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Korea 2018 Internet White Paper



Ministry of Science and ICT

I-KOREA 4.0

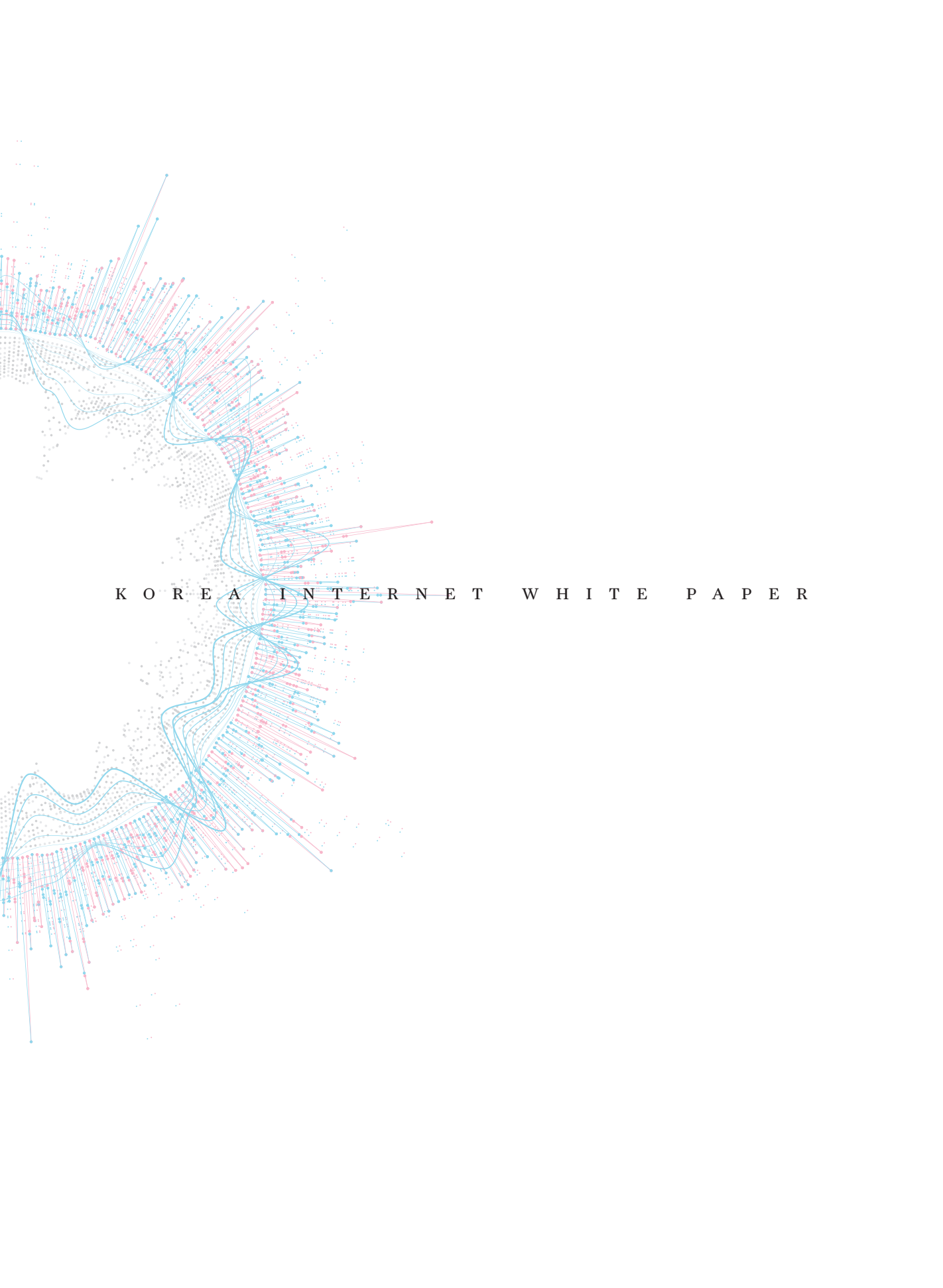


Korea²⁰¹⁸ Internet White Paper

Notes

The numbers in the tables of statistics are rounded; therefore, the totals indicated may differ the actual sum of all values.

The 2018 Korea Internet White Paper is a collection of the domestic and international issues and trends of 2017.



K O R E A I N T E R N E T W H I T E P A P E R

William Gibson, a novelist who first started using a term cyberspace, said that “The future is already here. It’s just unevenly distributed”. The era of hyper-connection and hyper-intelligence, when tens of billions of objects are connected to the Internet and the information is transmitted in real time through the 5G network, will be our future that will be unfolded soon, not a fictional story. Many experts foresee the year 2025 as a threshold, seven years from now.

Korea has laid the groundwork for achieving a connected society by commercializing the 5G network (December 1) for the first time in the world, which realizes a big data economy that various data can be used easily so that it serves as catalysts for the development of other industries such as automobile, healthcare, and finance, and creates innovative businesses and services at the same time.

Korea Internet White Paper 2018, which is the 19th edition, summarizes the present condition and future prospects of different fields, including the Internet industry and service, utilization, and infrastructure, to review current changes and prepare for the future to come. The white paper also provides in-depth review of the economic and social development based on the ICT, together with suggestions for the related policies.

In particular, the white paper is put together in such a way that readers can look deeply into the changes in the ICT, such as smart city and self-driving car that will be an actual implementation place for the hyper-connected network; artificial intelligence that extends to the medical field; and blockchain that adds value to various industries. Regulatory reforms, needed for the society to develop in parallel with disruptive technical innovation, are also covered.

The next year marks the 50th anniversary of the birth of the Internet (ARPAnet, 1969). I hope that this white paper will serve as valuable data, which enables us to understand the achievements of the Internet that has developed remarkably over the last 5 decades, and to prepare for the future. Through this, I hope that we can revitalize the national economy based on the ICT and become a central country in the era of the Fourth Industrial Revolution. I’d like to thank the authors, editors, and staff members who put in the time and effort to publish the white paper.

2018 December

President of Korea Internet & Security Agency

Kim Seok-hwan



Message from the Publisher
History of Internet in Korea
Infographic
Top 10 Internet News of 2018

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History of Internet in Korea

Internet service was launched in Korea after the establishment of the System Development Network in 1982, and it rapidly grew in 1994 when it was commercialized. In 2013, the number of Internet users in Korea exceeded 40 million, and became the first country to launch WiBro and HSDPA commercial services. In 2016, Korea has announced the longterm comprehensive plans of intelligence information society in response to the Fourth Industrial Revolution, and has taken a leap to becoming the world's best intelligence information powerhouse.

INDUSTRY & SERVICES

1981 ~ 1984

- 1982
 - Launched the first Internet service
- 1983
 - Launched the first information search service
- 1984
 - Launched the first commercial email service [Dacom]

1985 ~ 1989

- 1985
 - Launched the email service in Korean
 - Launched the PC communication service [Dacom]
- 1987
 - Launched the H-Mail service
 - Launched the PC banking service
- 1988
 - Launched a commercial PC communication service [Chollian]
 - Launched a private bulletin board service [The FIRST]
 - Developed an antivirus software following the first virus [Brain] attack
 - Launched the EDI service [Dacom]

INFRA

- 1982
 - SDN [TCP/IP] established [Seoul National University - Korea Institute of Electronic Technology]
- 1983
 - Connected to SDN-EUNET/UUCPNET [Technical, academic information exchange network]
 - Launched the PSTN data service
 - Opened an overseas public data network
- 1984
 - Connected to SDN-CSNET [information science network]
 - Opened the PSDN DACOM - Net for the first time

- 1985
 - Connected to the SDN-PACNET [Asia-Pacific academic research network]
- 1986
 - The first IP address [128.134.0.0] assigned in Korean
 - Introduced the Korean domain [.kr]
- 1988
 - Connected to the SDN-MHSNET [academic network]
- 1989
 - Launched an educational network [KREN], and a research network [KREONet]
 - Established the SON-HANA network [Korea Telecom: KT]

POLICY

- 1981
 - Korea Telecom was established
- 1982
 - Korea Data Communication Corporation was established
 - Established the first basic plan for administrative computerization
- 1983
 - Enacted the Framework Act on Telecommunications [used the term 'information communication' for the first time]
 - Established the business plan for the key national network project
- 1984
 - Formed the key national network mediation committee

- 1985
 - Established a promotion plan for the national administration network
 - Held the first international computer network-related conference [PCCS]
- 1986
 - Enacted the Act on the Expansion and Promotion of the Use of the Information and Communication Network
- 1987
 - The Korea Computerization Agency was launched
 - Established the first basic plan for the key national network
 - Formed the computer network mediation committee

- Launched the commercial Internet service(1994)
- The Ministry of Information and Communication was founded(1994)

- Launched the commercial broadband Internet service(1998)
- The number of Internet users exceeded 10 million(1999)

- Korea was ranked No. 1 for the establishment of its broadband networks(2001)
- Enacted the Information Communications Network Act(2001)
- The number of broadband Internet subscribers exceeded 10 million(2002)
- Established "e- Korea Vision 2006"(2002)
- Established "Broadband IT Korea Vision 2007"(2003)
- Established "IT839 Strategy"(2004)
- The number of Internet users exceeded 30million(2004)
- Launched commercial VoIP services(2005)

1990 ~ 1995

1991

- Launched the online issuance service for a copy of the "resident registration"
- 1994
- Introduced a commercial Internet service [KT]
- Introduced a text-based MUD game for the first time
- Launched the first government agency websites [Chongwadae, etc.]
- 1995
- Launched the "WWW" service
- The first Internet cafe [Netscape] was opened
- Introduced the Internet newspaper and broadcasting service [JoongAng Ilbo and KBS]

1996 ~ 2000

1996

- Launched the ISDN Internet service
- Launched the first e-commerce and webzine services
- Introduced the first graphic-based MUG game
- Held an information EXPO
- 1997
- Launched the Internet stock trading service
- Launched a free Internet service, including search engine and email services
- Launched the first Internet portal service [Netsgo]
- 1998
- Launched the first commercial broadband Internet service[Thrunet]
- Launched the e-government service
- 1999
- Launched the ADSL service [Hanaro Telecom]
- Launched online banking service

2001 ~ 2005

2001

- The number of onLine banking users exceeded 10million
- Introduced the Internet content class service
- 2002
- The size of the Korean game market exceeded KRW3 trillion
- 2003
- Launched the VDSL [20Mbps] service
- Launched the mobile banking service
- Launched the Korean.kr service
- 2005
- Launched a commercial VoIP service
- The number of mobile banking subscribers exceeded 1 million

1990

- The SDN-HANA network was connected to the IP-based Internet in the US
- 1993
- Launched a comprehensive administrative information network
- 1994
- Introduced commercial ISPs [KT, Dacom, iNet etc.]
- 1995
- Established a PC-Internet connection
- Established KIX and launched related services

1996

- Opened a public ISDN network
- 1997
- Launched a dedicated private circuit service
- Launched high-speed national Internet services
- The number of PC communication users exceeded 3 million
- 1999
- The number of Internet users exceeded 10 million
- The first IPv6 address was designated
- 2000
- Opened a commercial ATM exchange network
- The Korean ISP Association was founded

2001

- Ranked as the world's No. 1 in the establishment of the broadband network (OECD)
- 2002
- The number of broadband subscribers exceeded 10 million households
- Ranked as the world's No. 1 in the penetration of broadband Internet
- 2003
- The Internet security incident occurred on January 25th
- 2004
- The number of Internet users exceeded 30 million
- Promoted the pilot BcN project
- 2005
- Ranked as the world's No.1 in the ITU Digital Opportunity Index [DOI]
- Launched a pilot in-flight Internet service [Korean Air]
- Established the international WiBro- standards [IEEE]

1990

- Established the Comprehensive Measures for the Information Society
- 1992
- Established the second basic plan for the key national network project
- Established the Act on Promotion of Information and Communications Network Utilization
- 1993
- Established the basic plan for the formation of super highway information communication infrastructures
- 1994
- The Ministry of Information and Communication was founded
- 1995
- Established a comprehensive plan for super highway information and communication infrastructure
- Enacted the Framework Act on Informatization Promotion
- The Korea Internet Safety Commission was founded

1996

- Established the first basic plan for promotion informatization
- Organized an informatization promotion committee
- The Korea Information Security Agency [KISA] was founded
- 1998
- Established an advancement promotion plan for an information and communications network
- Established a plan for the promotion of PC communication and Internet usage
- 1999
- Established Cyber Korea 21
- Enacted the Framework Act on Electronic Commerce and Digital Signature Act
- The Korea Network Information Center[KRNIC] was founded
- 2000
- Completed the second stage of the super highway communication network project
- Enacted the Software Industry Promotion Law and Knowledge Information Resource Management Act
- Established the guidelines for personal data protection
- Promoted the top 11 initiatives for e-government
- The Korea IT Industry Promotion Agency [KIPA] was founded

2001

- Implemented the Act on Promotion of Information and Communications Network Utilization and Information Protection
- 2002
- Established e-Korea Vision 2006
- 2003
- Established the Broadband IT Korea Vision 2007
- 2004
- Established the IT839 strategy
- Established the basic plan for the establishment of BcN
- 2005
- Established the basic plan for the promotion of IPv6 distribution
- Implemented the real name verification system for Internet civil affairs application

- Launched the world's first WiBro and HSDPA services)
- Established the basic plan for u- Korea(2006)
- Implemented the Restrictive Identification System(2007)
- The Korea Communications Commission was founded (2008)
- Held the OECD Ministerial Meeting on the future of the Internet economy(2008)

2006 ~ 2008

2006

- Launched the world's first WiBro and HSDPA services
- The volume of online shopping mall transactions exceeded KRW 13 trillion
- Launched the mobile application service for the issuance of civil affairs documents
- 2007
- Launched the second-level .kr domain [QuickDom] service
- The total volume of e-commerce transactions exceeded KRW500 trillion
- 2008
- The number of the .kr domain registrations exceeded 1 million
- The number of online banking subscribers exceeded 50 million
- Launched a commercial IPTV service

- Ranked No. 2 in the ICT Development Index (2009)
- Ranked No. 1 in the UN e-Government Development Index and e-Participation Index(2010)
- The number of smartphone subscribers exceeded 7 million(2010)

2009 ~ 2010

2009

- The number of VoIP subscribers exceeded 6.5 million
- The number of mobile banking users exceeded 10 million
- 2010
- The number of real-time IPTV service subscribers exceeded 3 million
- The number of smartphone subscribers exceeded 7 million
- The amount of Wibro exports reached KRW1 trillion

- Launched a commercial LTE service(2011)
- Celebrated the 30th anniversary of the launch of the Internet in Korea(2012)

2011~2012

2011

- Launched a commercial LTE service (SKT/LG U+)
- Launched the "(Korea)" domain service
- The number of smartphone subscribers exceeded 20 million
- The number of online banking users exceeded 70 million
- The number of mobile banking users exceeded 20 million
- 2012
- The number of smartphone subscribers exceeded 30 million
- The number of IPTV service subscribers exceeded 6 million
- The number of LTE subscribers exceeded 15 million

2006

- Ranked as the world's No. 1 in ITU DOI
- Launched the FTTH service
- 2007
- Ranked as the world's No. 1 in ITU DOI
- Achieved the international standardization of WiBro/DMB ITU
- 2008
- The number of broadband Internet subscribers exceeded 15 million
- Expanded the commercialization and coverage of WiBro/Wave2

2009

- Ranked as the world's No. 2 in the ICT Development Index
- Began the Giga Internet pilot project
- DDoS occurred on July 7th
- 2010
- Ranked as the world's No. 1 in the UN eGovernment Development Index and eParticipation Index
- Completed the BcN foundation establishment project

2011

- Ranked as the world's No. 1 in the ICT Development Index (as of 2010)
- Established the LBS Business Support Center
- Ranked as No. 1 in the category of the wire-less broadband Internet subscribers per 100 people [OECD]
- DDoS occurred on March 4th
- Completed the allotment of IPv4
- 2012
- Marked the 30th anniversary of the launch of the Internet in Korea
- The number of broadband Internet subscribers exceeded 18 million

2006

- Established the basic plan for u-Korea
- Established the measures for the prevention of the illegal use of other people's names in online gaming and hacking
- Held the first Korea Internet Awards
- 2007
- Implemented the Restrictive Identification System
- Introduced i-PIN, an alternative measure for RRN registration
- The Korea IT International Cooperation Agency [KIICA] was founded
- 2008
- The Korea Communications Commission was founded
- Held the OECD Ministerial Meeting on the future of the Internet economy
- Enacted the Internet Multimedia Services Act

2009

- The Korea Internet and Security Agency [KISA] was founded
- Established a mid- to long-term broadcasting communication network development plan
- Established the primary and secondary wireless Internet activation promotion plan
- Held the 36th ICANN meeting in Seoul
- Established the comprehensive cloud computing activation plan
- 2010
- "118 Counseling Center" was founded
- Established the IPv6 transition promotion plan
- The Internet Cooperation Forum was founded
- Established a comprehensive promotion plan for the activation of the Internet ad market
- The Korea Internet Dream Star was founded

2011

- Established the promotion plan for the activation of the NFC-based mobile smart life service
- Established a pan-government cloud computing policy council
- Implemented the Act on the Protection of Personal Information
- Introduced a mobile ad platform certification system
- 2012
- The Korea Internet Governance Alliance was founded
- The Day of Information Security was designated [second Wednesday of July]

- The number of domestic Internet users exceeded 40million(2013)
- Launched a commercial IPv6 service(2014)
- Launched a Giga Internet service(2014)

- The number of online banking users exceeded 110 million
- Ranked No.1 in the DECO Open, Useful, Reusable (OUR) Data Index
- Announce the long-term comprehensive plans of intelligence information society in response to the 4th Industrial Revolution

- Popularization ratio of smart phone 87.8%; top in the world
- Defining development strategy for block chain technology
- Commercialization of 5G network first in the world

2013~2014

2013

- The number of domestic Internet users exceeded 40 million
- The number of domestic mobile messenger [KakaoTalk] users exceeded 120 million
- Domestic mobile messengers started entering the foreign markets [Line, etc.] 2014
- Launched a commercial IPv6 service
- The number of IPTV subscribers exceeded 10 million
- The number of LTE subscribers exceeded 36 million

2015~2016

2015

- The number of online banking users exceeded 110 million
- The number of broadband Internet subscribers exceeded 20 million
- The number of LTE subscribers exceeded 41 million
- The size of the Korea game market exceeded KRW 10 trillion 2016
- Mobile telecommunications service subscribers in Korea surpassed 55 million
- Go match between Alpha Go and Lee Sedol
- Internet usage rate among senior citizens aged 60 or over was 51.4%, and user count surpassed 5.053 million
- Korea's first Internet-only bank has emerged, and has surpassed 0.3 million in subscribers
- The transaction volume of mobile e-commerce surpassed the PC shopping transaction volume, going over KRW 35.5 trillion won
- Gachon University Gil Medical Center opened the AI Cancer Center

2017 ~ 2018

2017

- Internet bank launched
- Popularization ratio of smart phone 87.8%; top in the world
- Daily average simple transfers: 682.5, Increased by 375.8% of the previous year 2018
- Customers of internet bank: 7 millions; Total loans: 8 trillion KRW
- Toss subscribers recording 10 millions (Oct.), and Making its way into FinTech Unicorn first in Korea (Dec.)

2013

- Ranked as the world's No. 1 in the ICT Development Index (as of 2012)
- DDoS occurred on March 20th [affecting financial world and broadcasting companies]
- APT occurred on June 25th [affecting government and public agencies]
- Held a bidding for LTE frequencies allotment 2014
- Launched a commercial Giga Internet service
- Ranked as the world's No. 1 in the UN e-Government Development Index for three consecutive years
- Connected to the international IPv6 line
- Ranked as the world's No. 2 in the ICT Development Index as of 2013

2015

- Ranked No. 1 in the DECO OUR Data Index
- Reclaimed the world's No. 1 ranking in the ICT Development Index as of 2014
- Confirmed the distribution method of 700MHz frequencies
- Korean Internet speed ranked No. 1 for 7 consecutive quarters
- The Korean team won the DARPA Robotic Challenge
- The Korean team won at the DEF CON Hacking Conference 2016
- Korea has ranked 1st in ICT Development Index for 2 consecutive years
- Constructed the world's first 5G demonstration service network
- Korea has ranked 1st in Internet speed for 13 consecutive quarters
- Constructed LPWA network dedicated to IoT around the country
- Finished the IPv6 commercialization by domestic mobile networks
- Launched an open platform shared by the financial institutions

2017

- Internet users (3-years or older): 45.28 millions
- Utilization rate reached 90.3%

2013

- Opened the Phishing Response Center
- Launched the Ministry of Science, ICT and Future Planning
- Enforced the Amendments of the Information Communications Network Act
- The Internet Startup Alliance was founded
- Announced the Guidelines for the Internet Search Service 2014
- Held the ITU Plenipotentiary Conference in Busan
- The Multilateral Internet Governance Alliance was founded
- Opened the IoT Innovation Center
- Opened the Comprehensive IPv6 Support Center
- Launched the prohibition of RRN
- Launched a TFT for the improvement of ecommerce regulations

2015

- Established the K-ICT strategy
- Enacted the Cloud Development Act
- Enacted the Information Security Industry Promotion Act 2016
- Announce the long-term comprehensive plans of intelligence information society in response to the Fourth Industrial Revolution
- Expand the subjects obligated to pass ISMS (Information Security Management System) certification to include medical and educational institutions
- Open a support center for FinTech security and authentication technology
- Launch Cybersecurity Alliance For Mutual Progress (CAMP)
- Establish the mobile app accessibility guideline 2.0 (KS X 3253:2016) KCS (Korea Certification Standard)
- Run a robo-advisor test bed

2017

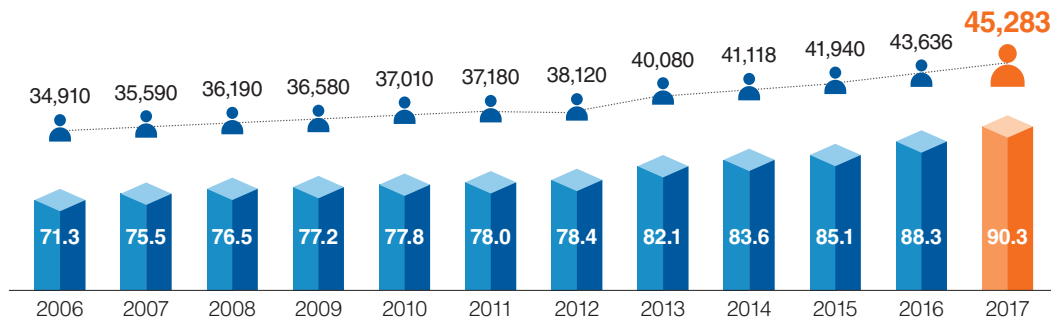
- Establishment of the 4th Industrial Revolution Committee 2018
- Establishment of Blockchain Technology Development Strategy
- 10-Giga Internet commercialization
- Commercialization of 5G network first in the world(1.December)

Foreign and Domestic Internet Usage

Internet Usage in Korea

Internet users Internet usage

(Unit : %, Thousand people)

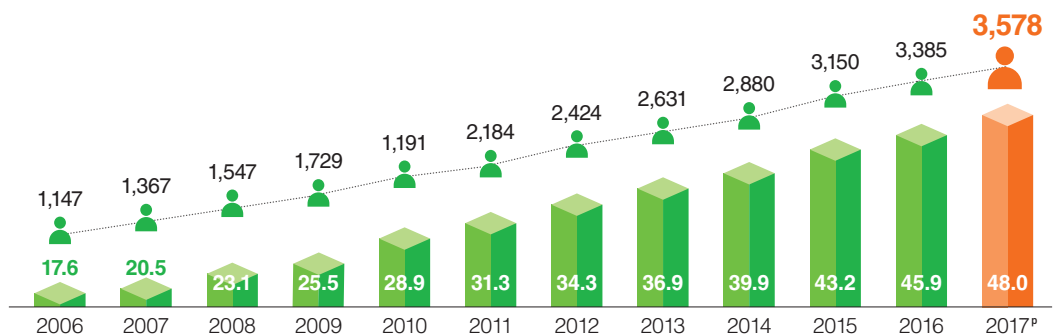


* Aged 3 years or over

International Internet Usage

Internet users Internet usage

(Unit : %, 1 Million people)



p : estimate

Internet Access Method

Wireless internet

99.4

Wired Internet
71.3

Share of internet users
accessing internet wireless internet

Mobile phones such as 3G/LTE 99.3

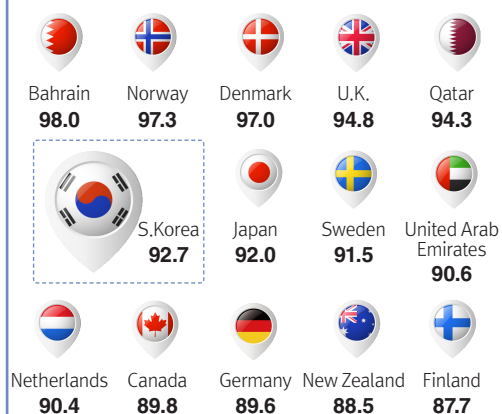
WiFi 98.0

Mobile wireless internet router 2.6

* Aged 3 years or over, multiple answers

Internet Usage by Country

(Unit : %)



* Excluding cities with less than one million population

Internet Address Status

IPv4, IPv6 and AS Number Adoption Status

U.S.A		Korea	
			
		(Unit : Cases)	
1 st	IPv4 Number 1,604,467,456	IPv4 Number 112,449,024	6 th
1 st	IPv6 Number 45,155 (/32)	IPv6 Number 5,256 (/32)	11 th
1 st	AS Number 26,410	AS Number 1,025	18 th

Domestic Domain Registration

(Unit : Cases)

2-level system

(English.Korean/Korean.English/
Korean.Korean)

358,752



3-level system

(co.kr/or.kr)

718,525

Domain Registration of Key Countries

(Unit : Cases)



1st

Germany

Domain

.de

registrations

16,315,693



2nd

U.K.

