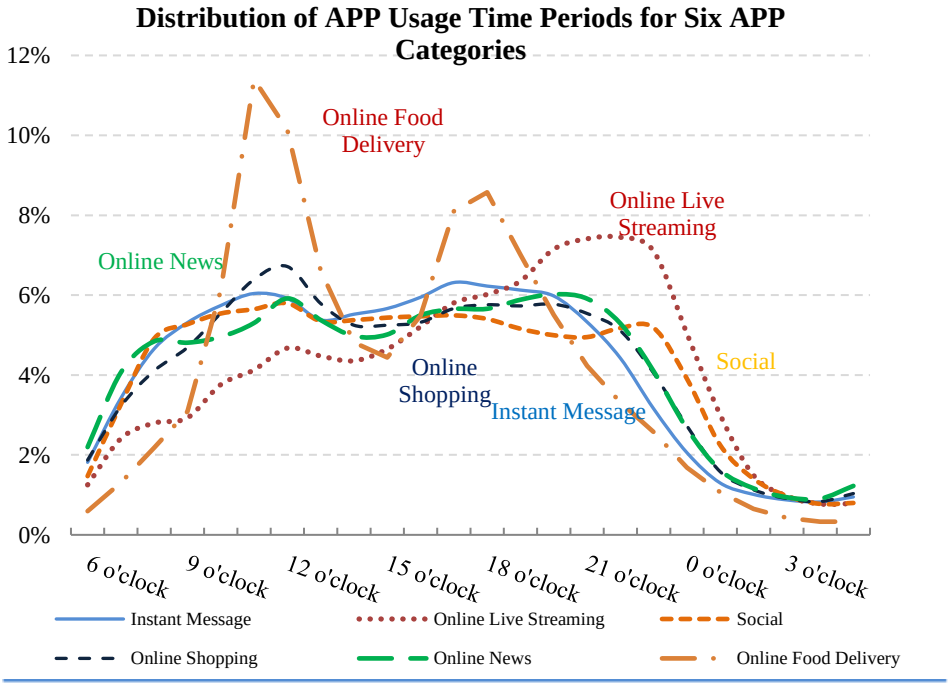
Figure 14 Percent of Total Internet Access Duration by APP Category[2]

[1] Internet APPs through which users can listen to online radio and other audio programs

[2] The data are from China Telecom, which calculated the total time spent on each category per user per day through a mathematical model into which the Internet log data of all China Telecom mobile phone users and China Telecom APP label data were used as the inputs.

3.3.3 Distribution of APP Usage Time Periods based on Different Categories

In 2018, with respect to the six most popular APP categories, the time spent on IM category saw a relative even distribution due to its high correlation with daily schedules of Internet users; the time spent on live streaming category peaked at 12:00, 20:00 and 23:00; the time spent on social category after 8:00 was quite stable and reached a small peak at 22:00; online shoppers preferred 12:00 and night for shopping; time spent on reading news was requite regular and reached two peaks at 12:00 and 21:00; time spent on online food delivery category embraced peaks at 12:00 and 18:00, noticeably due to its high correlation with meal times.



Source: China Telecom 2018.11

Figure 15 Distribution of APP Usage Ratio1 for Six APP Categories

[1] This refers to the distribution of time periods calculated from the total time duration spent on different

3.4 Ratio of Broadband Subscribers at a Speed Higher than 100 Mbps

As of December 2018, 70.3% of total broadband subscribers accessed broadband at a speed higher than 100 Mbps.

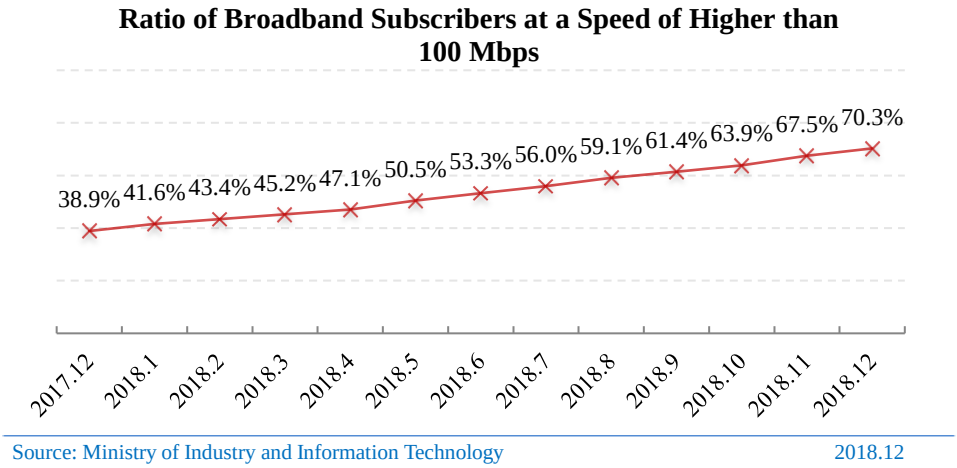


Figure 16 Ratio of Broadband Subscribers at a Speed of Higher than 100 Mbps

3.5 Size and Ratio of Fiber Broadband Users

As of the end of 2018, FTTH/O users accounted for 368 million and made up 90.4% of total fixed Internet broadband users, 6.1 percentage points higher compared to the previous year.

categories. For example, a user spends 15 minutes on Instant Messaging category from 6:00 to 7:00 and the total time duration for Instant Messaging category is 4 hours in a day, hence 0.25/4 is calculated.

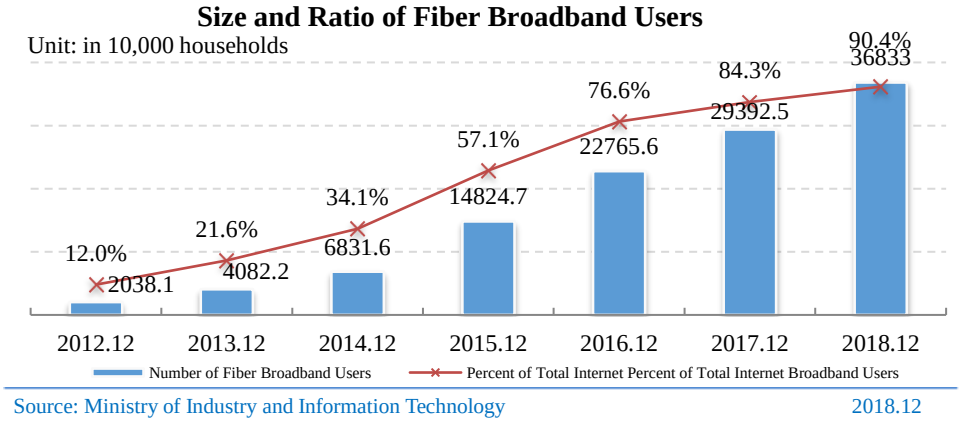
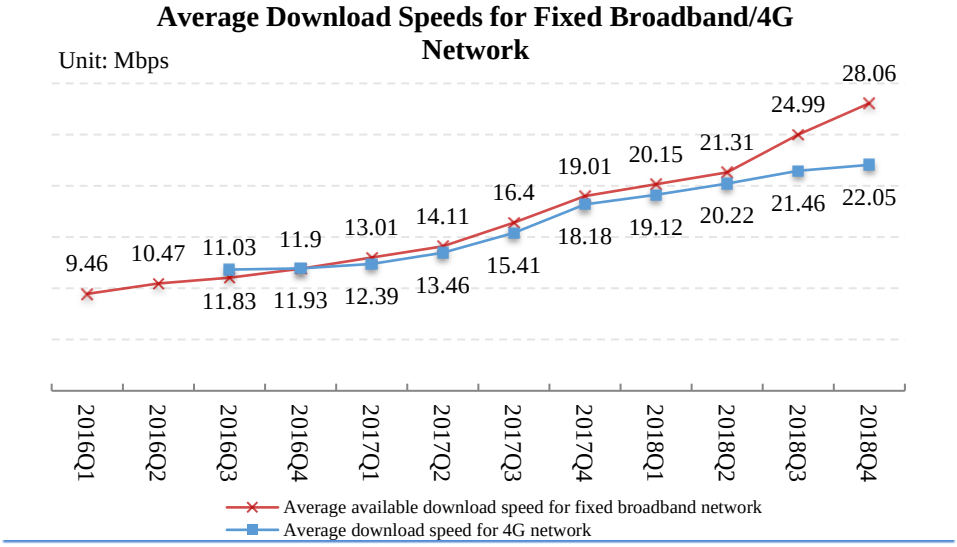


Figure 17 Size and Ratio of Fiber Broadband Users[1]

3.6 Broadband Download Speed

In Q4 2018, average available download speed for fixed broadband in China was 28.06 Mbps, a year-over-year growth of 47.6%; the average download speed for mobile broadband users through 4G network was 22.06 Mbps, a year-over-year growth rate of 21.3%.

[1] Data of 2012 to 2016 are from *Annual Reports of China's Communication Industry Statistics*; and data of 2017 and 2018 are from tables of Major Performance Indicators of Communication Industry published on the website of the Ministry of Industry and Information Technology.



Source: Broadband Development Alliance 2018.12

Figure 18 Average Download Speeds for Fixed Broadband/4G Network

Chapter 2 Development of -Internet Applications

1. Internet Use

1.1 Number of Internet Users

As of the end of 2018, Chinese Internet users were 829 million, a year-over-year increase of 56.53 million, with an Internet penetration rate of 59.6%, 3.8 percentage points higher compared to 2017.

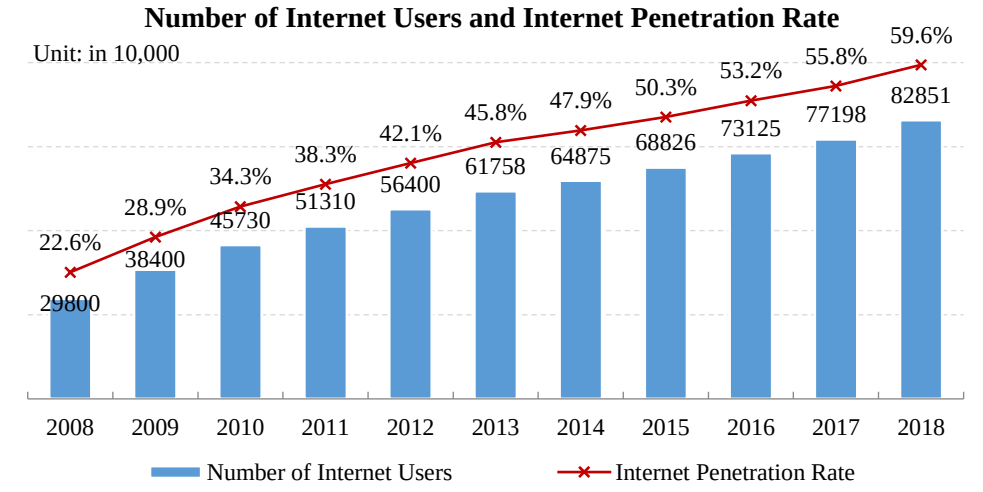


Figure 19 Number of Internet Users and Internet Penetration Rate

As of the end of 2018, the number of Chinese mobile Internet users was 817 million, a

year-over-year increase of 64.33 million; the percentage of all Internet users who accessed the Internet through mobile phones increased from 97.5% at the end of 2017 to 98.6% at the end of 2018.

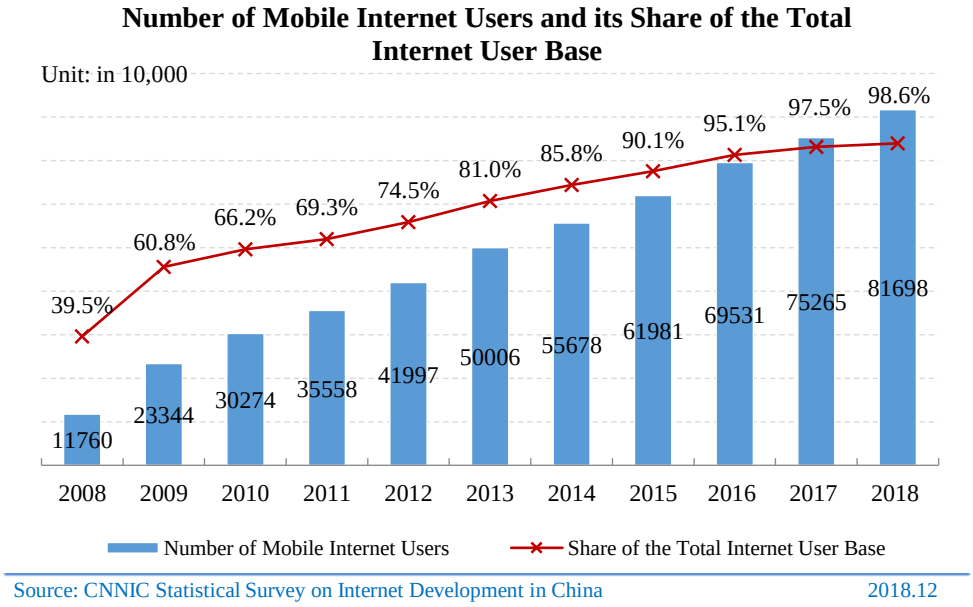


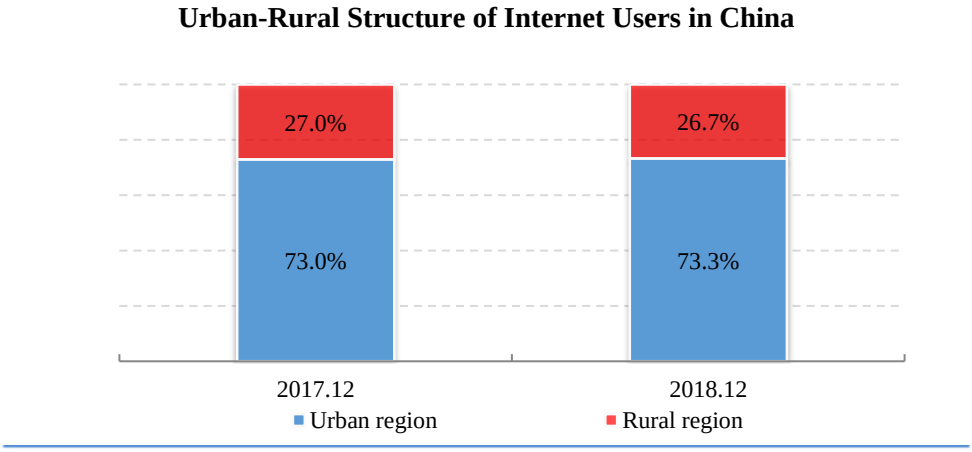
Figure 20 Number of Mobile Internet Users and its Share of the Total Internet User Base

1.2 Internet Users by Urban and Rural Region

As of the end of 2018, the number of Internet users in rural areas reached 222 million—a growth of 12.91 million or 6.2% compared to the previous year—and accounted for 26.7% of the total Internet users in China; urban Internet users were 607 million—a growth of 43.62 million or 7.7% compared to the previous year—and accounted for 73.3% of the total Internet users in China.

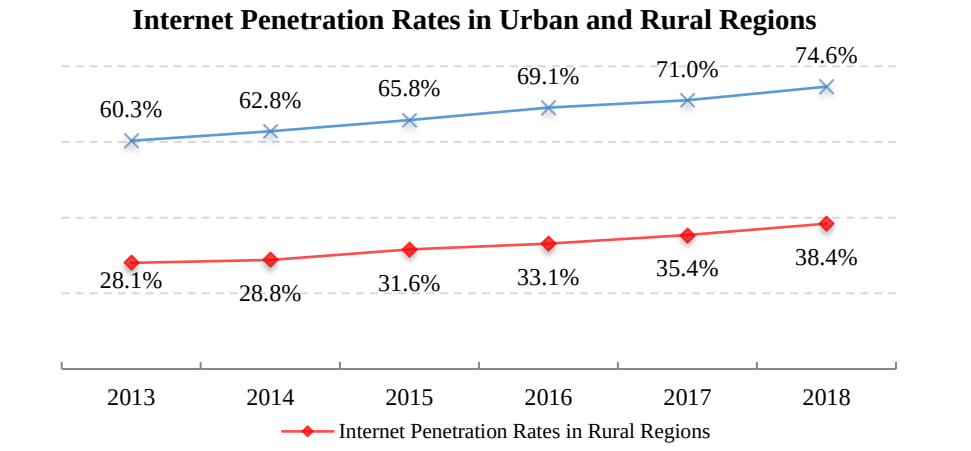
Internet penetration rate increased both in rural and urban regions. By the end of 2018, Internet penetration rate in urban regions reached 74.6%, 3.6 percentage points higher

compared to the previous year; it reached 38.4% in rural regions, 3.0 percentage points higher compared to the previous year.



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 21 Urban-Rural Structure of Internet Users in China



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 22 Internet Penetration Rates in Urban and Rural Regions

1.3 Number of Non-Internet Users

Non-Internet users were mainly distributed in rural areas. As of December 2018, 562 million people in China did not use the Internet, of whom, 36.8% lived in urban areas and 63.2% in rural areas.

This non-Internet population was mainly driven by lack of skills and low education level. According to our survey, lack of computers/Internet skills and low education level accounted for 54.0% and 33.4% of such population; age factor, i.e., too old/or too young, contributed to 11.2% of non-Internet population; lack of devices such as computers prevented 10.0% of such population from accessing the Internet; and people who did not use the Internet due to them having no need/interest/time and no Internet connectivity were less than 10% in each case.

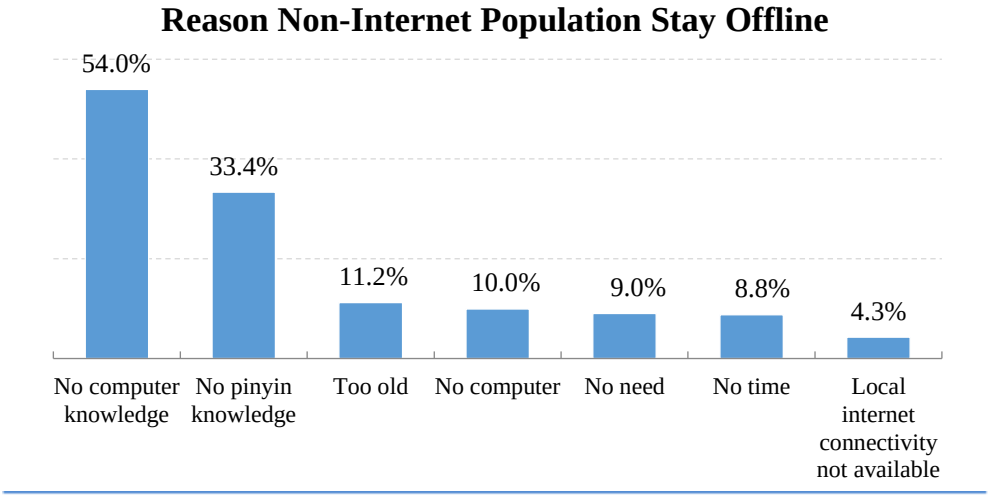
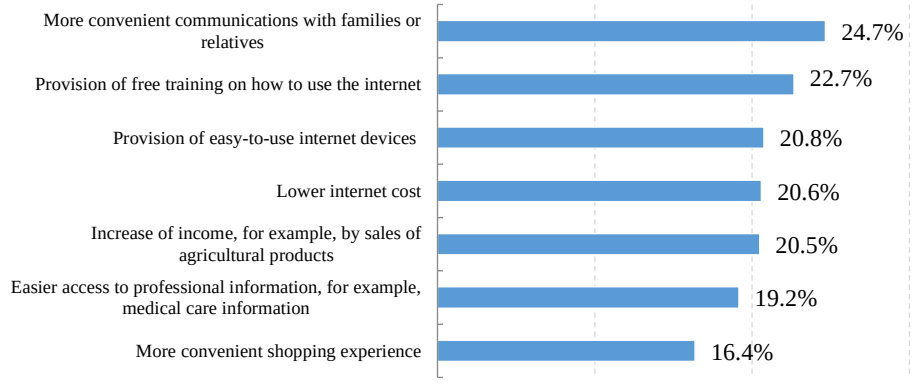


Figure 23 Reasons Non-Internet Population Stay Offline

According to our survey, the following three factors are expected to drive non-Internet users to use Internet. The first is improvement of their Internet skills: 22.7% of non-Internet users are willing to access the Internet if they are provided with free training.

The second is reduction of Internet cost or provision of relevant devices: 20.6% of them would use the Internet if the cost of access is lowered, and 20.8% expressed their willingness to use the Internet if relevant devices that can help them easily access the Internet are available. The third factor is driven by daily needs: 24.7% would access the Internet for more convenient communication with their families, 20% for income increase due to sales of agricultural products through the Internet and for easy acquisition of medical and other professional information, and 16.4% for convenient online shopping.

Factors that can Drive Non-Internet Users to Use the Internet



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 24 Factors that can Drive Non-Internet Users to Use the Internet

2. Structure of Internet Users by Attributes

2.1 Gender Structure

As of December 2018, male-to-female ratio among Chinese Internet users was 52.7:47.3, with little change compared to that as of December 2017.

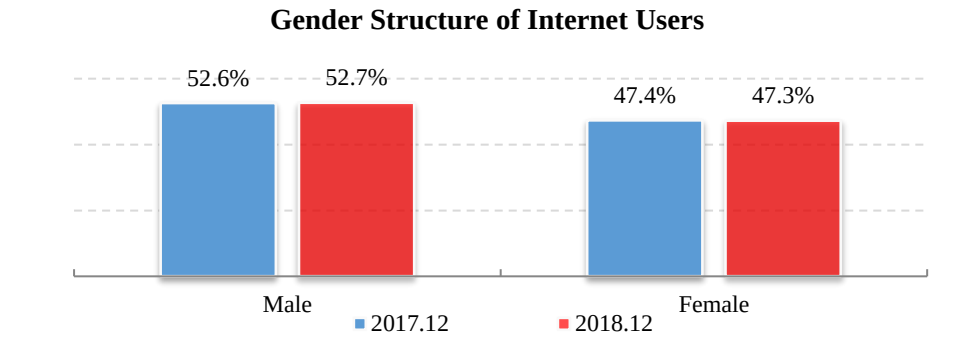


Figure 25 Gender Structure of Internet Users

2.2 Age Structure

Middle-aged group and young people constitute the dominant force among Chinese Internet users, and the Internet penetration rate in middle-aged and old people is growing. As of December 2018, the 10–39 years' age group represented 67.8% of all Internet users, in particular, people in their 20s led all other groups accounting for 26.8% of all users. The ratio of Internet users in the 40–49 years' age group grew from 13.2% at the end of 2017 to 15.6% and the ratio of Internet users who are 50 years old or above grew from 10.5% to 12.5%.

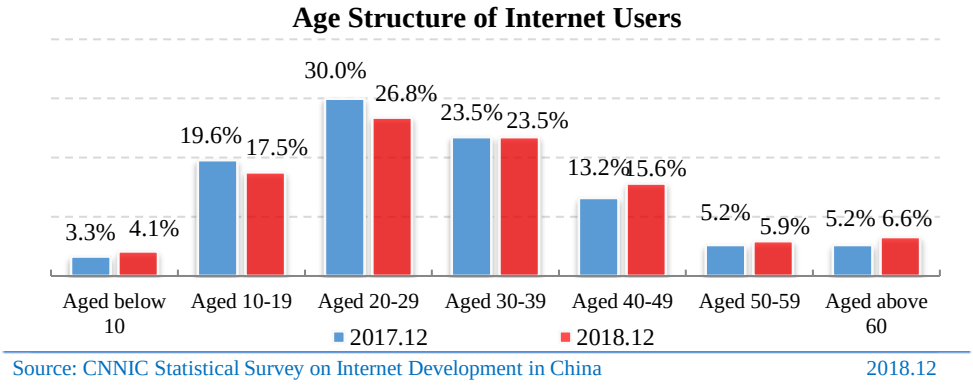
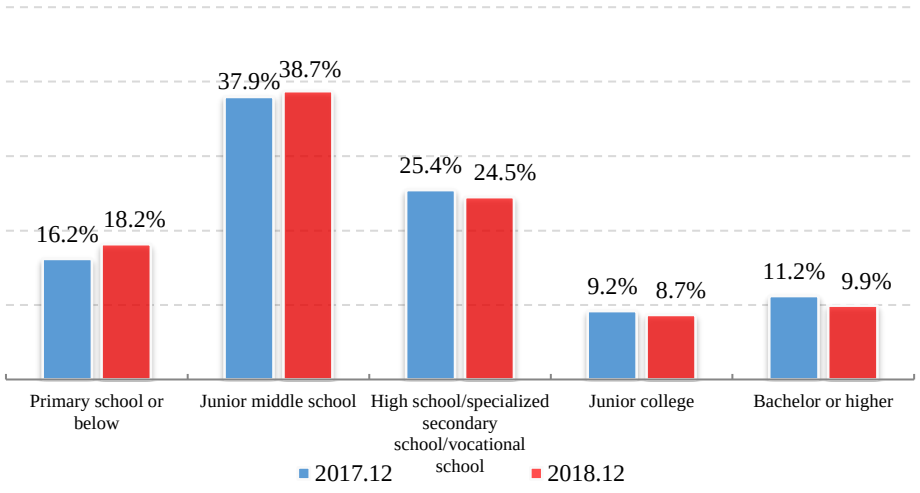


Figure 26 Age Structure of Internet Users

2.3 Education Structure

Most Chinese Internet users have received secondary education. As of the end of 2018, Internet users who had graduated from junior middle schools and high schools/specialized secondary schools/vocational schools accounted for 38.7% and 24.5% of total Internet users, respectively; while those who had graduated from junior colleges or held a bachelor's degree or higher accounted for 8.7% and 9.9%, respectively.

Education Structure of Internet Users



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

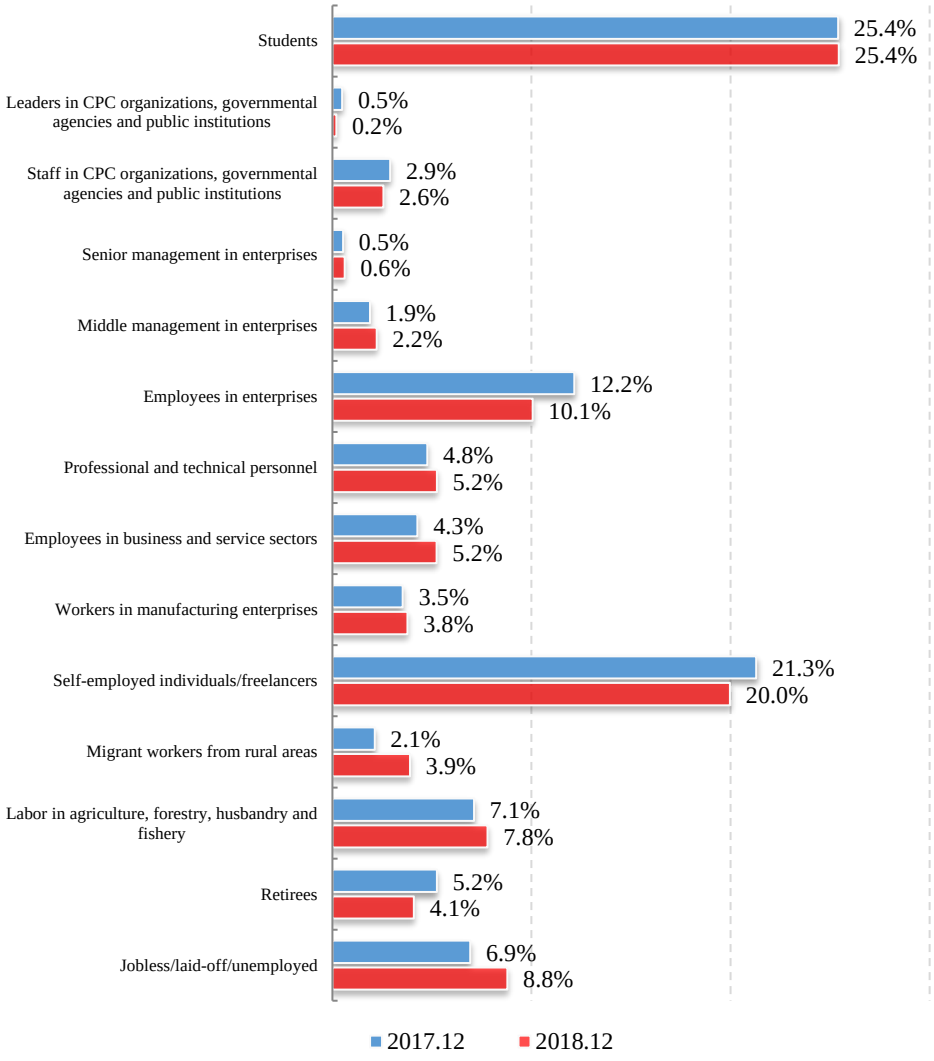
Figure 27 Education Structure of Internet Users

2.4 Occupation Structure

As of December 2018, students dominated Chinese Internet users accounting for 25.4%, followed by self-employed individuals/freelancers, who accounted for 20.0% of total Internet users; corporate employees and management staff contributed to 12.9% of total

Internet users.

Occupation Structure of Internet Users



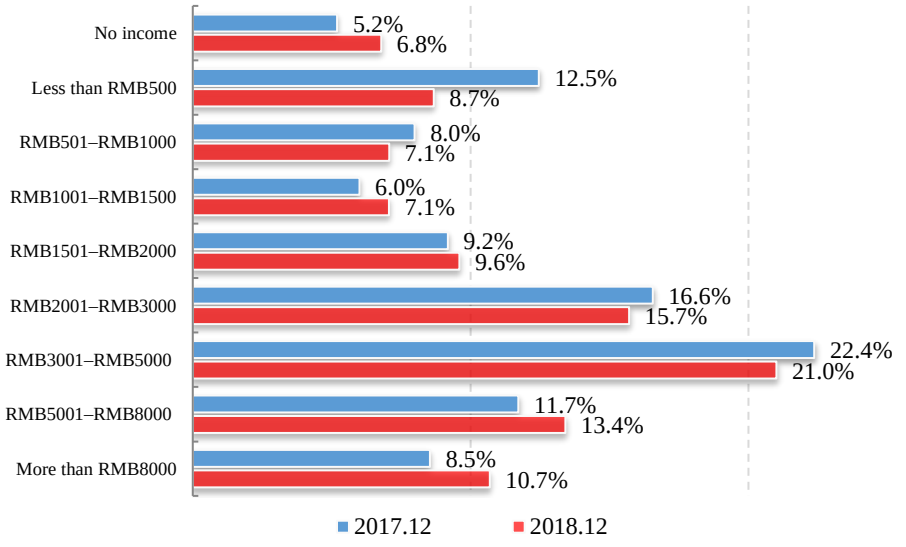
Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 28 Occupation Structure of Internet Users

2.5 Income Structure

As of December 2018, people who earned RMB2001 to RMB5000 a month[1] represented 36.7% of all Internet users, ranking first among all monthly income groups; those who earned more than RMB5000 a month represented 24.1% of the total, 3.9 percentage points higher compared to the previous year; and those who earned less than RMB1000 yuan a month (excluding those who earn nothing) witnessed a sharp decline from 20.4% at the end of 2017 to 15.8%.

Monthly Personal Income Structure of Internet Users



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 29 Monthly Income Structure of Internet Users

[1] Specifically, a student's income includes the living allowance provided by his/her family, the money he/she earns from part-time jobs, scholarships and funds from other sources; a peasant's income includes living allowances provided by his/her children, income from agriculture production, governmental subsidy and other fund sources; the income of a jobless/laid-off/unemployed person includes the living allowance provided by his/her children, governmental relief, governmental subsidy, survivor pension, the minimum living security fund and other fund sources; the income of a retiree includes living allowance provided by his/her children, pension and other fund sources.

3. Development of Personal Internet Applications

In 2018, China's personal Internet applications maintained stable development momentum. Users of online car hailing service grew at a rapid speed of 40.9% a year; online education witnessed robust development as well with it users having grown by 29.7% a year; users of online food delivery, Internet-based wealth management, online taxi-hailing and online shopping also grew significantly; short video applications rose rapidly with a utilization ratio of 78.2% as its users grew by 9.1% in the second half of 2018.

Table 6 Users and Utilization Ratios of Internet Applications as of December 2017 vs. December 2018

Application	December 2018		December 2017		
	Users (in 10,000)	Utilization ratio	Users (in 10,000)	Utilization ratio	Annual growth rate
Instant messaging	79172	95.6%	72023	93.3%	9.9%
Search engine	68132	82.2%	63956	82.8%	6.5%
Online news	67473	81.4%	64689	83.8%	4.3%
Online video	61201	73.9%	57892	75.0%	5.7%
Online shopping	61011	73.6%	53332	69.1%	14.4%
Online payment	60040	72.5%	53110	68.8%	13.0%
Online music	57560	69.5%	54809	71.0%	5.0%
Online games	48384	58.4%	44161	57.2%	9.6%
Online content	43201	52.1%	37774	48.9%	14.4%
Online banking	41980	50.7%	39911	51.7%	5.2%
Travel booking[1]	41001	49.5%	37578	48.7%	9.1%
Online food ordering	40601	49.0%	34338	44.5%	18.2%
Online live streaming[2]	39676	47.9%	42209	54.7%	-6.0%

[1] In this report, travel booking refers to online booking of air tickets, hotels, train tickets or travel products within the latest six months.

[2] In this survey, online live streaming includes live sports, reality shows, game shows and concert shows.

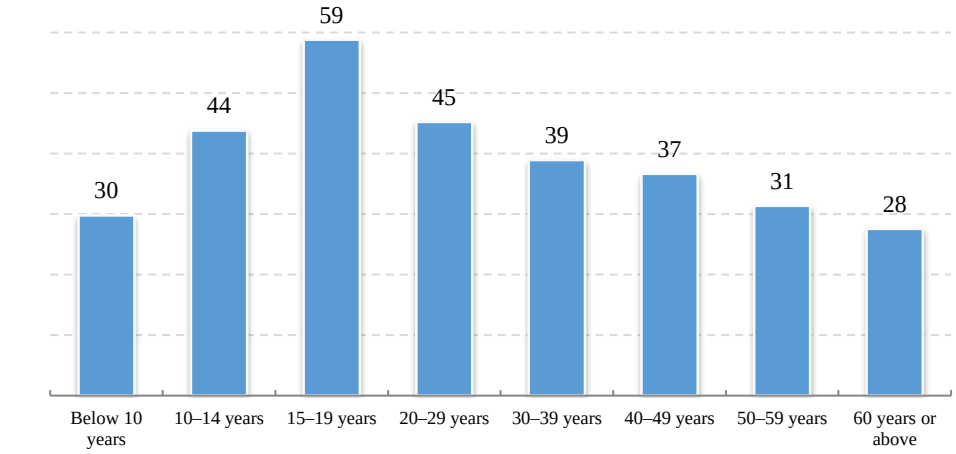
Application	December 2018		December 2017		
	Users (in 10,000)	Utilization ratio	Users (in 10,000)	Utilization ratio	Annual growth rate
Weibo	35057	42.3%	31601	40.9%	10.9%
Online custom car or express car	33282	40.2%	23623	30.6%	40.9%
Online taxi hailing	32988	39.8%	28651	37.1%	15.1%
Online education	20123	24.3%	15518	20.1%	29.7%
Internet-based wealth management	15138	18.3%	12881	16.7%	17.5%
Short video	64798	78.2%	-	-	-

Table 7 Users and Utilization Ratios of Mobile Internet Applications as of December 2017 vs. December 2018

Application	December 2018		December 2017		
	Users (in 10,000)	Utilization ratio	Users (in 10,000)	Utilization ratio	Annual growth rate
Mobile Instant messaging	78029	95.5%	69359	92.2%	12.5%
Mobile Search engines	65396	80.0%	62398	82.9%	4.8%
Mobile news	65286	79.9%	61959	82.3%	5.4%
Mobile shopping	59191	72.5%	50563	67.2%	17.1%
Mobile video	58958	72.2%	54857	72.9%	7.5%
Mobile payment	58339	71.4%	52703	70.0%	10.7%
Mobile music	55296	67.7%	51173	68.0%	8.1%
Mobile games	45879	56.2%	40710	54.1%	12.7%
Mobile content	41017	50.2%	34352	45.6%	19.4%
Mobile travel booking	40032	49.0%	33961	45.1%	17.9%
Mobile food ordering	39708	48.6%	32229	42.8%	23.2%
Mobile courses	19416	23.8%	11890	15.8%	63.3%

As of November 2018, Internet users who were aged between 15 and 19 installed the most number of APPs—as many as 59—in their mobile phones; followed by the 20 to 29-year-old group, which installed 45 APPs on average in their mobile phones; the number of mobile phone APPs installed per person above the age of 20 years showed a steady decline as the age grew and reached 28 APPs when the age reached 60 or higher.

Number of Mobile Phone APPs Per Person by Age Group



Source: China Telecom 2018.11

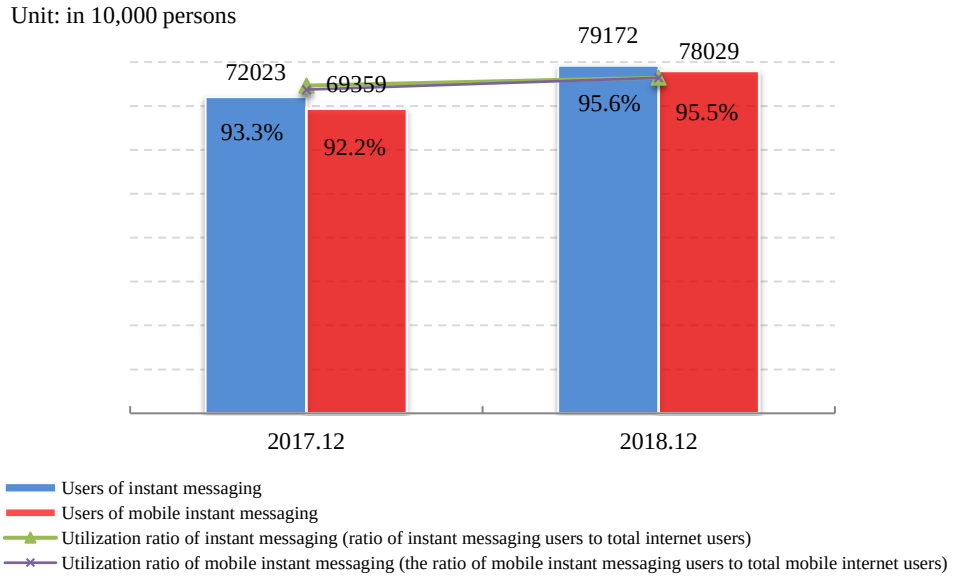
Figure 30 Number of Mobile Phone APPs Per Person by Age Group

3.1 Development of Basic Applications

3.1.1 Instant Messaging

As of December 2018, China had 792 million instant messaging users, accounting for 95.6% of total Internet users, an increase of 71.49 million compared to 2017. Users of mobile instant messaging reached 780 million, accounting for 95.5% of mobile Internet users, an increase of 86.70 million compared to 2017.

Users and Utilization Ratios of Instant Messaging/Mobile Instant Messaging as of December 2017 vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 31 Users and Utilization Ratios of Instant Messaging/Mobile Instant Messaging as of December 2017 vs. December 2018

In 2018, the instant messaging industry developed stably with its user base and penetration rate increasing further. At the same time, as a basic Internet application category, instant messaging saw many innovations focused on exploration of product features, extension of application scenarios and improvement of content quality.

In terms of product features, instant messaging products relied on mini-programs, with the aim to become powerful tools for driving the digital process of conventional industries. Taking conventional retail as an example, by using mini-programs, advertisements and official accounts and other relevant features provided by instant messaging products, conventional retailers provided all life-cycle and personalized services for customers through early customer reach, promotions, service provision and relationship maintenance. These features were initially used in supermarkets, stores,

catering, household and some other industries.

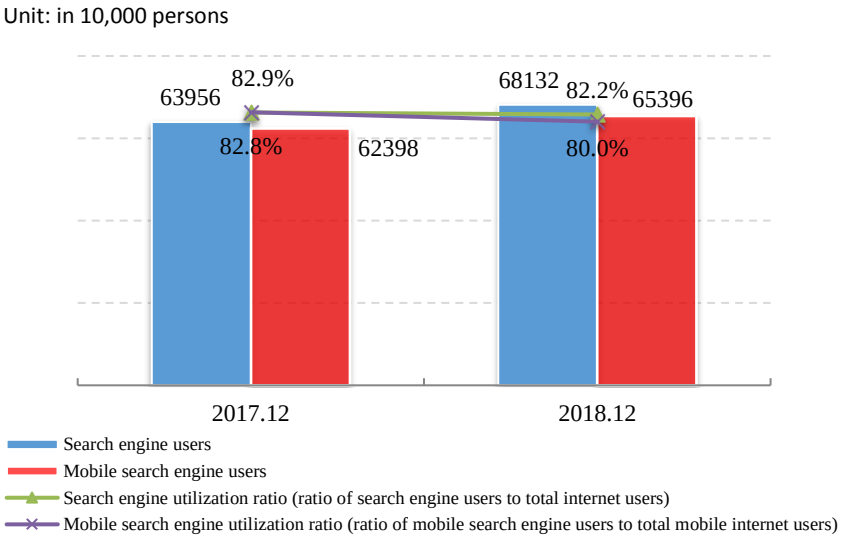
In terms of application scenarios, instant messaging products oriented for individuals and businesses made further breakthroughs. For individual-oriented products, Momo further secured its market share of stranger-based social media by acquiring 100% equity in Tantan. Taking Dingtalk and WeChat Work as representative products, instant messaging products designed for businesses saw a continued growth in their user group; special instant messaging products designed for vertical industries started showing increasing value, for example, financial compliance instant messaging products intended for helping businesses meet financial regulatory requirements have established a certain presence in the industry.

In terms of content quality, the accountability mechanism for suppliers of instant messaging products was further implemented and a common governance mechanism for content within a platform was basically established. With the joint efforts of the Office of the Central Cyberspace Affairs Commission, relevant authorities and enterprises, violations of laws and regulations on instant messaging platforms were heavily cracked down upon. Platforms themselves exerted more efforts into self-review and self-correction. Mini-programs and forward-inducing links that are fraudulent or otherwise malicious were included in the list for focused regulation and administration, with more than one thousand non-compliant mini-programs permanently closed and the number of forward-inducing links noticeably reduced.

3.1.2 Search Engine

As of December 2018, Chinese search engine users reached 681 million, an increase of 41.76 million or 6.5% year-over-year, and the utilization ratio of search engines was 82.2%; the number of mobile phone search users reached 654 million, an increase of 29.98 million or 4.8% year-over-year, and the utilization ratio was 80.0%,

Users and Utilization Ratios of Search Engine/Mobile Search Engine as of December 2017 vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 32 Users and Utilization Ratios of Search Engine/Mobile Search Engine as of December 2017 vs. December 2018

In 2018, mainstream search engine platforms exerted tremendous efforts into development of information flow products [1] to attract user traffic and increase advertising revenue to secure their market positions. To respond to the competition from vertical APPs, mainstream search engine platforms made use of their advantages as gateways to other APPs to increase user retention by connecting to news, short videos and other content as well as releasing information flow products. Information flow advertising brought a new growth driver for revenues of search engines and became an increasingly important revenue source. According to financial statements provided by relevant companies, driven by information flow products, daily active users and average visit duration of search engines showed an upward trend: In September 2018, the daily

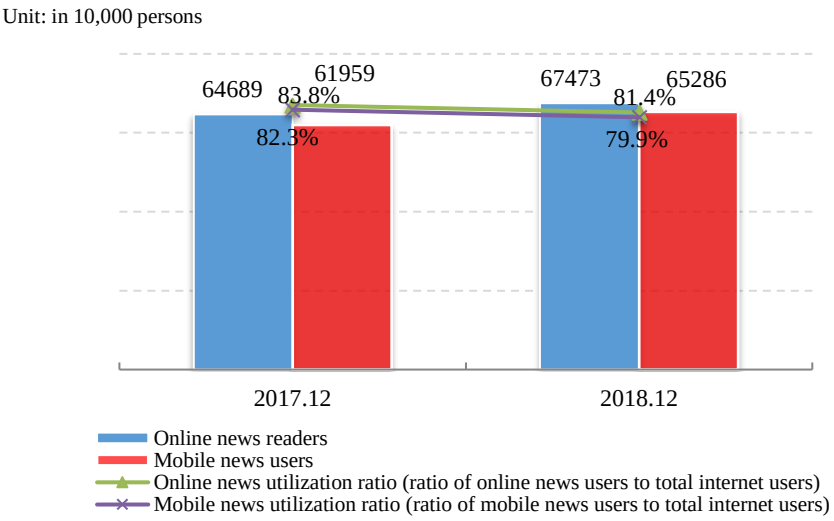
[1] Products that are displayed in the form of user updates, images, news, videos and so on in a waterfall layout in social media, news, video/audio and other Internet applications.

active users of Baidu APP saw an increase of 19% year-over-year, and the average visit duration of its information flow product indicated a year-over-year growth of 68%; in Q3 2018, operation revenue from Baidu information flow advertising and artificial intelligence exceeded 20% of the company's total operating revenue. Supported by artificial intelligence and information flow product, search engines are expected to provide more diverse and efficient use experience.