Domain

.uk

registrations

10,012,729



3rd

Netherlands

Domain

.nl

registrations

5,798,481



18th

Korea

Domain

.kr

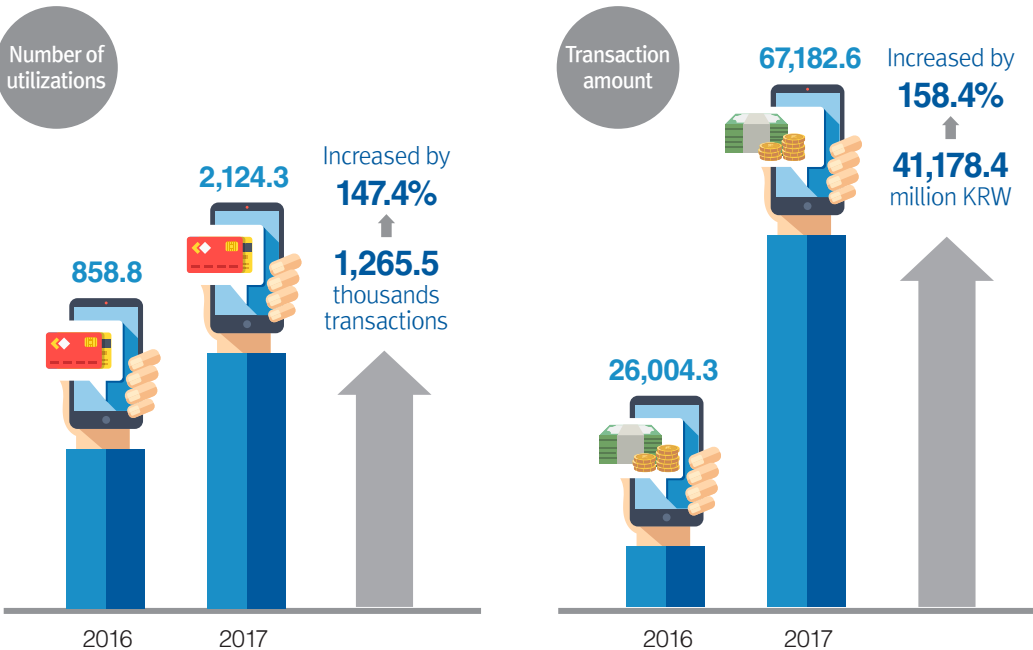
registrations

1,078,067

Internet Convergence Service

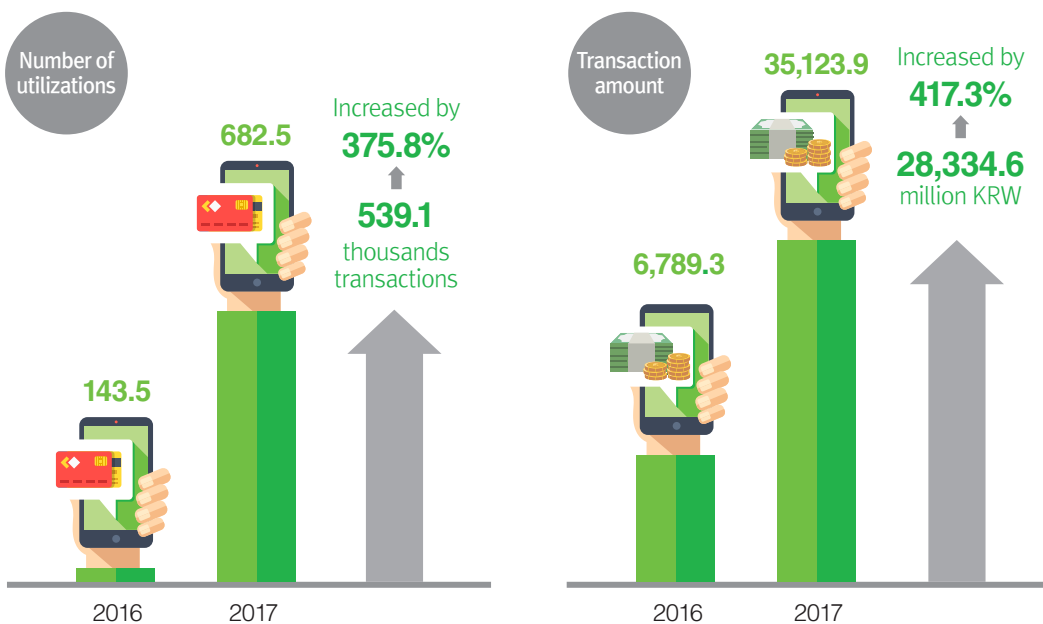
Status Utilization of Easy Payment Service

(Unit : 1,000 payments, Million KRW)



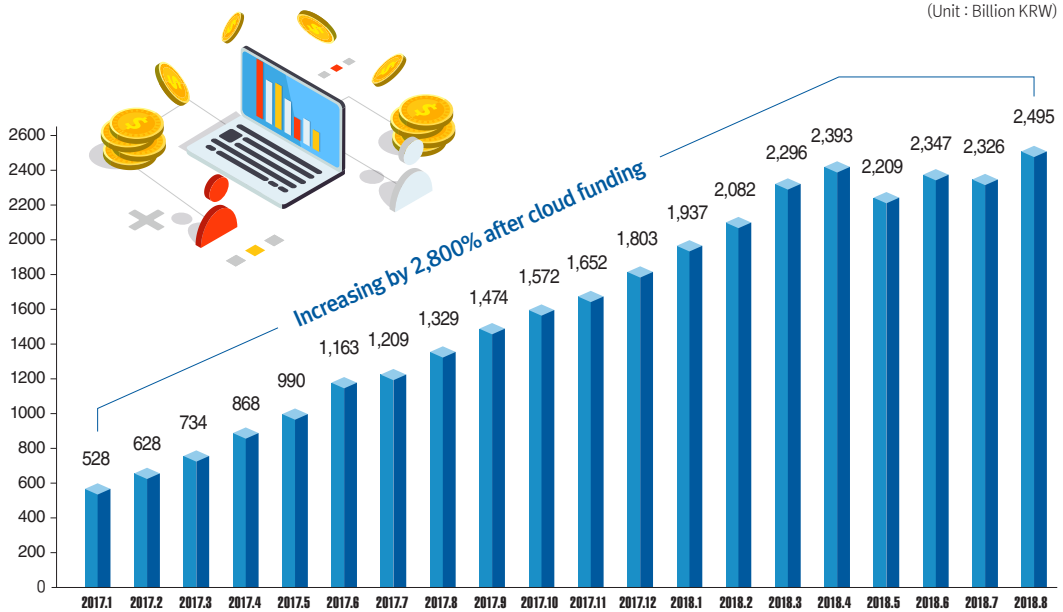
Status Utilization of Easy Transfer Service

(Unit : 1,000 payments, Million KRW)



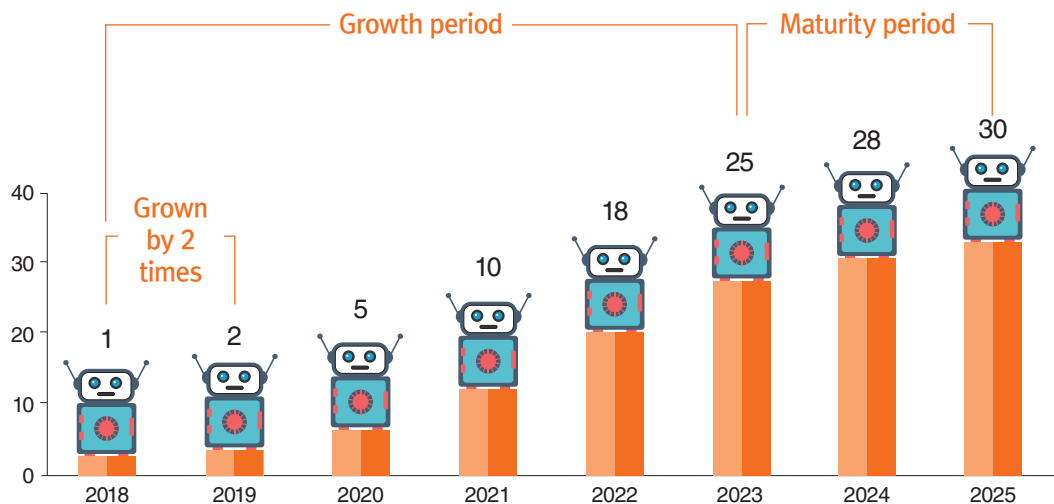
Amount of P2P Loans

(Unit : Billion KRW)



Forecast of Robo-advisor Markets in Korea

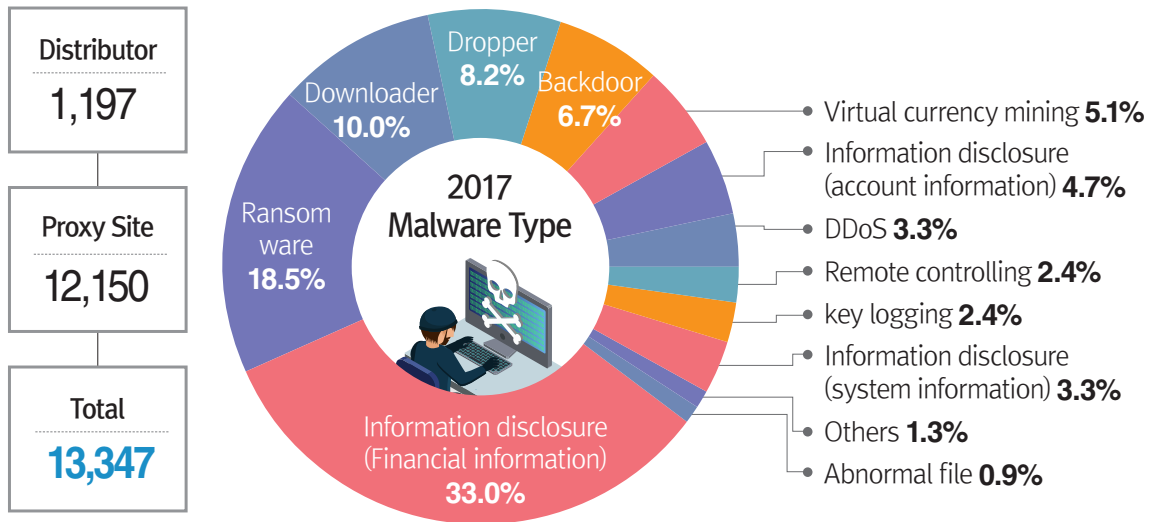
(Unit : Trillion KRW)



Information Security

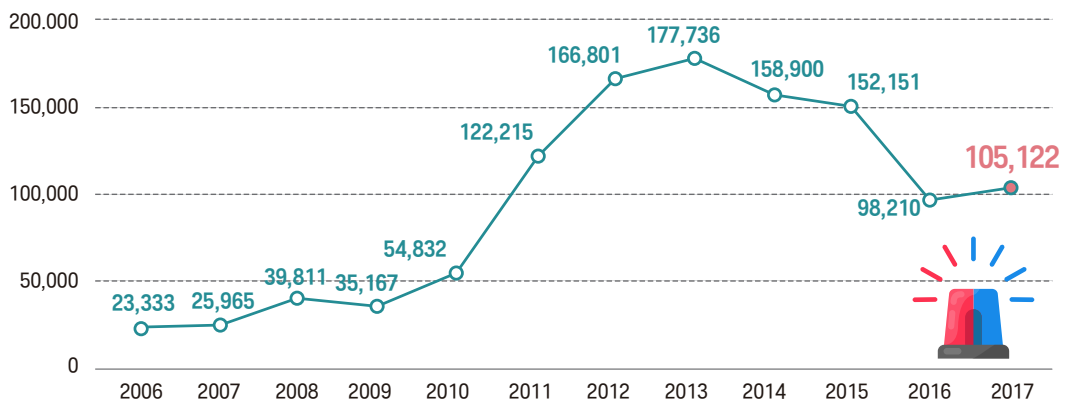
Number of Detected Websites with Malicious Code in 2017

(Unit : %)

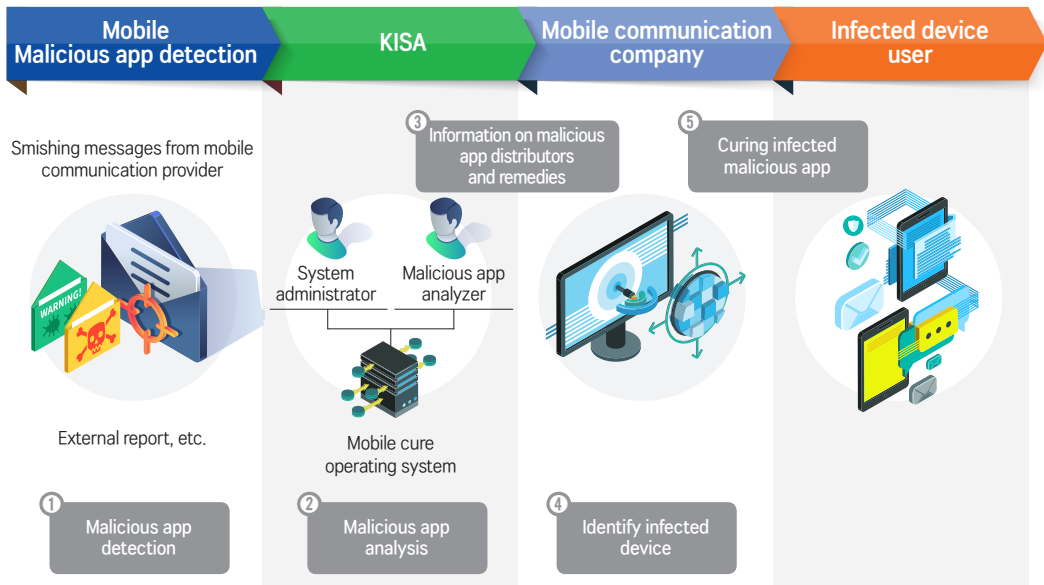


Number of Counseling Sessions on Personal Data Infringement

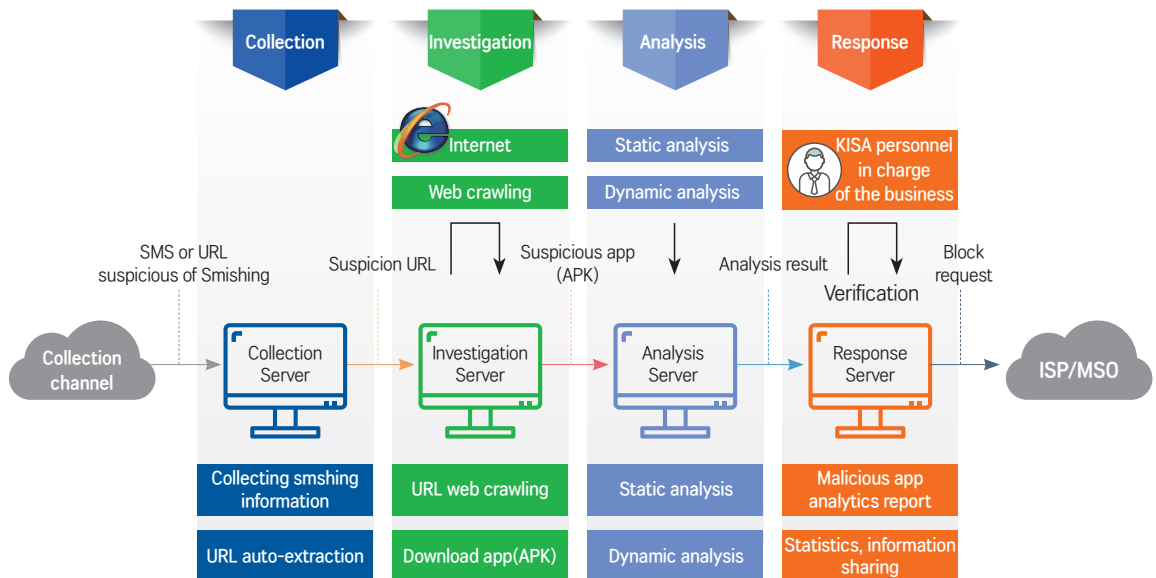
(Unit : Cases)



Mobile Emergency Cyber Cure System



Smishing Response System



Top 10 Internet News of 2018

01

Data revealing its power, Big Data

Since its advent as a Google search term in 2006, 'Big Data' has been considered one of the most important raw materials completing cutting-edge technologies for 12 years. Big data plays a powerful role for growth in every aspect of technology development, and is called the 'crude oil of the 21st century'.

IDC predicts that global throughput of data of 16.1 ZB in 2016 will grow ten times in 2025 up to 163 ZB. PwC, a multinational financial consulting firm, estimated that only 29% of businesses used predictive analysis techniques in 2016. Since then, a number of big data suppliers have launched predictive analysis tools to attract large interest in prediction techniques by utilizing large-capacity data. Development of ICT and widespread use of smart systems led to further popularization of social networks and IoT to produce a huge volume of data, which indicates the probability of further advances in big data processing technologies.

Such big data is the foundation for a technology-based society and constitutes one of the most important industrial groups. Wikibon, a global market survey

institute, estimates the market size of global big data to be 40.8 billion USD in 2018. It was estimated that the market size will be 78.7 billion USD in 2023 at annual average growth rate of 15.3%.

Expectation of such market growth rate in the world has led to the advent of government-led strategies relevant to big data in many countries. The U.S. established Big Data R&D Initiative in 2016, and Japan started data utilization projects for realizing Society 5.0 in 2017. China also established a Big Data Industry Development Plan in 2017.

Korea is also expecting rapid growth of big data markets. Data published by the International Trade Research Institute of the Korea International Trade Association in April 2018 predicts that the big data market of Korea will grow from 344.0 billion KRW in 2016 to 967.1 billion KRW in 2020.

The government of Korea also shows interest in policymaking for the market. The Presidential Committee on the 4th Industrial Revolution suggested strategies for data utilization and economy activation in 2018. The strategies include converting the data use system paradigm, innovation of the whole data value chain,

and formation of global data industry cultivation bases. The committee also established plans for achieving big data leading technologies of 90% of the level of advanced countries for improving the data industry by 2022, and for cultivating 50 thousand experts by training young human resources for the next five years.

02

5G service highlighted in Pyeongchang Winter Olympics

One of the technologies attracting keen interest at the Pyeongchang Winter Olympics started on Feb. 9, 2018 is 5G service. The 'Pigeon of Peace' performance at the opening ceremony utilized LTE candles that can be controlled wirelessly through the 5G network. The system capable of controlling brightness and blinking of the LTE candles via a 5G terminal was the core element of the successful performance. An ultra-low time delay communication network with data delay time shorter than conventional networks by 10 times was utilized for the





03

Block chain technologies have led to infinite zone such as token economy

performance, which represents one of the cores of 5G technologies.

Real-time images were provided at the cross-country race by GPS sensors affixed on the racer's uniforms, and 5G module cameras were installed throughout the race courses. Coaches and audiences were able to enjoy positions and real-time records of their favorite athletes on 5G tablets.

Further, 'SyncView' was first introduced for transmitting super-high resolution images with communication module on ultra-compact cameras. One the advantages of SyncView is enjoying fast-speed games such as bobsleigh from the viewpoint of the athlete. KT mounted cameras and batteries on the sleighs of 107 bobsleigh teams for SyncView.

The drone show, the highlight of the Pyeongchang Olympics opening ceremony, was performed by Intel, who demonstrated commercialized technologies of 5G mobile communication with the drone show. Intel Mobile Trial Platform (MTP) played the core role, which is the essential system for direct connection of 5G devices to support stable operation of 5G demo services at the Pyeongchang Olympics. In addition, Flex Ran technology made its advent for streamlined processing of a variety of data and transmitting 5G signals.

For the Olympics, KT had participated

in Pyeongchang 5G demo service for 3 years, and defined 'Pyeongchang 5G Standards' for the first time in the world together with Intel and Samsung Electronics. 85% of 'Pyeongchang 5G Standards' were reflected on '3GPP NSA (Non-Standalone) 5G standards' finally fixed in 2017. KT applied for listing of some 100 patents while preparing 5G demo services for the Pyeongchang Olympics, and accumulated various 5G network technologies. It is considered that interest in 5G services dramatically increased with the Pyeongchang Olympics, as the public witnessed the most advanced broadcasting and communication technologies. Collaboration between KT and Intel is considered the optimal integrated model of 5G technologies and makes people anxious to see 5G technologies at the Tokyo Olympics in 2020. 5G service (for companies) was commercialized in Korea in Dec. 2018 for the first time in the world. It is expected that three major mobile communication providers (SKT, KT and LG U+) will accelerate further commercialization of 5G service in 2019. SKT plans to upgrade its own moving picture contents to UHD image, and KT plans to commercialize the 5G network. LG U+ integrates Netflix, Google, and Huawei for 5G-based changes in content and systems.

Block chain technologies causing keen interest in virtual currency called bitcoin are creating a new economic arena called 'token economy'. It is anticipated that block chain technologies will be applied in every corner of our lives including online content trading such as moving pictures and music sources, financial services, public documents, consumer goods supply network, medical records, life information, and sharing services of house and automobile. The World Economy Forum (WEF) already predicted that 10% of production around the world will be stored by block chain technologies in 2025. Gartner, a consulting firm, predicted in their publication in 2017 that block chain-relevant markets will grow to 176 billion Dollars in 2025, and then rapidly grow up to 2.16 trillion U.S. Dollars in 2030.

IBM, a typical ICT business, has developed 100 block chain projects in 2017. In short, block chain technologies are deemed technologies configuring every aspect of our lives, and converting economic structure from its root.

The Ministry of Science and ICT of Korea established 'Strategies for Developing Block Chain Technologies' in 2018, and the Ministry emphasizes the advantages of the technologies for creating huge economic value by reducing trade costs, dramatically contributing to preventing data forgery/modification and maximizing efficiency of industrial progress. A report from the ministry estimates that the



number of block chains is 30, and the market size is 50 billion KRW in 2017.

Companies leading block chain technology development in Korea have been driving businesses in full force since 2017. Samsung SDS launched the 'Marine Logistics Block Chain Consortium' together with the Ministry of Oceans and Fisheries, Korea Customs Service, and IBM Korea in May, 2017.

Blocko, a block chain platform company, entered a cooperation contract for project drive with Samsung SDS to drive a project for establishing the Samsung Card block chain.

Kakao applied block chain technologies to KakaoPay authentication service in June 2017, and listed its shares on the stock exchange through its affiliate, UPbit.

In the course of activities of these

companies, the Korea Block Chain Industry Promotion Association (KBIPA) was approved as a corporation by the Ministry of Science and ICT on Sep. 12, 2018.

Organizations with names including 'block chain', 'virtual money', or 'virtual currency' have suffered hardship regarding corporate approval from the government; however, the approval of the KBIPA shows a relaxation of applicable regulations to some extent. Now, the association will conduct a survey of block chain companies and projects ordered by such companies, in order to contribute to defining systematic policies.

In the meantime, Korea defined 2018 as the starting year of development support of block chain convergence technologies, and invited public participation in projects

in full force. The Ministry of Science and ICT defined block chain as a discrete business field in 2018, and started investing funds into R&D and demo projects of block chain technologies. 2018 was a year when the block chain industry of Korea became brisk.

04

Fully cultivating the unmanned vehicle industry as the core driver of innovative growth

Unmanned vehicles, typically drones, played a core role in driving ICT innovative growth in 2018. Interest and market growth have already been anticipated since Amazon demonstrated drone delivery at the MARS 2017 Conference in 2017.

Teal Group, a consulting firm for US national defense, judged the world's drone market size as 4 billion USD, and predicted market growth up to 14.7 billion USD by 2024. Allied Market Research, a Markey survey institute, also predicted the market size of the world's commercial drones up to 10.738 billion USD in 2022.

Markets of autonomous vehicles are predicted to grow rapidly in 2020, when



road driving of such vehicles is fully permitted in the U.S.

Gartner predicted that markets of drones, unmanned vehicles, autonomous vehicles, and unmanned underwater vehicles will rapidly grow at an annual average rate of 22% by 2020. Gartner also predicted that markets of unmanned vehicles, autonomous vehicles, unmanned agricultural machinery, and unmanned marine machinery will expand to 67.3 billion USD by 2020.

The Ministry of Science and ICT of Korea made public notice of '10-Year Roadmap of Technology Innovation and Growth of Unmanned Vehicles' in Dec. 2017 for full care and support of the government. The roadmap plans to support R&D of core technology development of unmanned vehicles with the amount of 12 billion KRW in 2018, and further investing of 550 billion KRW over the next ten years. Based on such support and investment, the ministry has set the objective of becoming in the top third of technology competitiveness, a world market share of 10%, 92,000 new jobs, and export of 16 billion USD of unmanned vehicles.

The ministry held the '2018 Innovative Growth Fair of Unmanned Vehicles' for demonstrating innovative technologies of promising domestic companies as well as the achievement of R&D results in the fields of unmanned vehicles.

The fair held by the ministry provided a meeting for sharing achievements of innovative growth, exhibiting innovative technologies, and presentations of investment into promising companies and technology businesses to indicate government interest in the field of unmanned vehicles. In particular, this fair showed communication technologies by remotely operating drones in Yeongwol at Yeouido in Seoul and transmitting and



receiving images from drones in Yeongwol by making use of LTE technologies.

05

Building smart city platform for the 4th industrial revolution

'Smart City,' the concept of resolving urban issues and building an innovative city through ICT technologies and big data is the core platform capable of leading the 4th industrial revolution. 'Smart City' is a new alternative for environmental issues, traffic, and security resulting from aged buildings and deficiency of energy in cities.

It is generally agreed that smart city markets will expand in the next few years. A report issued by Research and Market forecasts a smart city market size of 1.4 trillion USD in 2020. McKinsey also predicts growth of smart city markets to 1.7 trillion USD by 2025 to cause keen interest in added values resulting from market growth. The National Information Society Agency of Korea pointed out elements of smart city in 2016: urban infrastructure, ICT infrastructure, spatial information infrastructure, IoT, data

sharing, algorithm & services, and city innovation.

When considering that various and innovative technologies are applied to city space through smart city to maximize the value of the platform, the scope of industries and markets of smart city will be enlarged very extensively. This is why the world drives active policies for smart city.

The U.S. already announced the 'Smart Cities Initiative' in 2015, investing 160 million USD for crime prevention, economy growth, and public services. The U.S. Ministry of Transportation executed Smart City Challenge to drive the formation of smart city.

Japan suggested Future Investment Strategy 2018 (Society 5.0) in July 2018 as a smart city realization plan based on traffic and safety. The EU Executive Committee commits its best endeavors to being leader of the smart city field while planning various smart city plans.

In Korea, the Ministry of Land, Infrastructure and Transportation announced '2018 National Strategic Project for Smart City 2018' to place orders for projects that shall be completed between Sep 2018 and Dec 2022.