3.1.3 Online News

As of December 2018, online news readers in China reached 675 million, an increase of 4.3% year-over-year, representing 81.4% of all Internet users. Mobile news readers in China reached 653 million, representing 79.9% of all mobile Internet users and an increase of 5.4% year-over-year.

Readers and Utilization Ratios of Online News/Mobile News as of December 2017 vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 33 Readers and Utilization Ratios of Online News/Mobile News as of December 2017 vs. December 2018

Since the *Rules on Administration of Internet News Service* (No.1 Order of Office of the

Central Cyberspace Affairs Commission) was implemented, the Office of Central Cyberspace Affairs Commission and local cyberspace offices of all provinces, autonomous regions and several cities directly administered by the State Council, organized and conducted works related to licenses and approvals in accordance with laws. As of December 31, 2018, 761 online news providing entities received approvals from cyberspace offices of corresponding levels; the services provided by these entities included 743 Internet websites, 563 APPs, 119 forums, 23 blog accounts, 3 Weibo accounts, 2,285 official WeChat accounts, 1 instant messaging tool, 13 online live products and 15 other services, accounting for 3,765 services[1].

In its effort to develop through integration, media administered by the central government showed the following characteristics. First, exploration of platform-based development. Central media tried to create an integrated content platform and construct a new media content ecosystem that not only communicates mainstream values but also represents innovative force; for example, the "Ren Min Hao" platform launched by China Daily attracted thousands of CPC organizations, governmental agencies, universities and colleges, quality we-media operators and celebrities. Second, improvement of content quality. With content production as the main approach, central media rearranged internal news production process, extensively used novel news collection and editing and content representation techniques, and actively shared resources with both internal and external parties, to plan and produce quality news programs. Third, broadening of news communication channels. While building a more powerful product matrix, central media also actively broadened its own news outlet with the help of commercial media channels. On the other hand, commercial news media exhibited the following characteristics. First, increased competition for quality content. Internally, commercial media increased their efforts for cultivation and competition for we-media resources by launching mini-

[1] Data source: Licenses to Internet News Providers, source http://www.cac.gov.cn/2019-01/11/c_1122842142.htm.

programs and providing advertisement profit sharing plans; externally, they expanded their distribution capacity in content ecosystems by cooperating with video and QA (like Zhihu) websites. Second, reshaped content distribution mechanism. The weaknesses of interest-based algorithm recommendation mechanism were increasingly prominent, in light of which, some news websites proactively made changes by adopting an "algorithm recommendation + artificial intervention" form, a novel content distribution mechanism. Third, development of diverse content carriers. News websites made greater investments into development of new content carriers like short videos, audio and animations, in particular, short video format won tremendous attention from news websites.

3.1.4 Social Applications

As of December 2018, utilization ratios of WeChat Moments, QQ zone and Weibo were 83.4%, 58.8% and 42.3%, a decline of 3.9 percentage points and 5.6 percentage points and an increase of 1.4 percentage points year-over-year, respectively.

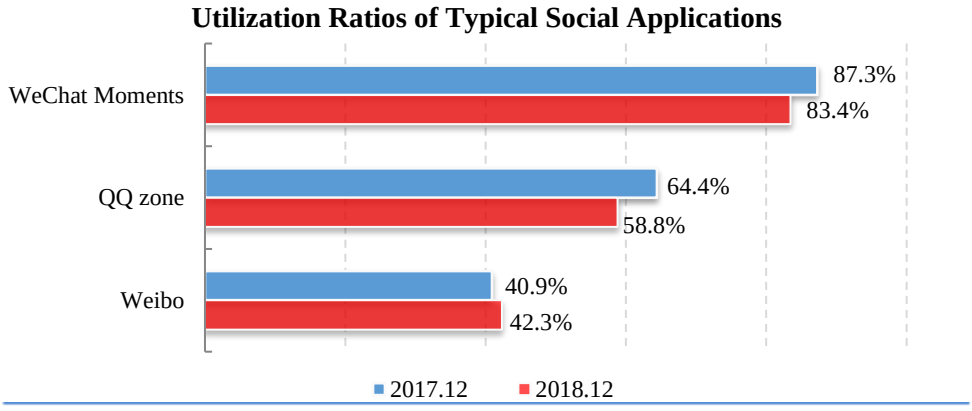


Figure 34 Utilization Ratios of Typical Social Applications

Social applications and traditional media complement each other and developed in an integrated manner. On one hand, by establishing a presence on social platforms, traditional media have become a significant source of quality content on these platforms,

which not only helped traditional media transform into we-media but also increased the credibility of these platforms. Watching live streaming videos on CCTV's Weibo account and interacting with People's Daily's Weibo account have become common Internet surfing habits among the youth. On the other hand, social platforms helped traditional media promote mass communication while enhancing their own influence. With users as the core, social platforms emphasize interactions, sharing and communications among users, a practice that deeply combines traditional media content and social platform channels. As Internet users shift to mobile terminals and social media and driven by social applications such as WeChat and Weibo, more positive information is easily communicated to the public with the help of social networks. For instance, People's Daily started a Weibo topic "China cannot be deprived of any of its territory" on November 17, 2018, which received 1,259,000 times forwarding, 118,000 comments, 943,000 likes and was read 8.94 billion times in just half a day[1].

The business models of social applications are increasingly mature. Advertising remains the main revenue source for social platforms. Compared with other online advertisements, those published on social platforms are social, video-based and intelligent, attributes that can help lock targeted audience and implement precision marketing by learning about users' social relationships, interest and behaviors. This can greatly increase advertisement reach and conversion ratios and attract more advertisers, thereby expanding their market share in the advertisement field. On the other hand, content producers can make money through social platforms. In 2018, content producers earned RMB26.8 billion on the Weibo platform. Online celebrity-driven e-commence is the fastest-developing and most crucial form of revenue generation. In 2018, celebrity-driven e-commerce made about RMB25.4 billion, representing 94.8% of total revenue generated by content producers, an increase of 36% year-over-year[2], with the revenue-

[1] Data source: Sina Weibo

[2] Data source: Sina Weibo

generating ability increasing in a robust manner.

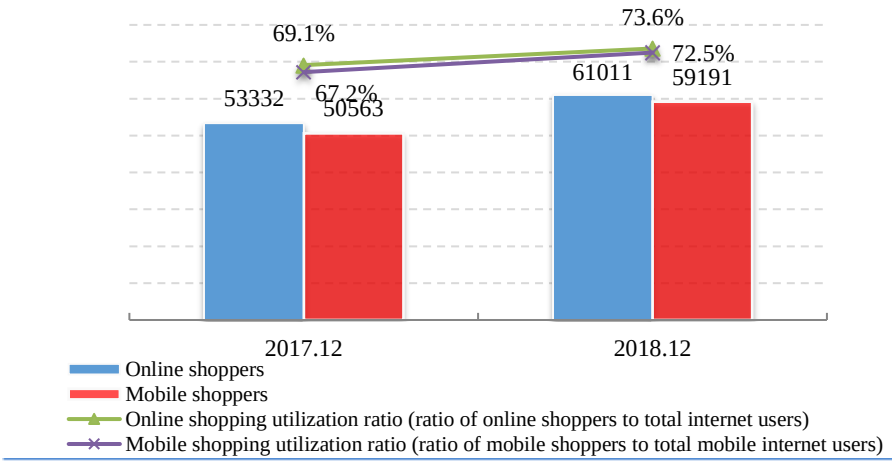
3.2 Development of Business Transaction Related Applications

3.2.1 Online Shopping

As of December 2018, China had 610 million online shoppers, an increase of 14.4% compared to the previous year, accounting for 73.6% of total Internet users. People who shopped on their mobile phones reached 592 million, an increase of 17.1% year-over-year, with a utilization ratio of 72.5%.

Users and Utilization Ratios of Online Shopping/Mobile Shopping as of December 2017 vs. December 2018

Unit: in 10,000 persons



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 35 Users and Utilization Ratios of Online Shopping/Mobile Shopping as of December 2017 vs. December 2018

With respect to legal environment, the official release of *E-commerce Law* marked the further improvement in laws and regulations applicable to Internet consumption. The *E-commerce Law* clearly defines provisions on e-commerce operators, execution and performance of contracts, dispute resolution and legal responsibilities, enabling the Law

to play a significant role in sustaining the healthy development of this industry. *E-commerce Law* includes natural persons into the scope of operators, who are required to fulfill tax obligations, a move that would prompt fair online and offline competition. What is more, principles for punishing behavior such as increasing one's credit through false transactions or other improper approaches and restricting fair competition, are set forth in the Law, which will further regulate market order.

With respect to industry development, after the period of user-based high-growth benefits faded, the "dual-upgrade" of supply and demand has become a new driving force for this industry. From the demand side, Internet consumption in 2018 maintained an upgrade momentum, providing a powerful driver for industrial growth and market development. For example, personalized demand prompted tailored supply, increased release of user demand from small cities accelerated the penetration of e-commerce channels into small cities, and quality-oriented demand and rational consumption further promoted the rapid development of quality e-commerce. From the supply side, the upgrade of resources, technologies and business models were further sped up. For example, large e-commerce operators opened physical stores on a faster pace, indicating a strong trend for convergence of e-commerce and traditional retail and further integration of online and offline resources; artificial intelligence, Big Data and block-chain technologies were increasingly applied in logistics, marketing and quality tracking fields; e-commerce traffic was further segregated, with new transaction models like group shopping, mini-program-based e-commerce and content e-commerce increasing exponentially. Supply side upgrade accelerated resource mobility and synergy-oriented division of work, increased supply chain efficiency and further stimulated consumer potential by enriching consumption scenarios.

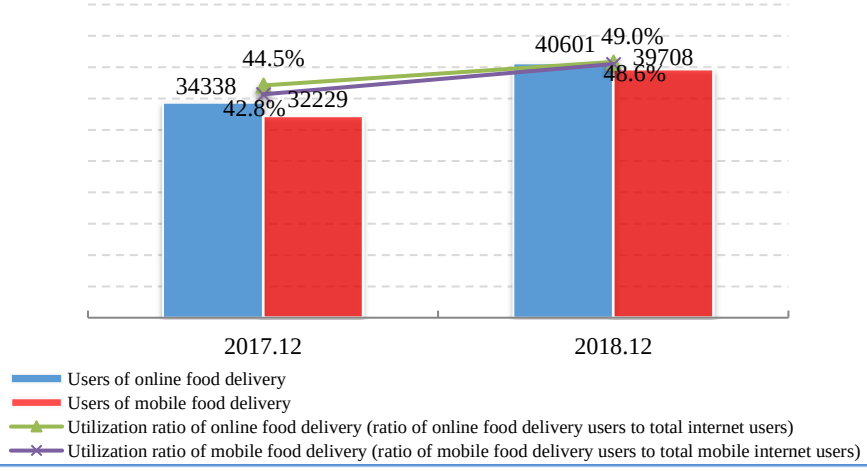
3.2.2 Online Food Delivery

As of December 2018, online food delivery users in China reached 406 million, an

increase of 18.2% compared to the previous year, maintaining a high growth rate. The number of people who ordered food using their mobile phones was 397 million, an increase of 23.2% year-over-year, with a utilization ratio of 48.6%.

Users and Utilization Ratios of Online Food Delivery/Mobile Food Delivery as of December 2017 vs. December 2017

Unit: in 10,000 persons



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 36 Users and Utilization Ratios of Online Food Delivery/Mobile Food Delivery as of December 2017 vs. December 2018

With respect to market distribution, the food delivery market is now clearly dominated by two players. Meituan-Dianping was listed in Hong Kong, while Alibaba purchased 100% of Ele.me, which was later integrated with Koubei into a newly established local life service company by Alibaba. This signified that online food delivery market has upgraded into a battlefield where players have to show their ecosystem building ability and resource capacity. As this pattern is further standardized, it is probable that no unicorn platform will emerge in this market and small and mid-sized platforms have to search for opportunities in all nodes of the industry chain and vertical segments of this market.

With respect to industrial trends, in the context that market changes and platforms are adjusting their strategies, new industrial trends are being established. First, food delivery service is playing an increasingly important role in the local life service ecosystem and has gradually become a crucial element that determines the success or failure of platforms in the life service market. Second, the industry ecosystem is further opened to embrace multi-party success through synergies. For example, Meituan acquired a SaaS provider in the catering field and provides Big Data services by cooperating with offline retailers; Ele.me provides instant delivery service for local life service retailers that operate on the Alibaba platform. Platforms have increased their revenue channels and the diversity of the platform ecosystem by performing crossover cooperation and by empowering businesses. These practices will further increase the industrialization of food delivery and the service quality of the catering and retail industry.

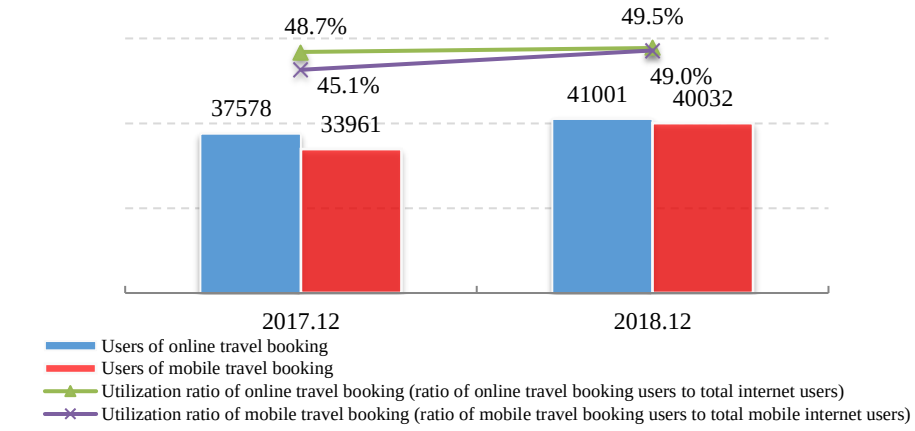
3.2.2 Travel Booking

As of December 2018, online travel booking[1] users in China reached 410 million, an increase of 34.23 million or 9.1% year-over-year; people who booked air tickets, hotels, train tickets and travel products online represented 27.5%, 30.3%, 42.7% and 14.5% of total Internet users, respectively. The number of users who purchased travel products online witnessed the fastest growth rate of 35.5%.

[1] Online travel booking includes online booking of air tickets, hotels, train tickets and travel products.

Users and Utilization Ratios of Online Travel Booking/Mobile Travel Booking as of December 2017 vs. December 2018

Unit: in 10,000 persons



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 37 Users and Utilization Ratios of Online Travel Booking/Mobile Travel Booking as of December 2017 vs. December 2018

In the field of air ticket booking, OTA[1] platforms maintained their robust growth, and international air ticket booking was the main driving force. At present, OTA platforms are concentrating on expanding their share of international market and sustain their revenue growth through expanded international air ticket business. Booking flight tickets on mobile phones is growing into a normal practice, with 98.8% of users using mobile phones to book flight tickets online in 2018. Thanks to the boom of mobile Internet, the user experience of APPs is constantly improving, with boarding, booking services and other value-added services focused on meeting "highly personalized needs" of users and in attracting Internet users to book air tickets using mobile phones.

Hotel booking manifested three main characteristics: First, OTA accommodation business grew stably. In 2018, bookings placed on mainstream OTA platforms in all

[1] OTA: Online Travel Agency

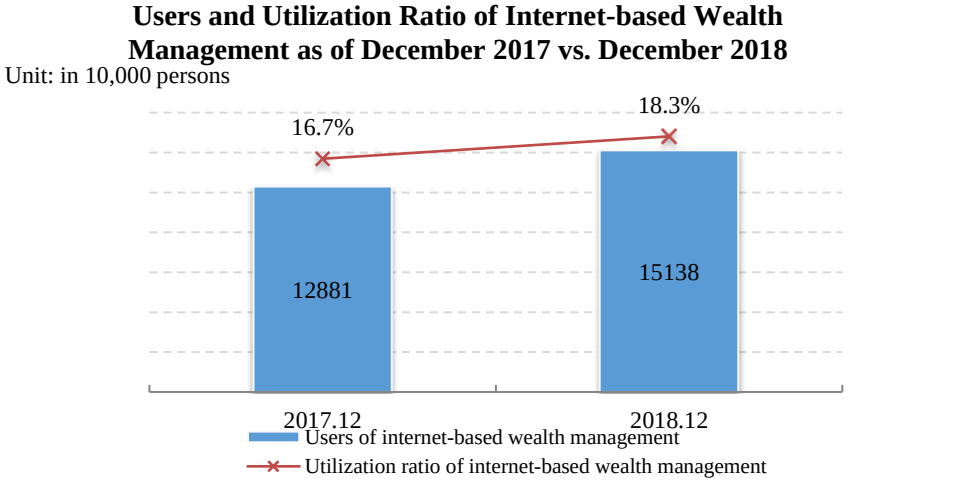
seasons saw a robust increase, which was mainly attributable to overseas market expansion and increased marketing activities. Second, "one-step" online service platforms developed rapidly. By integrating sub-brands and optimizing member experience, hotels tried to enhance user loyalty. Third, accommodation services provided by inns and homestays experienced a strong development momentum. Coupled with folk culture and proper pricing, inns and homestays in large cities and tourist destinations saw increasing user attention.

Two main characteristics were demonstrated in the travel product booking field. First, consumption upgrade stimulated demand for outbound travel booking. As Chinese economy develops, the middle income group has been expanding, driving a significant increase in travel, in particular outbound travel. OTA platforms and traditional travel agencies are competing fiercely for the outbound travel market. Second, synergy of online and offline services promoted booking consumption. OTA platforms sped up establishment of offline stores to attract potential users who are not using online booking services, and applied Big Data technology to optimize their product portfolio and promote sales. Traditional travel agencies extended their marketing channels to mobile terminals by maintaining customer relationships and providing tailored services with instant messaging tools.

3.3 Development of Finance Applications

3.3.1 Internet-based Wealth Management

As of December 2018, Chinese Internet users who bought online wealth management products reached 151 million, a 17.5% increase year-over-year; the utilization ratio of online wealth management products was 18.3%.



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 38 Users and Utilization Ratio of Internet-based Wealth Management as of December 2017 vs. December 2018

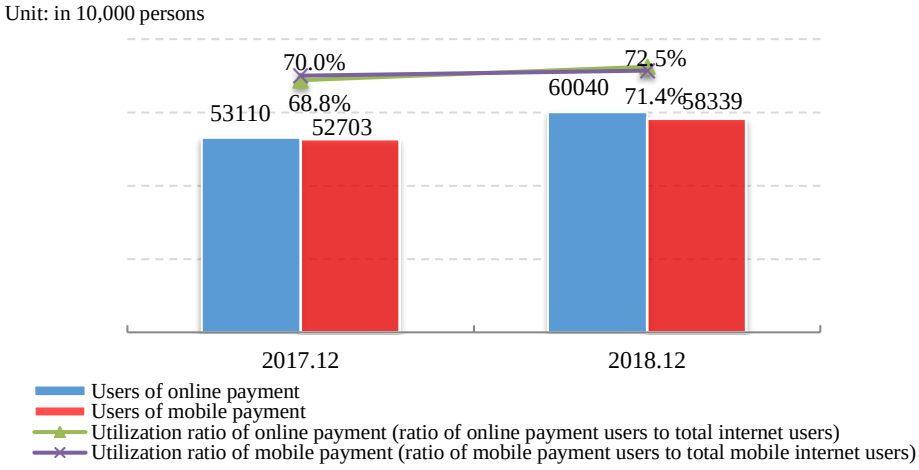
Guidance Opinions Concerning Standardization of Asset Management Operations by Financial Institutions, *Guidance Opinions Concerning Further Standardization of Online Sale and Redemption of Monetary Market Funds* and other financial industry policies were released in 2018. According to these policies, implicit guarantees—a widely present but improper practice in finance, must be ceased, "T+0" redemption of monetary market funds tightened and the threshold of investment into banking wealth management lowered. In this context, the Internet-based wealth management market has demonstrated new development trends. First, the size of monetary fund products of "Bao-Bao" category were effectively controlled. The issuing and trading scale of monetary funds was continuously lowered. Super-large wealth management products like Yu'e Bao were linked to many monetary fund products and were divided to maintain a moderate size. Second, the threshold of investment into banking wealth management products was remarkably lowered; coupled with banks' liquidity and return on investment advantages, "T+0" wealth management products issued by banks have gradually become alternatives to the "Bao-Bao" category. The above new changes indicate that the finance industry is

moving toward a robust and regulated direction, which on one hand mitigates financial risk caused by the large size of the wealth management market and on the other hand lowers financing cost of financial institutions, which helps funds flow back and effectively increases utilization efficiency of funds.

3.3.2 Online Payment

As of December 2018, online payments users in China reached 600 million, an increase of 69.30 million or 13.0% compared to 2017, with the utilization ratio of online payments increasing from 68.8% to 72.5%. Users who made payments using mobile phones reached 583 million, an increase of 10.7% year-over-year, with the utilization ratio of mobile payments increasing from 70.0% to 71.4%. The ratio of Internet users who made payments using mobile phones when they bought products in brick-and-mortar stores was raised from 65.5% at the end of 2017 to 67.2%.