The specifics of the projects include: development of smart mobility and parking space sharing support;

development of safety under urban disaster and emergency rescue technologies for community safety; development of high-end technologies for data hub center and urban administration services; cloud sourcing-based urban air environment measurement and prediction technology development; development of residence/building/factory/public facilities integrated energy control technologies (xEMS); total care system for solitary elders and development of disabled mobility guarantee system; and living lab innovative model-based open data hub platform building and validation. The Ministry of Land, Infrastructure and Transportation, and the Ministry of Science and ICT held the Second World Smart City Week (WSCW) 2018 for the purpose of inviting international events of smart city, the largest in Asia and Pacific Rim. Events of the meeting included global joint program, Smart City Summit Asia 2018, seminars of smart city innovative growth power and launching business overseas, and Smart City Best Business Fair for small businesses and startups of smart city.

06

GDPR emphasizing concern regarding safe use of personal data

Personal data has been a hot issue throughout 2018. Typically, GDPR (General Data Protection Regulation) of EU on May 25 attracted interest in ICT industries all over the world. GDPR consists of 173 articles including the rights of information owners such as claiming reading, correction, deletion, and information

transfer, and contains specifics of rights of information owners such as specifying personal data protection staff, and personal data effect assessment.

GDPR is an action for responding to changes in the ICT environment, and applies to 28 EU member countries as well as companies around the world that process personal data of EU citizens. All of the countries in the world provided alternatives for companies to comply with GDPR. The government ministries and public authorities of Korea also committed policy endeavors to pass adequacy assessment of GDPR. The government provided companies operating their business in Europe with guidelines and information at seminars to let them respond to GDPR without confusion. In particular, Korea Internet and Security Agency plays the role of expert authority that provides learning data for GDPR and executes training in response to GDPR.

Interest in efficient utilization of personal data increased prior to initializing the GDPR in 2018. The Presidential 4th Industrial Revolution Committee held Second Regulation and System Innovation Hackathon at the beginning of the year to classify the legal terminology system of personal data, provide legal basis, and clearly define the scope of targets of the

personal data protection laws. Based on the specifics, the Ministry of Science and ICT, Ministry of Public Administration and Security, Financial Services Commission, and Korea Communication Commission agreed on the legal writing of scope of personal data supply. The purpose was to find valid utilization methods of personal data.

GDPR actually contributed to further recognition of personal data nationally and abroad; however, International Information System Audit and Control Association (ISACA) predicts only 29% of companies all over the world may comply with the regulations of GDPR without difficulty. The issue of specific utilization of personal data was highlighted by GDPR in 2018; however, discussion on the response shall continue further.

07

Easy payment markets and accelerated growth of FinTech

Positive predictions make their advents for easy payment markets and FinTech while people desire simpler lives. Transparency Market Research predicted that worldwide





mobile payment technology markets will grow from 338.7 billion USD in 2015 to 1.773 trillion USD in 2024. Accenture also announced that worldwide investments into FinTech in 2013 were 2.4 billion USD, and 4.7 billion in 2018.

Powerful companies have entered the markets of easy payment and FinTech. Android Pay was first marketed in the U.S. in May 2016, and provided services to 13 countries including Japan, Ireland, Australia, and Taiwan as of the end of 2017. PayPal operates in 200 countries, and consistently increases its number of active users and transaction volumes.

Growth in China is also powerful. Domestic Chinese services such as Alipay and Tenpay occupy a high share of the market in China, and are becoming competitive at national level compared with other countries.

In the meantime, multiple global companies operate their businesses in the mobile payment markets in China. Apply Pay launched in China in Feb. 2016, and Samsung Pay in March of the same year. An announcement from the Bank of Korea indicates fast growth of payment markets in Korea.

Digital payments by digital banking companies and financial companies in

the first quarter of 2017 were 2,080 transactions, and 432.6 billion KRW per day. The easy payment markets built environments where early businesses such as Samsung Pay, Naver Pay, KakaoPay, and Payco remain competitive.

EY, a market survey institute, announced that the FinTech index of Korea is 32%, which is lower than world average, in a 2017 report. Service share of FinTech is lower than that of other countries. Accordingly, the government has designed various plans. The Financial Services Commission designed 'Measures for innovation activation of FinTech' in March 2018 to drive the enactment of laws for financial support, forming civil-public funds, operation of FinTech consultant group, and relieving regulations on business type restriction and investment limits. Korea Internet & Security Agency and the Ministry of Science and ICT started developing new FinTech services of 4th industrial revolution ICT basic technologies such as block chain, AI, IoT, and big data in 2018 through public invitation to Demo Projects of FinTech. One FinTech company became the first Unicorn (company with value of 1 billion USD or more) in Korea. Viva Republica, operating the mobile financial service

Toss, announced that the value of the company is recognized at 1.2 billion USD (1.3 trillion KRW) after the investment of 800 million USD from Kleiner Parkins and Ribbit Capital, both of which are global investment firms. Subscribers of Toss exceeded 10 thousand users in Nov. 2018 since beginning simple transfer service in Feb. 2015, and the value of the company grew by 10 times within 1 year and 9 months from 130 billion KRW as of March 2017.

08

Digital Healthcare Services

The HIMSS (Healthcare Information and Management Systems Society) event was held in Las Vegas, U.S. in March 2018, attended by global ICT businesses including Amazon, Google and IBM.

To reflect this trend, IBM estimated that worldwide digital healthcare markets will be 360 billion USD in 2020. Investments into companies are also rapidly increasing. CB Insights, a market survey institute, calculated that investments of the top ten U.S. tech companies into healthcare businesses grew from 280 billion USD in 2012 to 2.7 billion in 2017 (Nov.). This means that tech companies invested ten times more into healthcare.

ICT companies around the world are building digital healthcare business systems through active cooperation with healthcare companies.

Verili, an affiliate of Google, cooperated with GlaxoSmithKline, a U.K. drug company, to establish Galvani Bioelectronics in 2016. AMGEN, an American drug manufacturer, is



cooperating with Owkin, a tread mill manufacture, in the medical area in 2018. AstraZeneca, a U.K. drug manufacturer, partnered with Alibaba for applying AI to healthcare in Feb. 2018.

In Korea, industries and the government are working quickly to activate the digital healthcare market. SK Telecom plans to provide chronic disease control solutions to medical institutes in five areas of Beijing, Jiangsu, Guangdong, Shaangxi, and Sichuan by 2023. SK Telecom has been providing hospital services in the vicinity of SK Hynix plant in Jiangsu, and this plan will accelerate their business in China.

The government has also made an effort to discuss policy improvement. The Ministry of Trade, Industry and Energy announced Measures for Activation of Smart Healthcare in 2015, and the Ministry of Health and Welfare completed the Direction of Progress of Health Industry and Integrated Development Strategies of Health Industries to be One of Seven Top Counties for Bio Healthcare in 2015 and 2016 respectively.

However, these endeavors of the government are not sufficient for policy improvement compared to advanced countries such as the U.S., Japan, U.K. and Germany. For example, medical laws allow remote treatment between physicians

and medical expert, and the revised bill allowing remote treatment between physicians and patients is still pending at the assembly since 2016.

At the bull session on regulation innovation chaired by the president at the beginning of 2018, the Ministry of Health and Welfare and Ministry of Food and Drug discussed relaxing regulations in the medical area; however, no clear solutions are visible for relief of regulation of remote treatment. Demands for policy improvement will remain persistent, since the concept of remote treatment is one of the core elements of digital healthcare.

09

Growing markets of immersive medical (VR and AR)

It is determined that immersive media (VR and AR) markets are in full growth phase. Digi Capital, a market survey institute, expects that worldwide AR and VR markets will grow to 105 billion USD in 2022. IDC predicts that VR market size will grow from 5.2 billion USD in 2016 to 162.0 billion in 2020. The prediction indicates that market size will grow by 30 times in 4 years.

The same applies to the markets in Korea. KB Security predicts that VR and AR markets in Korea will grow from 200 billion KRW in 2017 to 1 trillion in 2020. This means a 5-fold growth within 3 years. Korea VR Industry Association predicts a market size of 5.7 trillion KRW in 2020 including hardware systems.

The markets of immersive media are still premature comparing to other industries, and there are multiple relevant industries, and this expectation seems realistic.

The government of Korea drives support to maximize expansion of the markets.

The Ministry of Science and ICT held VR/AR Grand Challenge in June 2018 to develop promising developers and activate markets of AR and VR industries. At the third event, a prototype containing creative ideas of AR and VR will be selected and awarded. The ministry also supports content purchasing, distribution, additional development, and mentoring.

The Ministry of Food and Drug published Guidelines on Permit and Examination of Medical Devices Applied with Virtual and Augmented Reality (VR and AR) in Jun. 2018, containing standards of concept and classification of medical devices out of devices and software applied with AR and VR. The guidelines provide classification standards and measures of permit and examination of medical devices applied with virtual reality and augmented reality technologies based on medical device laws, provisions of medical device permit, report and examination, and provisions of medical device items and class of each item.

The guidelines contain specific considerations for permit or examination of virtual reality (VR), augmented reality (AR), mixed reality (MX) and head-mount display (HMD) as medical devices. The Ministry of Food and Drug began



operation of an expert committee of industry officials, academics, and medical experts to develop the guidelines in April 2017 and completed monitoring processes of the guidelines by considering opinions on the guidelines (draft) in March 2018.

The government of Korea realizes the critical nature of market expansion of VR and AR, and fully executes policy endeavors in the direction of activating various forms of support and applying technologies between industries.

10

Urgent innovation of regulations on 4th industrial revolution

The term 'Regulatory Sandbox' was highlighted in 2018. A Regulatory Sandbox is a system is for exempting or delaying current regulations for a certain period for new products or services in the fields of new industries and new technologies. The purpose of the system is to provide an environment free from regulation to developer companies.

At Bull Session on Regulatory Innovation at Blue House on Jan. 22, 2018, a positive

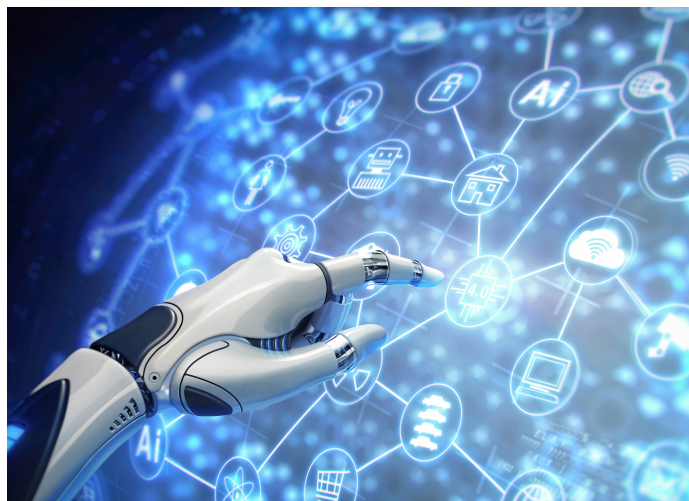
introduction of the regulatory sandbox was announced.

The Survey of Regulatory Hardship for New Industries in Korea announced by Korea Chamber of Commerce and Industry in 2017 indicates that 74.6% of companies identified "regulatory hardship" as a barrier to global competition. This means that domestic regulations stricter than those of other countries are a barrier to growth.

The Office for Government Policy Coordination published the Integrated Plan for Regulation Arrangement containing measures for regulatory innovation in 2018. Specifics of the plan include arrangement of extraordinary

laws and regulations of new industries, enactment of laws of regulatory sandbox, development of core regulations for innovative growth leading industries, and tailored regulatory relief. Achievements from such activities include decision of promulgation of information and communication convergence law, industrial convergence promotion law, and special area law.

Consent was drawn on regulatory and policy innovation at the 4th Hackathon of the 4th industry revolution committee in Sep. 2018. Consent on regulatory innovation was made on converged/integrated medical products, lodge sharing, and traffic services. At the meeting, a management system reflecting the features of converged/integrated medical devices was clearly defined, and consent was formed on commercialization of converted/integrated medial products. In addition, measures for mutual cooperation between lodge businesses and platform providers were discussed, and consent was formed on highly valid measures of solving the unbalance between demand and supply of taxis by utilizing ICT.





Part 1

Industry & Service

1. Internet Economy
2. Internet Industry
3. Internet Service Convergence
4. Internet Information Service
5. Internet Service in the Public Sector

1. Internet Economy

A. Data Economy

With data emerging as the key factor of The 4th Industrial Revolution, leading countries of the world are working quickly to take the initiative before the conversion of paradigm into the data-based society. EU acknowledges data as the essential resource for economic growth, job creation, and social progress to carry out “Building a European Data Economy (2017)” as the counter-strategy for The 4th Industrial Revolution. Korea is also re-acknowledging the value of data to accelerate the implementation of policies for developing the ecosystem in the data-based industry.

The market volume of the data industry provided by the Korea Data Agency is an index for estimating the status of data economy in Korea. The market volume of the data industry is composed of data solution, data construction·consulting, and data service sector, and it has been showing consistent annual average increase rate of 7.5% since 2010. According to the 2017 Data Industry White Paper, the market volume of the data industry increased 4.0% from KRW 13,7527 trillion in 2016 to KRW 14,3047 trillion in 2017, KRW 6,2973 trillion of which is relevant to the direct sales on data except for indirect sales such as advertisement sales and other operating system SI sales, etc.

[Table 1-1-1] Volume of the Data Industry

(Unit : KRW 100 million)

Category	2010	2011	2012	2013	2014	2015	2016	2017 ^p	Growth Rate 2016~2017	CAGR 2010~2017
Data Solution	6,725	8,717	10,487	10,789	13,619	14,124	15,720	16,536	5.2%	13.7%
Data Construction / Consulting	37,407	43,180	47,715	49,985	53,730	55,280	55,850	58,565	4.9%	6.6%
Data Service	42,242	43,218	47,317	52,258	57,329	64,151	65,977	67,946	3.0%	7.0%
Total	86,374	95,115	105,519	113,032	124,678	133,555	137,547	143,047	4.0%	7.5%

* p : estimate

[MSIT · KDA, 2017 Data Industry White Paper, 2017]

The data solution market includes the fields of data collection, design, DBMS, data management, data quality, and data platform, and the 2017 market volume is KRW 1.6536 trillion. The data construction·consulting market is the sector including data implementation & processing and DB design & construction and is valued at KRW 5.8565 trillion. The data service market includes the

data transaction and services on providing information and analysis, which recorded the largest portion with KRW 6.7946 trillion.

B. Platform Economy

Platform economy refers to the specific economic bloc formed by the distinct exchange of various economic activities such as production, consumption, distribution, etc. enabled based on platform. Business transaction and advertisement through platform constitute the largest portion, but the direct & indirect economic effects including the social activities occurring through the platform and network effect are included as the platform economy.

The platform economy is based on the newly emerging The 4th Industrial Revolution; especially, the data platform based on data and AI (Artificial Intelligence) platform are receiving attention as the core technology platform based on virtuality.

The most developed platforms in Korea are the fields of order & delivery, commerce, real estate transaction, and accommodation reservation. In the technical field, the efforts of domestic companies to pull cloud or AI up to the platform field are slowly bearing fruit.

In 2018, the most noticeable news in the domestic platform economy is that the government acknowledged the importance of the platform economy, verifying its significance as the foundation of The 4th Industrial Revolution. Accordingly, the government is planning to invest KRW 10 trillion until 2023 to support actively the platform field for data, AI, and hydrogen economy.

The FinTech platform is also seeing intense competition due to the emergence of Easy payment service and Internet banks. Easy payment service is currently competing through online Easy payment and offline Easy payment services; in 2017, the transaction amount of the Easy payment service tripled to KRW 40 trillion compared to 2016.

Among them, Naver, Kakao, and NHN Entertainment are being stabilized as the main platform in the online Easy payment market, with Samsung Electronics in the offline Easy payment market. Kakao's transaction amount exceeded KRW 1.13 trillion as of March 2018, showing a monthly increase of 900% a mere 11 months after the spin-off into the subsidiary in April 2017 and in May 2018 and initiation of "KakaoPay QR Payment" for small businesses based on the QR Code. In just 3 months, KakaoPay QR Payment had more than 100,000 businesses as subscribers, and the monthly transaction amount of KakaoPay exceeded KRW 2 trillion thanks to such increase.

[Figure 1-1-1] Domestic Status of Easy Payment Platform

Easy payment services expanding their capabilities				
				
	Samsung Pay	KakaoPay	NaverPay	PAYCO
Monthly transaction amount	1trillion KRW	1 trillion and 130 billion KRW (Including simple transfer)	500 billion KRW	400 billion KRW
Number of chain store members	Credit card allowed whole offline stores	12,000 (online)	190,000 (online)	100,000 (online), 130,000 (offline)
New business strategy	Launching in Italy markets in March operating in 21 countries	Launching offline service utilizing QR code and barcode in May	Driving launching financial services in collaboration with Mirae Asset Daewoo	Starting business in meal ticket and coupon markets in the first half of this year

※ PAYCO = NHN Entertainment

[Data by Company, 2018]

Among the companies with the highest value in the world, the fact that the platform companies hold the biggest portion suggests that the platform economy already has significance in the world. Especially, the fact that most of the new unicorn companies are pursuing growth based on platform shows that market presence cannot be maintained without considering the platform.

What is important is that most of the powerful platform companies already developed a successful service and established the platform on these services to have a new ecosystem. In other words, successful service must be developed in the market in advance to establish the platform.

C. Internet Startup

Internet economy based on startups is showing rapid growth globally. Likewise, the Internet venture boom that started with the global supply of Internet is facing explosive growth in the startup ecosystem and business along with the emergence of mobile personal devices such as smartphone, etc.

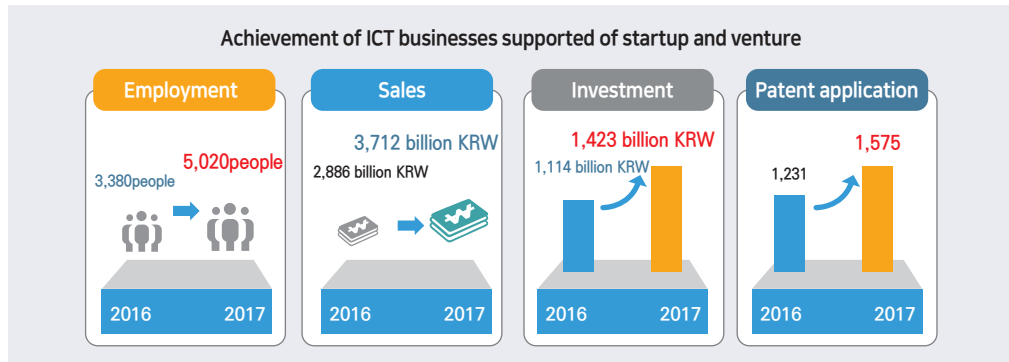
In Korea, the startup ecosystem is continuing stable growth under the continuous startup support policies by the government. According to the 2017 statistical data on the detailed survey among venture companies, there were approximately 7,700 venture companies in Korea as of 2003, and the number of venture companies increased consistently to about 33,000 in December 2016. The gross revenue of the venture companies in 2015 was approximately KRW 228.2 trillion, showing an increase rate of 7.9%.

Various innovative Internet startups are emerging and showing development based on the domestic startup ecosystem that is expanding consistently, and they are also active in the global competition. In addition, the government is operating various programs for supporting startups in advancing into the overseas market, and global investors and companies are showing increasing interest in Korean startups as well.

According to the “2017 Annual Domestic Startup Investment Trend Report” published by specialized startup media Platium in March 2018, investments in domestic startups in 2017 decreased slightly to KRW 953.8 billion compared to 2016 (KRW 1,007.8 trillion) but increased compared to KRW 811.9 billion in 2015.

The Korean government is operating various programs through the relevant ministries and various agencies for quantitative & qualitative startup support policies to support the establishment and overseas expansion of startups. In 2017, the government supported the startups through the “K-Global Project,” and 547 beneficiary companies attracted total investment of KRW 142.3 billion. The number of employees increased 48.5% to 5,020 compared to 2016. The number of patent applications also increased 27.9% to 1,575 cases refer to [Figure 1-1-2].

[Figure 1-1-2] Result of Beneficiary Companies through the 2017 ICT Startup-Venture Support Project



[MSIT, Press Release, 2018]

The Korean startup ecosystem and the startups will show continuous growth. The government sees startup development for innovative growth – one of the economic policies – as an important policy task, and the 4th Industrial Revolution Committee was newly established with the Ministry of SMEs & Startups (MSS) to support the startups and to improve the regulations. Among the startups, new ones are being established continuously; among the startups with increased enterprise value through accumulated investment, “unicorn” startups are expected to emerge consistently. In addition, there will be more investments by startups that already experienced success and by large companies.

2. Internet Industry

A. Status of the Internet Industry

The domestic Internet industry showed sustainable growth thanks to the world's highest level of high-speed Internet supply rate and Internet use. According to the "Status of High-speed Internet Subscribers" announced by the Ministry of Science & ICT (MSIT), the number of high-speed Internet subscribers in Korea stood at 21.2 million in 2017. For each company, KT has approximately 8.76 million subscribers for a 41.3% share, followed by SK Broadband with 5.44 million (25.7%), LG U+ with 3.82 million (18%), and SO (System Operator) with about 3.16 million subscribers (14.9%).

[Table 1-2-1] Status of High-Speed Internet Subscribers

(Unit : 1,000 people, %)

Business \ Year	2011	2012	2013	2014	2015	2016	2017
KT	7,823	8,037	8,067	8,129	8,328	8,516	8,758
	(43.8)	(44.0)	(43.1)	(42.3)	(41.6)	(41.4)	(41.3)
SK Broadband	4,192	4,394	4,569	4,811	5,036	5,207	5,440
	(23.5)	(24.1)	(24.4)	(25.1)	(25.1)	(25.3)	(25.7)
LG U*	2,810	2,743	2,928	3,014	3,483	3,611	3,815
	(15.7)	(15.0)	(15.6)	(15.7)	(17.4)	(17.6)	(18.0)
System Operator (SO)	2,857	2,960	3,060	3,158	3,111	3,160	3,163
	(16.0)	(16.2)	(16.3)	(16.4)	(15.5)	(15.4)	(14.9)
Others	178	120	113	87	66	60	20
	(1.0)	(0.7)	(0.6)	(0.5)	(0.3)	(0.3)	(0.1)
Total	17,860	18,254	18,738	19,199	20,025	20,554	21,196

*Others are relay cable TV, transmission network, specific telecommunication

*SK Broadband includes SKT resales

*) refers to the portion

[MIST, Reconstruction on the status of high-speed internet subscribers, 2018]

The Internet industry refers to the overall economic activities created by the Internet based on information technology; it can be largely classified into three industrial fields: the "Information & Communication Broadcasting Device" industry; the "Information & Communication Broadcasting Service" industry; and the "Software & Digital Contents" industry. The existing classification system was organized according to the ICT classification system, which was amended from the

reorganization of the “ICT Statistical Classification System” in 2014. First of all, the “Information & Communication Broadcasting Device” industry refers to the communication device field including computers, peripheral devices, and wireless devices such as the smartphone, which enables individuals and companies to use the Internet; the “Information & Communication Broadcasting Service” industry deals with the information service through wired & wireless communication, broadcasting service such as IPTV, etc. and Internet for providing the service on using the Internet. Finally, the Internet field of the “Software & Digital Contents” industry includes the package software, game software, IT service, etc.

[Table 1-2-2] Classification of the Internet Industry

Main Category	Sub Category	Third-level Category	Detail Category
Information, Communication, Broadcasting Device	Computer & Accessories	Computer, Peripheral Device	Small computer, Display, Storage device
	Communication & Broadcasting Device	Communication Device	Wireless communication device (Mobile Device)
Information, Communication, Broadcasting Service	Communication Service	Wired Communication Service	Phone service, Wired Facility Access service & Internet backbone service, Exclusive line service, High-speed network service
		Wireless Communication Service	Communication resale and relay service, Wireless High-Speed Internet Service, Wireless Data Communication
		Communication Resale and Relay Service	Line and facility lease, resale, Communication service invitation, Relay service
	Broadcasting Service	Paid Broadcasting Service	IPTV service
	Information Service	Information Infrastructure Service	Data Processing Service, Hosting service, Additional network service, Internet management service, and Other Information infrastructure service
		Information Intermediating Service	Advertising Service, Information Service
		Information Provision Service	Internet Information Provision Service, Voice Information Provision Service, Information Provision Application Service, and Other Information Provision Service
SW & DC	Package SW	System Software, Application software, Industry specialized	Operating system, Contents, Financial software
	Game SW	Cable online game, Mobile game, PC game, Video game, Arcade game	-
	IT Service	IT Consulting & System Development, IT System Management & Support Service, and Other IT Service	IT consulting, IT system design and development, IT system management, BPO service, HW/SW technology supporting

Main Category	Sub Category	Third-level Category	Detail Category
SW & DC	Embedded SW	Embedded SW platform, Industry-dedicated embedded SW	Imbedded OS, embedded SW development tool, Embedded software for wired/wireless communication devices, Information, Home appliance, Office automation devices and smart factory
	Digital Contents Development & Production	Publication, Video, Music, Education	E-Book, Digital Animation, Internet (music), Mobile (music), E-Learning

[KAIT, ICT Survey, 2018]

In the 2017 standard, the market volume of the Internet industry was estimated to be KRW 134.103 trillion. When we look at the detailed fields, the “Information & Communication Broadcasting Device” field was KRW 52.45 trillion -- constituting 39% of the total Internet industry -- followed by the “Information & Communication Broadcasting Service” field with market volume of KRW 29.435 trillion or 22% of the total Internet industry. The market volume of the “Software & Digital Contents” field related to Internet contents was KRW 52.623 trillion, constituting about 39% of the total industry similar to the Information & Communication Broadcasting Device.

[Table 1-2-3] Revenue of the Domestic Internet Industry

(Unit : KRW 1 billion, %)

Division	2017 ^p
Information & Communication Device Industry	52,045 (39%)
Information & Communication Service Industry	29,435 (22%)
Software & Digital Contents Industry	52,623 (39%)
Total	134,103

* p : estimate, () percentage

[KAIT, ICT Survey, ICT Product Survey, 2018]

[Table 1-2-4] Revenue of the Information & Communication Broadcasting Device

(Unit : KRW 1 billion, %)

Division	2017 ^p
Computer & Peripheral Device	11,941 (23%)
Communication & Broadcasting Device (Mobile Device)	40,103 (77%)
Total	52,045

* p : estimate, () percentage

[KAIT, ICT Survey, ICT Product Survey, 2018]

[Table 1-2-5] Revenue of the Information & Communication Broadcasting Service (Unit : KRW 1 billion,, %)

Division	2017 ^p
Communication Service (Wired & Wireless Internet)	7,357 (25%)
Broadcasting Service (IPTV)	3,005 (10%)
Information Service	19,074 (65%)
Total	29,435

* p : estimate, () percentage

[KAIT, ICT Survey, ICT Product Survey, 2018]

[Table 1-2-6] Revenue of the SW & Digital Contents (Unit : KRW 1 billion,, %)

Division	2017 ^p
Package Software	7,913 (15%)
Game Software	10,778 (20%)
IT Service	33,932 (64%)
Embedded Software	-
Digital Contents Development & Production	-
Total	52.623

* p : estimate, () percentage

[KAIT, ICT Survey, ICT Product Survey, 2018]

B. Internet finance & Fintech

1) Internet Banking

Internet banking is an e-finance service that enables customers to use offline bank services -- such as transfer, inquiry, remittance, etc. -- online. Mobile banking is also an e-finance service using the Internet, but customers use mobile communication devices such as smartphone and tablet PC, etc. instead of the general desktop PC to avail themselves of the financial services.

As of the end of 2017, there were about 135.04 million customers registered to the Internet banking service, representing a 10% increase compared to the end of 2016. When we look at the customer

composition for each customer type, there were 126.59 million personal customers and 84.53 million corporate customers, constituting an increase of 10% and 9%, respectively, compared to the previous year.

[Table 1-2-7] Number of Users Registered at Internet Banking of Financial Institutions

(Unit : 1,000 people, 1,000 EA, %)

Category	2013	2014	2015	2016 (A)	2017 (B)	Difference (B-A)	Growth Rate
Individual	89,788	96,825	109,760	114,755	126,593	11,838	10
Corporation	5,704	6,363	7,093	7,783	8,453	670	9
Total	95,492	103,188	116,853	122,538	135,046	12,508	10

[Bank of Korea, Domestic Status of Using Internet Banking Service, 2017]

Customers registering for mobile banking increased according to the increase in the number of Internet banking users. The total number of mobile banking users increased by 1.8 million compared to 2015, reaching 78.36 million in 2016; among them, customers who registered for smartphone-based mobile banking numbered 74.67 million, constituting 95.29%. The number of users also increased 15.3% in 2015 & 2016 compared to 2014 & 2015, respectively, showing steady increase.

[Table 1-2-8] Number of Uses Registered at Mobile Banking of Financial Institutions

(Unit : 1,000 people, %)

Category	2013	2014	2015 (A)	2016 (B)	Difference (B-A)	Growth Rate
IC Chip + VM	12,749	11,905	11,770	3,687	-8,083	-68.7
Smartphone based	37,185	48,203	64,791	74,675	9,884	15.3
Total	49,934	60,107	76,561	78,362	1,800	2.4

[Bank of Korea, Domestic Status of Using Internet Banking Service, 2017]

2) Transfer based Payment

Financial institutions and non-financial institutions are increasing their service portion of use of the FinTech industry for the provision of e-payment service. In the FinTech industry, the payment system refers to using the mobile device for Easy payment when purchasing goods or services online or offline. This is different from the existing method of cash transaction such as cash or plastic card, and smartphone can be used to avail oneself of services such as transfer and payment through the QR Code or APP; representative methods are mobile Easy payment and mobile card.

In Korea, the installation of the 3-type security kit such as personal firewall, keyword security, and virus vaccine and mandatory use of the certificate that stifled the e-finance service providers were

finally abolished in 2015, including the security review system by the Financial Supervisory Service. Accordingly, domestic non-financial companies showed rapid growth, and they are leading the Easy payment & transfer service market. As for the number & amount of using Easy payment and transfer in the 3rd quarter of 2017, non-financial companies accounted for 99% and 98.7%, respectively, with the number & amount of use increasing 38.9% and 47%, respectively, compared to the previous quarter.

In the standard as of the end of 2017, there were 91 e-finance service providers registered to the Financial Services Commission, 23 of which were financial companies. E-payment service can be classified into electronic payment settlement agency service, e-prepayment, e-bill payment, e-debit payment, etc.

In the standard as of the end of 2017, the usage volume (Daily Average) of the e-payment service provided by e-finance service providers and financial companies was 22.59 million cases; the usage amount (Daily Average) was KRW 468.8 billion, representing an increase of 11.5% and 36.5%, respectively, compared to the previous year. The usage amount for each e-payment service was KRW 20,752 as of the end of 2017, representing a 22.3% increase compared to KRW 16,962 in 2016.

[Table 1-2-9] Status of Daily Average Use of E-Payment Service for Each Business Type

(Unit : 1,000 EA, KRW 1 million, %)

Category		2015	2016 (A)	2017 (B)	Difference (B-A)	
						Growth Rate
Payment Gateway Service	Number	3,620.3	4,747.1	6,378.4	1631.3	34.4
	Amount	179,170.3	244,976.0	327,556.1	82,580.1	33.7
Escrow Deposit	Number	1,136.1	1,146.7	1,265.6	118.9	10.4
	Amount	1,136.1	56,342.3	60,945.7	4,603.3	8.2
Debit Payment Instrument	Number	20,627.8	14,295.7	14,822.4	526.8	3.7
	Amount	14,610.2	30,659.4	58,930.0	28,270.6	92.2
Prepaid Payments Instruments	Number	6,902.1	65.4	124.9	59.5	90.9
	Amount	34.9	11,593.0	21,388.0	9,795.0	84.5
Electronic Bill Presentment and Payment	Number	47.1	0.1	0.4	0.3	360.0
	Amount	1.4	3.5	6.5	3.0	85.2
Total	Number	19,402.9	20,255.1	22,591.8	2,336.7	11.5
	Amount	252,372.9	343,574.3	468,826.2	125,252.0	36.5
	Amount per EA	KRW 13,007	KRW 16,962	KRW 20,752	KRW 3,790	22.3

* The values in 2016 were adjusted according to the modification of usage result by some companies

* Usage result of e-money payment service included

[Press Release by the Bank of Korea, Status of Using E-payment Service in 2017, 2018]

In the standard as of the end of 2017, the usage result (Daily Average) of the Easy payment service was 680,000 cases, representing a 375.8% increase compared to 140,000 cases in 2016. The usage amount increased by KRW 28.3 billion (417.3%) to KRW 35.1 billion as of the end of 2017 compared to 2016.

In 2017, the payment settlement market showed more rapid changes through innovation compared to 2016; especially, there were changes in the awareness of financial consumers with regard to mobile payment and digital currency. This market is forecast to show higher growth based on FinTech related to The 4th Industrial Revolution.

Several noticeable activities in the market give rise to expectations of changes and innovation in the financial payment market in the future. First of all, since the use of mobile APP is increased to be generalized, we are using mobile more; mobile payment is also showing consistent increase, leading to an increase trend.

3) Crowd Funding

Crowd funding is different from the existing stock listing; it refers to the method wherein the venture entrepreneur or the small ~ medium-sized enterprise can be supported with business funds.

In Korea, the bill on crowd funding was passed in July 2015 and has been enforced since January 2016. There were some restrictions such as investment limit for protection against any side effects and to protect the venture & startup companies; last June, however, the Financial Services Commission decided that the crowd funding market has developed sufficiently to ease the restriction of investment limit to activate crowd funding.

The fund issuance limit of financing through crowd funding is also being promoted with the method of expanding by over 2 times, and the law on the tax rate for P2P loans will be introduced as well. At the same time, the tax rate in the P2P loan market will be relieved to enable activation. In April 2017, the government stipulated the policy through the amended tax bill, i.e., the interest income tax rate on the return on investment of P2P finance will be reduced from the current 25% to the interest income tax rate level of deposit & installment savings (14%). After the legislation is completed along with relieving the tax rate, the ecosystem of the FinTech industry is expected to be invigorated.

The domestic P2P loan market volume started from the accumulated amount of KRW 89.1 billion in May 2016 and exceeded KRW 500 billion in January 2017. As of the end of August 2018, an accumulated amount of KRW 2.495 trillion was recorded, representing a 2,800% increase compared to the accumulated amount in May 2016 on the initial disclosure after enforcing the bill related to crowd funding in January 2016. In Korea, P2P loan agencies were first established in 2006; as of the end of 2017, there were a total of 34 P2P loan agencies. As of the end of August 2018, there were a total of 60 P2P loan agencies in the market.

The domestic market volume of crowd funding is expected to increase according to the government's expansion of scope of using crowd funding, deregulation such as relieving the tax rate on P2P loan, and basic trend of investment protection. Accordingly, the domestic market volume of crowd funding is forecast to reach USD 21.5 billion by 2019.

4) Asset Management

Robo-Advisor is a compound word of Robot (Robo) and asset management advisor; it refers to the AI (Artificial Intelligence) investment platform based on the robot with investment-centered algorithm.

In Korea, the Financial Services Commission amended the Financial Investment Business Act in June 2018, allowing untact investment discretionary contract of the Robo-Advisor that satisfied the disclosure requirement of 1.5 years. In addition, along with the advancement in the policy, many companies including financial institutions have developed -- or are in the process of developing -- the relevant services.

The domestic Robo-Advisor market volume was estimated to be approximately KRW 1 trillion in 2018 and is expected to reach KRW 2 trillion in 2019, KRW 25 trillion in 2023, and KRW 30 trillion by 2025.

5) Internet-Only Bank

Internet-only bank refers to any of the banks operating with the minimum number of offline branches or performing most of the work through e-media such as ATM and Internet, etc. without any offline branches.

In Korea, all banks including Internet-only banks are governed by the regulation on the "separation of industrial and financial capital." The regulation on Internet-only banks regarding the minimum capital amount is KRW 25 billion as relief from the KRW 100 billion for commercial banks; untact real name verification was also permitted to enable the opening of new account and financial transaction without face-to-face meeting.

In November 2015, the Financial Services Commission approved 2 consortiums of Korea KakaoBank and K-Bank as Internet-only banks as a measure for the financial reform of enabling innovation in the financial services and enhancing the competitiveness of the banking industry through convergence between the ICT·finance sectors.

Internet-only banks must operate using the method of e-financial transaction according to Paragraph 1, Article 102 of the Banking Supervision Regulations. In other words, Internet-only banks must provide financial instruments & services through electronic devices (CD, ATM, computer, phone, etc.), so that users are able to use the financial instruments & services in an

automated method without meeting bank personnel face-to-face.

[Table 1-2-10] Deregulation Method by the Government in 2015 related to Internet-only Bank

Division	Existing Method	Amendment (Plan)
Easing of the separation of industrial and financial capital	Industrial capital possessing 4% or more financial capital is prohibited	Except for mutual investment-limited corporate groups, the financial capital possession limit on industrial capital is expanded to 50%
Scope of Work	Loan & depository work	Equal to ordinary banks, credit card issued
Minimum Capital Amount	Commercial Bank -KRW 100 billion Local Bank -KRW 50 billion	KRW 25 billion nationwide
Financial Real Name Verification	Face-to-face verification	Untact real name verification possible

[Financial Services Commission, 2015]

Internet-only banks expanded the business based on the low interest on loan and high convenience in use, etc., and contributed to cultivating a competitive environment in the banking industry by inducing existing banks to expand the untact channels and to improve customer services, etc. Note, however, that the middle-credit loan was not activated as much as expected, and the BIS capital ratio – which has reached a maximum of 24.3% since its establishment – was reduced to 11.4% as of the end of March 2018. This suggests that there are limitations in the attempt to expand the loan for a turnaround.

C. e-Commerce

In 2017, the volume of online shopping transactions in Korea increased 19.2% to KRW 78.2 trillion compared to the previous year. In the last 4 years, the online shopping transaction volume has seen an annual average increase rate of 19.25% to record the highest growth rate among the retail businesses.

The product groups with the highest increase rate in transaction amount compared to the previous year were the beverage-food products (38%), home appliance-electronics-communication devices (24.3%), and travel & reservation service (14.8%), accounting for a large portion of consumer goods transactions out of the total transaction amount and recording a high increase rate compared to the previous year.

[Table 1-2-11] Volume of Online Shopping Transactions (2014~2017)

(Unit : KRW 1 million, %)

Year	2014	2015	2016	2017
Volume of Online Shopping Transactions (KRW 1 million)	45,302,487	54,055,617	65,617,046	78,227,331
1-Year Growth Rate(%)	18	19	21	19

[KOSIS, Korea Statistics Portal Online Shopping Trend, 2017]

Out of the total online shopping transaction amount in 2017, the mobile shopping transaction amount increased 34.6% to KRW 47.8 trillion compared to the previous year, accounting for 61.1%. When we look at the statistics in 2016 when a higher mobile transaction amount than the PC transaction amount was recorded for the first time, the former increased 7% from 54.1%; thus suggesting that purchase through mobile is being expanded.

In 2017, the online overseas direct revenue was approximately KRW 2.9 trillion, increasing 28.7% compared to the previous year; the overseas direct purchase amount increased 17.6% to about KRW 2.2 trillion.

For the composition rate of overseas direct revenue for each country, China showed the highest purchasing power with 78.5%, followed by the USA with 6.1%, Japan with 4.7%, and Southeast Asian countries with 3.7%. Public direct revenue increased 29% compared to the previous year despite the trade disputes and somewhat intense international situation, with the USA recording a 17.1% increase and Japan posting a 13.9% increase.

In 2017, 79.3% of the overseas direct revenue came from duty-free shops, with China accounting for 92%. When we look at the revenue for each item through the duty-free shop, cosmetics recorded the highest amount (KRW 1.9896 trillion), followed by clothing & fashion (KRW 225.4 billion) and household appliances/electronics/communication devices (KRW 31.9 billion).

In 2017, 97.6% of the total online overseas direct purchase amount was concentrated on 4 countries; in the standard for transaction amount, the share for each country is in order of USA (57.4%), EU (21.3%), China (11.5%), and Japan (7.5%). Moreover, in the standard of transaction amount, the increase rate compared to the previous year for each country was as follows: EU (30.2%), China (48.2%), USA (5.3%), and Japan (61.1%). Direct purchase in Japan and China by domestic consumers increased greatly, whereas that in Central & South American decreased 70.4% compared to the previous year.

D. O2O and Sharing Economy

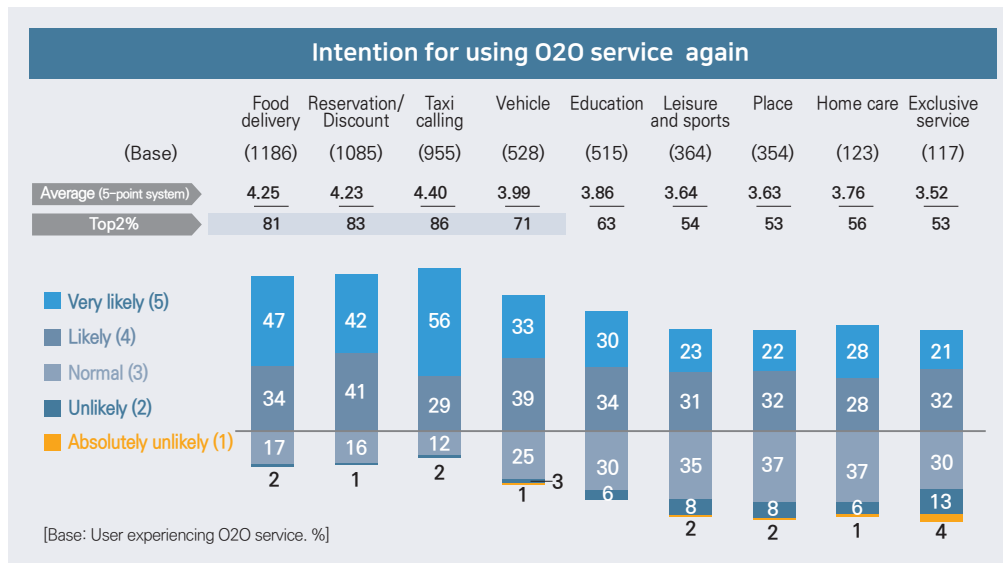
1) O2O Service

O2O (Online to Offline) service is defined as the “omni-channel converging online & offline; for any channel such as offline, PC, mobile, etc., the shopping environment of using the equal store is provided.” It is a concept of digital matching that connects the consumers and service providers through the APP as well as a concept of sharing economy or collaborative economy.

O2O is referred to as the representative bridging service in the period of The 4th Industrial Revolution. This is a service that is popular for a fixed period of time and is utilized as material for the ultimate technology of disappearing after fulfilling its duties. Note, however, that the meaning of disappearing specifies that the service is stabilized deep into our lives. O2O does not have a technology barrier, and it is bridging the existing industry with online and offline centering on the smartphone to change all fields efficiently without discrimination.

According to the 2017 report by the KT Economics & Business Research Institute, the O2O market will increase to KRW 32.1 trillion in 2017 compared to KRW 17.1 trillion in 2016, and the domestic O2O market will grow up to KRW 108.1 trillion by 2020.

[Figure 1-2-1] Survey on Intention of Use of O2O Service by Consumers



[Opensurvey, O2O Service Usage Trend Report, 2017]

Domestic conditions are similar to the foreign conditions, but the difference lies in the evolution into O4O; this is a phenomenon arising from the sense of crisis on the limits to the growth of online.

Online is approached using the method for offline to enable the companies to expand offline based on the asset information of the company, and online is linked with offline to provide customers precise and seamless service.

O2O companies are finding new methods through not only offline experience-type O4O but also the diversity and convenience of the online & offline payment service, Big Data processing and M&A, etc. to show effects. Companies are increasing their net profit, and -- as shown in the example of several companies introduced earlier -- there is a polarization of wealth among companies.

The recent changes in consumption pattern are accelerating seamless online behavior, combining offline with online and also online with offline. Ultimately, this is referred to as the interconnection of O2O and O4O, and all channels are provided to the consumers. When consumers were asked during the 2017 open survey as to which services they will use in the near future, they replied that the O2O service will be used consistently based on fields that are very close to our everyday lives and are frequently used such as the food-related delivery service, which has a high usage rate even today, or the reservation, discount, and taxi call services, etc.; this is estimated to have high growth possibility in the future. Especially, the survey indicates that all services will continue to be used overall; considering the fact that over 50% of most services are being used today, the O2O service can be said to have stabilized quickly as a living service.

2) Blockchain & Sharing Economy

Sharing economy is an economic activity and a social phenomenon wherein the individual is the center of the economic activity; this implies that the center of economy has shifted drastically from companies to individuals.

With the users participating so actively in the initial period of Internet that they have become consumers of information, they are also producing economic value in the economy. Users are also participating not only in producing economic value but also in distribution; the method of consumption is developing as well into sharing or subscription types instead of ownership. In other words, individuals are becoming the center of all fields of producing, distributing, and consuming economic value.

The rapid spread of the sharing economy worldwide is a natural phenomenon according to the rapid supply of innovative technology, hyper-connected society, increase in the role of individuals, and change in consumption pattern. Among the world's top 10 startups with enterprise value, 4 are in the field of sharing economy, suggesting the rapid development of the sharing economy market. There are various sharing services, but those showing the most noticeable growth are car & riding, accommodations, office, and financial field.

For the past 2~3 years, Bitcoin has shown rapid increase in value; thus suggesting the possibility of

decentralized autonomous infrastructure of the blockchain. Bitcoin is a digital currency that can be exchanged peer-to-peer without the intervention of a 3rd-party mediator to secure reliability, and blockchain is the technology enabling the Bitcoin.

The emergence of various blockchain-based tokens enabled the data, social value, environmental value, and various resources that were previously not convertible through the existing currency to be converted into economic value and a reliable peer-to-peer exchange environment to be established. From this perspective, blockchain is distinguished from the existing Internet of Information to be defined as the Internet of Value as well.

Blockchain is a network constructed based on the Internet of Information, and it will evolve faster than the Internet of Information. The definition of blockchain, i.e., the network that enables reliable peer-to-peer exchange, is in line with the definition of the sharing economy as a person-centered economic model. In other words, when the act of individuals exchanging value through blockchain is interpreted from the economic perspective, that is sharing economy.

There are five reasons sharing economy had a turning point with the emergence of blockchain; first is that the economic value produced by individuals can conveniently be used with transaction.

Second, it is possible not only to convert into the existing currency but also to tokenize social data, activities, and various assets to expand the subject for creating sharing value by the individuals. Third, individuals can create an incomparable amount of various sharing values to be used with transaction with anyone in the world, and this will amplify the added value.

Fourth, funding is possible to establish a decentralized autonomous union through the token economy and ICO (Initial Coin Offering) based on blockchain.

Fifth, the philosophy of platform unionism as described earlier can be realized through decentralized unionism without the platform, and the existing sharing economy market can change rapidly.

[Table 1-2-12] Comparison of Centralized Sharing Economy and Decentralized Sharing Economy

Category	Centralized Sharing Economy	Decentralized Sharing Economy
Owner	Company (Ex.: Uber, Airbnb)	Participant (Host/Micropreneur, Guest)
Construction Cost Funding	Investor (Venture Capital)	ICO (Initial Coin Offering) & Token Economy
Character	Business	Community
Operating Method	Board of Directors & Executives of the Company	Autonomous Operation of the Community
Commission	15%~30%	0%
Participant Compensation	Limited (Securing Accommodations, Invitation)	Huge economic compensation according to the participation value
Beneficiary of Created Value	1. Investor 2. Company Founder, Employee	1. Participant (Host/Guest) 2. Project promotion team & adviser 3. Initial investor

[Wehome, Home Sharing on Blockchain, 2018]

Blockchain and sharing economy have outstanding consistency philosophically or functionally, so more blockchain-based sharing economy protocols or services are forecast to emerge. The blockchain utilization method or project character will be developed into various forms, but the decentralized autonomous organization based on combination-type sharing service without the mediator is the most ideal model.

E. Online Advertising

Online advertisement is expanding from web to mobile to become the main source of profit for ICT service providers and as the foundation for creating new services.

In Korea, online advertisement emerged as the number 2 advertising medium next to broadcasting in 2011; since 2014, online advertisement has been the only one showing consistent growth among the advertisement media. Especially, online advertisement outperformed the broadcasting advertisement market -- which had the largest volume so far -- to record the highest advertisement revenue in 2016; online advertisement constitutes 35.2% of the total advertisement market. Unlike other advertisement media, which has shown a slowdown in growth since 2017, the online advertisement market is recording consistent growth of 6% to lead the overall advertisement market.

[Table 1-2-13] Revenue for Each Advertisement Type in Korea

(Unit : KRW 1 million, %)

Category	2014		2015		2016		2017 ^e		2018 ^e	
	Revenue		Revenue		Revenue		Revenue		Revenue	
	Share	Growth Rate	Share	Growth Rate	Share	Growth Rate	Share	Growth Rate	Share	Growth Rate
Broadcasting	4,185,239		4,463,967		4,105,595		4,141,722		4,154,314	
	(38.4)	-	(38.8)	(-6.7)	(34.8)	(-8.0)	(34.2)	(0.9)	(33.7)	(0.3)
Print	2,051,656		2,035,404		1,979,878		2,012,531		2,001,668	
	(18.8)	-	(17.7)	(-0.8)	(16.8)	(-2.7)	(16.6)	(1.7)	(16.2)	(-0.5)
Online	3,050,949		3,427,815		4,154,724		4,421,253		4,684,253	
	(28.0)	-	(29.8)	(12.4)	(35.2)	(21.2)	(36.6)	(6.4)	(38.0)	(6.0)
Outdoor	1,172,408		1,061,274		1,088,531		1,063,174		1,033,383	
	(10.8)	-	(9.2)	(-9.5)	(9.2)	(2.6)	(8.8)	(-2.3)	(8.4)	(-2.8)
Others	395,046		336,666		278,979		273,823		266,623	
	(3.6)	-	(2.9)	(-14.8)	(2.4)	(-17.1)	(2.3)	(-1.9)	(2.2)	(-2.6)
Total	10,895,513		11,496,332		11,793,720		12,096,429		12,333,098	
	(100.0)	-	(100.0)	(5.5)	(100.0)	(2.6)	(100.0)	(2.6)	(100.0)	(2.0)

* e : estimate

[KOBACO, Broadcasting Communication Advertising Cost Survey Report, 2017]

Online advertisement can be classified further into PC-based Internet advertisement and mobile device-based mobile advertisement. Internet advertisement, which has shown annual average growth rate of 28.3% since 2000, is now entering the mature period; hence the slowdown in growth rate. Meanwhile, mobile advertisement is increasing rapidly along with the expansion of smartphone supply. In fact, the revenue in 2015 exceeded KRW 1 trillion, and it is forecast to exceed the revenue of Internet advertisement in 2017.

According to the result of estimating the video advertising market volume in the “2018 First-half Business Analysis Report” announced by Mezzo Media, Google’s YouTube recorded KRW 116.9 billion in sales in the first half of 2018, accounting for 40.7% of the total market. Facebook is in second place with KRW 93 billion in sales (32.4%), with Korea’s main media companies Naver (KRW 24.9 billion, 8.7%) and Daum (KRW 16.4 billion, 5.7%) ranking third and fourth, respectively.

3. Internet Service Convergence

A. IoT

IoT (Internet of Things) is the technology of using sensor on all things including people and things to collect and exchange data. It is being heralded as the next-generation technology that will lead the hyper-connected society.

At present, IoT is gradually being applied to our everyday lives. A report from a research institute estimated that the global IoT market will show annual average growth of 28.8% from USD 300 billion in 2015 to USD 1 trillion in 2020; the domestic IoT market is also forecast to show annual average growth rate of 38.5% from KRW 3.3 trillion to KRW 17.1 trillion during the same period.

The 2017 IoT Industry Survey by the Ministry of Science & ICT (MSIT) showed that the Korean IoT market in 2017 had 2,118 companies with approximately 480,000 employees working in the market, and that the market rapidly grew 23.4% to KRW 7 trillion. The range of application for each industry and empirical cases are expected to show gradual increase based on the innovative solutions developed consistently and which will give birth to various services.

A representative demonstration project by the government for the development of IoT is the KRW 4 billion public demand discovery & application support project announced during the 2018 briefing. Efforts for discovering IoT services are being continued as well in the private sector. Three main domestic mobile service companies are engaged in an intense competition to preoccupy the IoT communication market. SK Telecom completed the construction of the national network for LoRa in July 2016 as part of efforts to pioneer the market related to the Internet of Small Things such as gas or power meter to exchange a small amount of data and by using an inexpensive device. KT and LG U+ are also showing the will for active cooperation for the NB-IoT commercialization that adopted LPWA (Low Power Wide Area) technology, which uses licensed bands unlike LoRa.