Users and Utilization Ratios of Online Payment/Mobile Payment as of December 2017 vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 39 Users and Utilization Ratios of Online Payment/Mobile Payment as of December 2017 vs. December 2018

China's online payment market showed the following characteristics in 2018: First,

competition in this industry remained excessive. China Union Pay and commercial banks increased their investments into the payment business by directly competing with third-party payment institutions, while optimizing user experience of their products. In this respect, "Yun Shan Fu" (Cloud Flash Payment), a product launched by China Union Pay, captured over 100 million users in less than a year. Second, payment scenarios were further extended. Online payment made breakthroughs in public transport, medical care and many other applications. Mobile payment applications have been applied to public transportation systems in an overwhelming majority of third-tier and above Chinese cities. Third, payment methods were more diverse. Following the popular application of payment via QR code scanning, contactless payment[1] based on car number plate recognition and facial recognition have been commercialized and fingerprint payment based on bio-recognition technology has been widely used, resulting in a more efficient and convenient world for online payment.

While deepening their efforts in the Chinese market, Chinese businesses accelerated expansion in the international market by developing cross-border payment and local payment in foreign countries. In terms of cross-border payment by tourists, Chinese companies have started services in many countries where popular tourism destinations are located, with a one-stop cross-border payment system that covers catering, sightseeing, shopping, travel and tax refund, and both, Alipay and WeChat Pay are being legally used in more than 40 countries and regions. In terms of overseas resident payment, by capital and technology investment and otherwise, Chinese companies have operated local digital wallet products in 9 Asian countries and regions and have started to deploy mobile payment services in Africa.

[1] Contactless payment shortens the entire payment process into just one or two seconds, during which, no specific payment action is required.

3.4 Development of Online Entertainment Applications

3.4.1 Online Music

As of December 2018, there were 576 million online music listeners in China, an increase of 27.51 million year-over-year, accounting for 69.5% of total Internet users. People who listened to music on mobile phones reached 553 million, an increase of 41.23 million year-over-year, accounting for 67.7% of total mobile Internet users.

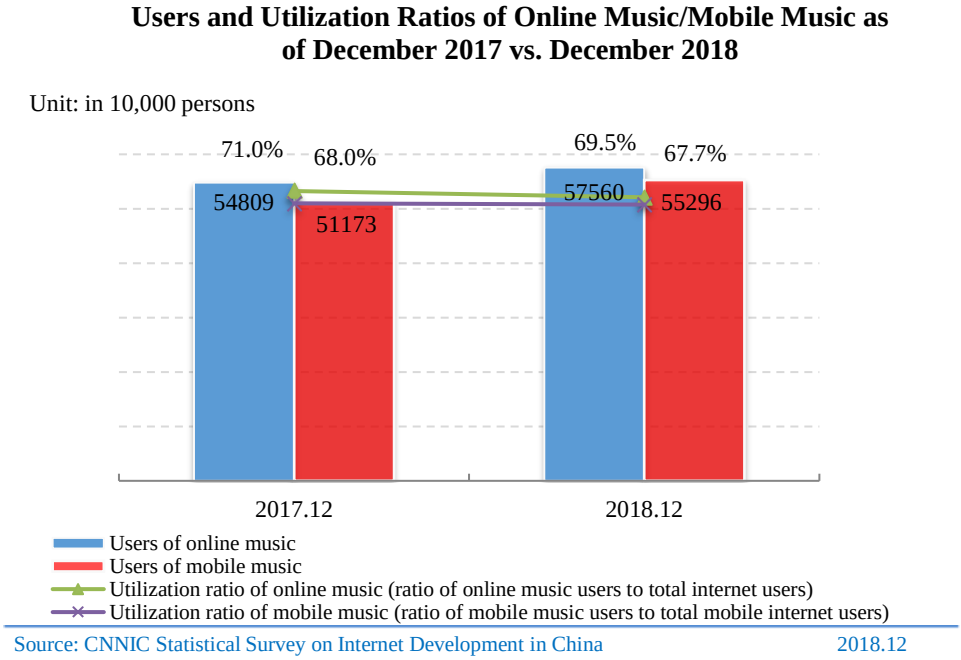


Figure 40 Users and Utilization Ratios of Online Music/Mobile Music as of December 2017 vs. December 2018

A further improved environment favorable to protection of digital music copyrights, increased support for short videos and other music forms by various platforms, and continued financing by large music groups, jointly drove the development of online music in 2018.

With respect to copyright cooperation, copyright cooperation among Chinese online music companies were furthered and coverage of licensed digital music was significantly widened. With the copyright agreement entered by and between Tencent Music and NetEase Cloud Music, supported by National Copyright Administration of China, music platforms further deepened their cooperation on copyrights, which initially created an industrial atmosphere conducive to copyright sharing and pushed the quicker coverage of licensed music. 96% of Chinese consumers used licensed music, much higher than the global average (62%), according to the data contained in *Music Consumer Insight Report* released by International Federation of the Phonographic Industry in October 2018.

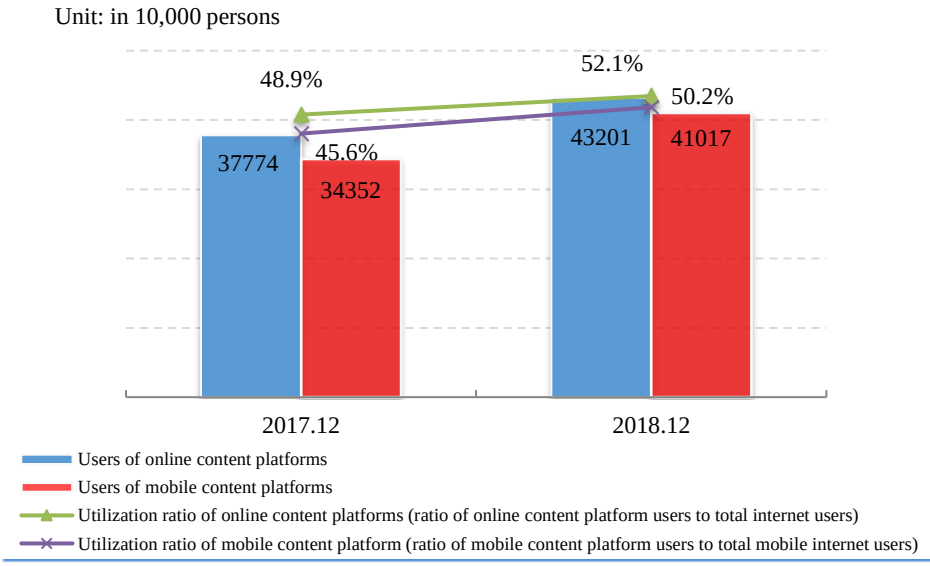
With respect to the form of music presentation, short videos, a new presentation form of online music, was attached importance to by large music platforms. In 2018, short video APPs penetrated quickly into the Chinese market and saw a significant increase of user base. Cross-over combination between online music companies and short video companies were further deepened due to the good matching between short videos and music content; in this respect, large platforms launched many incentive schemes to find and fund authors who create music for short videos. Using their unique advantages, NetEase Cloud Music, Douyin and other platforms supported original music-backed short-videos in terms of traffic, copyright, funding and other aspects.

With respect to company development, large online music platforms in China continued to enhance their competitiveness by raising more funding and showed robust operating profitability. In November 2018, NetEase Cloud Music completed a B-round financing of US$600 million; in December, Tencent Music Group was listed on the New York Stock Exchange. According to the prospectus of Tencent Music Group, its operating revenue in the first three quarters of 2018 increased 83.7% year-over-year with net profit increasing by as high as 244.8% year-over-year, which to some degree showed the flourishing and great potential of the online music market in China.

3.4.2 Online Content

As of December 2018, China had 432 million online content platform users, an increase of 54.27 million compared to the previous year and represented 52.1% of total Internet users. People who read and created online content on mobile phones were 410 million, an increase of 66.66 million compared to the previous year and represented 50.2% of total mobile Internet users.

Users and Utilization Ratios of Online Content/Mobile Content Platforms as of December 2017 vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 41 Users and Utilization Ratios of Online Content/Mobile Content Platforms as of December 2017 vs. December 2018

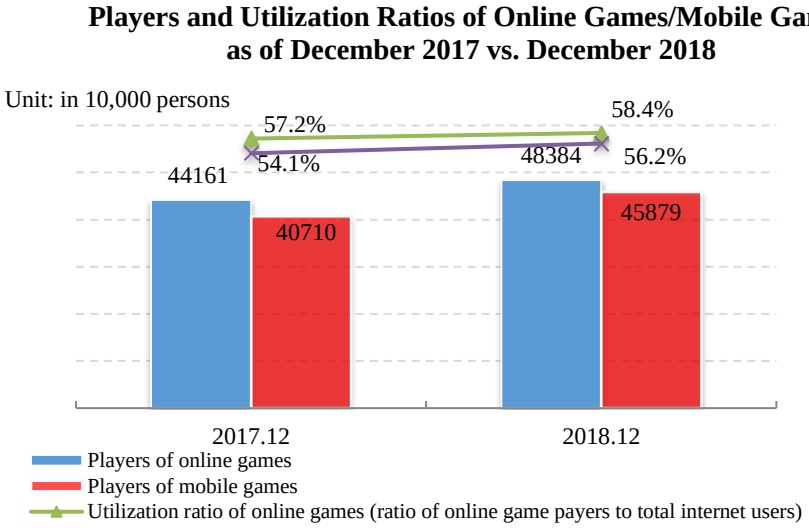
Online content industry continued its healthy development in 2018, with further increased user base and operating revenue of listed companies. Development of cross-over content and increase in copyright-driven operating revenue became the highlight changes in this industry.

With respect to content production, cross-over convergence became a more significant trend. Companies that led in either online content or online video fields started to be engaged in producing content in the other field, in order to improve their own content ecosystem. For example, China Literature Limited merged with New Classics Media Corporation with an investment of RMB15.5 billion in October 2018, and therefore transformed into an Internet content platform that is able to create both textual content and film & TV works; iQIYI proposed "content-driven films and TV programs" as its development direction and helped its content business development and the conversion of content into films and TVs by a series of Yunteng Plans.

With respect to business development, copyright-driven operating income for online content companies kept increasing at a high speed and its share of total operating revenue went up noticeably, indicating its potential to become a main revenue driver for large online content businesses. Taking the data published in financial statements of the listed China Literature Limited as an example, its operating revenue generated from copyrights in the first half of 2018 increased by 103.6% year-over-year, much higher than the 13.3% year-over-year growth of online reading business in the same period; in terms of its operating revenue structure, copyright revenue's share of total revenue grew from 8.1% to 13.9%. Zhangyue Technology, another listed online content company, enjoyed a year-over-year growth of 243.9% in copyright-driven income, according to its financial statements for the 2017 fiscal year issued in April 2018.

3.4.3 Online Games

As of December 2018, online game players in China reached 484 million, an increase of 42.24 million compared to the previous year, and accounted for 58.4% of total Internet users. Mobile game players reached 459 million, an increase of 51.69 million compared to the previous year, and accounted for 56.2% of total mobile Internet users.



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 42 Players and Utilization Ratios of Online Games/Mobile Games as of December 2017 vs. December 2018

In 2018, China's online game industry maintained stable growth. Partnerships between Chinese game makers and the overseas market became increasingly close, and a society-level control system for the bad influence of games was established.

From the perspective of industrial development, increasingly close cooperation between large Chinese game companies and overseas game developers paved the way for a sound foundation for export of domestic games and import of overseas games. More and more companies began to emphasize on overseas business, which indicates that the influence of Chinese games in overseas markets would further increase. In 2018, domestic game makers like Tencent, NetEast, and Perfect World entered strategic partnerships with Ubisoft, Valve and some other overseas game developers, which would benefit the publishing of overseas games in the Chinese market.

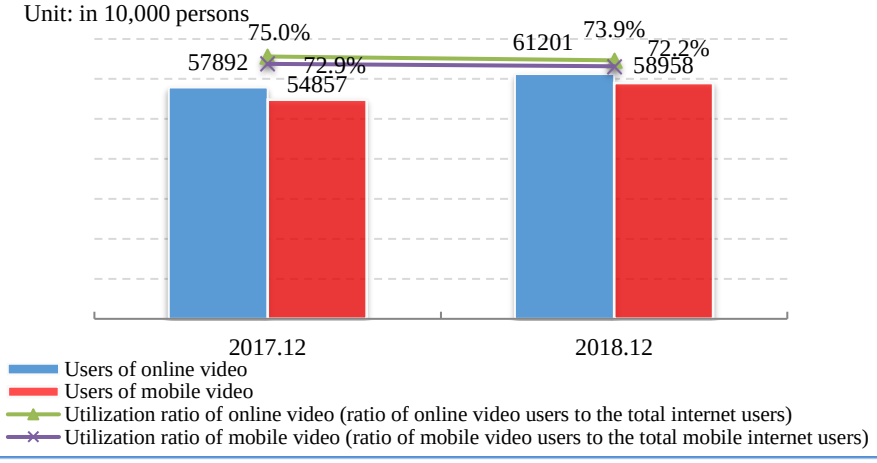
From the perspective of social environment, a society-level control system for the bad influence of games was established. With the release of the *Opinions on Strict Regulation of Online Game Market Administration*, the work on eliminating improper games was

implemented, leading to a cleaner and more regulated industry environment. Also, large game makers began to deploy many technical measures to prevent possible negative influence of online games on minors. A variety of anti-online game addiction systems were implemented to control and limit the online time and payment behavior of minors, through technical measures like facial recognition, mandatory real name authentication, online game consumption alert for minors, etc.

3.4.4 Online Video

As of December 2018, 612 million people watched online videos in China[1], an increase of 33.09 million compared to the previous year, representing 73.9% of total Internet users. The number of people who watched online videos on mobile phones reached 590 million, an increase of 41.01 million year-over-year, accounting for 72.2% of total mobile Internet users.

Users and Utilization Ratios of Online Video/Mobile Video as of December 2017. vs. December 2018



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 43 Users and Utilization Ratios of Online Video/Mobile Video as of December 2017. vs. December 2018

[1] Users who watched or downloaded online videos within half a year before the survey.

In terms of devices that people used to watch online videos, both, smart phones and smart TVs demonstrated great ability to meet the video service needs of individuals and households. On one hand, as the most important tool for individual online video services, smart phones showed a further increase in the utilization ratio despite already being at the top position, and the gap between the number of mobile phone users who watched online videos and the number of total online video watchers was further narrowed. On the other hand, with increased speed and reduced cost of home broadband, and further decreased price of smart TVs, the market share of smart TVs saw an increase. As of the end of September 2018, coverage of smart TVs reached 322 million sets, of which, 218 million were activated; and more than half of online video users watched online video programs using smart TVs[1].

In terms of video content, large platforms paid attention to improvement of content quality with more and more well-designed and independently-produced content. Despite their slightly reduced or unchanged user base, independently-produced programs including online TV dramas, variety shows and films newly released on online video platforms enjoyed a tremendous growth in total views and views per program; and high-quality, exclusive and innovative content were more preferred by users. For example, online variety shows were highly successful in genre innovation, with reality shows on basketball, robotics, aerospace and performance fields being highly popular and influential thanks to their high quality.

In terms of market structure, users, content and traffic in this industry were concentrated on Tencent Video, iQiyi and Youku, with a prominent Matthew Effect. With respect to user size, these three platforms attracted nearly 90% of total online video users; and with respect to content and traffic, about 80% of independently-produced programs launched in 2018 were exclusively broadcast on these three platforms, which covered more than

[1] Data Source: *2018 Research Report on Development of Online Video and Audio Industry in China*

80% of total views[1]. The second and third level platforms were overridden by the first level platforms in terms of utilization rate, quantity of independently-produced and exclusively broadcast content. This marked a higher market concentration.

In the short-video field, a great number of Internet companies fought to capture a piece of the pie by developing special and quality content. The short video field caught the attention of all interested parties. Baidu, Tencent, Alibaba and Weibo continued their efforts in this field and NetEase and Sohu launched their new short video applications as well, driving the rapid development of this market. As of December 2018, short video application users[2] reached 648 million, with the utilization ratio of short video applications being 78.2%. As the market became more mature, there was increased professionalism in content production, driving homogeneous content out of the market and making quality content the core competitiveness of platforms. Due to this, short video platforms strengthened their collaboration with quality MCN[3] institutions and KOLs to build good PGC (professionally generated content) and drive better UGC (user generated content).

3.4.5 Live Streaming

As of December 2018, online live streaming users reached 397 million, a decline of 25.33 million year-over-year, with 47.9% utilization ratio of online live streaming, 6.8 percentage points lower than the ratio in 2017. With respect to four content segments, i.e., sports, games, reality shows and concerts, the utilization ratio of game streaming users remained basically unchanged, that of sports showed a marginal decline, and that of concerts and reality shows declined by 6.2 percentage points and 8.8 percentage points, respectively.

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[1] Data Source: *2018 Research Report on Development of Online Video and Audio Industry in China*

[2] Users who watched online short videos within six months prior to this survey.

[3] MCN means Multi-Channel Network, an organization that connect different kinds of quality PGCs or UGCs on a platform and provides a platform for operation, commerce, marketing and other services for content producers, helping them exchange PGCs or UGCs for cash.

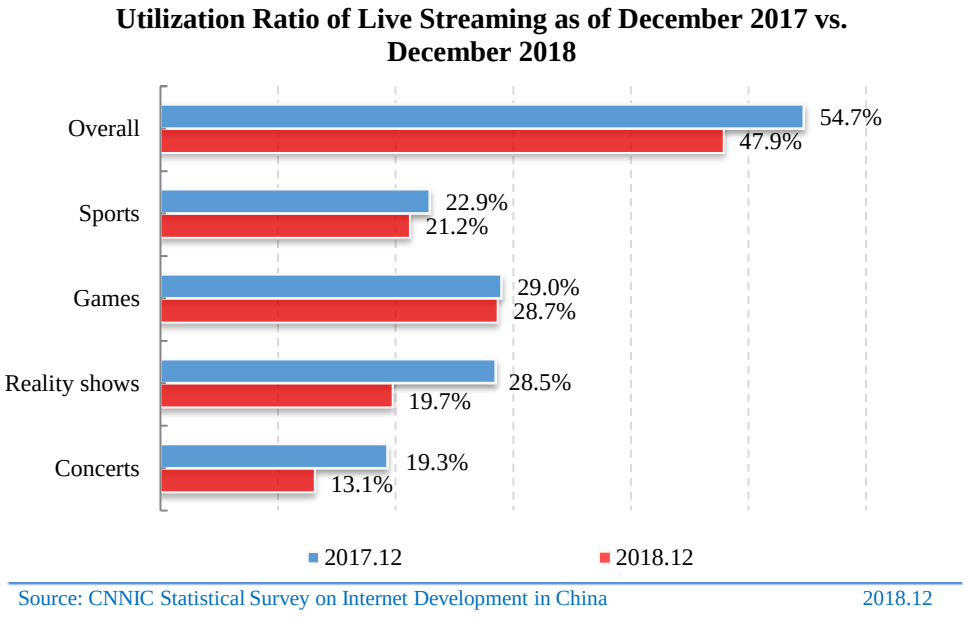


Figure 44 Utilization Ratio of Live Streaming as of December 2017 vs. December 2018

There was a gradual differentiation in the live streaming industry, which meant the industry entered into a transformation period in 2018. First, supported by investors, the first level platforms expanded their leading advantage. In March, Douyu received an investment of US$630 million from Tencent, and Huya received an investment of US$460 million. In May and July, Huya and Yingke were listed; surprisingly, high financing ensured better material preparation for the improved operation of these platforms and accelerated industry agglomeration. Second, the second level platforms tried to grow through partnerships in order to maximum their traffic and profits. For example, platforms like YY and Xiaomi, Huajiao and Liujianfang, Douyu and Sina Weibo, integrated resources and complemented each other in terms of traffic through either reorganization or strategic cooperation.

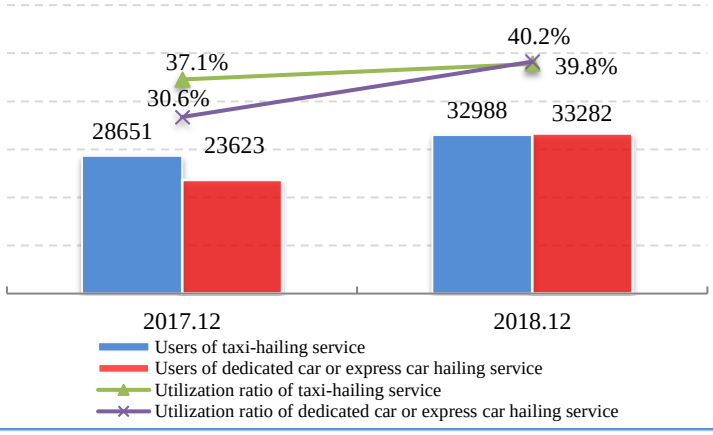
3.5 Development of Public Service Applications

3.5.1 Car-hailing

As of December 2018, Chinese taxi-hailing users reached 330 million, an increase of 43.37 million or 15.1% year-over-year. The number of people who used dedicated car/express car hailing services reached 333 million, an increase of 40.9% year-over-year, with the utilization ratio of dedicated car/express car hailing service increasing from 30.6% to 40.2%.