Thus, Korea has recently been promoting the connection between the open platform development & demonstration & pilot project by discovering promising IoT services with high possibility of advancing into the overseas market and with high ripple effect to become the leading IoT country that develops and realizes IoT service most actively in the world.

Moreover, global companies in the IoT field are enabling industrial, academic, research institute, and government cooperation in Korea to develop IoT entrepreneurs and for the joint development

of products and services. Through such efforts, not only the construction of safe & dynamic IoT development infrastructure but also the establishment of an environment where various small ~ medium enterprises and venture companies can advance into the new market based on creative & innovative ideas and technologies can be expected.

B. Cloud

The National Institute of Standards and Technology (NIST) defines cloud computing as a “computing model that can access the network whenever, wherever conveniently and according to the need for configurable shared computing resources (network, server, storage, application & service) provided and distributed quickly through minimum management effort and interaction with the service provider”; it is providing the technology road map, trend, standard, and security guideline.

In 2015, the government enacted the 「Act on the Development of Cloud Computing & Protection of Its Users (hereinafter referred to as the “Cloud Computing Act”)」 and announced the K-ICT Cloud Computing Activation Plan (1st Basic Planning on Cloud Computing Development (2016~2018). Various policies such as cloud computing quality·performance verification system and security authentication system implementation, etc. are also implemented to promote the development of the cloud computing industry and to provide an environment of safe cloud computing use at the same time. Despite these policy-related efforts, however, the expansion speed of cloud computing in the domestic market is still slow.

Korea accounts for only 0.6% (USD 730 million) of the global cloud computing market, but the domestic cloud computing market is forecast to record an annual average growth rate of 14.8% from KRW 796 billion in 2017 to KRW 1.3041 trillion by 2021 (IDC, June 2017). The overseas cloud computing market is being developed centering on SaaS, but the domestic market in the 2017 standard posted 52.1% IaaS, 41.1% SaaS, and 6.7% PaaS. This shows that it is still developing centering on IaaS (IDC, June 2017). Among the domestic companies, existing IT companies such as KT, NBP, LG CNS, SK, Samsung SDS, NHN Entertainment, Douzone Bizon, Younglimwon Softlab, etc. are advancing into the cloud computing market, with the number and revenue of companies specializing in the cloud computing service increasing consistently. In the 2017 standard, there are 700 companies in the market with total revenue of KRW 1.5134 trillion (NIPA, 2017 Cloud Industry Survey).

Domestic cloud computing companies are evaluated to be lacking in various services, technology, and expertise in the competition with global companies. Especially, domestic cloud computing

companies are weak in providing the platform linked with IoT, Big Data, and AI as well as alliance between companies. Among the domestic software companies, only 9.5% (700 companies in 2017) are cloud computing companies; this implies that domestic software companies are still focusing on package software and SI. Note, however, that the domestic cloud computing service market is showing distinct growth; especially, growth centering on SaaS is expected. According to the report announced by Gartner in September 2018, the expenditure of the final user of SaaS in Korea is approximately KRW 840.4 billion, accounting for almost 50% of the total expenditure on cloud computing service; it is forecast to exceed KRW 1 trillion in 2019.

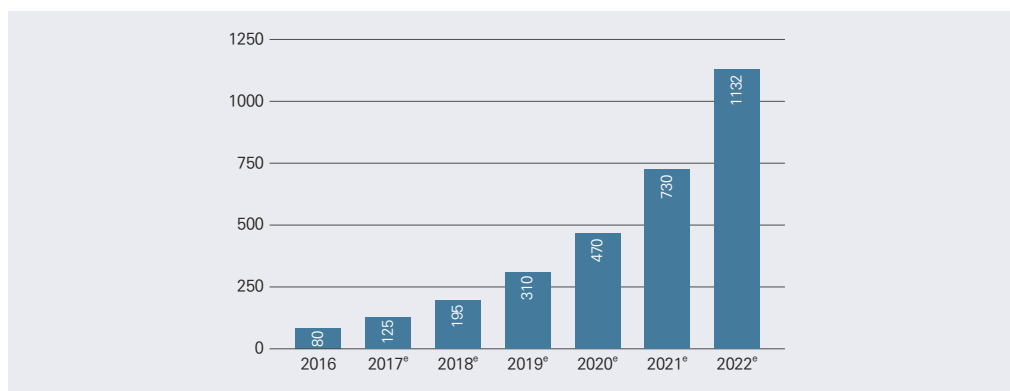
C. Artificial Intelligence

AI (Artificial Intelligence) is generally referred to as the “system that enables action as if having intellect like human”. Note, however, that only the partial capabilities of human are copied, and there is no technology for following the overall thinking system of human. There are more AIs resembling the capabilities of human thanks to technical development, but there is still a difference, the biggest of which is free will.

“Free Will” can be understood as determining one’s basis for action by oneself. AI that cannot establish “free will” is referred to as weak AI, and that which thinks like human as in SF films or novels is called strong AI. Some in the scientific world predict that there can be an existence possibly exceeding the intellectual capability of human -- in other words, the emergence of strong AI -- and that those with intelligence exceeding that of human will be referred to as super intelligence.

[Figure 1-3-1] Global AI Market Volume

(Unit : USD 100 million)



*e : estimate

[IDC]

At present, all AI technologies are weak AI, and it is still unclear whether we will be able to develop AI into strong AI just before super intelligence. Nevertheless, the AI market is showing rapid increase, with market survey company IDC forecasting that the USD 8 billion AI market as of 2016 will grow up to USD 12.5 billion in 2017 and reach USD 113.2 billion by 2022 [Figure 1-3-1], for an annual average growth rate of 55.5% during the period 2016~2022.

The Korean government announced the AI industry support measures in March 2017, and the Ministry of Science, ICT & Future Planning (currently Ministry of Science & ICT (MSIT)) presented the KRW 163 billion investment plan with the goal of developing the key fields of the intelligent information technology of AI software, relevant hardware and basic technology, etc. In February of the same year, MSIT announced the regulatory innovation method regarding AI, VR (Virtual Reality), and FinTech.

The active policy response on AI is also continuing through the policies in 2018. The Presidential 4th Industrial Revolution Committee reviewed and decided on the “AI R&D Strategy” in May; the plan is to promote the large-volume project during the period 2020~2024 centering on the national defense, medical, and safety fields. In July 2018, the Ministry of Science & ICT (MSIT) announced the promotion plan of the “AI & Bio-Robot Medical Convergent Technology Development Project by Government Ministries”; this project is participated in by the Ministry of Science & ICT (MSIT), Ministry of Trade, Industry & Energy, Ministry of Health & Welfare, and Ministry of Food & Drug Safety. In this project, a total of KRW 42 billion will be invested for 5 years until 2022.

D. Virtual Reality

It has only been about 4 years since VR (Virtual Reality) entered the stage of popularization wherein the general public can easily enjoy VR. In 2018, the VR market faced a considerable number of changes, such as reducing the new hardware being launched for improving and modifying the technologies for a new leap in VR and increasing the next-generation VR technologies and relevant parts.

When we look at the report by market survey company TrendForce in January 2018, 3.7 million VR headsets were sold globally in 2017 excluding the VR headset utilizing the smartphone; in 2018, 500 VR headsets were estimated to have been sold. It is still too early to regard this as sufficient supply, but we must focus on the fact that the level of increase is a rapid one.

Nonetheless, the smartphone VR that led the initial stage of VR is expected to shrink gradually. VR enjoyed with a smartphone is actually an option on the smartphone; nowadays, the trend of

mobile VR is the stand-alone type of VR device with enhanced specialization and reduced price.

As one characteristic of the VR headset market in 2018, most of them can realize room-volume & 6-degree freedom. Unlike the VR that is used while sitting down or standing up, room-volume VR is mounted with internal & external sensors to enable the user to move around in a certain space; the axial rotation and spatial movement are recognized to have huge impact on increasing the immersion level of VR.

Various types of VR headsets are also sold domestically, with the relevant contents distribution platforms such as Oculus, Steam, PSN, and Window MR being serviced; nonetheless, it has been pointed out that the entry barrier of the hardware is still too high.

At present, the VR technology and platform are in the mediating stage but are expected to be finished by the end of 2018 or mid-2019. After the mediation is finished, the VR market will enter the second stage to start the competition again, and the option for consumers and the industry will increase further compared to before 2018.

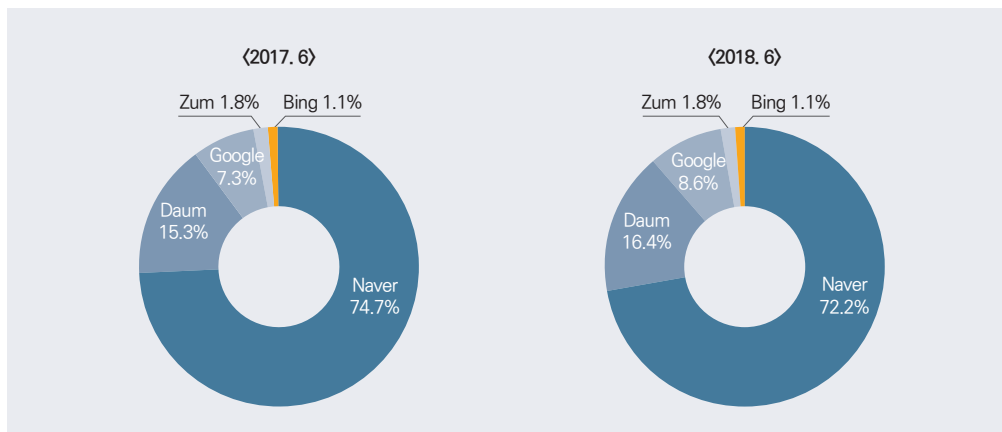
4. Internet Information Service

A. Search Engine

When we look at the share on website search QC (Query Count) on the main domestic search engines as of June 2018, Naver accounts for 72.2%, which is still a considerable portion, followed by Daum with 16.4% and Google with 8.6%. Note, however, that Naver recorded a 2.5%p decrease in search QC share compared to June 2017, but Daum and Google posted increases of 1.1%p and 1.3%p, respectively. Zum recorded a 1.6%p increase in share as of June 2018 but posted a 0.2%p decrease compared to June 2017, whereas Bing's share increased 0.2%p to 1.1% in June 2018.

[Figure 1-4-1] QC Market Share of Domestic PC Search Engine

(Unit: %)

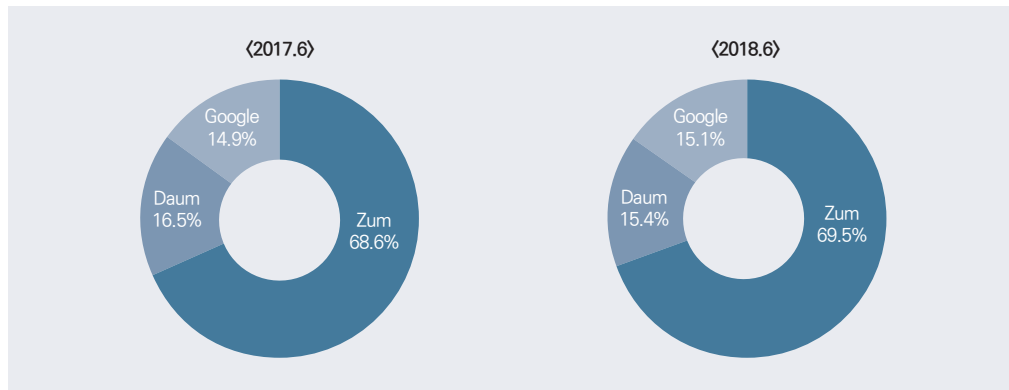


[Nielsen Korea, www.koreanclick.com]

When we check the share through the mobile website search QC run in the basic browser of the previous version of Android OS, Chrome Browser under OS 6.0, and Samsung S Browser under OS 7.0 version (most of the mobile search traffic occurs through the application, but measurement was not possible through the mobile website search QC), Naver accounted for 69.5% as of June 2018 -- securing a large share as in PC -- followed by Daum with 15.4% and Google with 15.1%. Unlike PC, the search QC share of Naver increased 0.9%p, and that of Google rose 0.2%p in the mobile website compared to June 2017, but Daum recorded a 1.1%p decrease.

[Figure 1-4-2] QC Market Share of Domestic Mobile Search Engine

(Unit: %)



[Nielsen Korea, www.koreanclick.com]

B. Communication

1) SNS

Among the Internet users on PC and Android smartphone in Korea, 77.8% used SNS within the last one month, and the monthly average use per user was found to be 388.9 minutes. When this was converted into daily average, the users were found to spend approximately 13 minutes on SNS. In addition, as a result of analyzing the usage pattern for each device, use through mobile out of the total SNS usage hours accounted for 96.9%; thus showing that SNS is generally being used via mobile rather than on PC.

[Table 1-4-1] SNS Usage per Device (as of June 2018)

Device	Number of Users (1,000 EA)	Reach Ratio (%)	Total Use Hours (one-millionth minute)	Portion of Total Use Hours (%)	Monthly Average Use Hours (min.)
PC + Mobile	30,260	77.8	11,769	100	388.9
PC	13,422	42.6	367	3.1	27.4
Mobile (①+②)	25,397	82.8	11,401	96.9	448.9
① Mobile WEB	8,132	26.5	131	1.1	16.1
② Mobile APP	24,042	78.4	11,271	95.8	468.8

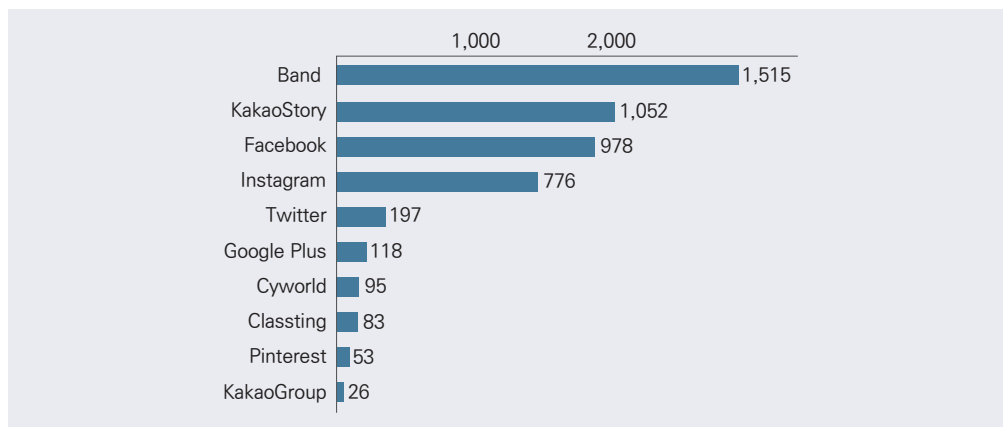
※ Mobile was measured limited to Android smartphone users

[Nielsen Korea, www.koreanclick.com]

The analysis result for services in the higher rank in the standard for the number of net users within the SNS category (limited to Android smartphone) showed that “Band” secured the highest number of users due to its popularity among the middle-aged class with a large number of users, followed by “Kakao Story”, “Facebook”, “Instagram”, and “Twitter”. In the standard for total use hours, “Facebook” held the 1st-tier position, with “Band”, “Instagram”, and “Twitter”, etc. in the 2nd tier. According to the recent 1-year trend, however, “Facebook” –which contributed greatly to the overall activity performance -- showed consistent decrease in the use hours. At the same time, the 2nd tier also recorded decrease or no change in the use hours, with only the use hours of “Instagram” increasing consistently to 26.9% compared to June 2017.

[Figure 1-4-3] Number of Users in the Top 10 Services (as of June 2018)

(Unit : 10,000 people)



[Nielsen Korea, www.koreanclick.com]

2) Instant Messenger

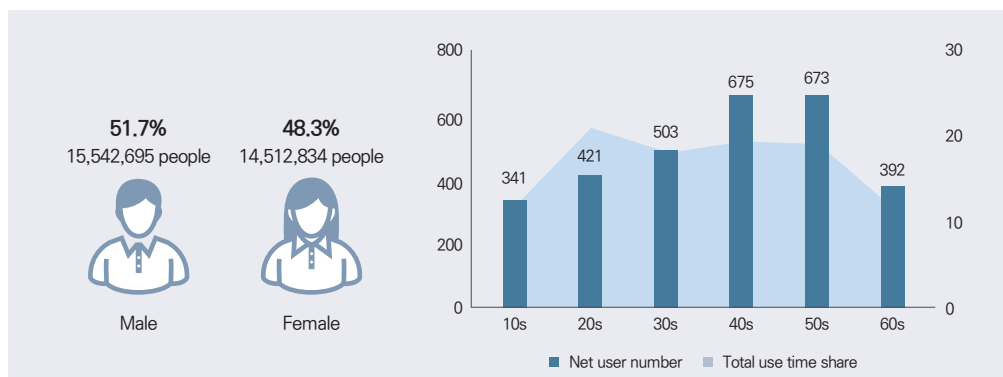
Among the Internet users on PC and Android smartphone in Korea, 97.9% were found to have used mobile instant messenger within the last one month. Thus, messenger showed the highest reach ratio among the Internet-based communication services, becoming stabilized as a universal service. The monthly average use hours for 1 person was found to be 941.8 minutes; when this is converted into daily average, users spent about 31 minutes on messenger per day.

Instant messenger was found to have been used more frequently by female users compared to male users (Male – 51.7%, Female – 48.3%); for each age group, the middle-aged class (40s & 50s) showed the largest portion as in SNS, followed by those in their 30s, 20s, 60s, and teens. In the standard for total use hours, the use hours of those in their 20s accounted for the largest portion, with those in their 40s and 50s posting 19.7% each and those in their 30s recording 18.7%; thus showing that there was no big difference as in the age group for SNS use hours. Meanwhile, the use hours of those in their teens constituted 8.4%, representing a relatively small portion even when considering

the small user level. This can be interpreted to mean that the online communication pattern of those in their teens changed considerably from using the messenger to now using the SNS chatting function.

[Figure 1-4-4] Mobile Instant Messenger Usage According to Age and Gender Demographic (as of June 2018)

(Unit : 10,000 people, %)

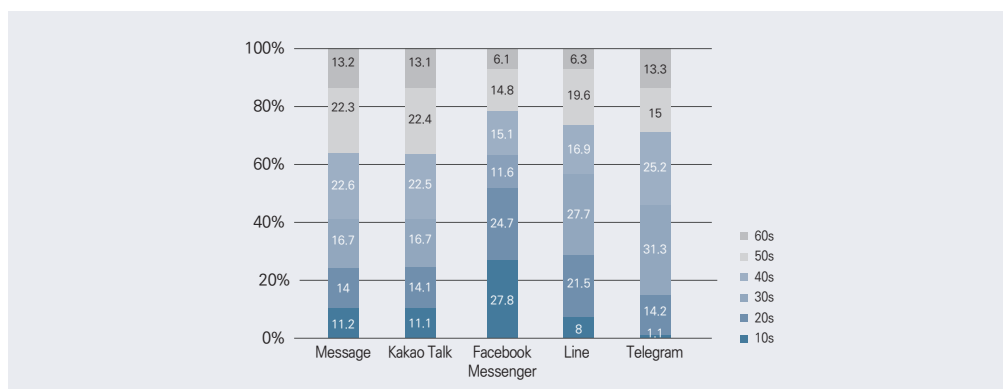


[Nielsen Korea, www.koreanclick.com]

As a result of analyzing the services in the higher class of users within the messenger category (limited to Android smartphone), the basic APP “Message” and “KakaoTalk” were in the 1st tier. In addition, “Facebook Messenger” was found to be in 2nd tier with a gap from the 1st tier, followed by “Line” and “Telegram”. Messenger was an existing personal connection-based service with strong lock-in effect; thus, excluding this basic APP, one service maintained the exclusive position. According to the recent 1-year trend in use hours, however, the activeness of “KakaoTalk” is showing a gradual decrease, whereas others are maintained or increased except for “Line”. Especially, “Telegram”, known as the “Confidential Messenger”, is starting to see an increase in use hours as there is more information sharing of cryptocurrency.

[Figure 1-4-5] Composition Ratio of User Age Group per Services (as of June 2018)

(Unit : %)



[Nielsen Korea, www.koreanclick.com]

The analysis on the composition ratio of the user age group for main services shows that “Message” and “KakaoTalk” have very similar composition ratio, suggesting that users of all age groups acknowledge “KakaoTalk” as an essential service along with the APP “Message”. “Facebook Messenger” had a very high number of users in their teens compared to other services with 27.8%; for “Telegram”, users in the 30s & 40s age group constituted 56.5%.

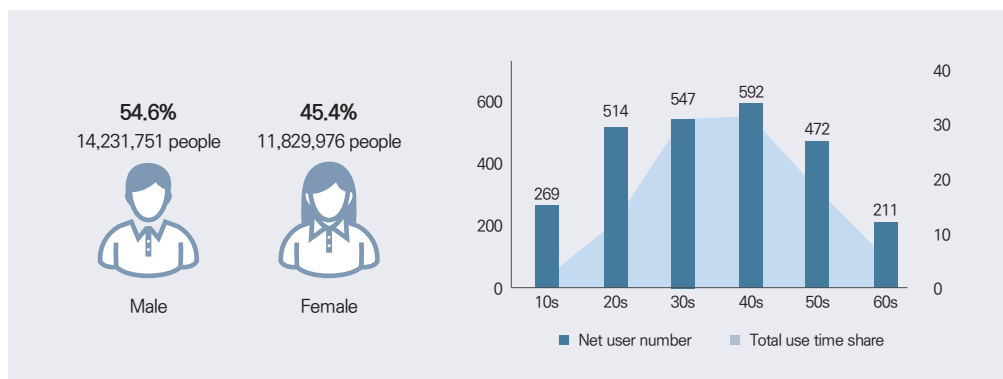
3) E-mail

Among the Internet users on PC and Android smartphone in Korea, 67% used E-mail within the last 1 month, and monthly average use hours per user was found to be 64.9 minutes. As the most popular communication service in the initial stage of PC communication, e-mail recorded a relatively low reach rate compared to SNS and Instant Messenger. Nonetheless, majority of the users are still using E-mail as an efficient method of communication in specific circumstances. As a result of analyzing the user pattern for each device, use through PC out of the total E-mail use hours stood at 91.1%, suggesting that E-mail is stabilized as the PC-based service used mostly in high-involvement communication rather than instant communication.

For E-mail users, there were more male than female users (Male – 54.6%, Female – 45.4%). For each age group, those in their 40s accounted for the largest portion, followed by those in their 30s, 20s, 50s, teens, and 60s. In terms of the total use hours, the 40s and 30s age groups constituted large portions of 31.7% and 30.8%, respectively, similar to the number of users; this can be interpreted to mean that the 30s and 40s age groups are the most economically active group in using E-mail for work.

[Figure 1-4-6] E-mail Usage According to Age and Gender Demographic

(Unit : 10,000 people, %)



[Nielsen Korea, www.koreanclick.com]

C. Contents

1) TV / Visual Media

The domestic broadcasting industry is recording a continuous increase in revenue, and OTT (Over The Top) service with original contents is being stabilized gradually as the main service along with the high-quality services of UHD high-definition and two-way interface, etc.

The number of people working in the broadcasting & video industry has increased 3.0% to 43,662 compared to 2015, for an annual average increase rate of 1.7%. The export amount increased 28.3% to USD 411.21 million compared to the previous year, for an annual average increase rate of 15.2% for the last 5 years since 2012. Note, however, that the import amount shrank 11.7% to USD 129.11 million compared to the previous year; this is considered attributable to the decrease in program import by the broadcasting channel service providers.

In terms of the sales of the overall broadcasting & video industry, IPTV service providers increased 27.7% compared to the previous year, recording the highest growth rate; such increase in IPTV subscribers led to a decrease in the growth of cable TV service providers, and the revenue of CATV service providers decreased 4.0% compared to the previous year. In the Internet video service business, the revenue increased from KRW 2.1742 trillion to KRW 2.7759 trillion thanks to the increase of IPTV subscribers. In terms of revenue, the total sales of IPTV service providers came from only 2/3 of the terrestrial broadcasting service providers; in terms of average revenue for each service provider, however, IPTV service providers recorded the highest amount with KRW 809.2 billion.

Moreover, broadcasting channel service providers are recording rapid increase; they exceeded the revenue of the terrestrial broadcasting service providers with total sales of KRW 6.3801 trillion in 2016. The number of service providers was reduced to 164 from 178 in the previous year, but the number of people working in the field increased by 620 to 15,791; thus showing that the activation of the broadcasting channel business also yields a positive impact on employment.

According to the “Settlement of 2017 Korean Film Industry” report released by the Korean Film Commission, the 2017 Korean film market volume increased approximately 2.4% to KRW 2.3271 trillion compared to the previous year. The competition in film distribution intensified further under the stagnated market condition, and the shares of the Top 3 theater chains accounted for 97%; thus showing the monopolistic condition in the theatre market and dominance of the contents & media conglomerates.

[Table 1-4-2] Average Revenue Per Broadcasting Company and Employee (2016)

Category		No. of Companies (company)	No. of Employees (person)	Revenue (KRW 1million)	Average Revenue per Company (KRW 1million)	Average Revenue per Employee (KRW 1 million)
Terrestrial TV	Broadcaster	52	14,288	3,998,744	76,899	280
	Mobile Multimedia Broadcaster	19	69	10,328	544	150
	Sub-total	71	14,357	4,009,072	56,466	279
Cable TV	Comprehensive Cable Broadcaster	90	4,679	2,169,185	24,102	464
	Broadcast Relay Station	49	116	2,477	51	21
	Sub-total	139	4,795	2,171,662	15,623	453
Satellite TV	Satellite Broadcaster	1	346	565,631	565,631	1,635
	Satellite Digital Multimedia Broadcasting	-	-	-	-	-
	Sub-total	1	346	565,631	565,631	1,635
Program Production for TV Channel	Program Provider	164	15,791	6,380,071	38,903	404
Program Production for Internet	IPTV	3	703	2,427,660	809,220	3,453
	IPTV CP	25	-	348,229	13,929	-
	Sub-total	28	703	2,775,889	99,139	3,949
Independent Program Production	Independent Program Provider	554	7,670	1,428,813	2,579	186
Total		957	43,662	17,331,138	18,110	397

[Ministry of Sports, Culture and Tourism (MSCT), 2017 Korean Content Industry Statistics, 2018]

The 2017 total revenue of the digital online market increased 5.7% to KRW 436.2 billion compared to 2016. In the standard as of October 2017, there were 7.79 million subscribers of digital cable TV, suggesting a continuous increase in the revenue of cable TV and digital cable TV (hereinafter referred to as TV VOD) although the growth rate is lower than the previous year. The Internet VOD market that is being focused on with the emergence of new OTT recorded a 10.8% growth compared to the previous year.

In 2017, IPTV and digital cable TV accounted for the largest portions in the digital online market

sales volume. TV VOD was pegged at KRW 354.3 billion in 2017, accounting for 81.2% of the overall market. The Internet VOD revenue increased 10.8% to KRW 75.2 billion compared to the previous year; TV VOD also continued to dominate the market in 2017 with KRW 354.3 billion in revenue and 81.2% market share. The share within the overall digital online market also increased to 17.2%. The revenue of package products stood at KRW 6.7 billion, showing consistent decrease in sales volume and share ratio.

[Table 1-4-3] Revenue of the Online Digital Market within the Movie Industry (2013~2017)

Division*	2013		2014		2015		2016		2017	
	Revenue	1-year Growth Rate (%)	Revenue	1-year Growth Rate (%)	Revenue	1-year Growth Rate (%)	Revenue	1-year Growth Rate (%)	Revenue	1-year Growth Rate (%)
IPTV & Digital Cable	1,737	32.6	2,254	29.7	2,609	15.7	3,347	28.3	3,543	5.9
Internet VOD (Mobile + N Screen included)	729	18.0	499	▽31.5	582	16.7	679	16.7	752	10.8
Package	210	▽8.7	218	3.0	158	▽27.4	99	▽37.3	67	▽32.3
Total	2,676	24.0	2,971	11.0	3,349	12.7	4,125	23.2	4,362	5.7

* IPTV & digital cable TV (TV VOD) are a VOD service platform that uses set top box such as KT Olleh TV and digital cable TV, etc., to be serviced through the TV (including partial mobile revenue).

* Internet VOD is PC & mobile-based VOD service platform/webhard site such as Naver N-Store, etc.

* Package product refers to the revenue of DVD and Blu-ray.

[Korea Film Council (KOFIC), 2017 Korean Movie Industry Report, 2018]

The 2017 statistical survey of the contents industry by the Ministry of Culture, Sports & Tourism showed that there were 447 companies with 5,142 employees in the animation business as of 2016. Revenue was pegged at KRW 677 billion, added value was KRW 222.4 billion, and added value rate was 32.9%. Export amount stood at USD 135.62 million, and import amount was USD 7.32 million.

The companies in the animation industry posted an annual average increase of 7.0% in the number of companies from 341 in 2012 to 447 in 2016. The revenue was KRW 521 billion in 2012 and KRW 677 billion in 2016, for an annual average increase rate of 6.8%. The number of companies and revenue are showing consistent increase, but the amount of added value increased 1.9% compared to the previous year and recorded a relatively poor annual average increase rate of 0.3%.

The average revenue for each company in the animation industry was KRW 1.098 billion, with average revenue of KRW 95 million per person. In terms of mid-class, the average revenue for each online distributor was KRW 862 million, with average revenue of KRW 130 million per person. The average revenue per company was highest in production companies, but that per person was highest in distributors.

[Table 1-4-4] Domestic Animation Industry (2012~2016)

Category	Business (company)	Employee (people)	Revenue (KRW 1million)	Gross Value (KRW 1 million)	Value Added Ratio (%)	Export Amount (USD 1,000)	Import Amount (USD 1,000)
2012	341	4,503	521,005	219,999	42.2	112,542	6,261
2013	342	4,502	520,510	219,232	42.1	109,845	6,571
2014	350	4,505	560,248	221,750	39.6	115,652	6,825
2015	376	4,728	610,175	218,202	35.8	126,570	7,011
2016	447	5,142	676,960	222,442	32.9	135,622	7,324
1-Year Growth Rate (%)	18.9	8.8	10.9	1.9	-	7.2	4.5
Annual Average Growth Rate (%)	7.0	3.4	6.8	0.3	-	4.8	4.0

[MSCT, 2017 Korean Content Industry Statistics, 2018]

When reviewing the small class, in terms of the average sales amount per company, the animation creation & production business recorded the highest sales with KRW 1,539 billion, and the average revenue per person was highest in the online (Internet/Mobile) animation production with KRW 228 million. The fact that the online animation production business recorded the highest average revenue per person shows that the Korean animation industry has evolved from the existing production practice of being labor-intensive and investing a high amount of production cost to one that is “reorganized with the distribution line” according to the emergence of new platform to enable the creation of new sales.

[Table 1-4-5] Average Revenue of the Animation Industry per Business and Employee (as of 2016)

Sub-Category	Third-level Category	No. of Businesses (company)	No. of Employees (person)	Revenue (KRW 1 million)	Average Revenue per Business (KRW 1 million)	Average Revenue per Employee (KRW 1 million)
Animation Production	Animation Creation	203	2,782	312,428	1,539	112
	Animation Subcontract	150	2,014	128,242	855	64
	Online Internet/Mobile Animation Production	24	52	11,854	494	228
	Sub-total	377	4,848	452,524	1,200	93
Animation Distribution	Animation Distribution, PR	53	152	23,445	442	154

Sub-Category	Third-level Category	No. of Businesses (company)	No. of Employees (person)	Revenue (KRW 1 million)	Average Revenue per Business (KRW 1 million)	Average Revenue per Employee (KRW 1 million)
Online Animation Distribution	Online Animation Service (Internet/Mobile)	17	142	14,662	862	103
Total		447	5,142	490,631	1,098	95

[MSCT, 2017 Korean Content Industry Statistics, 2018]

2) Music

The 2017 statistical survey on the contents industry showed that there were 37,501 companies with 78,393 employees in the music industry as of 2016. Revenue was KRW 5.3082 trillion, added value was KRW 1.9131 trillion, and added value rate was 36.0%. The export amount was pegged at USD 442.57 million, and the import amount was USD 13.67 million.

The revenue of the online music distribution business increased 8.8% to KRW 1.4454 trillion compared to the previous year, for an annual average increase rate of 10.7%. The Internet/mobile music service business also increased 9.5% compared to the previous year. The small-class business with the highest increase rate in annual average revenue during the period 2014~2016 was the music planning & production business, showing an annual average increase rate of 12.3%; it was followed by Internet/mobile music service with annual average increase rate of 11.9% and music performance planning & production business with 11.3%. This can be said to be the result of the stabilization of streaming service using smartphone as the most widely used music service type in Korea.

[Table 1-4-6] Revenues of Online Music Distribution Businesses

(Unit : KRW 1 million)

Category	2014	2015	2016	Share (%)	Growth Rate from 2014 (%)	Annual Average Increase Rate (%)
Internet/Mobile Music Service	995,260	1,136,983	1,245,425	23.5	9.5	11.9
Digital Music Broker	102,632	107,732	114,477	2.2	6.3	5.6
Internet/Mobile Music Content Production and Distribution (CP)	81,156	83,310	85,488	1.6	2.6	2.6
Total	1,179,048	1,328,025	1,445,390	27.2	8.8	10.7

[MSCT, 2017 Korean Content Industry Statistics, 2018]

〈Financial Times〉 forecast that the digital music streaming service would exceed album sales for

the first time in 2017 to lead the global digital music sales market. PwC also expects the revenue of streaming service to increase 37% to USD 9.1 billion (approximately KRW 10.2 trillion), exceeding the USD 7.7 billion (KRW 8.6 trillion) album sales for CD/Records, etc.

3) Game

The 2017 statistical survey on the contents industry announced by the Ministry of Culture, Sports & Tourism showed that the 2016 domestic game industry volume increased 1.6% to KRW 10.8945 trillion compared to 2015. The 2016 revenue in online game was pegged at KRW 4.6464 trillion (Share Ratio of 42.6%) -- accounting for the largest portion in the overall game industry -- with mobile game sales increasing as high as 24.3% to KRW 4.3301 trillion (Share Ratio of 39.7%) compared to 2015. Next was PC Cafe with KRW 1.4668 trillion (Share Ratio of 13.5%) and video games with KRW 262.7 billion (Share Ratio of 2.4%).

In 2016, the export amount in the domestic game industry increased 2.0% to USD 3.27735 billion (KRW 3.9607 trillion, applied with the 2016 annual average standard exchange rate of KRW 1,208.5 from the Bank of Korea) compared to the previous year. Meanwhile, the import amount decreased 17.0% to USD 147.36 million (KRW 178.1 billion) compared to the previous year.

[Table 1-4-7] Domestic Game Industry Status

Category	Business (company)	Employee (person)	Revenue (KRW 1million)	Gross Value (KRW 1million)	Added Value Ratio (%)	Export (\$ 1,000)	Import (\$ 1,000)
2012	16,189	95,051	9,752,538	4,568,089	46.8	2,638,916	179,135
2013	15,078	91,893	9,719,683	4,545,896	46.8	2,715,400	172,229
2014	14,440	87,281	9,970,621	4,711,118	47.3	2,973,834	165,558
2015	13,844	80,388	10,722,284	5,047,597	47.1	3,214,627	177,492
2016	12,363	73,993	10,894,508	4,848,056	44.5	3,277,346	147,362
1-Year Growth Rate (%)	△10.7	△8.0	1.6	△4.0	-	2	△17.0
Annual Average Growth Rate (%)	△6.5	△6.1	2.8	1.5	-	5.6	△4.8

[MSCT, 2017 Korean Content Industry Statistics, 2018]

In 2016, the number of employees in the game production & distribution business was reduced by 4.1% to 33,979; when viewed in detail, the overall number of employees in the game industry decreased. Employees in online game platform decreased 22.1%, but those in mobile game platform increased 23.2%. Due to the impact of new VR games, the employees in the arcade game platform increased 62.2%. Employees in the game distribution & consumption companies (PC Cafe, Arcade

Game Room) decreased 11.0% to 40,014 compared to the previous year; when viewed in detail, the employees working in the PC cafe decreased 12.7%, but those in the arcade game rooms increased 60.8%.

Out of the total revenue of the overall game industry, the portion of game production & distribution business stood at 85.8% with revenue of KRW 9.0161 trillion. Note, however, that the sales portion of the game distribution business decreased 14.2% to KRW 1,5418 trillion compared to 2015. The revenue in the game production & distribution business recorded an annual average growth rate of 3.7% in the last 3 years, showing consistent increase; this can be said to be the result of the mobile game showing a growth trend, with the online game stagnating.

The revenue of online game showed a decrease in the last 3 years, recording less than KRW 5 trillion in 2016. Meanwhile, mobile game showed a consistent increase with share ratio of 39.2% in the domestic game industry, narrowing the gap with online game (42.6%) to only 2.9%p; such situation is expected to continue.

[Table 1-4-8] Revenue per Business in the Game Industry

(Unit : KRW 1 million, %)

Sub-Category	Third-level Category	2014	2015	2016	Share (%)	1-Year Growth Rate (%)	Annual Average Increase Rate (%)
Game Production & Distribution Business	Online Games	5,542,468	5,280,353	4,646,355	42.6	△12	△8.4
	Video Games	159,806	166,091	262,656	2.4	58.1	28.2
	Mobile Games	2,913,646	3,484,406	4,330,096	39.7	24.3	21.9
	PC Games	33,668	37,861	32,275	0.3	△14.8	△2.1
	Arcade Games	52,848	47,428	81,359	0.7	71.5	24.1
	Sub-total	8,702,436	9,016,139	9,352,741	85.8	3.7	3.7
Game Distribution	Internet Cafe Business	1,227,696	1,660,400	1,466,815	13.5	△11.7	9.3
	Arcades	40,489	45,745	74,952	0.7	63.8	36.1
	Sub-total	1,268,185	1,706,145	1,541,767	14.2	△9.6	10.3
Total		9,970,621	10,722,284	10,894,508	100	1.6	4.5

[MSCT, 2017 Korean Content Industry Statistics, 2018]

4) e-Learning

According to the 2017 e-learning industry status survey announced by the National IT Industry Promotion Agency (NIPA), the 2017 total sales volume of domestic e-learning businesses increased 6.1% to KRW 3.6992 trillion compared to the previous year; thus suggesting that the industry is being activated again following the 0.1% increase in 2016. For the sales composition of the overall e-learning industry, the revenue of companies in the service sector constituted 70.9%, followed by

contents (19.5%) and solution (9.6%); thus showing an increase in revenue in all 3 sectors. Note, however, that the portion of the service industry is increasing.

[Table 1-4-9] Revenue of e-Learning Service Providers

(Unit : KRW 100 million, %)

Category	2015		2016		2017		1-Year Growth Rate (%)
	Revenue	Share	Revenue	Share	Revenue	Share	
Contents	6,894	19.8	6,789	20.2	7,208	19.5	6.2
Solution	3,466	9.9	3,336	9.9	3,561	9.6	6.7
Service	24,491	70.3	24,750	69.8	26,223	70.9	6.0
Total	34,851	100.0	34,875	100	36,992	100	6.1

[NIPA, 2017 e-Learning Industry Status Survey (Reconstructed), 2018]

In 2017, there were a total of 1,680 companies in the e-learning industry; this was 126 less than that in 2015 and 41 more compared to 2016. When we look at the changes in the companies, there were 52 companies with revenue of KRW 10 billion or more, similar to 2016; this suggests that companies with less than KRW 100 million in sales decreased consistently, but the number of companies with revenue of KRW 100 million ~ KRW 10 billion increased. Companies with revenue of KRW 10 billion or more -- which are related to 3.1% of the total number of companies -- account for 42.1% of the total revenue. On the other hand, small companies with revenue of less than 100 million and which are related to 51.3% of the total number of companies constitute only 1.6% of the total revenue; thus showing the polarization in the overall business structure.

When we review the overall demand market in each sector, companies and individuals recorded sales of KRW 1.5140 trillion and KRW 1.6682 trillion, respectively, accounting for 87.7% of the overall market; next are government/public institutions with KRW 248.2 billion and formal educational institutions with KRW 199.5 billion. In the demand market, government/public institutions and formal educational institutions constituted only 6.8% and 5.5%, respectively; in terms of the portion of increase amount, they posted 16.1% and 10.8%, respectively, showing a high level of increase rate.

[Table 1-4-10] Comparison of market volume for each demand for e-learning

(Unit : KRW 100 million, %)

Category	Individual		Business		Educational Institution		Government·Public Institution		Total	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Amount	15,816	16,682	14,514	15,140	1,718	1,995	2,239	2,482	34,237	36,299
Ratio	46.1	46.0	42.3	41.7	5.0	5.5	6.5	6.8	100	100

[NIPA, 2016 e-Learning Industry Status Survey (Reconstructed), 2017]

5) Web Contents

The 2017 statistical survey on the contents industry announced by the Ministry of Culture, Sports & Tourism showed that the 2016 revenue of the domestic comics industry increased 6.2% to KRW 976.3 billion compared to 2015. The number of companies was pegged at 7,726, which was 419 less than the 8,145 in 2015; the number of employees increased slightly to 10,127. The total export amount of the domestic comics industry for 2016 was found to be USD 32.48 million, with the import amount pegged at USD 6.55 million.

[Table 1-4-11] Domestic Comics Industry

Category	Business (company)	Employee (person)	Revenue (KRW 1 million)	Gross Value (KRW 1 million)	Value Added Ratio (%)	Export (\$1,000)	Import (\$1,000)
2012	8,856	10,161	758,525	313,877	41.4	17,105	5,286
2013	8,520	10,077	797,649	322,569	40.4	20,982	7,078
2014	8,274	10,066	854,837	336,854	39.4	25,562	6,825
2015	8,145	10,003	919,408	362,028	39.4	29,354	6,715
2016	7,726	10,127	976,257	392,558	40.2	32,482	6,554
1-Year Growth Rate (%)	△5.1	1.2	6.2	8.4	-	10.7	△2.4
Annual Average Growth Rate (%)	△3.4	△01.	6.5	5.8	-	17.4	5.5

[MSCT, 2017 Korean Content Industry Statistics, 2018]

The 2016 total revenue of the domestic comics industry stood at KRW 976.3 billion, and the webtoon production & distribution business recorded KRW 148.1 billion (15.2%). The revenue of the webtoon production & distribution business increased 19.6% compared to 2015, showing an annual average increase rate of 21.0% with KRW 101.2 billion in 2014 and KRW 148.1 billion in 2016. Just like before 2016, the portion of the webtoon contents service sector out of the revenue of the webtoon production & distribution business (60.9%) was found to be highest, increasing consistently with 58.5% in 2014, 59.6% in 2015, and 60.9% in 2016. Note, however, that the revenue of Internet & mobile webtoon contents production & service (CP) was found to be decreasing gradually in share.

The e-book market including web-novels showed double the growth compared to the previous year thanks to the increase in contents, distributors, and activation. Since then, the web-novel/genre literature has shown rapid growth, recording KRW 200 billion in 2016; it is forecast to show approximately 30% increase in 2017 compared to the previous year. The 2017 E-book Sales Trend by Yes24 showed that 75.6% of the readers of e-book were female, which is triple the male readers. The 30s age group was found to be the highest. The literature genre recorded 50.8%, which was higher than majority, and also had a 10% share; thus showing an overall growth trend.

The Web-novel Industry Status Survey by the Publication Industry Promotion Agency of Korea showed that the average distributed works by platform companies in 2017 numbered 82,322, and that the daily average query of web-novels was 2,012,200 times. An average of 5,995 registered web-novelists and a monthly average of 10,045 web-novels were registered.

As for the status of platform subscribers, the average number of platform members was 595,750, and the average ratio of paid members was found to be 14.5%.

When we estimate the ratio of total members and paid members based on the result for each range of platform revenue, the platform with revenue of KRW 5 billion or more had an average of 733,333 members, with paid members accounting for 17.0%. The platform with revenue of KRW 1 billion or more to less than KRW 5 billion had an average of 638,667 members, 19.0% of whom were paid members, whereas the platform with KRW 500 million or more to less than KRW 1 billion in revenue had an average of 300,000 members 10.0% of whom were paid members.

[Table 1-4-12] Revenue of Online Comics Production and Distribution Businesses

(Unit : KRW 1 million)

Category	2014	2015	2016	Market Share (%)	1-Year Growth Rate (%)	Annual Average Increase Rate (%)
Internet/Mobile Comics Content Production and Distribution (CP)	21,564	25,578	27,255	18.4	6.6	12.4
Internet Comics Content Service	59,482	73,852	90,226	60.9	22.2	23.2
Mobile Comics Content Service	20,153	24,458	30,662	20.7	25.4	23.3
Total	101,199	123,888	148,143	100.0	19.6	21.0

[MSCT, 2017 Korean Content Industry Statistics, 2018]

D. Internet Media

1) IPTV

The average number of IPTV subscribers in the second half of 2017 (July ~ December) was 14,325,496. Here, the share of KT was highest with 45.2% (6,339,759), followed by SK Broadband with 30.5% (4,283,228) and LG U+ with 24.3% (3,415,855). When we review only the second half of 2017, we can see a consistent increase in the number of subscribers from 13,719,791 in July to 14,325,496 in December (refer to Table 1-4-13).

Among the paid broadcasting service providers, IPTV showed the highest increase in subscribers.

IPTV subscribers, who numbered only 3,108,814 in 2010, increased 314.6% to 12,889,223 in 2016. Meanwhile, the portion of IPTV subscribers out of the total number of paid broadcasting subscribers also showed an increase. The portion of IPTV subscribers compared to the total number of subscribers to paid broadcasting service in 2010 was 13.8% (total paid broadcasting subscribers: 22,502,113; IPTV subscribers: 3,108,814), increasing to 42.9% (total paid broadcasting subscribers: 30,032,592; IPTV subscribers: 12,889,223) in 2016.

[Table 1-4-13] Number of IPTV subscribers & market share in the second half of 2017

Category	7	8	9	10	11	12	Average	Share
KT*	6,225,117	6,272,747	6,329,123.5	6,360,761	6,406,209	6,444,596	6,339,759	45.2%
SK Broadband	4,198,526	4,235,630	4,275,125	4,301,415	4,330,918	4,357,751	4,283,228	30.5%
LG U+	3,296,148	3,347,710	3,401,319	3,443,648	3,483,154	3,523,149	3,415,855	24.3%
Total	13,719,791	13,856,087	14,005,567.5	14,105,824	14,220,281	14,325,496	14,038,842	100.0%

* From the total number of subscribers, the 110,000 receiving real-time broadcasting only from KT Skylife were calculated as the subscribers of KT Skylife, and the 1,740,000 subscribers receiving real-time broadcasting from both KT and KT Skylife were calculated by dividing the number of subscribers equally into each company. The total value and number of subscribers in each company may differ slightly due to the rounding off from the distribution of subscribers.

[MSIT, "Notice on the No. of Subscribers & Market Share of Paid Broadcasting Service in the Second Half of 2017", 2018]

In the standard as of the end of 2017, the revenue of broadcasting by the overall paid broadcasting service providers including IPTV, cable TV, and satellite TV increased 9.1% (KRW 468.8 billion) to KRW 5.6312 trillion compared to 2016. In 2017, the revenue of IPTV increased 20.5% (KRW 497.5 billion) to KRW 2.9251 trillion compared to the previous year due to the increase in license fee sales (KRW 1.7209 trillion in 2016, KRW 1.9916 trillion in 2017) and homeshopping channel transmission fee (KRW 336.8 billion in 2016, KRW 489 billion in 2017). The revenue of satellite TV also increased 1.7% (KRW 9.8 billion) to KRW 575.4 billion, due largely to the increase in advertising sales (KRW 28 billion in 2016, KRW 48 billion in 2017). Meanwhile, the 2017 broadcasting sales of cable TV including individual SO (CATV, System Operator) decreased 18% (KRW 38.5 billion) to KRW 2.9251 trillion. In this case, the decrease was largely attributable to the license fee of SO (broadcasting fee) (KRW 842.4 billion in 2016, KRW 812 billion in 2017).

2) Mobile OTT

According to the Korea Communications Commission, the domestic OTT market volume nearly doubled to approximately KRW 317.8 billion as of 2015 compared to 2014, and the market estimate in 2016 was around KRW 488.4 billion. The advertiser survey result showed that OTT advertisement expenditure was about 7.6% of the TV advertisement expenditure in 2016 and 8.8% in 2017 (Estimate); thus suggesting that, unlike the TV VOD advertisement, the demand for OTT

advertisement is increasing consistently. When the OTT advertisement expenditure was increased, the portion of converting the TV advertisement expenditure to secure the fund was shown to be highest; the ratio of converting the online advertisement expenditure other than OTT and the ratio of organizing the budget separately were found to be 25.9% each. There is no official statistical data on the OTT advertisement, but it is also estimated to be on the rise according to the increase in OTT market volume.

3) Smart TV

As of 2017, the supply rate of Smart TV in Korea's households exceeded 10% for the first time to record 11.1%. Pegged at only 2.6% in 2011, the supply rate gradually increased; for reference, the supply rate of digital TV increased from 49.7% share in 2011 to 89.7% share in 2017.

Nowadays, the supply of Smart TV is increasing rapidly around the world; this is related to the supply of AI speakers and increase in the use of string service. According to IHS Market, the share of Smart TV in 2017 was 64% of the total TV shipment amount, representing a 19%p increase from 45% in 2015; such increase was expected to continue in 2018. Like PC, Smart TV requires an OS (Operating System); according to the IHS Market, Android recorded the highest ratio in Smart TV OS, followed by Tizen from Samsung Electronics (23%) and LG Electronics' Web OS (13%). IHS Market expects the portion of Android to continue increasing until 2022.

E. Location Based Service (LBS)

LBS (Location-Based Service) refers to the service of providing various kinds of information related to location, such as location tracking service, public safety service, location-based information service, etc. by mounting the chip for connecting the base station or GPS (Global Positioning System) to the mobile device such as smartphone, etc.

LBS has been showing growth alongside the rapid growth of the smartphone market since 2010. In the standard as of 2017, there were 193 location information service providers and 1,079 LBS service providers, with authorized and registered businesses increasing in number every year.

[Table 1-4-14] Permit Issued / Registration of Domestic LBS Providers (as of 2017)

Category	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Location Information Provider	19	29	36	48	57	74	84	97	114	132	155	180	193
Location-Based Service Providers	66	88	107	119	148	202	414	551	676	738	848	936	1,079
Total	85	117	143	167	205	276	498	648	790	870	1,003	1,116	1,272

[Location Information Support Center, 2017]

F. Mobile Application

The domestic & foreign mobile APP market maintains a two-digit growth even in the midst of the market saturation by leading smartphone countries. In 2017, the total number of APP downloads worldwide stood at 175 billion; in the standard as of the end of 2017, there were more than 2.1 billion APPs in the Apple APP Store and 3.5 million APPs in Google Play.

In July, 2017, APP survey firm APP Ape announced that the use rate of smartphone in Korea compared to the population was highest at 91%. Among them, Android accounted for about 80%, with the Google Android-based global local store as the top domestic APP Store and evaluated to be still active compared to other countries. Even with these evaluations, the previous performance of occupying the top position in the Google local APP store as the role model of global mobile communication companies can hardly be expected anymore, because we are continuing to fall behind in competition both in quantity and quality.

Apple APP Store —which started with 500 APPs — and Google Play APP Market that started with about 2,000 APPs are now on their 10th year. Google Play had more than 3.5 million APPs as of December 2017, with Apple also officially recording over 2.1 million registered APPs. Tens of thousands of APPs are newly being registered today.

APP Annie expects the APP market to continue to mature and the revenue of global APP stores to show annual average growth rate of 17.6% during the period 2016 ~ 2021 to reach USD 139.1 billion by 2021. Today, APP users in over 40 countries are consuming over USD 100 million in each of Apple APP Store and Google Play Store.

Note, however, that the APP market is being formed centering on games due to the continuous increase in the game market. In fact, games were expected to maintain an 80% share of the total consumer sales in 2017 and a 74% share of the consumer sales in 2022; hence the need for market diversification.

5. Internet Service in the Public Sector

A. Open Government Innovation

Government transformation by the current government starts from the critical thinking that the standard of our government falls short compared to the high standard of the people. We accomplished impressive economic development – we are now in the Top 11 in the world, and maturity in democracy was acknowledged by the world symbolized by the Candlelight Revolution.

The government is still showing disappointing results, however. In the “Better Life Index” announced by OECD in 2017, Korea ranked 29th among 38 countries. In the 2017 Government Trust announced by OECD, Korea was ranked as low as 32nd among 35 countries, recording 24% or only half of OECD’s average of 42%. In the 2018 Corruption Perceptions Index by Transparency International, Korea was ranked 51st among 180 countries; the quality of life of the people, government trust, and corruption perceptions of the country are evaluated to have a big gap with the demand and expectations of the people.