Users and Utilization Ratios of Taxi-hailing/Dedicated Car or Express Car Hailing as of December 2017 vs. December 2018

Unit: in 10,000 persons



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 45 Users and Utilization Ratios of Taxi-hailing/Dedicated Car or Express Car Hailing as of December 2017 vs. December 2018

From the perspective of operation management, the size of the car-hailing industry expanded consistently and there was a shift towards new energy vehicles in the car-hailing industry. In this respect, the industry showed the following characteristics. First, access by new players increased the competition. As of October 2018, the number of car-

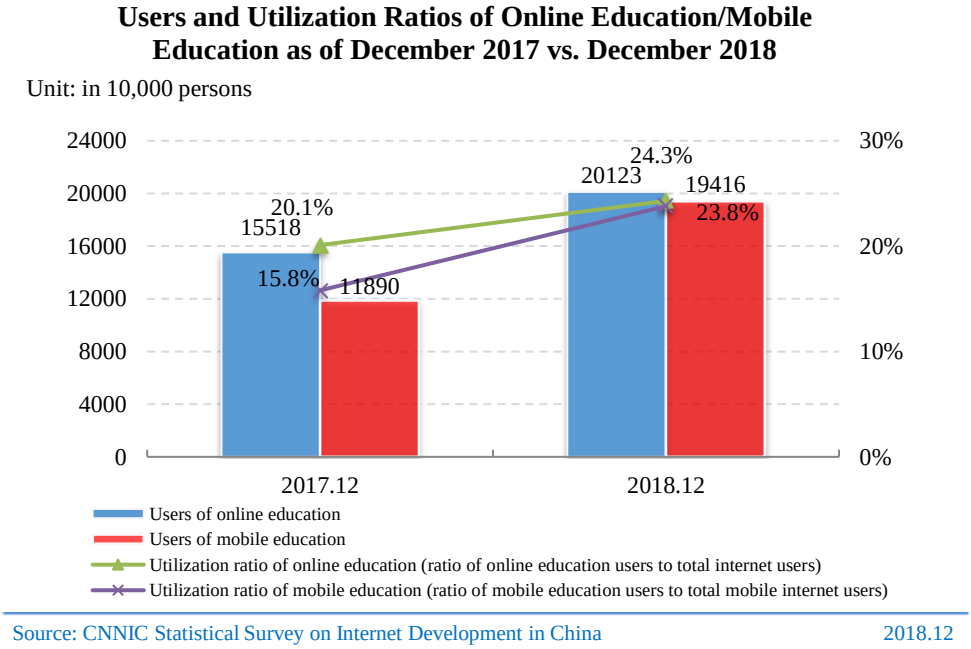
hailing platforms that obtained business license in at least one city exceeded 100[1]; following Ctrip, Gaode Map and Meituan, which entered the car-hailing market, Daimler and Geely also got involvement in this market. Second, new energy vehicles are gradually replacing traditional vehicles. Some cities have adjusted their implementation rules on car-hailing services by requiring that new or updated cars must be new energy vehicles and some platforms have even begun to regulate their car-hailing business in the "Internet + new energy" model.

From the perspective of regulation, policies governing car-hailing industry were further deepened and greater importance was attached to safety. This is manifested in two aspects. First, in 2018, after a joint supervisory mechanism was developed and carried out in the ride-hailing industry, the Ministry of Transport in collaboration with other ministries and commissions organized and conducted safety inspections to restrict the disorder in the ride-hailing market. Second, car-hailing platforms optimized their product structure to improve safety guarantee in order to protect legitimate rights and interest of ride-hailing passengers; the measures adopted include upgrading car-loaded intelligent hardware systems—use of artificial intelligence to monitor the entire process and provision of intelligent passenger assistance, short text alarm, real-time position protection and online black listing of drivers.

3.5.2 Online Education

By December 2018, 201 million people took online education courses in China, an increase of 46.05 million or 29.7% compared to 2017. The utilization ratio of online education was 24.3%, an increase of 4.2 percentage points compared to 2017. People who took online courses using mobile phones reached 194 million, an increase of 75.26 million or 63.3% year-over-year; the utilization ratio of mobile education was 23.8%, an increase of 8.0 percentage points year-over-year.

[1] Data Source: routine press release issued by the Ministry of Transport in October 2018.



Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 46 Users and Utilization Ratios of Online Education/Mobile Education as of December 2017 vs. December 2018

Online education showed a further shift to mobile terminals, with WeChat being an important platform for e-learning. The rapidly growing popularity of smart devices and advancements in mobile Internet created more opportunities for online education, and short, segmented and structured knowledge content were more easily adapted to learning scenarios supported on mobile terminals. By December 2018, the number of users who took online courses via mobile phones accounted for 96.5% of total online education users, an increase of 19.9 percentage points compared to 2017. More and more education products began to explore new service models with the help of WeChat's ecosystem, which is mainly attributable to WeChat's leading advantages in capturing user traffic, community operation, user scale and retention. Users were attracted to these education products through WeChat groups, public accounts and mini-programs, and were prompted to share what they learned on a regular basis; these aspects lowered the cost

incurred to get a new user and increased user retention.

Live streaming technology also supported online education. With the progresses made in voice recognition and cloud storage, live streaming classrooms could create a good teaching environment that reproduced the offline learning model to the largest extent, and the teaching effect was widely recognized by users. This made live streaming platforms the preferred choice for education platforms and learners. Live education streaming satisfied diverse user needs through one-on-one, one-to-many and two-teacher modes, and allowed students and teachers to interact without being hindered by restrictions of distance. This can further enlarge teaching coverage and promote the popularity and deepening of online education.

Chapter 3 Development of Government Applications

1. An Overview of Internet-based Governmental Services

By December 2018, users of online governmental services in China reached 394 million and made up 47.5% of total Internet users. In 2018, the "Internet + governmental services" model was further enhanced; governments at all levels utilized information technologies like the Internet, Big Data and artificial intelligence to improve their comprehensive service ability and governmental service effectiveness through technology-driven innovation and process optimization. For rendering front-end services, relevant departments kept promoting online and offline integration of governmental services; the use of online government platforms allowed real time collection of online applications, appointments and approval (review) processes and complemented and seamlessly connected online and offline functions, with whole-process tracking ability. What is more, coverage of governmental services through the Internet, self-service terminals and mobile terminals was further extended to the common public to realize "one stop, one trip and one paper" services. For backend data management, governments at all levels sped up improvement in government data resources by developing a uniform and inter-connected nationwide data sharing and exchange platform. They strengthened the functions of the platform and enhanced its regulation to make it useful for sharing data across different levels, regions, systems, departments and services, enabling greater and easier access to data.

While enhancing "Internet+ governmental services", counties started to construct media convergence centers. President Xi Jinping, the General Secretary of CPC Central Committee, called for the sound construction of county-level media convergence centers in the national publicity and ideological work meeting held in August 2018, and required nearly 100% coverage by the end of 2020; at present 600 centers were established in 2018, to better guide and serve the public. In November, President Xi Jinping hosted and delivered an important speech at the fifth meeting of the Central Commission for Comprehensive Deepening Reform, which reviewed and approved the *Opinions on Strengthening the Construction of County-level Media Convergence Centers*, which pointed out the direction for the construction work and became the fundamental basis for institutional reform at county-level media. By including radio and TV stations, CPC newspapers and websites in corresponding counties, these centers are responsible for publishing all information, including governmental news, weather forecast, medical care and transportation, community services and so on. They shall integrate resources, centralize management, improve information quality and regulate services, thereby better communicating governmental information and serving the public.

2. Operation of Government Websites

2.1 Overall Distribution of Government Websites

By December 2018, China had 17,962 government websites[1], chiefly consisting of

[1] Government websites refer to those run by the People's Government at all levels and their departments, agencies and institutions with administrative functions, on the Internet. They provide functions such as information release, interpretation and response, service and interactive communication.

government portals[1] and departmental websites[2]. Of these 17,962 websites, 1,080 were operated by ministerial-level institutions and 16,882 by provincial-level and lower-level ones, all of which were distributed across 31 provinces (autonomous regions and municipalities directly under the administration of the State Council) and Xinjiang Production and Construction Corps.

Number of Government Websites from December 2015 to December 2018

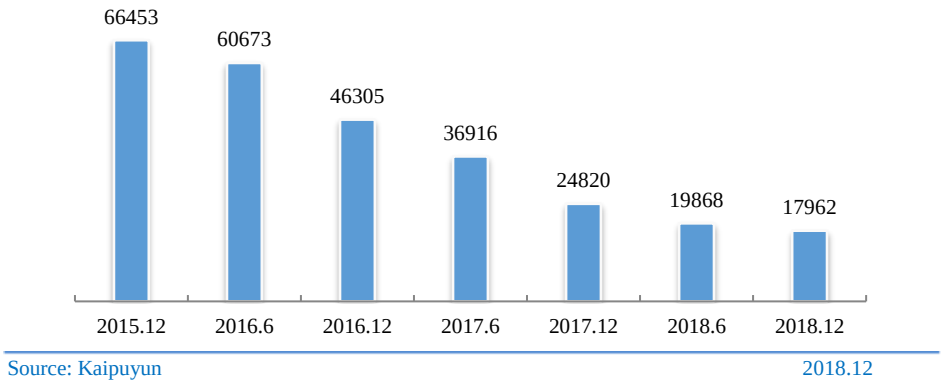


Figure 47 Number of Government Websites from December 2015 to December 2018

In September 2018, the General Office of the State Council released the *Notice on Strengthening the Administration of the Domain Names of Government Websites*, based on which, administration of government website domains would be further improved, structure of their domains regulated, domain registration and cancellation process optimized, and domain security protection and monitoring work further promoted to

[1] Government portals: People's Government at or above the county level and departments under the State Council must set up government portal websites. In principle, villages, towns, and sub-districts do not set up government portals, unless special needs arise.

[2] Departmental websites: provincial and municipal government departments, as well as institutions above the county level where the system-wide vertical management department is located, can set up their own websites as required. In principle, county-level government departments do not set up government websites, unless special needs arise.

drive the healthy development of government websites. As the entity responsible for registration and administration of domain names of government websites, China Internet Network Information Center must perform registration and cancellation reviews strictly in compliance with established procedures, check necessary information pursuant to laws, optimize relevant registration and cancellation procedures, and assist in the same. Governments at all levels actively and properly organized the centralized construction of local government websites. In November 2018, the General Office of the State Council printed and distributed the *Work Plan on Integrated Government Website Pilots* against conspicuous problems such as website decentralization, lack of data sharing between different websites and usability issues. According to the Work Plan, integrated government websites will be developed based on a uniform information base, to drive the overall governmental service in pilot regions through information sharing. As of December 2018, the number of government websites at provincial and lower administrative levels decreased by 24.6% compared to the previous year. Governments at all levels further carried through the central arrangement to adapt to changes in Internet development and push information sharing among government websites.

Table 8 Number of Government Websites by Province[1] as of December 2017 vs. December 2018

Province	December 2018	December 2017	Decline
Beijing	80	1046	92.4%
Tianjin	133	210	36.7%
Hebei	573	725	21.0%
Shanxi	422	490	13.9%
Inner Mongolia	618	652	5.2%
Liaoning	666	812	18.0%
Jilin	373	468	20.3%

[1] Number of government websites operated by ministerial-level departments are not included.

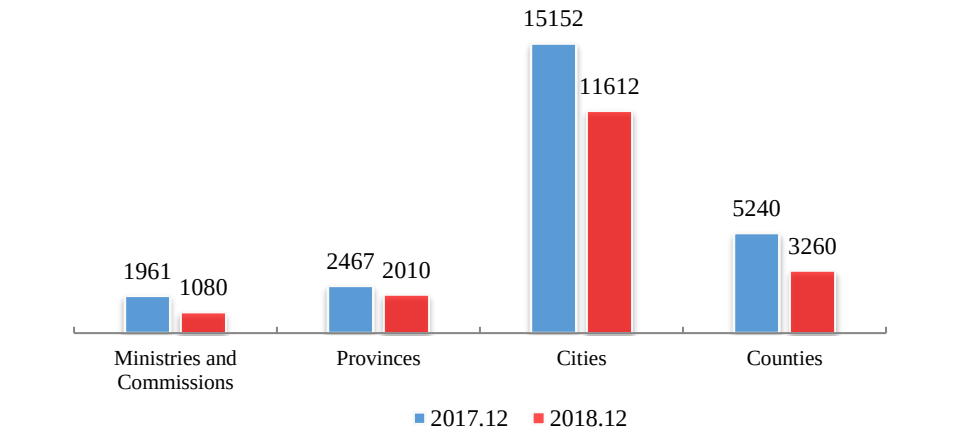
Province	December 2018	December 2017	Decline
Heilongjiang	449	532	15.6%
Shanghai	88	647	86.4%
Jiangsu	800	849	5.8%
Zhejiang	689	1063	35.2%
Anhui	909	973	6.6%
Fujian	495	558	11.3%
Jiangxi	625	702	11.0%
Shandong	1120	1244	10.0%
He'nan	1054	1580	33.3%
Hubei	852	833	-2.3%
Hu'nan	746	787	5.2%
Guangdong	867	1618	46.4%
Guangxi	758	1343	43.6%
Hai'nan	127	150	15.3%
Chongqing	342	526	35.0%
Sichuan	1066	1147	7.1%
Guizhou	450	502	10.4%
Yunnan	394	486	18.9%
Tibet	165	164	-0.6%
Shaanxi	752	772	2.6%
Gansu	616	698	11.7%
Qinghai	181	195	7.2%
Ningxia	158	251	37.1%
Xinjiang	167	172	2.9%
Xinjiang Production and Construction Corps	147	184	20.1%
Total	16882	22379	24.6%

Source: Kaipuyun

2.2 Distribution of Government Websites at Administrative Level

As of December 2018, ministerial institutions had established 1,080 government websites and accounted for 6.0% of total government websites; 14,872 government websites, representing 82.8% of the total number, were operated by municipal and lower administrative levels; the number of websites at each administrative level declined slightly compared to the previous year. As integrated websites were developed at a faster speed, by standardizing rules and procedures, processing data and providing services in a central manner and gradually integrating county-level websites to prefecture-city level websites, governments can optimize website resources, share and mutually recognize data, standardize management and provide efficient services.

Number of Government Websites at Administrative Level as of December 2017 vs. December 2018



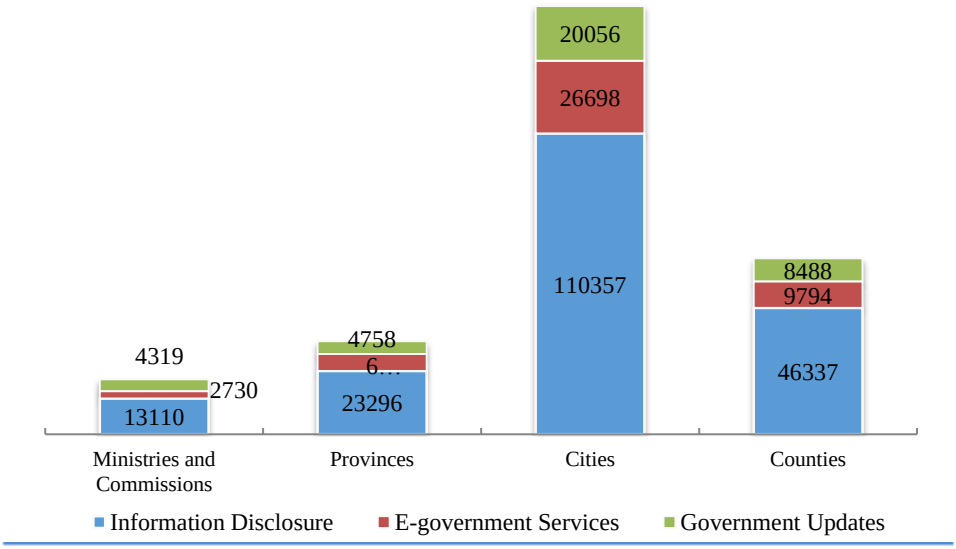
Source: Kaipuyun 2018.12

Figure 48 Number of Government Websites at Administrative Level as of December 2017 vs. December 2018

2.3 Distribution of Website Columns on Government Websites at Administrative Level

By December 2018, government websites at all administrative levels opened 276,000 website columns, of which, 157,000 were on city-level websites and accounted for 56.9% of all columns, outweighing all other administrative levels. Information disclosure column ranked the first among all available columns, amounting to 193,000 columns and representing 69.9% of all columns; following which were e-government columns, which accounted for 16.4% of all columns; the next were government update columns, which accounted for 13.6%.

Number of Different Website Columns at Administrative Level



Source: Kaipuyun 2018.12

Figure 49 Number of Different Website Columns at Administrative Level

2.4 Article Updates on Home Pages of Government Websites at Administrative Level[1]

In 2018, the number of articles updated on home pages of government websites at each administrative level increased, resulting in an overall annual growth rate of 19.4%. The highest annual growth rate was 69.5%, occurring in ministerial websites.

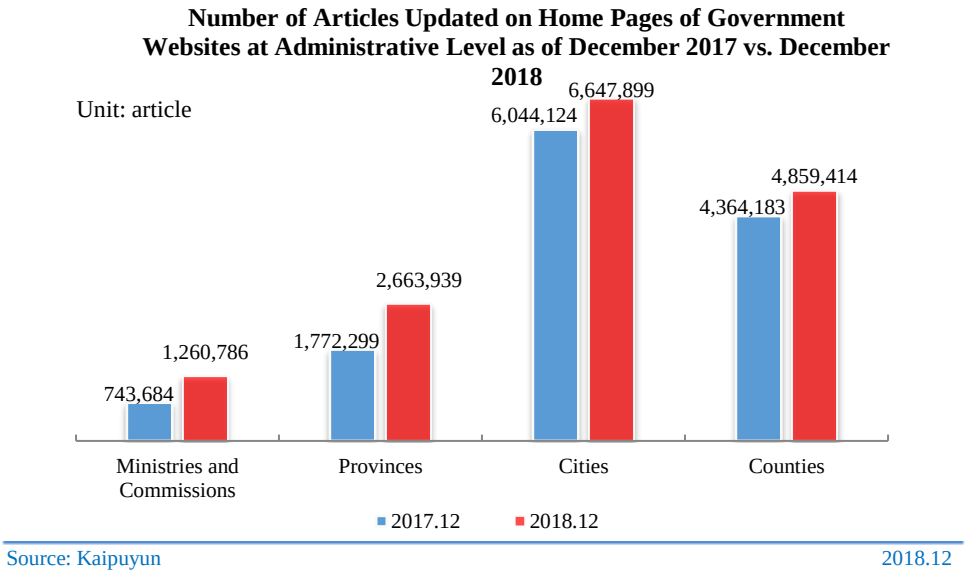


Figure 50 Number of Articles Updated on Home Pages of Government Websites at Administrative Level as of December 2017 vs. December 2018

3. WeChat-based Governmental Services

3.1 Overall Use of WeChat-based Governmental Services

As of December 2018, the number of people who received governmental services via WeChat was 570 million.

[1] Number of articles updated on home pages of government websites

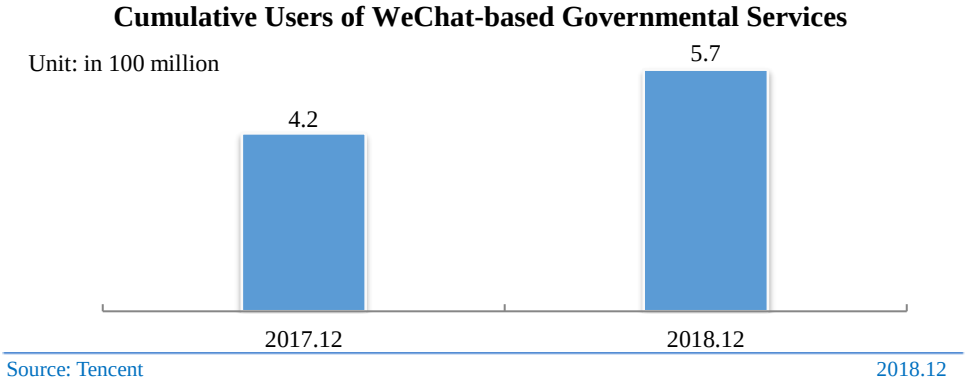


Figure 51 Cumulative Users of WeChat-based Governmental Services

3.2 Use of WeChat-based Governmental Services by Province

By December 2018, WeChat-based governmental services were available in 31 provinces, autonomous regions and municipalities directly under the administration of the State Council. In Guangdong Province, WeChat-based governmental services were provided to 168 million users, making it the number one province in China.

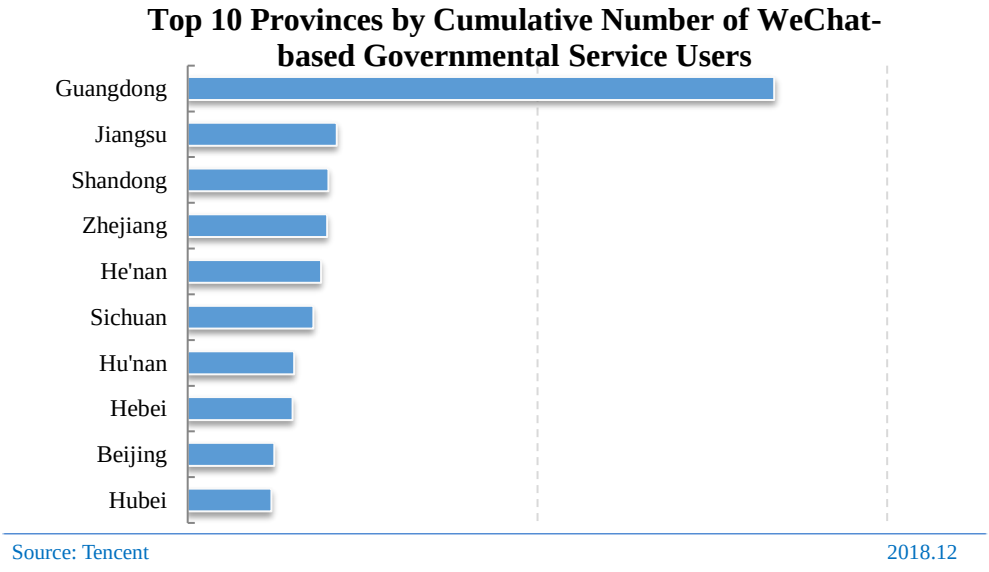


Figure 52 Top 10 Provinces by Cumulative Number of WeChat-based Governmental Service Users

3.3 Fields Covered by WeChat-based Governmental Services and Distribution of Users

As of December 2018, the number of users who paid household bills on WeChat topped all fields covered by WeChat-based governmental services, and was nearly 46.84 million users.

Table 9 TOP 10 WeChat-based Governmental Services by Cumulative Users and their Coverage

Service Type	Cumulative Users	Coverage
Household bills	46,836,493	89 cities including Guangzhou and Shenzhen
Vehicle violation inquiry	30,401,519	89 cities including Shanghai and Xiamen
City heat map	26,775,941	Nationwide
Weather forecast	20,051,851	Nationwide
Social insurance inquiry in Guangdong	15,537,387	18 cities including Guangzhou and Zhuhai
Vehicle violation inquiry in Guangdong	15,002,156	Guangdong province
Education level inquiry	14,041,501	Nationwide
Rainfall forecast	12,675,976	Nationwide
Electronic social insurance card	10,251,447	89 cities including Guangzhou and Shenzhen
College admission letter inquiry	8,459,092	Nationwide

Source: Tencent

4. Governmental Weibo Accounts

4.1 An Overview of Governmental Weibo Accounts

As of December 2018, the number of governmental Weibo accounts verified by Sina platform totaled 138,253.

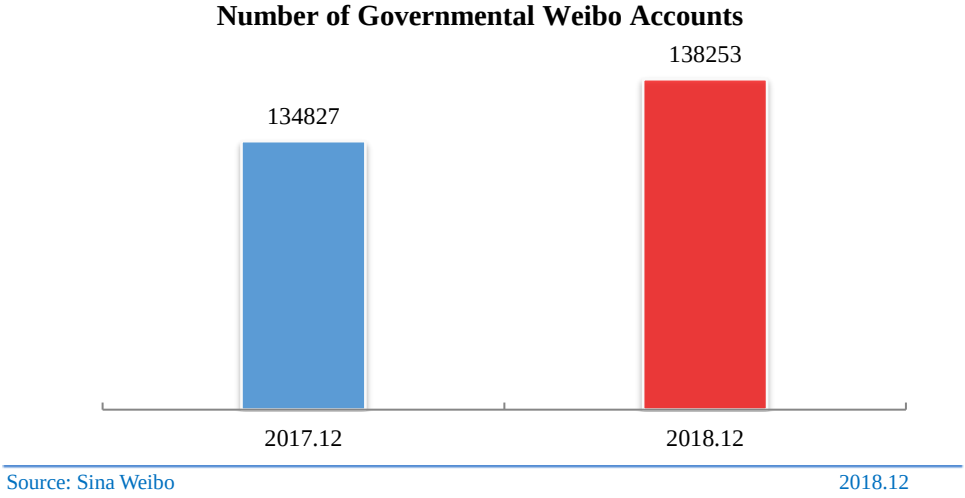
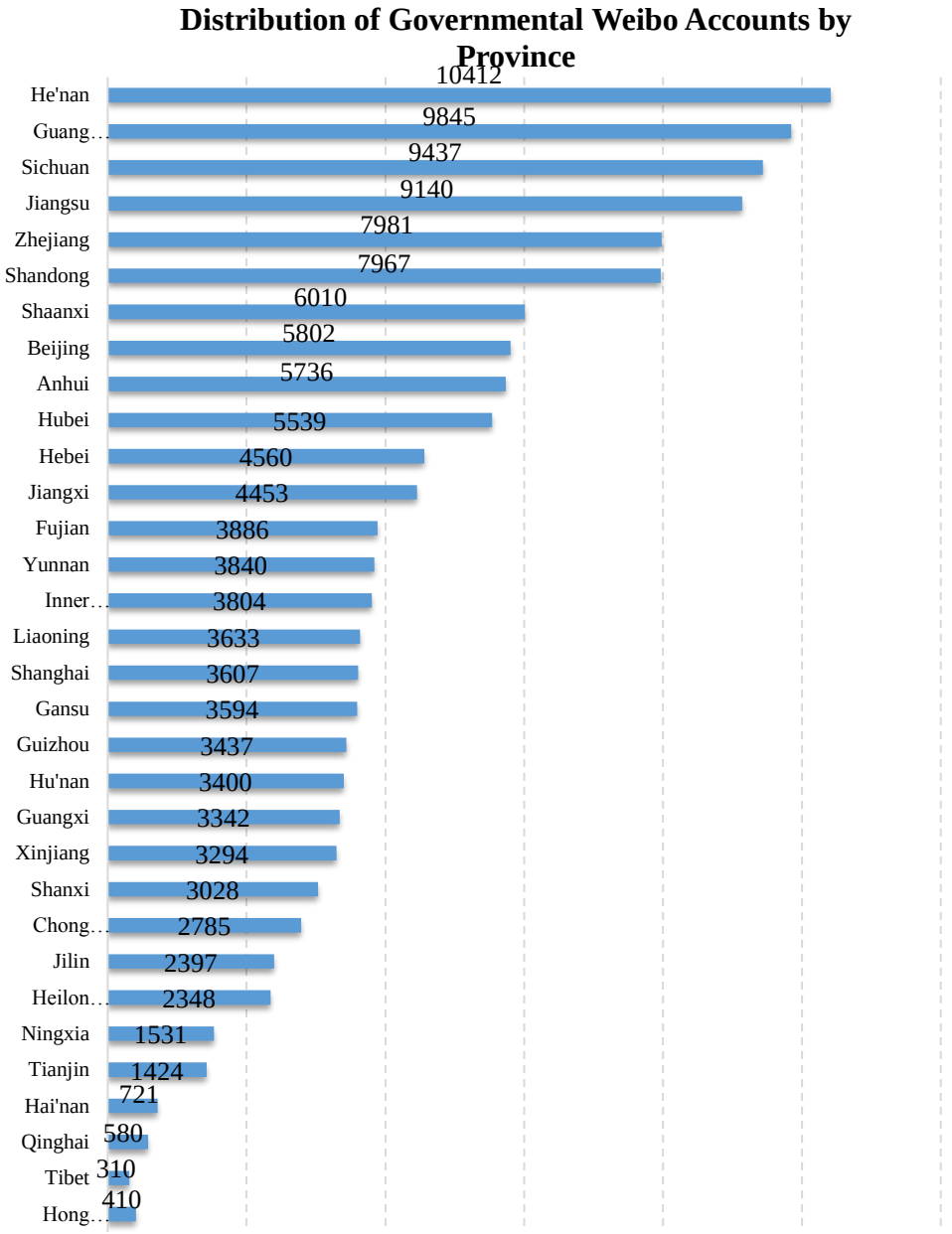


Figure 53 Number of Governmental Weibo Accounts

4.2 Distribution of Governmental Weibo Accounts by Province

As of December 2018, governmental service-related Weibo accounts were opened in all provinces (autonomous regions and municipalities directly administered by the State Council). Specifically, 10,412 such accounts were opened in He'nan Province, making this province the number one in China; next was Guangdong Province with 9,845 Weibo accounts.

By December 2018, governmental institutions at provincial and ministerial levels opened 179 Weibo accounts, and administrative institutions lower than county levels opened more than 120,000 Weibo accounts.



Source: Sina Weibo 2018.12

Figure 54 Distribution of Governmental Weibo Accounts by Province

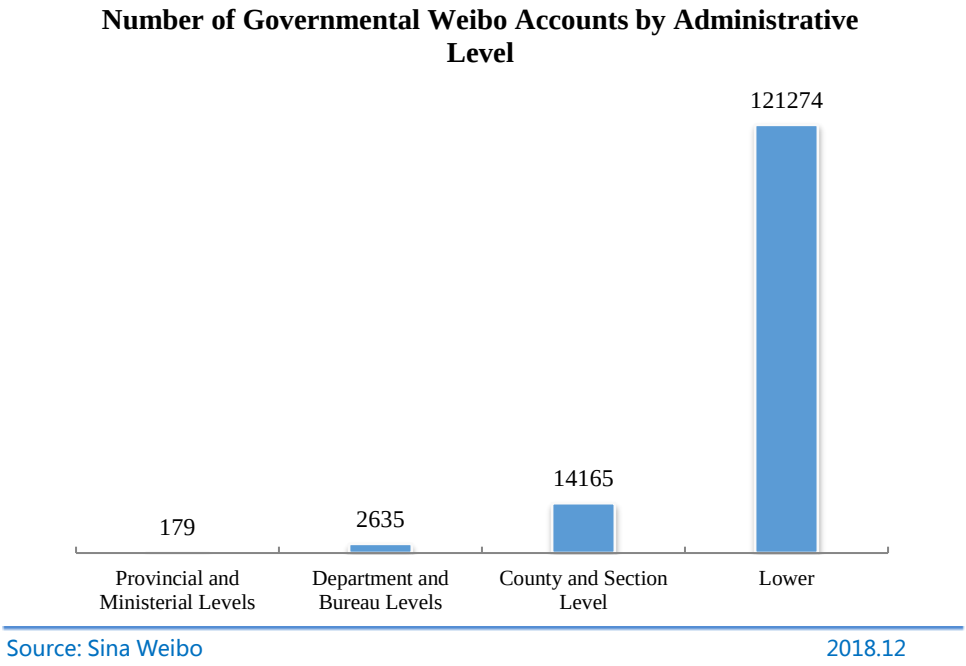


Figure 55 Number of Governmental Weibo Accounts at Administrative Level

4.3 Distribution of Governmental Weibo Accounts at Institution Category

As of December 2018, CPC committees, governments, courts, procuratorates and many other public institutions opened Weibo accounts for work purposes. In terms of account owners, governments at all levels stood out among all other institutions by opening 93,215 accounts; associations were second with 30,886 accounts. The 93,215 accounts opened by governments covered many categories including public security, publicity, basic organization, health, culture and tourism. There were 21,411 public security Weibo accounts, making public security the number one among all categories.

Table 10 Distribution of Governmental Weibo Accounts by Category

Tier one category	Number	Percentage	Tier two category	Number
Government	93215	67.4%	Public security	21411
			Publicity	11125
			Basic organization	8203
			Health	5070
			Culture & tourism	4954
			Transport	2954
			Others	39498
Associations	30886	22.3%	CYL committees	27493
CPC committee	5699	4.1%		
Procuratorate	3768	2.7%		
Court	3612	2.6%		
National People's Congress	328	0.2%		
Political Consultation Conference	211	0.2%		
Others	533	0.4%		
Total	138253	100.0%		

Source: Sina Weibo

4.4 Operation of Governmental Weibo Accounts

As of December 2018, "China Police Online"—the Weibo account operated by the News Center of Ministry of Public Security, ranked the first in terms of total number of followers among all governmental Weibo accounts. With respect to categories that users paid the highest attention to, the public security category was the top, as 8 of the top 20 governmental Weibo accounts by total number of followers, were opened by public

security institutions.

Table 11 Operation of Governmental Weibo Accounts

Weibo account name	Province	Category	Total followers
China Police Online	Beijing	Public Security	29,274,984
Safe Beijing	Beijing	Public Security	12,471,164
Central Committee of CYL	Beijing	CYL Committee	6,791,951
China Peace	Beijing	Political and Legal Affairs Committee	5,215,443
Shanghai Police	Shanghai	Public Security	4,519,584
Nanchang Railway	Jiangxi	Transport	4,181,485
Safe Luoyang	He'nan	Public Security	3,808,087
Shenzhen Police	Guangdong	Public Security	3,656,028
China's Weather	Beijing	Meteorology	3,160,347
China Fire Control	Beijing	Emergency Response	2,703,613
Shenzhen Traffic Police	Guangdong	Public Security	2,223,510
Hu'nan Expressway Traffic Police	Hu'nan	Public Security	2,155,943
Chengdu Committee of CYL	Sichuan	CYL Committee	1,862,206
Chinese Anti-Cult	Beijing	Political and Legal Affairs Committee	1,855,259
Shenzhen Weather	Guangdong	Meteorology	1,765,868
Guangdong Weather	Guangdong	Meteorology	1,599,320
China Meteorology	Beijing	Meteorology	1,149,801
China Police Network	Beijing	Public Security	1,022,367
Chengdu Metro	Sichuan	Transport	751,088
Inner Mongolia Anti-Cult	Inner Mongolia	Political and Legal Affairs Committee	399,115

Source: Sina Weibo

5. Governmental Toutiao Accounts

5.1 An Overview of Governmental Toutiao Accounts[1]

As of December 2018, a total of 78,180 Toutiao accounts were opened by the CPC, government and public institutions at all levels, an increase of 7,286 compared to 2017.

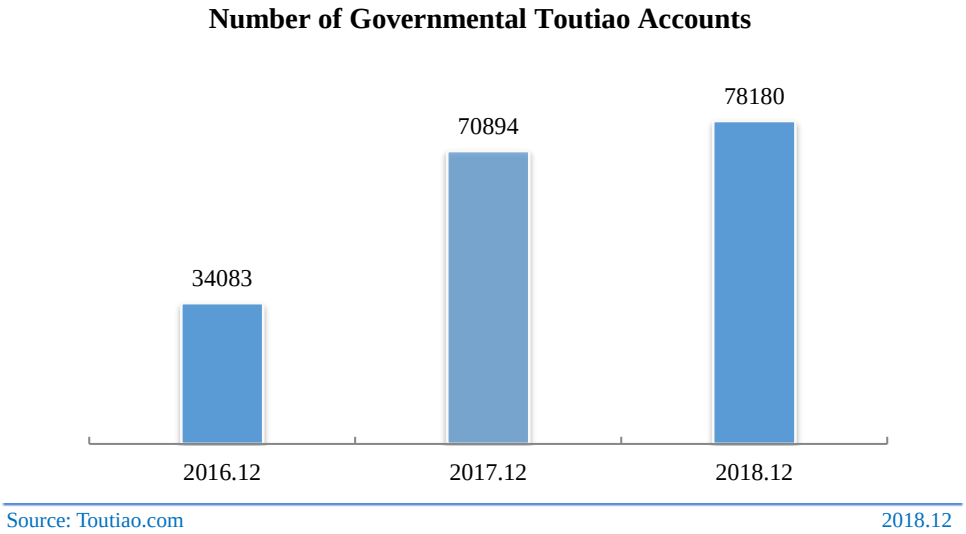


Figure 56 Number of Governmental Toutiao Accounts

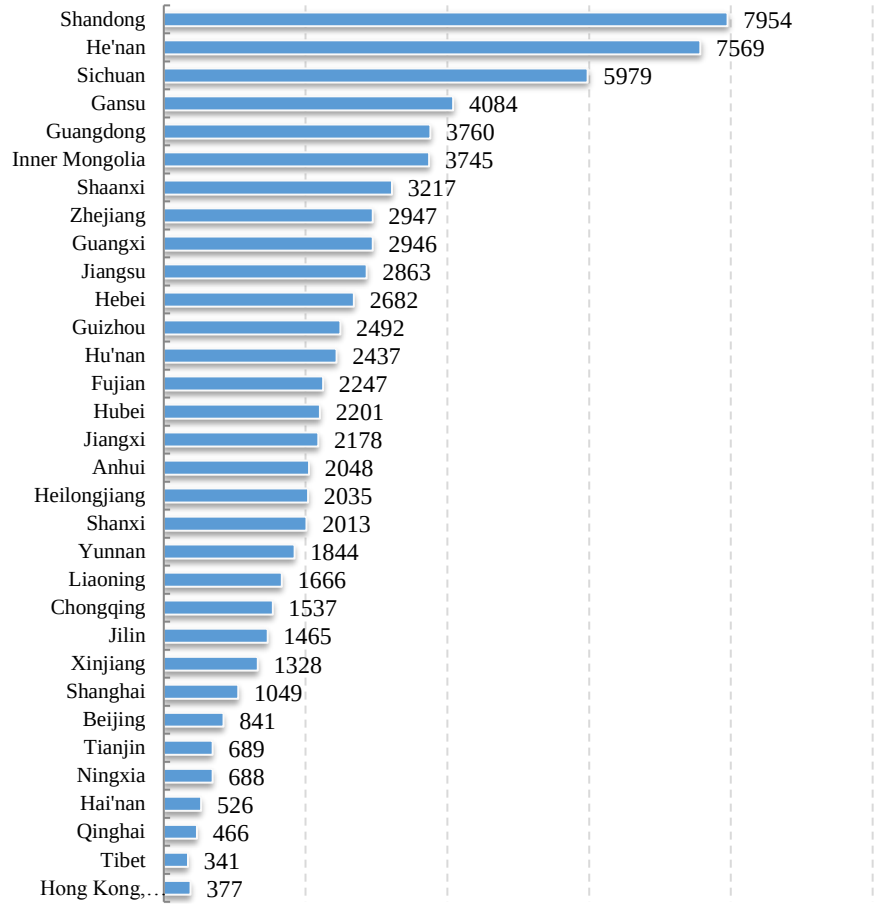
5.2 Distribution of Governmental Toutiao Accounts by Province

As of December 2018, each province (autonomous region and municipality directly under the administration of the State Council) opened governmental Toutiao accounts.

[1] Governmental Toutitao Accounts are accounts opened by governmental institutions for information disclosure on the Toutiao platform.

19 provinces opened more than 2,000 accounts each. Shandong opened 7,954 governmental Toutiao accounts, outweighing all other provinces in China. Six provinces opened between 1,000 and 2,000 governmental Toutiao accounts.

Number of Governmental Toutiao Accounts by Province



Source: Toutiao.com 2018.12

Figure 57 Number of Governmental Toutiao Accounts by Province

Shandong Province ranked first in China in terms of both total articles (nearly 600,000

articles) and total views (3.455 million views).

Table 12 Total Articles and Views of Governmental Toutiao Accounts in Some Provinces

	Province	Total Governmental Toutiao Accounts	Total Articles	Total Views
1	Shandong	7954	599978	3455 million
2	He'nan	7569	315339	402 million
3	Sichuan	5979	553465	1120 million
4	Gansu	4084	428969	1241 million
5	Guangdong	3760	372548	1823 million
6	Inner Mongolia	3745	297349	444 million
7	Shaanxi	3217	433731	922 million
8	Zhejiang	2947	309760	645 million
9	Guangxi	2946	217327	608 million
10	Jiangsu	2863	293138	1262 million

Source: Toutiao.com

5.3 Distribution of Governmental Toutiao Accounts by Category

By December 2018, governmental Toutiao accounts opened in China covered public security, public complaints, basic organization, justice, procuratorate and other categories. The public security category had the largest number of Toutiao accounts, representing 12.3% of the total number in China; in second place was the public complaints and proposals category, accounting for 8.4% of the total number in China.

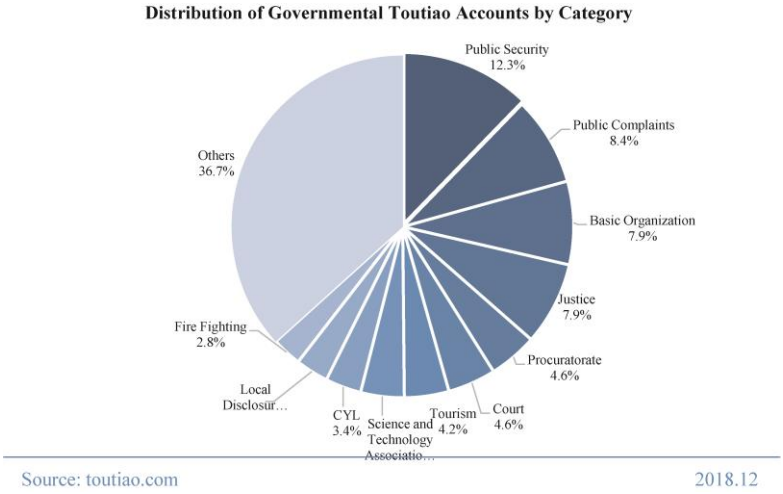


Figure 58 Distribution of Governmental Toutiao Accounts by Category

5.4 Operation of Governmental Toutiao Accounts

As of December 2018, central governmental and CPC institutions opened and operated as many as 83 governmental Toutiao accounts. The most popular Toutiao account receiving the highest number of views was Micro Business News, operated by the Ministry of Commerce.

Table 13 Number of Articles and Views of Toutiao Accounts opened by Central Governmental and CPC Institutions

Toutiao Account Name	Institution	Total Articles	Total Views
Micro Business News	Ministry of Commerce	1048	930 million
Peace Sword of Central Political and Legal Affairs Commission	Central Political and Legal Affairs Commission of the Communist Party of China	2808	521 million
gov.cn	The Office of Government Information Disclosure of the General Office of the State Council	1889	332 million
Website of the Central Commission for Discipline Inspection and the National	Central Commission for Discipline Inspection and the National Supervisory	7512	294 million

Toutiao Account Name	Institution	Total Articles	Total Views
Supervisory Commission	Commission		
China Meteorological Administration	China Meteorological Administration	5799	275 million
Supreme People's Court	Supreme People's Court	4691	248 million
Central Committee of the Communist Youth League	Central Committee of the Communist Youth League	1666	178 million
Supreme People's Procuratorate	Supreme People's Procuratorate	4852	148 million
Ministry of Ecological Environment	Ministry of Ecological Environment	5572	146 million
Healthy China	National Health Commission	1414	115 million

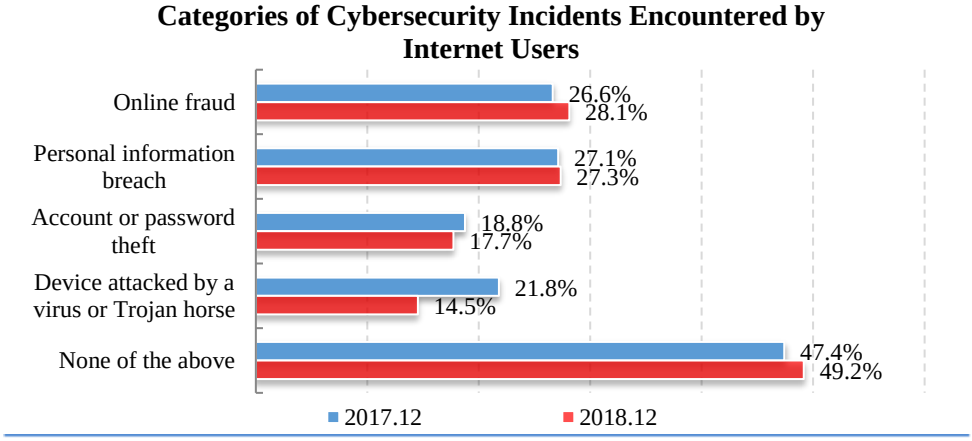
Source: Toutiao.com

Chapter 4 Cybersecurity

1. Cybersecurity Incidents

1.1 Cybersecurity Incidents Encountered by Internet Users

The percentage of cybersecurity incidents encountered by Chinese Internet users declined once again in 2018. According to data, 49.2% of Internet users encountered no cybersecurity incident during the past six months, an increase of 1.8 percentage points year-over-year. It was found from analysis of cybersecurity incidents encountered by Internet users that the percentage of Internet users whose devices were attacked by viruses or Trojan horses decreased significantly by 7.3 percentage points compared to 2017; the ratio of cybersecurity incidents caused by other reasons remained basically stable when compared to the data of 2017.