In July 2017, along with the inauguration of the Moon Jae-in Government, 100 Major Government Projects were announced, and 5 major government goals such as the “Government of the People” were presented. Especially, the goals include “Open Innovative Government, Administration of Service” in the government projects for promotion. Later, the 1st Government Innovation Strategy Meeting was held in March 2018 to confirm and announce the ‘Comprehensive Promotion Plan for Government Innovation’, and the entire government including the central administrative agency, local government and public institutions, etc. are promoting government innovation by the new government.

The Moon Jae-in Government is promoting “Innovation with the People,” “Autonomous & Upward Innovation,” and “Innovation of Enhancing the Quality of Life of the People” to address the outcomes and limitations of the previous government innovations. Especially, this ‘Comprehensive Promotion Plan for Government Innovation’ was established and implemented in a new method.

In the vision and 3 major strategies of the government innovation, the first strategy involves converting the government operation centering on social value such as safety and human rights, etc. Social value refers to the value that can contribute to public interest and development of the community in all social, economic, environmental, and cultural fields, etc.; detailed fields include

human rights, safety, environment, welfare, community, consideration for the disadvantaged, provision of good jobs, citizen participation, regional revitalization, etc.

The second strategy is to realize a government that works through participation and cooperation. “Gwanghwamun 1st Street,” which drew great response from the people for 50 days in May 2017 with 1 million visitors and 180,000 policy proposals, etc., will be maintained permanently and will be operated as the “main window for national participation” in connection with the participation of each agency.

The third strategy involves reinventing the old customs to realize a trusted government. The zero tolerance principle will be applied to eradicate corruption completely in recruitment in the public sector. When corruption in recruitment is discovered, the perpetrator will be fired, and anyone involved in the corruption will be subject to investigation. Investigation and disciplinary action on those involved in the corruption in recruitment will strictly be implemented through follow-up measures. Government officials who asked for money and valuables actively or performed the work intentionally from graft will be severely punished such as expulsion or dismissal; the regulation on limiting the alleviation of any disciplinary measures will be applied as well.

Fire trucks will be arranged in optimization based on Big Data analysis, with the location of the 119 Fire House to be optimized to enhance the quality of life of the people. A “Public Big Data Center” for supporting data-based decision making must be established by 2019. In addition, (an “e-document wallet” service (tentative) will be developed to prevent various certificates such as Certificate of Resident Registration and Abridged Transcript of Resident Registration from being printed and allow them to be received through mobile instead by 2019. In addition, “Document 24,” which involves exchanging official documents between the people and administrative agencies through the Internet instead of mail & visit, will be expanded to all administrative works to realize the “Paperless Administration.”

The government must change to enable innovation not only for the people but also to help public offices and government officials. Providing support to all is true innovation, and public offices must take the lead. Note, however, that innovation cannot be accomplished easily; thus, considerable efforts must be made by the government for 10 ~ 20 years.

B. Service for the People

“e-Government” refers to the government (Article 2 of the e-Government Act) that utilizes information technology to digitalize the work in administrative agencies and in public institutions

and performs the administrative work between other administrative agencies and for the people. In Korea, PC for demographic purposes was set up in 1967 to take the first step toward e-Government. After 50 years, the Korean government has stabilized as the world's top e-Government country with 18,000 types of information systems.

Along with services that are already used in the lives of the people such as "Government 24" --which handles all civil complaints and policies of the government in one place -- and "Hometax," which handles all tax-related matters online without the need to go to the Tax Office, there were substantial developments during the past 50 years such as establishing the NEIS System for educational administration, PISS (Public Information Sharing Center), National Computing & Information Service for managing government IT resources, development platform of the e-Government Standard Framework, etc.

As the economic volume got bigger and society evolved, the administrative demand of the people became more segmentalized and diversified, and the existing administrative service had to be redesigned fundamentally to satisfy the standard of the people. In addition, IoT (Internet of Things), Cloud, Big Data, AI (Artificial Intelligence), etc. -- which are referred to as the "4th Industrial Revolution" -- are deemed to have changed our lives completely and the way we work through the interaction of machinery, humans, and industry. In such big wave of change, people must be provided with infrastructure to lead the development of policies and administrative services instead of simply enabling participation; intelligence information-based e-Government service development and expansion must be enabled to develop the e-Government ecosystem suitable for the 4th Industrial Revolution Period.

The future e-Government is expected to develop into the intelligent e-Government based on the 4th industrial technology to play an important role in supporting the government and to enhance national benefit.

C. Service for Enterprises

The government promoted G2B (Government to Business) by improving business-related processes and services such as licensing and providing information from the perspective of the companies to ensure efficiency and support the reinforcement of competitiveness of the companies. Through this, companies were able to standardize and simplify various civil affairs forms to improve the delay in administrative process and focus on their businesses to create new added values.

Representatively, integrated business support service is provided in linkage with the relevant

agencies and systems to integrate and process the administrative processes related to business activities such as establishment and construction of the factory, etc.; the logistics, trade, and custom clearance information services that used to be provided individually for each agency are now provided through integrated service linked with the necessary information from the perspective of the companies such as logistics company, trading firms, customs brokerage company, etc. In addition, a comprehensive small ~ medium enterprise support policy portal service is provided such as policy information for each support field, training, seminar, exhibition information, online consultation, etc., and the overall process of the procurement work by the ministries and public institutions can now be done online to provide transparent procurement administration and civil affairs service to the procurement companies. Moreover, the patent information service enables applying for, reviewing, registering, judging, and publishing intellectual property rights without having to visit directly to process all patent administration works online.

The business environment is becoming more complicated, and domestic & foreign competition is becoming more intensified owing to the response to the 4th Industrial Revolution, slowdown of growth, decrease in domestic demand, diversification of export market, expansion of FTA, global economy synchronization, etc. Accordingly, the government is planning to provide not only online one-stop licensing service but also various kinds of business support information such as trade barriers, technology regulation, business support, R&D expansion, etc. in an integrated manner to integrate, expand, and provide constantly the various kinds of information that the companies actually need in terms of business type, volume, region, country, etc.

In addition, the service is provided to enable the companies to use not only the PC but also smart devices such as smartphone, tablet PC, wearable devices, etc. to make inquiries and handle civil affairs customized for the business activity in the field upon transfer or immediately. Moreover, intelligent information technology such as AI, IoT, Cloud computing, Big Data, Blockchain, etc. will be expanded and applied to enable processing intelligent work automatically whenever, wherever.

Existing services for enterprises are prepared or promoted with the next-generation information service systematically from the degraded system, requirement of service sophistication, innovation through the application of new technology, creation of added value, etc. Accordingly, deregulation centering on companies, process redesign, expansion of cooperation between the government and the company, participation of companies and reflection of their opinion in the process of establishing and determining government policies, and opening and sharing of data related to the company possessed by the agencies and public institutions are expected to enable the companies to receive more realistic & customized services and to enable the creation of added value.

[Table 1-5-1] Internet Services for Enterprises in the Public Sector

Service Name	Website	Service Details
Government for Business	G4B (www.g4b.go.kr)	<ul style="list-style-type: none"> • Business support portal service that provides the corporate civil affairs administration with a government accompanying the company throughout the overall processes of the company's activities, dealing with lump-sum changes in business contents, business difficulties, funding information, test & certifications, etc.
National Logistics & Trade Information Service	National Logistics Information Center (www.nlic.go.kr)	<ul style="list-style-type: none"> • Logistics information service centering on the user who collects, integrates, and provides land, ocean & air logistics information existing individually
National Logistics & Trade Information Service	Air Cargo Information Service (AIRCIS)	<ul style="list-style-type: none"> • One-site & One-Stop service that supports the logistics work between the air cargo entities such as airlines, terminal operators, forwarders, carriers, shipper, warehouse companies, private VAN, etc., and provides air cargo information service (AIRCIS)
National Logistics & Trade Information Service	Integrated PORT-MIS (new.prtmis.go.kr)	<ul style="list-style-type: none"> • Smart Port Logistics Integration Service that provides comprehensive information on maritime & port logistics such as maritime & port civil affairs, utilization of port operation information and ship/hazardous material container monitoring, etc., and supports joint use and cooperation regarding the information between the maritime & port logistics entities
National Logistics & Trade Information Service	uTradeHub (www.utradehub.or.kr)	<ul style="list-style-type: none"> • e-Trade service that processes the overall trading work from marketing to commercial trade, logistics, custom clearance, and foreign currency payment
National Logistics & Trade Information Service	UNI-PASS (unipass.customs.go.kr)	<ul style="list-style-type: none"> • Exclusive e-custom clearance service that supports custom clearance application, approval, tariff payment, refund, and requirement verification through the Internet-based import & export custom clearance report system
SME Policy Information Service	Bizinfo (www.bizinfo.go.kr)	<ul style="list-style-type: none"> • Comprehensive information is provided for SMEs (small ~ medium enterprises) such as SME support project, training, seminar, exhibition information, policy news and expert consulting, etc.
Comprehensive e-Procurement Service	Korea Online E-Procurement System (www.g2b.go.kr)	<ul style="list-style-type: none"> • Exclusive comprehensive e-procurement service that enables Internet processing & verification of the overall government procurement such as bidding, contract, inspection and payment, etc.
Patent Information Service	Korea Intellectual Property Office (www.patent.go.kr)	<ul style="list-style-type: none"> • Service for general patent-related businesses, including online applications for patent registration and query of progress information

[Agency-specific Services Websites for Companies (Reconstructed), 2018]

An abstract graphic on the left side of the slide, consisting of numerous thin, light blue lines radiating from the left edge towards the center. These lines are punctuated by small, light blue dots, creating a sense of a complex network or data flow. The lines and dots are more densely packed on the left and become sparser as they move towards the right.

Part 2

Utilization

1. Internet Usage
2. Internet Environment
3. Internet Service Convergence

1. Internet Usage

A. Individual and Household

The 2017 Survey on Internet Usage conducted by the Ministry of Science & ICT (MSIT) and Korea Internet & Security Agency (KISA) showed that the Internet use of the population aged 3 or older (Ratio of people using the Internet at least once within the past 1 month) increased 2.0%p to 90.3% compared to the previous year; the number of Internet users stood at 45,280,000 (Increase of 1,647,046 compared to the previous year), showing consistent annual growth. Meanwhile, the Internet use rate of the elderly aged 60 or older increased 7.4% to 58.8% or 6,025,000 users and 9,720,000 users, respectively, compared to the previous year, showing that the half of the elderly in Korea were using the Internet.

[Figure 2-1-1] Pattern in Internet Usage and Number of Internet Users (over 3 years old) (Unit : %, 1,000 people)



* Including wireless (mobile) Internet as of 2004; the definition of "Internet users" changed from "used once a month on average" to "used Internet in the past month."

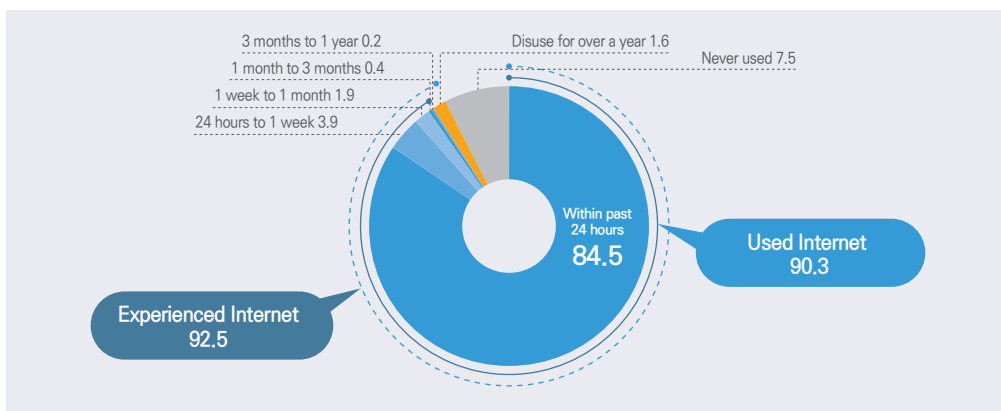
* From 2006, expanded the survey target to population over 3 years old (2000-2001: population over 7 years old, 2002-2005: population over 6 years old).

[KISA, 2017 Survey on Internet Usage, 2017]

Among the population over the age of 3, "Internet Users" with experience of using the Internet even once accounted for 92.5%; for each period of using the Internet, 84.5% used the Internet "within the last 24 hours", and users "within the last 3 months" and "within the last 1 year" constituted 90.7% and 90.9%, respectively.

[Figure 2-1-2] Recent Internet Usage (over 3 years old)

(Unit : %)



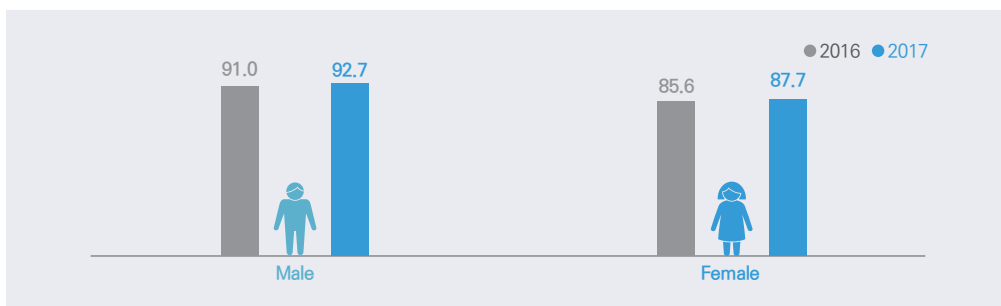
[KISA, 2017 Survey on Internet Usage, 2017]

The Internet use rate of males aged 3 or older was 92.7% (1.7%p increase compared to the previous year), and that of females was 87.7% (2.1% increase compared to the previous year). Meanwhile, there were 23,315,000 male users and 21,968,000 female users of the Internet.

For the gender composition of Internet users, male users accounted for 51.5%, and female users constituted 48.5%.

[Figure 2-1-3] Male/Female Internet Usage (over 3 years old)

(Unit : %)



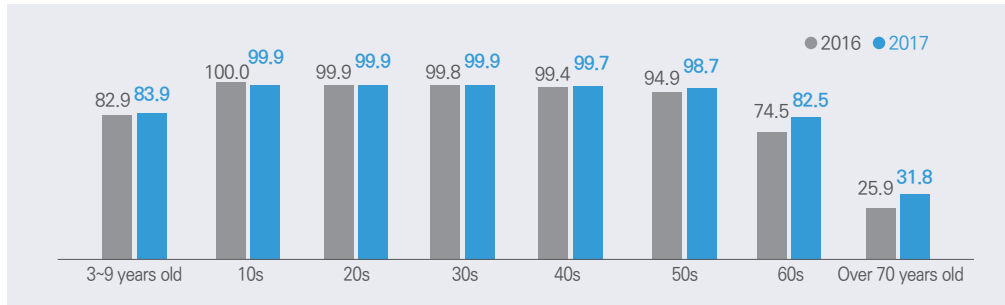
[KISA, 2017 Survey on Internet Usage, 2017]

In Korea, most of the users in the age group of teens ~ 40s (99.7% or more) used the Internet; the Internet use rate of those in their 50s was also high at 98.7%. In addition, there was a notable increase in the Internet use rate of the elderly class in their 60s (82.5%, 8.0%p increase compared to the previous year) and aged 70 or older (31.8%, 5.9%p increase compared to the previous year).

As for the number of Internet users for each age group, those in their 40s numbered 8,577,000, followed by those in their 50s (8,298,000), those in their 30s (7,555,000), those in their 20s (6,897,000), and teens (5,237,000).

[Figure 2-1-4] Internet Usage By Age Group (over 3 years old)

(Unit : %)

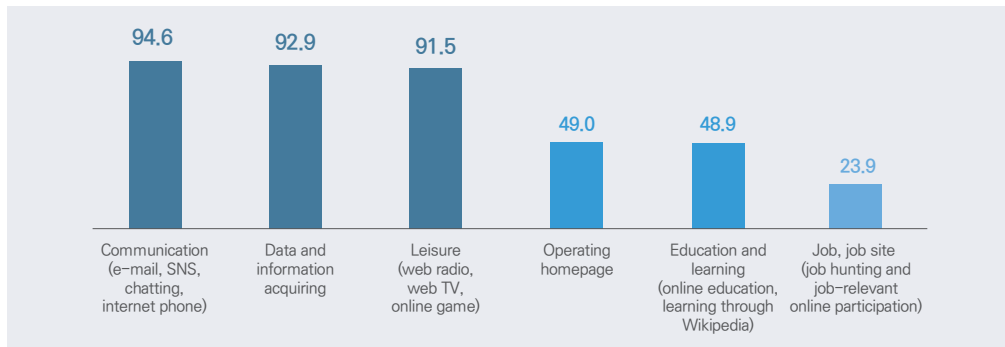


[KISA, 2017 Survey on Internet Usage, 2017]

With regard to the purpose of using the Internet (within 1 year), “communication” was highest with 94.6%, followed by “acquiring data & information” (92.9%) and “leisure activities” (91.5%), etc. The Internet was also used for purposes such as “operation including website” (49.0%), “education & learning” (48.9%), and “Work & Office” (23.9%).

[Figure 2-1-5] Purpose of Internet Use (over 3 years old, Multiple Responses)

(Unit : %)



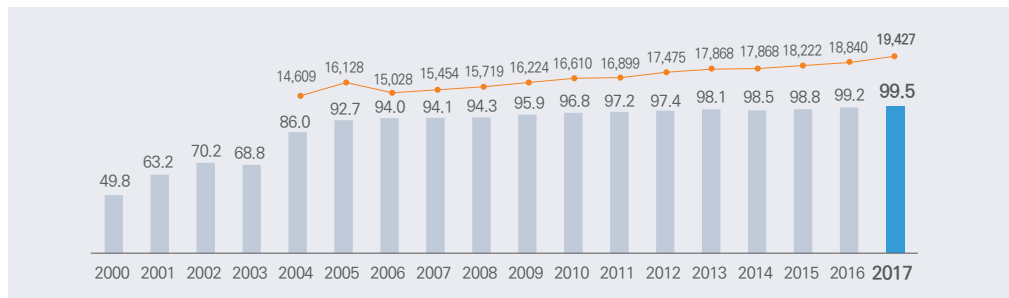
[KISA, 2017 Survey on Internet Usage, 2017]

The result of analyzing the gender showed that both male and female users cited “Communication” (Male – 94.7%, Female – 94.5%) as the most important purpose of using the Internet.

If we review by age group, the age group of teens or younger indicated mostly “Leisure Activity” (aged 3~9 – 97.7%, teens – 98.9%), and the age group of 20s ~ 50s responded that the most important purpose of using the Internet was “acquiring data and information” (20s – 100.0%, 30s – 100.0%, 40s – 99.9%, 50s – 99.3%).

As of July 2017, 19,427,000 (99.5% of the total households) out of 19,524,000 households in Korea could connect to the Internet through methods such as mobile Internet, wireless LAN, optical LAN service, xDSL, cable modem, etc. in their households. This represents a 0.3%p increase compared to the previous year and a 49.7%p increase compared to 2000.

[Figure 2-1-6] Trend of Internet connection rate in households and No. of household connections -Total Households (Unit : %, 1,000 households)



[KISA, 2017 Survey on Internet Usage, 2017]

Among households with access to the Internet, most were using “Mobile Internet” (100.0%) such as 3G, LTE, etc. to connect to the Internet; Internet access using “Wireless LAN” was also 100.0%. Other methods of connecting to the Internet were “Optical LAN Service (including Apartment LAN and FTTH)” (78.5%), “xDSL” (6.7%), “Cable Modem” (6.7%), and “Mobile Wireless Internet Router” (4.6%).

B. Business

The domestic status of Internet use by businesses was analyzed based on the result of the Information Management & Statistics Survey conducted by the Ministry of Science & ICT (MSIT) and National Information Society Agency (NIA) at the end of December 2016.

The result of the 2017 Study on the Information Society Statistics showed that, in the standard as of the end of December 2016, the Internet access rate of businesses in general (3.87 million) slightly increased to 74.2% compared to 2015. As for the method of Internet access, optical LAN service was pegged at 56.3%, the highest similar to 2015. The ratio of wireless Internet access methods such as mobile, wireless LAN, high-speed Internet, etc. also showed steady increase.

The utilization rate of Internet-based services such as e-Commerce and e-Government services, etc. remained the same or increased compared to the previous year. The utilization rate of e-Commerce increased 2.5% to 22.9% compared to 2015 (20.4%); especially the sales (order) rate through e-Commerce increased 3.3% to 8.0% compared to 2015 (4.7%). The utilization rate of e-Government service was 48.2%, similar to 2015 (49.0%).

2. Internet Environment

A. Improving Internet Environment

1) Web Compatibility

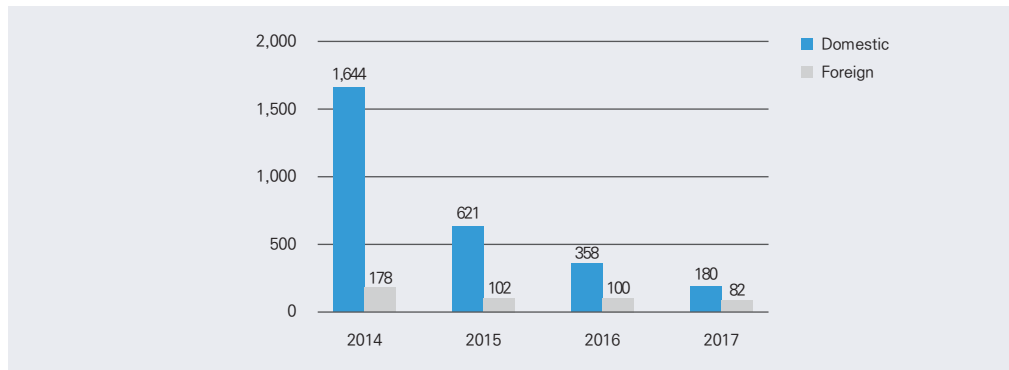
As shown in the domestic Internet use status in the second half of 2017 analyzed by the Korea Internet & Security Agency (KISA), the market share of Windows in PC OS was 96.44%, suggesting that Microsoft maintains an almost monopolistic system without change compared to 2016. In the browser section, however, Chrome recorded a 70.10% share, and IE's share was 23.41%. In particular, the share of IE -- which was relatively high in Korea -- naturally increased the usage rate of plug-ins such as the non-standard web technologies of the ActiveX and EXE file that operated only on IE. The main functions of the e-transaction & e-Government, which was introduced one step ahead in Korea for e-payment, transfer and civil affairs document issuance, etc., were realized through the non-standard technology to be expanded. Specific services such as the Certificate and Keyword Security -- which operate only through plug-in -- limited the access of the users using other browsers such as Chrome, etc., and the users had to start the browser again through plug-in installation; thus providing not only inconvenience but also other problems such as becoming the path for malignant code.

Meanwhile, the HTML5 Standard was confirmed through the next-generation web standard technology of W3C in 2014 and mounted in advance on Windows through the Edge browser; here, the use of non-standard technology of ActiveX was completely prohibited, and NPAPI was inactivated from Chrome and Firefox browsers beginning 2015. The policy was also changed in the direction of no longer supporting non-standard technology in the browser such as ending the technical support for Windows 7 by January 2020 and Adobe Flash support as of December. New alternative technologies that do not use plug-ins such as Easy payment or FIDO are being newly introduced as well, increasing the importance of web compatibility.

In 2017, the use status of the non-standard web technology of ActiveX was investigated through a survey among the top 100 websites in Korea, and there were a total of 180 remaining. This represented an approximately 89.1% decrease to 1,464 compared to 1,644 in 2014. In terms of functions, the share was high in the multimedia field such as e-payment and Flash, etc., and the dependency on ActiveX is being eased steadily. Note, however, that the number of ActiveX on the

top 100 foreign websites was only 82, suggesting the need for efforts for improvement by domestic websites.

[Figure 2-2-1] ActiveX Usage for Top 100 Domestic Web Sites



[KISA, 2017]

The “e-Government Service Compatibility Compliance Guideline (hereinafter referred to as “Compliance Guideline”) was established pursuant to Article 50 of the 「Electronic Government Act」 and Article 59 of its Enforcement Decree to enhance the general accessibility of the people in the course of provision of e-Government service by administrative agencies and public institutions. According to this regulation, the head of the administrative agency must enable compatibility regarding the establishment, improvement, maintenance, and operation of the e-Government service except when stipulated by other laws and regulations. The diagnosis of web compatibility provided in the compliance guideline can be largely classified into 3 parts: complying with the W3C standard of web standard grammar; securing compatibility with regard to the functions and display; and use of ActiveX, EXE file, and latest web standard technology.

We are using the Internet service conveniently by utilizing various web browsers without any limitations through the expansion of the web standard utilization environment. To support the expandability function of multimedia, the utilization of non-standard web technologies (ActiveX, Flash, etc.) wherein the user must install the program separately was reduced, and the usage rate of ActiveX on domestic websites has decreased greatly since 2014. In addition, support for web standard conversion for website is gradually gaining momentum as the Internet use environment improvement project on a web standard technology such as HTML5, etc. to develop the web standard environment. Note, however, that there are still pending issues such as focusing improvement on the functions (Flash, e-payment, etc.) with high residual portion and improvement of the website using ActiveX, etc.

2) Open Internet

“Open Internet” refers to the environment wherein users can use the Internet anytime, anywhere they desire, and it can be described as a concept of network neutrality. Developed by Professor Tim Wu of Columbia University, network neutrality has the principle of enabling all communication service providers to treat the contents on the Internet equally.

In Korea, the policy related to network neutrality was established after 4 years of discussions, but neutrality is guaranteed not through legislation but at the level of guideline. The “Guideline for Network Neutrality & Internet Traffic Management” sets forth the basic principles of Internet traffic management, and the purpose is to develop an open, fair Internet use environment and to promote the healthy and sustainable development of the ICT ecosystem. The basic principles are the rights of the users, transparency in the management of Internet traffic, no blocking, no unreasonable discrimination, rational traffic management, etc.

3) Web Accessibility

Since 2004, the Korean government has promoted web accessibility improvement projects consistently to develop an environment that enables everyone including the disabled and the elderly to access the information provided on the website without discrimination; such projects include standard & guideline establishment related to web accessibility, maintenance of legal system, status survey, professional training, quality certification, seminar, consulting, online consultation, development and supply of evaluation tool, etc.