Source: Source: CNNIC Statistical Survey on Internet Development in China 2018.12

Figure 59 Categories of Cybersecurity Incidents Encountered by Internet Users

1.2 Types of Online Frauds

According to the survey of Internet users who were the victims of online frauds, the most common type of online fraud was lottery and prize scams, accounting for 61.3% of all online fraud, which showed a decline of 9.2 percentage points compared to 2017. In addition, the ratio of online shopping fraud, employment fraud and phishing website-based fraud also declined by 4.6, 7.3 and 5.8 percentage points, respectively, year-over-year.

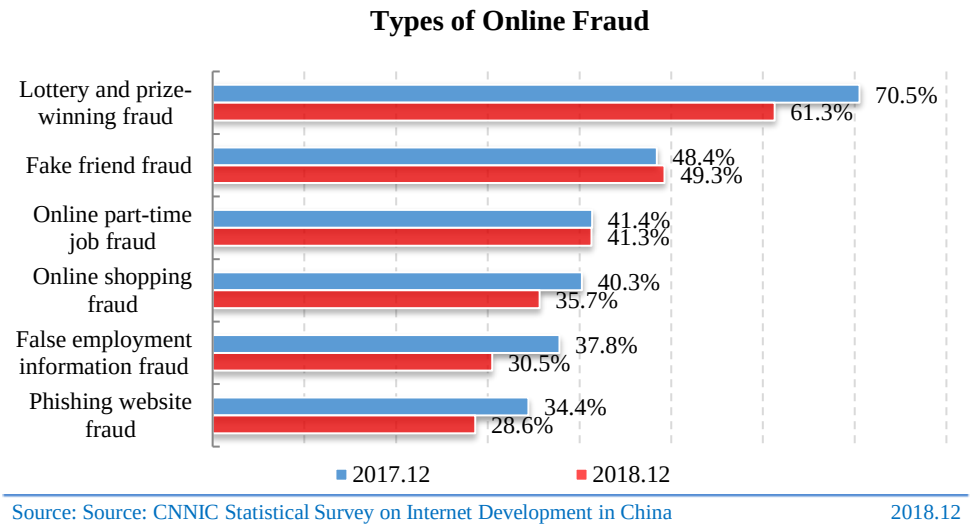


Figure 60 Types of Online Fraud

2. Spread of Internet Viruses, Website Security and Loopholes

2.1 Number of Terminals Infected with Internet Viruses in China

According to the monitoring data from CNCERT, 6.16 million terminals[1] in China were

[1] "Terminals" here refers to servers and computers monitored by CNCERT.

infected with Internet-borne viruses[1] in 2018, a decrease of 70.6% compared to 2017 when the number was 20.95 million.

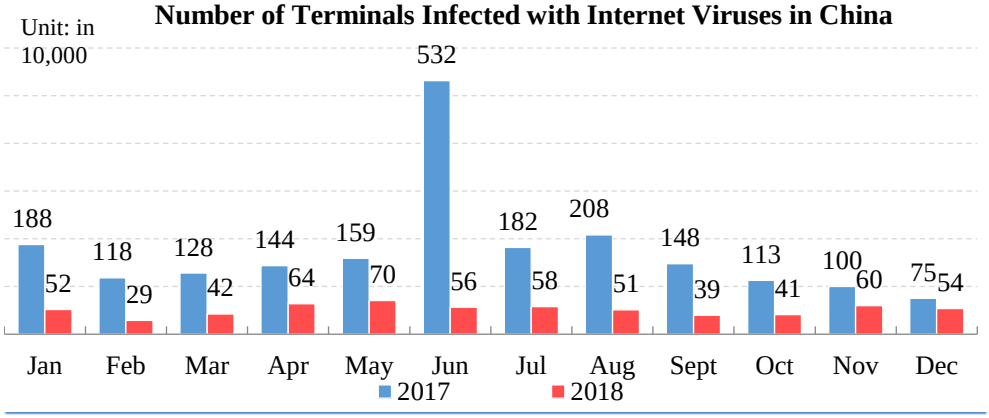


Figure 61 Number of Terminals Infected with Internet Viruses in China

2.2 Number of Websites Tampered with in China

According to the monitoring data from CNCERT, 23,459 Chinese websites were tampered with[2] in 2018, down by 61.3% compared to the previous year when the total number was 60,684.

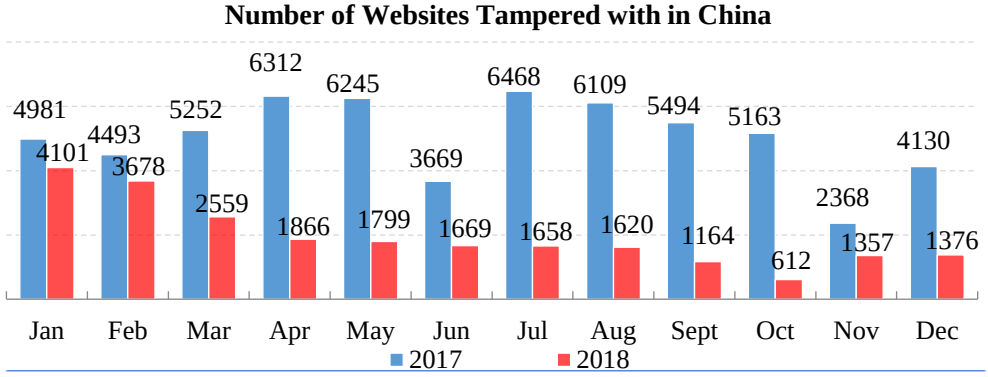


Figure 62 Number of Websites Tampered with in China

[1] "Internet viruses" here refer to all malicious code that is capable of Internet communication.

[2] A tampered website means the web page content is maliciously damaged or altered so that the website cannot operate, or the any exceptional web page content was inserted by hackers into the website.

In 2018, according to the monitoring data from CNCERT, a total of 689 governmental websites[1] were tampered with in China, down by 57.1% compared to 2017 when the number was 1,605.

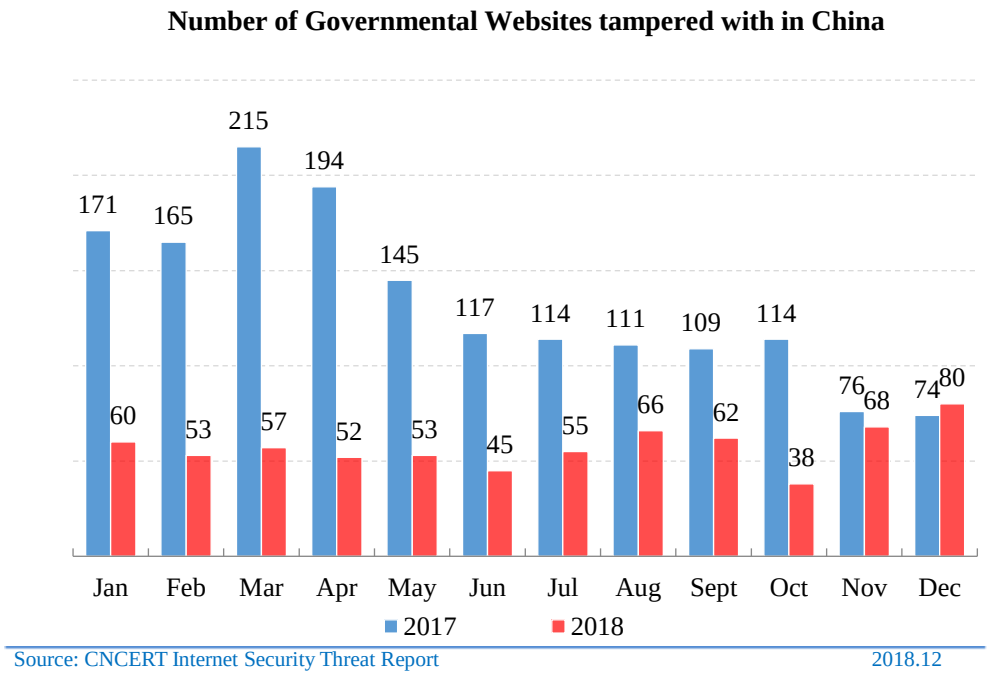


Figure 63 Number of Governmental Websites tampered with in China

2.3 Number of Websites Implanted with Backdoors in China

In 2018, CNCERT monitored 31,790 websites in China that were implanted with backdoors, down by 27.6% compared to the previous year when the number was 43,928.

[1] Governmental websites means websites whose domain names end with.gov.cn.

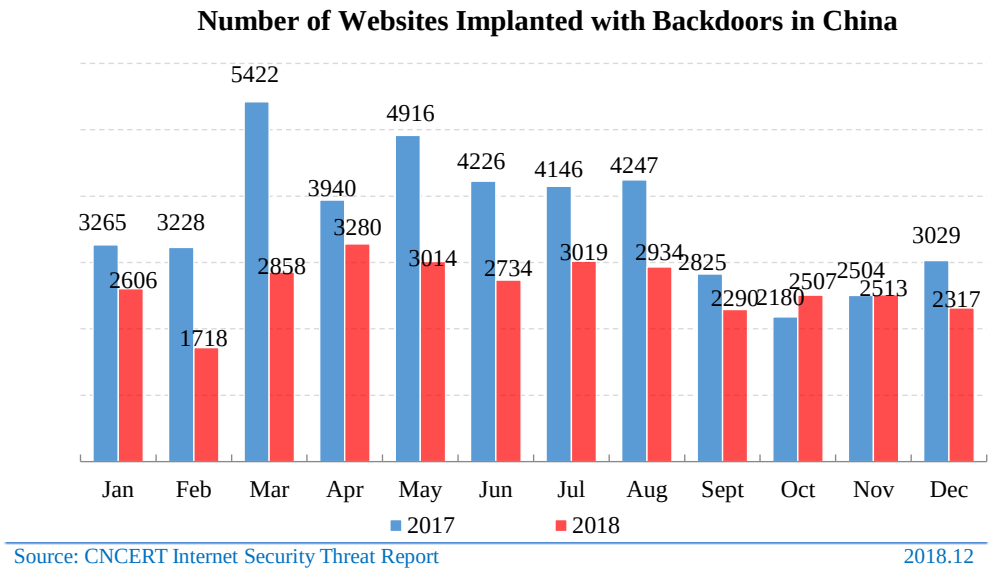


Figure 64 Number of Websites Implanted with Backdoors in China

According to 2018 monitoring data from CNCERT, a total of 843 governmental websites were implanted with backdoors in China, down by 59.1% compared to the previous year when this number was as high as 2,062.

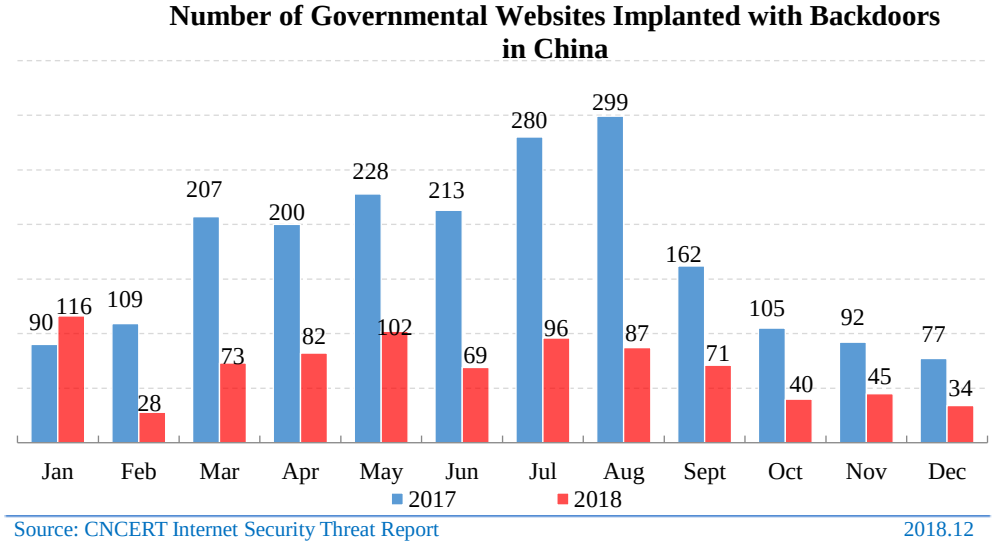


Figure 65 Number of Governmental Websites Implanted with Backdoors in China

2.4 Number of Information System Security Loopholes

In 2018, the information system security loopholes collected by China National Vulnerability Database (CNVD)[1] totaled 14,216, down by 11.0% compared to 2017 when the number was 15,981.

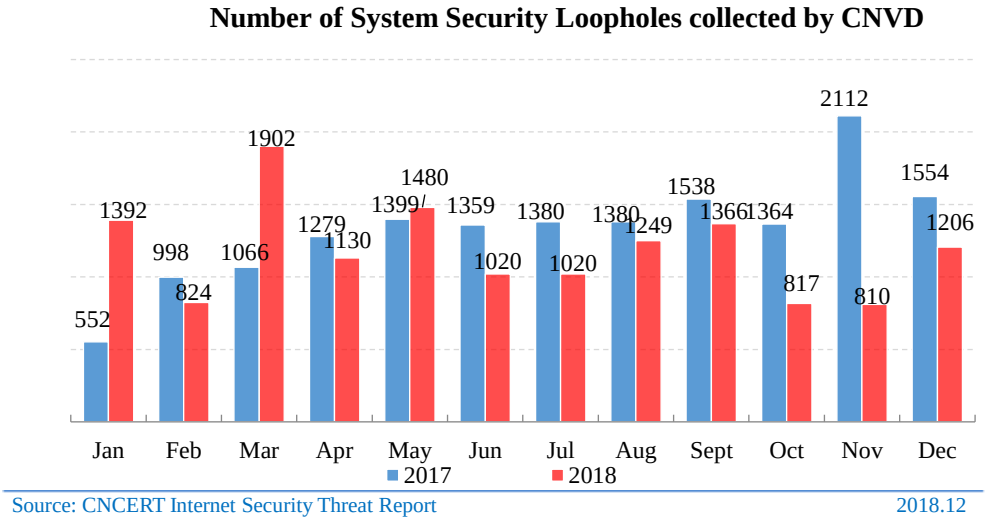


Figure 66 Number of System Security Loopholes collected by CNVD

Security loopholes that imposed high risks on systems totaled 4,899, down by 13.7% compared to 2017 when 5,678, security loopholes were detected.

[1] CNVD is a shared database for information system security loopholes, established by National Computer Network Emergency Response Technical Team/Coordination Center of China (CNCERT) in collaboration with major information system organizations, telecommunication infrastructure operators, cybersecurity providers, software providers and Internet companies in China.

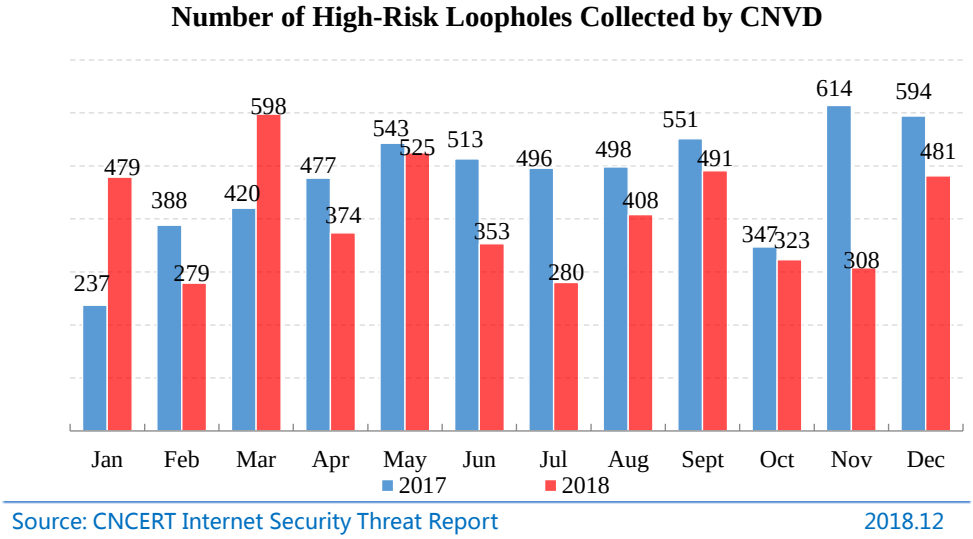


Figure 67 Number of High-Risk Loopholes Collected by CNVD

3. Reporting and Handling of Cybersecurity Incidents

In 2018, relevant authorities attached immense importance to cybersecurity issues related to telecommunication fraud, online rumors and other aspects, and continued implementing countermeasures. In terms of telecommunication fraud, 61,000 regulation-violating voice hotlines were shut down, the monthly average number of telephone numbers starting with "400" that were involved decreased from 700 in 2016 to less than 10, and the total number of telephone number complaints by users and numbers that were shut down by public security institutions decreased by 55% and 66%, respectively, year-over-year. In terms of online rumors, the China Internet Joint Rumor Rebuttal Platform, organized by China Center for Reporting Illegal and Improper Internet Information and co-organized by Xinhuanet was formally launched on August 29, 2018, to provide an authoritative place for the public to identify and report rumors.

3.1 Number of Cybersecurity Incident Reports received by CNCERT

In 2018, CNCERT received 106,700 cybersecurity incidents reported by the public, an increase of 3.1% compared to 2017 when the number was 103,463.

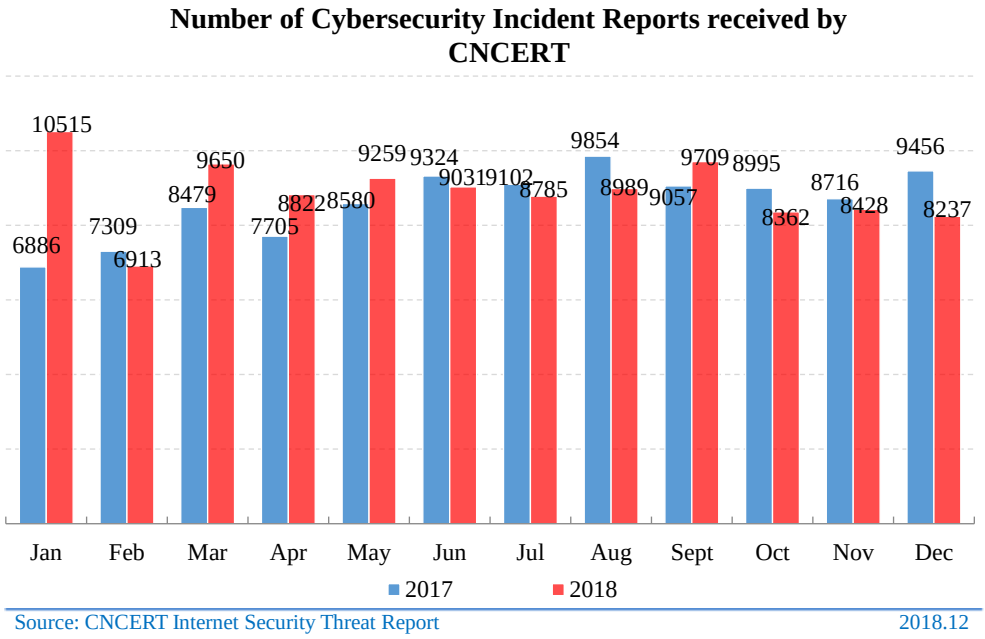
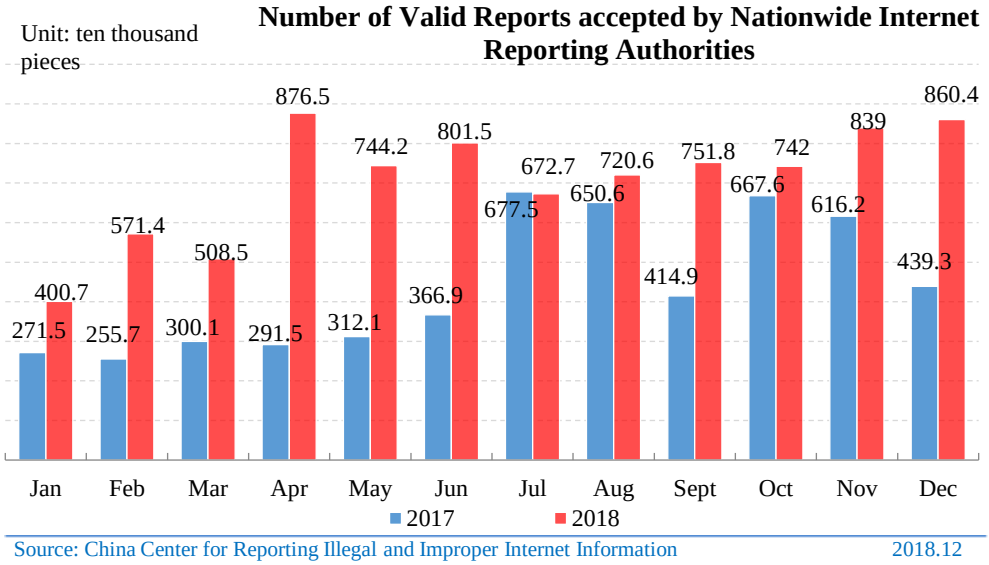


Figure 68 Number of Cybersecurity Incident Reports received by CNCERT

3.2 Handling of Reported Illegal and Improper Online Information

In 2018, nationwide Internet reporting authorities accepted 84.893 million valid reports about illegal and improper online information, an increase of 95.9% year-over-year; in 2017, this number was 52.639 million.



Source: China Center for Reporting Illegal and Improper Internet Information 2018.12

Figure 69 Number of Valid Reports accepted by Nationwide Internet Reporting Authorities

Appendix 1 Survey Methodology

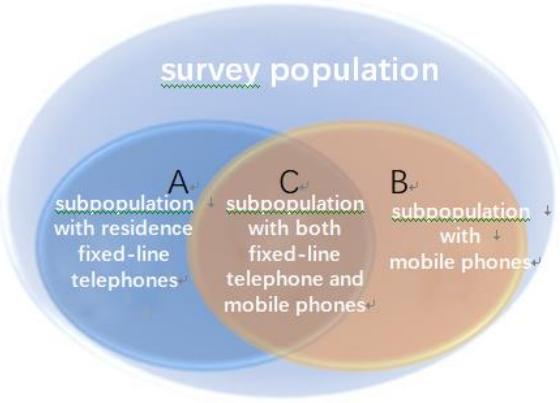
1. Survey Methodology

1.1 Survey on Individual Internet Users

1.1.1 Survey Population

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

◇ 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, PHS users, 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.

I.1.2 Sampling Method

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

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

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

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

To ensure the residence fixed-line telephones are taken with almost the same probability in each district, city or prefecture, that is, the local bureau number with more residence

fixed-line telephones will more likely be taken, and to make the phone visit more feasible, the residence fixed-line 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.

I.1.3 Survey Method

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

I.1.4 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.

1.2 Automatic Online Search and Data Report

Automatic online search is used to conduct technical statistics about the quantity of domain names and websites, and their geographical distribution. Statistical data for reporting mainly includes the number of IP addresses and international Internet gateway bandwidth.

1.2.1 Total Number of IP Addresses

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

1.2.2 Total Number of Websites in China

It is worked out by CNNIC according to the lists of domain names. The lists of domain names with .CN and .中国 come from the CNNIC database, while the lists of gTLDs come from relevant international domain name registries.

1.2.3 International Internet Gateway Bandwidth

Through a reporting system, the Ministry of Industry and Information Technology can obtain on a regular basis the number of total bandwidth of Internet connecting Chinese operators with other countries and regions. The reported data are included in the *Statistical Report on Internet Development in China*.

2. 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, but not limited to those surfing the Internet via mobile phones only.

◇ **Computer Internet Users:** Internet users who have used computers to access and surf the Internet in the past 6 months, but not limited to those surfing the Internet via computers only.

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

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

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

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

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

◇ **Deadline of Survey Data:** The deadline of the statistical survey data is December

31, 2018.

Appendix 2 Attached Tables of Basic Internet Resources

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

Region	Number of Addresses	Equivalence
Mainland China	338,924,544	20A+51B+148C
Taiwan	35,646,720	2A+31B+237C
Hong Kong SAR	10,937,600	166B+229C
Macau SAR	335,104	5B+29C

Table 2 The Allocation of IPv4 Addresses among Organizations in Mainland China

Organization Name	Number of Addresses	Total Number of IPv4 Addresses
China Telecom	125763328	7A+126B+255C
China Unicom	69866752 注1	4A+42B+21C
IP Address Allocation Alliance of CNNIC	61912832 注2	3A+176B+183C
China Mobile	35294208	2A+26B+140C
China Education and Research Network	16649728	254B+14C
China Tietong Telecom	15796224 注3	241B+8C
Others	13641472	208B+39C
Total	338924544	20A+51B+148C

Data sources: Asia-Pacific Network Information Center (APNIC) and China Internet Network Information Center (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 84.75 million, equivalent to 5A. The IPv4 addresses of the members of IP Address Assignment Alliance listed in the above table do not include those IPv4 addresses already assigned to former China Unicom and Tietong.

Note 3: The IPv4 addresses of China Tietong Telecom are assigned by CNNIC;

Note 4: The deadline for the above statistical data is December 31, 2018.

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

Region	Number of Addresses
Mainland China	41079
Taiwan	2475
Hong Kong SAR	424
Macau SAR	7

Table 4 The Allocation of IPv6 Addresses in Mainland China

Organization Name	Number of IPv6 Addresses(/32)
China Telecom	16387
IP Address Allocation Alliance of CNNIC	13961note2
China Unicom	4097
China Mobile	4097
China Tietong Telecom	2049note3
China Education and Research Network	18
China Science and Technology Network	17note4
Others	453
Total	41079

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 16027/32. The IPv6 addresses held by the members of IP Address Allocation Alliance listed in the above table do not include those IPv6 addresses already assigned to China Tietong Telecom and China Science and Technology Network (CSTNET).

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

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

Note 5: The deadline for the above statistical data is December 31, 2018.

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

Province	Proportion
Beijing	25.49%
Guangdong	9.53%
Zhejiang	6.47%
Jiangsu	4.76%
Shanghai	4.51%
Shandong	4.89%
Hebei	2.85%
Liaoning	3.33%
Henan	2.63%
Hubei	2.40%
Sichuan	2.77%
Fijian	1.94%
Hunan	2.36%
Shaanxi	1.63%
Anhui	1.65%
Heilongjiang	1.21%
Guangxi	1.38%
Chongqing	1.68%
Jilin	1.21%
Tianjin	1.05%
Jiangxi	1.73%
Shanxi	1.28%
Yunnan	0.98%

Province	Proportion
Inner Mongolia	0.78%
Xinjiang	0.60%
Hainan	0.47%
Guizhou	0.44%
Gansu	0.47%
Ningxia	0.28%
Qinghai	0.18%
Tibet	0.13%
Others	8.93%
Total	100.00%

Data sources: APNIC and CNNIC

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

Note 2: The deadline for the above statistical data is December 31, 2018.

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

Province	Domain names		Among them：.CN domain names		.中国 domain names	
	Number	Proportion in total domain names	Number	Proportion in .CN domain names	Number	Proportion in .中国 domain names
Fujian	7363736	19.4%	5047993	23.8%	1496619	86.8%
Guangdong	4490302	11.8%	2124638	10.0%	26472	1.5%
Beijing	4434713	11.7%	2003744	9.4%	33376	1.9%
Henan	2074800	5.5%	1308622	6.2%	5152	0.3%
Jiangsu	1883479	5.0%	944927	4.4%	12925	0.7%
Shandong	1516590	4.0%	692584	3.3%	19674	1.1%
Zhejiang	1491945	3.9%	660169	3.1%	10664	0.6%
Shanghai	1474461	3.9%	562647	2.6%	19209	1.1%
Sichuan	1445922	3.8%	673775	3.2%	10812	0.6%
Hunan	1222839	3.2%	681143	3.2%	3355	0.2%
Shanxi	1075614	2.8%	892784	4.2%	1935	0.1%
Hubei	1062054	2.8%	658475	3.1%	7339	0.4%
Anhui	904734	2.4%	531370	2.5%	2868	0.2%
Hebei	868084	2.3%	413780	1.9%	6176	0.4%
Jiangxi	771029	2.0%	519387	2.4%	9102	0.5%
Liaoning	647158	1.7%	353367	1.7%	7391	0.4%
Shaanxi	529594	1.4%	286721	1.3%	5055	0.3%
Guangxi	526716	1.4%	269325	1.3%	2942	0.2%
Chongqing	466520	1.2%	230896	1.1%	5320	0.3%
Yunnan	466150	1.2%	314858	1.5%	5656	0.3%
Guizhou	397950	1.0%	227968	1.1%	2267	0.1%
Jilin	370859	1.0%	253350	1.2%	1851	0.1%
Hainan	284044	0.7%	223495	1.1%	458	0.0%
Heilongjiang	281005	0.7%	167294	0.8%	3906	0.2%
Tianjin	267328	0.7%	104056	0.5%	1974	0.1%
Gansu	253713	0.7%	138301	0.7%	695	0.0%
Inner Mongolia	122409	0.3%	53816	0.3%	1602	0.1%
Xinjiang	80104	0.2%	34692	0.2%	1020	0.1%
Ningxia	71927	0.2%	49256	0.2%	1228	0.1%
Qinghai	30392	0.1%	20596	0.1%	162	0.0%
Tibet	12046	0.0%	7673	0.0%	333	0.0%
Others	1039310	2.7%	791776	3.7%	15986	0.9%
In total	37927527	100.0%	21243478	100.0%	1723524	100.0%

Table 7 The Number of Websites by Province

Province	Number of websites	Proportion in total number of websites
Guangdong	727579	13.9%
Beijing	719152	13.7%
Zhejiang	417303	8.0%
Shanghai	378190	7.2%
Shandong	317296	6.1%
Jiangsu	286616	5.5%
Fujian	279946	5.3%
Henan	248896	4.8%
Sichuan	239774	4.6%
Hubei	122820	2.3%
Hebei	122740	2.3%
Liaoning	113980	2.2%
Hunan	95295	1.8%
Anhui	86831	1.7%
Shaanxi	73735	1.4%
Shanxi	57058	1.1%
Chongqing	55820	1.1%
Tianjin	54287	1.0%
Guangxi	52818	1.0%
Jiangxi	49744	1.0%
Heilongjiang	42977	0.8%
Jilin	35034	0.7%
Yunnan	29057	0.6%
Hainan	26501	0.5%
Guizhou	22306	0.4%
Inner Mongolia	16003	0.3%
Gansu	14326	0.3%
Xinjiang	9647	0.2%
Ningxia	7833	0.1%
Qinghai	3890	0.1%
Tibet	1480	0.0%
Others	524689	10.0%
In total	5233623	100.0%

Note：The number of websites by province excludes .EDU.CN

Table 8 Web Pages Categorized by Updating Frequency

Updating frequency	Proportion
Every week	3.4%
Every month	9.5%
Every three months	15.7%
Every six months	12.7%
Updated in more than six months	58.8%
In total	100.0%

Data source：Baidu online network technology (Beijing) Co., Ltd.

Table 9 Web Pages Categorized by Suffix

Web page suffix	Proportion
html	37.06%
htm	3.71%
/	19.99%
shtml	3.55%
asp	1.25%
php	5.80%
txt	0.01%
nsf	0.00%
xml	0.01%
jsp	1.33%
cgi	0.00%
pl	0.00%
aspx	3.04%
do	0.37%
dll	0.00%
jhtml	0.01%
cfm	0.00%
php3	0.00%
phtml	0.01%
Other suffixes	23.86%
In total	100.00%

Data source：Baidu online network technology (Beijing) Co., Ltd.

Table 10 Web Pages Categorized by Multi-media Form

Multi-media form of web page	Proportion (in total multi-media web pages)
jpg	19.02%
gif	22.55%
zip	0.39%
swf	13.41%
doc	20.09%
pdf	11.46%
rm	0.00%
mid	0.00%
ram	0.00%
mp3	0.02%
ppt	0.16%
mpg	0.00%
Other multi-media form	12.90%
In total	100.00%

Data source：Baidu online network technology (Beijing) Co., Ltd.

Table 11 Number of Web Pages by Province

Province	Total web pages after duplication removed	Static	Dynamic	Proportion of Static to Dynamic
Anhui	3,196,937,025	2,376,457,951	820,479,074	2.90
Beijing	106,952,751,190	74,453,201,829	32,499,549,361	2.29
Fujian	8,127,476,602	6,200,507,223	1,926,969,379	3.22
Gansu	129,086,100	101,011,697	28,074,403	3.60
Guangdong	38,062,533,821	28,301,766,808	9,760,767,013	2.90
Guangxi	1,637,492,005	1,286,506,901	350,985,104	3.67
Guizhou	157,262,082	106,218,764	51,043,318	2.08
Hainan	862,900,586	575,998,522	286,902,064	2.01
Hebei	10,252,979,253	7,312,224,985	2,940,754,268	2.49

Province	Total web pages after duplication removed	Static	Dynamic	Proportion of Static to Dynamic
Henan	13,106,267,112	9,030,942,974	4,075,324,138	2.22
Heilongjiang	2,051,149,170	938,314,818	1,112,834,352	0.84
Hubei	1,568,060,833	1,090,977,962	477,082,871	2.29
Hunan	1,274,618,691	963,306,206	311,312,485	3.09
Jilin	1,807,658,832	1,222,390,706	585,268,126	2.09
Jiangsu	13,781,423,044	9,368,057,390	4,413,365,654	2.12
Jiangxi	2,086,943,193	1,615,304,311	471,638,882	3.42
Liaoning	1,772,316,699	1,244,613,910	527,702,789	2.36
Inner Mongolia	154,604,959	78,801,841	75,803,118	1.04
Ningxia	10,183,270	7,065,847	3,117,423	2.27
Qinghai	16,567,208	12,497,859	4,069,349	3.07
Shandong	5,257,520,029	3,817,912,420	1,439,607,609	2.65
Shanxi	2,949,922,980	1,799,187,496	1,150,735,484	1.56
Shaanxi	1,586,745,014	845,921,045	740,823,969	1.14
Shanghai	20,696,863,189	13,475,762,386	7,221,100,803	1.87
Sichuan	3,541,331,887	2,741,389,751	799,942,136	3.43
Tianjin	4,650,629,189	3,402,034,586	1,248,594,603	2.72
Tibet	4,591,781	4,257,480	334,301	12.74
Xinjiang	121,418,839	104,413,413	17,005,426	6.14
Yunnan	1,757,841,075	999,739,584	758,101,491	1.32
Zhejiang	33,540,709,383	23,281,027,677	10,259,681,706	2.27
Chongqing	505,621,448	308,291,615	197,329,833	1.56
The whole country	281,622,406,489	197,066,105,957	84,556,300,532	2.33

Data source：Baidu online network technology (Beijing) Co., Ltd.

Table 12 The Number of Web Page Bytes by Province

Province	Total Page Size	Average Page Size (KB)
Anhui	70,762,592,874	22
Beijing	8,850,596,518,824	83
Fujian	406,101,806,851	50
Gansu	5,936,927,800	46
Guangdong	2,379,324,010,167	63
Guangxi	79,084,398,602	48
Guizhou	8,548,744,679	54
Hainan	42,391,296,895	49
Hebei	764,961,237,470	75
Henan	702,591,688,789	54
Heilongjiang	111,953,163,194	55
Hubei	78,507,316,792	50
Hunan	56,658,749,079	44
Jilin	92,211,330,082	51
Jiangsu	615,384,096,790	45
Jiangxi	83,601,112,840	40
Liaoning	89,000,438,330	50
Inner Mongolia	4,826,218,259	31
Ningxia	360,926,843	35
Qinghai	589,391,506	36
Shandong	279,815,015,874	53
Shanxi	307,457,288,831	104
Shaanxi	55,018,416,114	35
Shanghai	1,500,918,595,618	73
Sichuan	166,599,590,345	47
Tianjin	247,725,929,556	53
Tibet	146,811,629	32
Xinjiang	5,607,111,372	46
Yunnan	82,244,810,877	47
Zhejiang	1,935,203,704,252	58
Chongqing	37,373,430,467	74
The whole country	19,061,579,332,918	68

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

Table 13 Proportion of Web Pages Categorized by Updating Frequency in Each Province

Province	Every week	Every month	Every 3 months	Every 6 months	Every more than 6 months
Anhui	2.6%	8.4%	16.5%	13.2%	59.2%
Beijing	3.2%	9.0%	14.2%	12.4%	61.3%
Fujian	2.9%	8.0%	15.3%	10.9%	62.9%
Gansu	4.1%	13.0%	16.7%	11.7%	54.5%
Guangdong	3.1%	9.1%	15.0%	11.7%	61.1%
Guangxi	4.1%	12.1%	21.5%	15.2%	47.1%
Guizhou	4.9%	11.9%	23.4%	13.8%	46.0%
Hainan	4.6%	8.9%	9.4%	12.2%	64.9%
Hebei	3.3%	9.2%	14.6%	11.7%	61.2%
Henan	3.3%	10.2%	16.9%	13.2%	56.4%
Heilongjiang	3.6%	7.5%	15.5%	10.6%	62.8%
Hubei	5.3%	13.2%	15.9%	10.8%	54.6%
Hunan	4.5%	12.4%	20.0%	10.7%	52.4%
Jilin	4.8%	11.5%	21.6%	12.3%	49.7%
Jiangsu	3.5%	9.9%	19.0%	15.7%	52.0%
Jiangxi	3.8%	8.9%	15.5%	15.6%	56.2%
Liaoning	4.0%	10.7%	19.4%	17.1%	48.9%
Inner Mongolia	6.5%	18.1%	25.3%	7.2%	42.9%
Ningxia	4.8%	9.3%	7.7%	8.1%	70.1%
Qinghai	3.0%	7.6%	9.1%	5.8%	74.6%
Shandong	3.8%	10.8%	21.5%	14.8%	49.0%
Shanxi	5.0%	14.6%	18.0%	10.0%	52.3%
Shaanxi	2.8%	9.0%	20.5%	27.2%	40.5%

Province	Every week	Every month	Every 3 months	Every 6 months	Every more than 6 months
Shanghai	3.0%	8.3%	16.7%	13.5%	58.5%
Sichuan	5.7%	15.8%	26.4%	15.3%	36.8%
Tianjin	3.5%	9.5%	15.6%	16.3%	55.0%
Tibet	4.0%	9.7%	9.8%	6.7%	69.8%
Xinjiang	5.9%	20.5%	20.6%	16.3%	36.7%
Yunnan	1.8%	6.0%	10.9%	7.6%	73.7%
Zhejiang	3.9%	10.4%	16.0%	12.3%	57.4%
Chongqing	4.9%	10.6%	15.3%	11.9%	57.2%
The whole country	3.4%	9.5%	15.7%	12.7%	58.8%

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

Table 14 Proportion of Web Pages Categorized by Coding Type in Each Province

Province	Chinese	Traditional Chinese	English	Others
Anhui	99.6%	0.2%	0.1%	0.1%
Beijing	98.4%	0.9%	0.3%	0.4%
Fujian	98.8%	0.1%	0.7%	0.5%
Gansu	99.4%	0.0%	0.1%	0.5%
Guangdong	99.1%	0.4%	0.1%	0.4%
Guangxi	99.7%	0.2%	0.1%	0.1%
Guizhou	99.7%	0.1%	0.2%	0.0%
Hainan	99.4%	0.6%	0.0%	0.0%
Hebei	98.9%	0.3%	0.5%	0.3%
Henan	99.5%	0.2%	0.1%	0.2%
Heilongjiang	99.6%	0.1%	0.0%	0.3%
Hubei	99.6%	0.1%	0.1%	0.2%

Province	Chinese	Traditional Chinese	English	Others
Hunan	99.0%	0.4%	0.3%	0.3%
Jilin	99.3%	0.1%	0.4%	0.1%
Jiangsu	99.1%	0.2%	0.1%	0.5%
Jiangxi	94.5%	5.2%	0.2%	0.1%
Liaoning	98.7%	1.1%	0.1%	0.1%
Inner Mongolia	99.9%	0.1%	0.0%	0.0%
Ningxia	99.5%	0.1%	0.2%	0.2%
Qinghai	99.7%	0.0%	0.1%	0.2%
Shandong	98.7%	0.5%	0.5%	0.3%
Shanxi	95.2%	2.7%	0.6%	1.5%
Shaanxi	99.9%	0.0%	0.0%	0.1%
Shanghai	99.0%	0.7%	0.2%	0.1%
Sichuan	99.4%	0.2%	0.2%	0.2%
Tianjin	98.9%	0.7%	0.2%	0.3%
Tibet	98.7%	0.0%	0.5%	0.8%
Xinjiang	99.0%	0.4%	0.3%	0.3%
Yunnan	98.5%	0.1%	0.1%	1.3%
Zhejiang	98.3%	0.6%	0.8%	0.3%
Chongqing	97.4%	2.2%	0.1%	0.3%
The whole country	98.7%	0.7%	0.3%	0.3%

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

Appendix 3 Supporting Organizations

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

China Telecom

Network Center of CERNET

Network Center of CSTNET

China Mobile

China Unicom

China Telecom Cloud Company

Alibaba Cloud Computing Co. Ltd

Beijing Oriental Wangjing Information Technology Co. Ltd.

Beijing Wanweitonggang Technology Co. Ltd.

Beijing Xinnet Digital Information Technology Co., Ltd.

Chengdu Feishu Technology Co., Ltd.

Chengdu Shijidongfang Network Communication Co., Ltd.

Chengdu West Dimension Digital Technology Co., Ltd.

Chongqing Zhijia Information Technology Co. Ltd.

Daqing Zhuochuang Multi-media Production Co., Ltd.

Foshan Yidong Network Co., Ltd.

Guangdong Huyi Network Intellectual Property Co., Ltd.

Guangdong Jinwanbang Technology Investment Co., Ltd.

Guangdong NaiSiNiKe Information Technology Co., Ltd.

Guangdong Shidai Hulian Technology Co., Ltd.

Guangzhou Mingyang Information Technology Co., Ltd.

Guangzhou Yiyou Information Technology Co., Ltd.

Hangzhou 22 Network Co., Ltd.

Henan Weichuang Network Technology Co., Ltd.

Jiangsu Bangning Technology Co., Ltd.

Ningxia Hengsheng Friends Network

Technology Co., Ltd.

Xiamen Nawang Technology Co., Ltd.

Xiamen 35.com Technology Co., Ltd.

Xiamen Shangzhong Online Technology Co., Ltd.

Xiamen ZZY Network Service Co., Ltd.

Xiamen eName Technology Co., Ltd.

Shanghai Meicheng Technology Information Development Co., Ltd.

Shanghai Yovole Network Co., Ltd.

Shenzhen IDCICP Technology Co., Ltd.

Shenzhen Internet Works Online Co., Ltd.

Shenzhen Web Information Technology Co., Ltd.

Shenzhen Yingmaisi Culture Technology Co., Ltd.

Sichuan Yuqu Network Technology Co., Ltd.

Tianjin Zhuiri Technology Development Co., Ltd.

Yantai DNSPOD Inc.

Zhejiang 22net Inc.

Zhengzhou Shanglv Technology Co., Ltd.

Zhengzhou Shijichuanglian Electronic Technology Development Co., Ltd.

Zhengzhou Yifang Technology & Trade Co., Ltd.

ChinaNet (Suzhou) Co., Ltd.

Knetreg (Tianjin) Technology Co., Ltd.

Hangzhou E-commerce Interconnection Technology Co., Ltd.

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

Shenzhen Tencent Computer System Co., Ltd.

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

Beijing Bytedance Technology Co., Ltd. (Toutiao)

Beijing Ucap Information Techonology Co., Ltd.

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

National Internet Emergency Center (CNCERT)

China Reporting Center for Illegal and Inappropriate Internet Information (12377)

We also extend our sincere thanks to other organizations that have helped us in the course of compiling and revising the Report.

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