In particular, given the rapid increase in the supply of smartphone, the “Guideline for Mobile Application Accessibility” was established in 2011 as a method of preferentially increasing the accessibility of the mobile field; the demonstration project was initiated in 2014 with regard to mobile application accessibility diagnosis, consulting, and quality inspection to promote professional training, diagnosis, and consulting actively on the mobile application. In 2016, the “Mobile Application Contents Accessibility Guideline 2.0” was established as the national standard.

In Korea, the “Korean Web Contents Accessibility Guideline (KICS.OT-10.0003)” was established as the national standard for web accessibility in 2005; in 2009, the “Technical Guideline on the National Standard for Web Accessibility Improvement” was proposed for the detailed description of the techniques to comply with this guideline. In 2010, the details on the international standard of web accessibility of WCAG 2.0 were reflected to establish the “Korean Web Contents Accessibility Guideline 2.0 (KICS.OT-10.0003/R1)” as the national standard for web accessibility, and the handbook “Contents Production Method Considering Web Accessibility 2.0” was presented in 2011.

In addition, the contents for responding to the changing web environment such as touch-based environment, etc. were reflected to establish the “Korean Web Contents Accessibility Guideline 2.1

(TTAK.OT-10.0003/R2)” as the standard for the Telecommunications Technology Association in 2013; this was amended as the national standard of the “Korean Web Contents Accessibility Guideline 2.1 (KICS.OT-10.0003/R2)” in March 2015. Meanwhile, to respond to the changing information access environment such as increase in the use of mobile device, etc., several collective standards were established, including the “Mobile Application Accessibility Guideline (TTAK.KO-10.0634)” in 2012 and “Mobile Application Accessibility Guideline 2.0 (TTAK.KO-10.0634)” in 2015. In October 2016, the “Mobile Application Accessibility Guideline 2.0 (KS X 3253:2016)” was established as the national standard (KCS); this standard was reflected to develop the Android & iOS mobile application accessibility production technique.

B. Internet Culture

1) Bridging the Information Gap

There are differences in class, region, gender, education, and income level as the side effects of rapid informatization development stemming from the discrimination on access and use of information and inequality of the economic society. The information gap is intensifying the economic polarization between those who have or do not have information, acting as the mechanism depriving some of the basic human right to enjoy the information. When the balance of power according to the information is concentrated on a specific group, such will inhibit the consistency of society and act as an obstacle to social integration.

Therefore, advanced countries including Korea guarantee the free access and use of information for anyone regardless of social, economic, and regional differences as part of efforts for improving the quality of their life and to contribute to balanced national economic development. Especially, the Korean government developed the “Digital Information Gap Index” to establish policies on narrowing the information gap and to identify tasks; the gap of the classes vulnerable to information is also being measured for management. In addition, information & communication devices and assistive devices are developed and provided to provide “equal opportunity of information access” to the disabled, elderly, low-income class, and farmers & fishermen who have difficulty accessing the information & communication products and services. Customized online information education is promoted as well, such as group and visit training for each class to enhance their abilities on using information such as PC, smartphone, and Internet application capability targeting the vulnerable classes of the disabled, elderly, marriage immigrants, etc.

At the level of digital information, comprehensive measurement is performed on the information gap level and characteristics for each sector in terms of digital access, capability, and application; the digital information level for each class is measured to calculate the relative value when the digital information level of the general public is 100.

As of 2017, the digital information level of the 4 main information neglected classes (Disabled · Low-income Class · Farmers & Fishermen · Elderly) increased 6.5%p to 65.1% from 58.6% in 2016. The results for each sector showed digital information access level of 91%, digital information application of 65.3%, and digital information capability of 51.9%; the increase level was in order of capability (6.7%p↑), access (6.5%p↑), and application (6.3%p↑).

[Table 2-2-1] Informatization for Marginalized Groups Compared to Average Citizens By Year (Unit : %)

Category	2014	2015	2016	2017
Digital Access	72.3	73.7	84.5	91
Capability	34.6	37.4	45.2	51.9
Utilization	47.7	51.6	59	65.3
Average	50.1	52.4	58.6	65.1

※ Informatization level = access (0.2) + capability (0.4) + application (0.4)

- Level of access: Access to wired/wireless Internet within the household, access to wired/wireless device (pc/mobile smart device)

- Level of capability: PC and mobile smart device capability

- Level of application: Use of wired or mobile Internet, number of Internet services used, level of producing/sharing information, level of social/economic activities involving Internet

[MSIT / NIA, 2017 Digital Information Gap Survey, 2018]

Meanwhile, the rate of possession of smartphone for the information-vulnerable class in 2017 was 68.7%, which was 23.8%p lower than the national rate of possession. By class, the elderly class recorded the lowest possession rate with 65.2%, followed by the farmers & fishermen class with 66.6%. This was the same as the order of digital information level for each class, suggesting that the digital information level is lower than the level of using smartphone in everyday life for Internet.

The Korean government is continuing efforts to provide the information-vulnerable class with equal opportunity for information access, and information access and use by the disabled and elderly, etc. are guaranteed through the “development & supply of information & communication assistive device,” “Green PC of Love Supply Project,” “provision of communication relay service,” etc. In 2017, 3,483 information & communication assistive devices were supplied, bringing the total to 58,013 since 2003. Support items began with 10 types in 2003, having been expanded annually to 68 types in 2014, 74 types in 2015, 84 types in 2016, and 98 types in 2017 to provide the opportunity to select the information & communication assistive device appropriate for the disability type & level.

2) Development of Healthy Internet Use Culture

As we use Internet and smartphone in our everyday lives to change the lifestyle and method of communication between generations, there is an increase in the experiences of inflicting or suffering from cyber violence for each class, resulting in serious adverse effects such as overdependence on smartphone, spread of false information, indiscreet disclosure of personal data, etc.

Especially among cases of school violence, cyber verbal violence through SNS such as insult and defamation increased 106.8% compared to the previous year; cyber-crime including cyber defamation and insult, etc. recorded more than 13,000 cases annually, suggesting the need for education & PR on Internet ethics and prevention of cyber violence.

[Table 2-2-2] Trend in Cyber Criminals

(Unit : People)

Category	2015	2016	2017
Cyber Defamation, Insult	15,043	14,908	13,348

[Korean National Police Agency, Trend in Cyber Criminals, 2017]

Accordingly, the Korean government and relevant agencies are planning to increase the customized & experience-type educational programs to spread the healthy Internet use culture to enable the people receiving the education to have consensus on Internet ethics and to practice it in public. Especially, Internet ethics contents will be secured; the campaign will be expanded, and visiting education and PR will be carried out in response to the increase of cyber violence by adults to expand the target for receiving the education. Along with the youth, the training on the mentors involved in education such as parents, teachers, youth instructors, etc. will be reinforced to induce changes in the household and school environment, and programs that can be applied to everyday life will be provided to enable healthy Internet use.

3) Overdependence on Smartphone · Internet

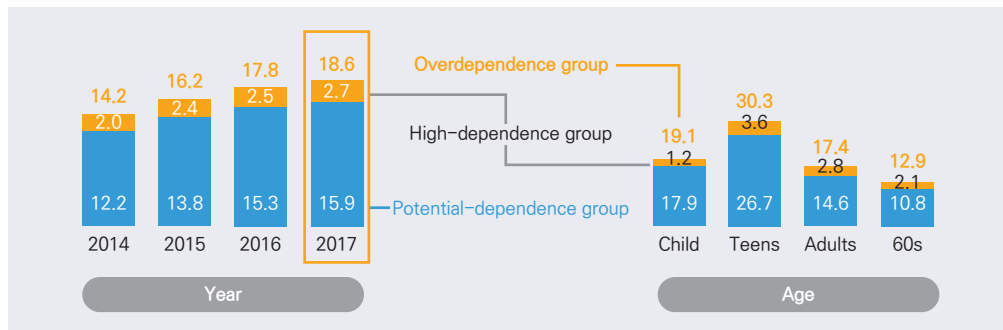
According to the 2017 Internet Use Status Survey (Korea Internet & Security Agency (KISA)), 87.8% of the population aged 3 or older were using the Internet through the smartphone, and the average weekly Internet use hours were 10 hours and 17 minutes. Internet and smartphone are now essential tools in life, but the tendency of habitual use and overdependence are threatening the balance of life.

The 2017 “Internet Addiction Survey” showed that 18.6% of the smartphone users in Korea aged 3 ~ 69 were suffering from overdependence; this represents a 0.8%p increase compared to the previous year’s 17.8%, but the increase rate is being reduced. In terms of each age group, the youth (aged 10~19) recorded 30.3% (1,523,000) — a slight decrease of 0.3%p compared to the previous

year's 30.6% -- but children (aged 3~9) and adults (aged 20~59) posted 19.1% (576,000) and 17.4% (5,310,000), respectively, representing an increase of 1.2%p and 1.3%p, respectively. In the 2016 survey, the overdependence risk group of those in their 60s was investigated for the first time, and their overdependence rate was found to have increased (1.2%p to 12.9% (451,000)) in the 2017 survey compared to 11.7% in the previous year.

[Figure 2-2-2] Trend in Smartphone Addiction By Year / Age Group

(Unit : %)



[NIA, 2017 Internet Addiction Survey, 2017]

The main contents used on the smartphone were the messenger (95.2%) as the highest, followed by games (77.4%), news search (74.6%), music (67.2%), etc. Contents with concerns of side effects were games (34.0%) as the highest, followed by messenger (31.7%), movies, TV, and videos (18.1%).

Moreover, in the survey on the awareness of the good functions of the smartphone, the overdependence risk group cited the reinforcement of knowledge capabilities (83.9%), close family & friend relationship (74.4%), and social participation & contribution activities (62.1%), showing relatively higher awareness of the good functions compared to the general user group. This implies that efforts for preventing and easing overdependence must be made by practicing proper use of the smartphone (Internet) instead of limiting its use.

4) Distribution of Unhealthy Information

Regulation on the information on the Internet must be enabled in the appropriate range of maximizing the good functions of the Internet and to prevent the freedom of expression and the right to know from being infringed upon unreasonably.

There are various systems wherein the government is regulating the “Information” (all types of data or knowledge expressed through texts and audio & visual forms in the information & communication network) on the Internet; among them, the most diverse and general regulation is the “Communication Standard” by the Korea Communications Standards Commission.

In 2017, there were a total of 91,853 kinds of information for review, 84,872 (92.4%) of which

were decided as request for correction and only 6,917 cases (7.6%) as N/A (approved for distribution due to the absence of issue on the contents of the information), dismissal, rejection, withdrawal of the request for correction, and cancellation of decision on the request for correction.

[Table 2-2-3] Status of Each Review & Request for Correction by the Korea Communications Standards Commission(2014~2017)

Category		2014	2015	2016	2017
Total Number of Reviews		140,421	158,073	211,187	91,853
Request for Correction	Total	132,884	148,751	201,791	84,872
	Deletion	24,581	27,650	35,709	15,499
	Cancellation & Discontinuance of Use	10,031	9,821	8,422	2,617
	Block Access	97,095	111,008	157,451	66,659
	Indication of being Harmful to the Youth	1,177	272	209	97
Determination of Harmful Media to the Youth		274	148	148	64
N/A, etc.		7,096	9,174	9,248	6,917

[Korea University Law School, Public Interest Law Center, Korean Internet Transparency Report, 2018]

Among the requests for correction in 2017 (84,872 cases), “Block Access” constituted 66,659 cases (78.5%), “Deletion” accounted for 15,499 cases (18.3%), “Cancellation of Use, etc.” made up 2,617 cases (3.1%), and “Others (related to indication of being harmful to the youth)” constituted 97 cases (0.1%).

The most frequent type of request for correction was “Block Access,” which accounted for approximately 80% of the total number of decisions on request for correction. “Block Access” is the measure of blocking access to the relevant information in Korea for the common carrier (network service provider) that has the server for the information on overseas and provides Internet access for such information.

Among the information types subjected to request for correction in 2017, prostitution & sexual information made up 30,200 cases (35.6%), gambling information constituted 21,545 cases (25.4%), and illegal food & drug information accounted for 18,556 cases (22.0%); together, these 3 types constituted approximately 88%. Among these 70,301 cases, about 84% of 58,787 cases were decided as “Block Access” to show that most of these kinds of illegal information have a server overseas to provide information through their website.

Other information includes other ordinance violation information (illegal name dealing, forgery of documents, organ trade, illegal finance, and violation of the National Security Law), harmful information, etc. Among the 11,403 cases decided as request for correction, 6,668 cases (58.5%)

received deletion and discontinuance of use orders, and 4,735 cases (41.5%) received a “Block Access” order; thus suggesting that most of them had the server in Korea to provide the information.

Out of the total number of information subjected to request for correction in 2017, illegal information accounted for 79,655 or 93.9%, and harmful information constituted 2,049 cases (2.4%). There were also 3,168 cases (3.7%) of information infringing rights.

In these kinds of illegal information, the ratio of request for correction on information violating the National Security Law was 0.8% in 2014, 1.2% in 2015, 1.3% in 2016, and 2.0% in 2017, showing a rapidly increasing trend.

The ratio of request for correction on information infringing rights was on the rise but recorded 3.7% in 2017, decreasing by approximately 0.1% compared to the previous year. Among them, the portion of defamation information has been decreasing since 2015, and review is performed centering on the information violating portrait rights (mostly digital sexual violence).

The ratio of request for correction on harmful information was 0.8% in 2014, 1.5% in 2015, 1.9% in 2016, and 2.4% in 2017, showing rapid increase.

[Table 2-2-4] Status of Each Information Type Subjected to Request for Correction in the Communications (2014~2017)

Category		2014		2015		2016		2017	
		Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio
Illegal	Porn-Prostitution	49,737	37.40%	50,695	34.10%	81,898	40.6%	30,200	35.6%
	Gambling	45,800	34.50%	50,399	33.90%	53,448	26.5%	21,545	25.4%
	Illegal Food & Drug	20,160	15.20%	26,071	17.50%	35,920	17.8%	18,556	22.0%
	Narcotics	1,725	1.30%	-	-	-	-	-	-
	Illegal Finance	1,694	1.30%	1,620	1.10%	2,234	1.1%	1,349	1.6%
	Personal Information Infringement	2,085	1.60%	1,860	1.30%	2,011	1.0%	524	0.6%
	Illegal Name Trade	1,959	1.50%	958	0.60%	5,586	2.8%	1,820	2.1%
	Forgery of Documents	1,961	1.50%	1,973	1.30%	1,493	0.7%	1,225	1.4%
	Violation of the National Security Law	1,137	0.90%	1,836	1.20%	2,570	1.3%	1,662	2.0%
	Infringement of Intellectual Property Right	-	-	862	0.60%	956	0.5%	976	1.1%
	Sub-total	129,799	97.70%	141,190	94.9%	190,390	94.3%	79,655	93.9%

Category		2014		2015		2016		2017	
		Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio
Harmful	Discrimination, Degradation, History Distortions	705	0.50%	891	0.60%	2,455	1.20%	1,166	1.40%
	Abusive Language	194	0.10%	549	0.40%	734	0.40%	774	0.90%
	Violence, Cruelty, Hatred	101	0.10%	535	0.40%	313	0.20%	109	0.10%
	Others	0	0.00%	207	0.10%	116	0.10%	0	0.00%
	Sub-total	1,000	0.80%	2,182	1.50%	3,618	1.90%	2,049	2.40%
Infringement of Rights	Portrait Right	1,706	1.30%	3,768	2.50%	7,557	3.70%	3,129	3.70%
	Defamation, etc.	379	0.30%	1,611	1.10%	226	0.10%	39	0.01%
	Sub-total	2,085	1.60%	5,379	3.60%	7,783	3.80%	3,168	3.70%
Total		132,884	100%	148,751	100%	201,791	100%	84,872	100%

[Korea University Law School, Public Interest Law Center, Korean Internet Transparency Report, 2018]

The analysis on the status of unhealthy information review & awareness showed that approximately 94% of the information subjected to request for correction were illegal information that were very extensive in quantity, and most of them had a server overseas. In addition, due to the characteristics of the Internet, the information can always change the domain and URL for redistribution even in “Block Access” state, so the increase in the cases of request for correction does not guarantee the decrease in the distribution of illegal information but may actually be viewed as a meaningless, inefficient measure. Therefore, the review capability of the Korea Communications Standards Commission must focus on the types of information with high level of illegality and which are connected directly to each individual or to the lives of the people and which can cause huge damage such as digital sexual violence materials, financial fraud and phishing, etc. Moreover, instead of focusing on the follow-up measures on the information, cooperation must be enabled with the relevant agencies to respond strictly to the distributors of illegal information to eradicate the distribution of illegal information.

3. Secure Internet

A. Information Security

Cyber-attack is continuing to evolve along with the development of ICT (information, communication & technology). Likewise, cyber-attack is expanding in volume from simple hacking for financial gain to attack on the national cyber network such as system destruction, causing confusion to the Internet network.

In 2018, a global event, the Winter Olympics, was held in Pyeongchang, Korea, prompting the relevant authorities to be on high alert for any cyber-attacks. Accordingly, the government operated the emergency service system for 24-hour monitoring during the complete period of the event in preparation for cyber-attacks. There were also frequent cyber-attacks on cryptocurrency service companies and S/W developers and on IoT devices, etc. Distributed continuously since 2016, ransomware are still misusing socio-technological attack methods disguised as resumes and documents related to the infringement of copyright, etc. Various types of ransomware have been developed since 2016, and they were distributed randomly to household & corporate PC, servers, etc. to cause large-volume damage. Ransomware is still distributed in 2018 through various methods. Especially, GandCrab ransomware is of the RaaS (Ransomware As A Service) type that can be purchased and was distributed domestically as a phishing mail disguised as a resume or a document on infringement of image copyright and traffic fine; thus resulting in great damage.

[Table 2-3-1] Civil Complaint Reports on Damage from Ransomware

(Unit : cases)

Category	Status of Civil Complaint Reports on Damage from Ransomware Per Quarter				
	1Q	2Q	3Q	4Q	Sub-total
2015	-	127	58	585	770
2016	176	353	197	712	1,438
2017	972	3,542	852	459	5,825
2018	570	620	-	-	1,190

[KISA, Status of Civil Complaint Report on Damage from Ransomware, 2018 2Q]

To prevent Internet infringement accidents in the private sector, enable quick response, and prevent the spread of damage, the Ministry of Science & ICT (MSIT) and Korea Internet & Security Agency (KISA) are carrying out various activities through the operation of the Internet Infringement Response Center. The Control Office of the Internet Infringement Response Center performs continuous monitoring of the traffic communication status of the domestic Internet network, main DNS service condition and access state of the main web servers such as government, public and finance, etc., and receives reports on DDoS attack or phishing accident and website falsification to take initial action. The domestic risk regarding new malignant code and security vulnerability are also evaluated to take action for each level.

Since there were cases of distributing malignant codes through the website, the malignant code-concealing websites have been detected, and the necessary action has been taken since 2006. Moreover, malignant code detection and measures were reinforced by inspecting the forgery of exclusive programs on the Webhard site and free distribution S/W in Korea (approximately 200).

Domestic websites were inspected in 2017, with the number of detected websites concealing malignant codes increasing 20.8% (11,044→13,347) compared to 2016. In distributing malignant codes through the website, the main vulnerabilities with high possibility of use on the user PC were misused in combination, and the ratio of misuse was in order of Adobe Flash Player (39%), JAVA Applet (30%), MS Internet Explorer (21%), and MS Edge (9%).

[Table 2-3-2] Detected Websites With Malicious Code By Year

(Unit : cases)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Distributor	993	1,619	1,324	1,731	1,434	1,433	3,270	4,472	2,583	3,295	1,370	1,197
Proxy Site	5,624	3,932	7,654	5,621	5,240	10,372	9,748	13,278	45,120	43,555	9,674	12,150
Total	6,617	5,551	8,978	7,352	6,674	11,805	13,018	17,750	47,703	46,850	11,044	13,347

* Distributor : Website distributing the malignant code directly to website visitors

** Proxy Site : Website concealing the address of the distribution point for automatic connection to the distribution point of the malignant code

[(KISA, 2017)]

DDoS attack is a form of causing overload to the system or network providing services such as website so that normal service cannot be provided; it can cause direct damage such as connection failure, etc.

As of 2017, the DDoS response system was being operated by 11 ISP service providers through a total of 28 interlocking sections; a total of 3,117 cases of DDoS attack on the interlocking section were detected, and actions have been taken in the last 9 years including 368 cases of DDoS attack

in 2017. From the detected attacks, the infected PC IP list was secured to induce the treatment of malignant codes, and immediate measure by the ISP and website operator was requested to minimize the spread of damage from the DDoS attack.

[Table 2-3-3] Detection & measure by the DDoS Response System in the Internet Interlocking Section

(Unit : cases)

Category	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Detection · Measures	53	239	290	318	415	457	502	475	368	3,117

* Statistics were calculated through verification by the institution sustaining damage when the attack volume was 1Gbps or more and when the same attack was detected for 10 or more minutes.

[KISA, 2017]

The Infected PC Cyber Treatment System refers to the service wherein the PC users causing attack due to the mishandling of the infringement accident are notified directly of the infection to provide customized exclusive vaccine for treatment to enable more systematic treatment of the infected PC.

Since 2010, cooperation with 3 ISPs -- KT, SK Broadband, and t-broad -- has been pursued to initiate the establishment and operation of the treatment system; in 2013, the system was expanded to LG U+, CJ Hello Vision, D'Live, and Hyundai HCN. In 2014, three small~medium SOs (Service Operator) were applied additionally to enable most of the domestic Internet users to be alerted of the infection through the treatment system.

Initiating operation in January 2011, the Infected PC Cyber Treatment System provided 11.92 million users with a guide to treatment during the national intelligent cyber-attack involving the 3.4 DDoS accident, which affected about 70% (KT, SK Broadband & t-broad) of the total Internet users. Through this action, 9.4 million users checked the alert pop-up, and 4.55 million exclusive vaccines were supplied to minimize the spread of the damage.

Since the methods of using financial services including e-finance are being diversified nowadays, there is an increase in e-finance fraud such as phishing, pharming, smishing, voice phishing, etc. In addition, the act of smishing malignant APPs is reinforced, bypassing the detection and response according to the increase in the supply of smartphone. Accordingly, the smishing response system was established and has been in operation since January 2014 to minimize the national damage from smishing.

Voice phishing has occurred since the mid-2000. As a compound word of voice and phishing, it is a general term describing the act of the criminal impersonating an investigative agency, a government agency, or a financial institution to induce the victims to transfer money or to take over personal & financial information.

The Korea Internet & Security Agency (KISA) is supporting the performance of preinspection of national infrastructure such as the event management system for the success of the 2018 Pyeongchang Winter Olympics and provision of the online e-apostille certificate service requested by the Ministry of Foreign Affairs to support the expansion of infrastructure of the public institutions for preventing any inconvenience in the lives of the people. Preinspection is also supported for the private sector to provide safe service to the small ~ medium information & communication service providers.

The Ministry of Science & ICT (MSIT) is producing and distributing the inspection handbook for the autonomous performance of the preinspection on the information security from this year to improve the recognition of the institutions on the preinspection for information security and to stabilize the autonomous performance of the preinspection.

B. Personal Data Protection

The Korean government established the 「Personal Information Protection Act」, a general law, in September 2011 to regulate the handling of all personal data by the private & public sectors. Specifically, the law regulates the mandatory measures for each stage of handling of personal data by the personnel and guarantee of rights by the entity of information such as reading and requesting the discontinuance of the process involving personal data.

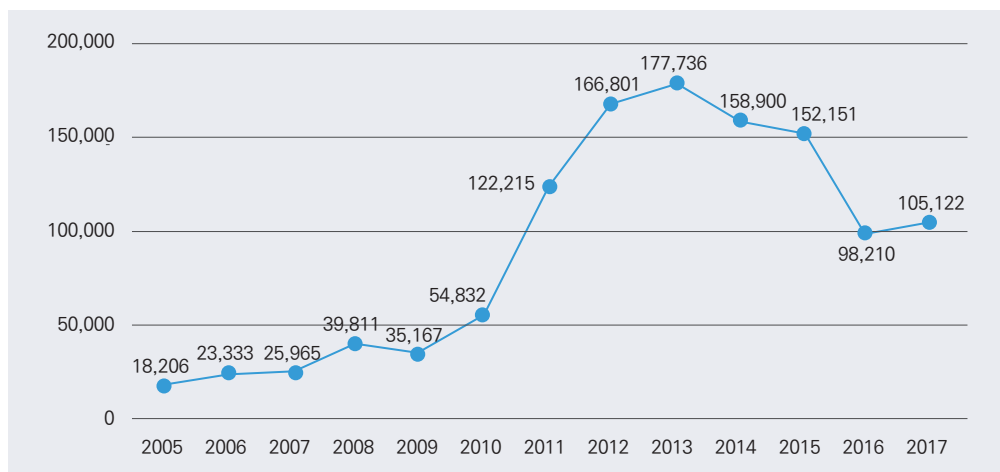
The number of reports to & consultations with the Personal Data Infringement Report Center of the Korea Internet & Security Agency (KISA) on the infringement of personal data increased consistently. Especially, in the year of legislating the 「Personal Information Protection Act」 in 2011, the number of reports & consultations increased by over 2 times compared to 2010, showing steady increase during the period 2011~2013. This can be said to be the result of improvement in the national awareness level regarding personal data and relevant laws.

The number of reports & consultations on the infringement of personal data has decreased steadily since 2014; especially in 2017, reports to & consultations with the Korea Internet & Security Agency (KISA) on the infringement of personal data numbered 98,210, decreasing considerably. Note, however, that the number of reports & consultations increased slightly in 2017 compared to 2016 with 105,122 cases.

In 2015, the Cyber One-Stop Center was opened to reinforce damage relief; since May 2015, this Cyber One-Stop Center has been operated to connect conveniently even to the police investigation when consulting through the phone number for cyber-crime (118). Among the reports & consultations on infringement, 2,054 cases were handled in connection with the Cyber One-Stop Center.

[Figure 2-3-1] Reports on Infringement of Personal Data

(Unit : cases)



[KISA Privacy Protection Center, Trend in Infringement of Personal Data Report and Response, 2017]

An abstract network diagram on the left side of the page, featuring a dense web of light blue lines and dots, representing a complex digital or communication network. The lines radiate from a central point on the left, branching out towards the right, with many small dots at the intersections and endpoints.

Part 3

Infrastructure

1. Internet Infrastructure
2. Internet Address Resource
3. Internet Technology
4. Legal System for Internet

1. Internet Infrastructure

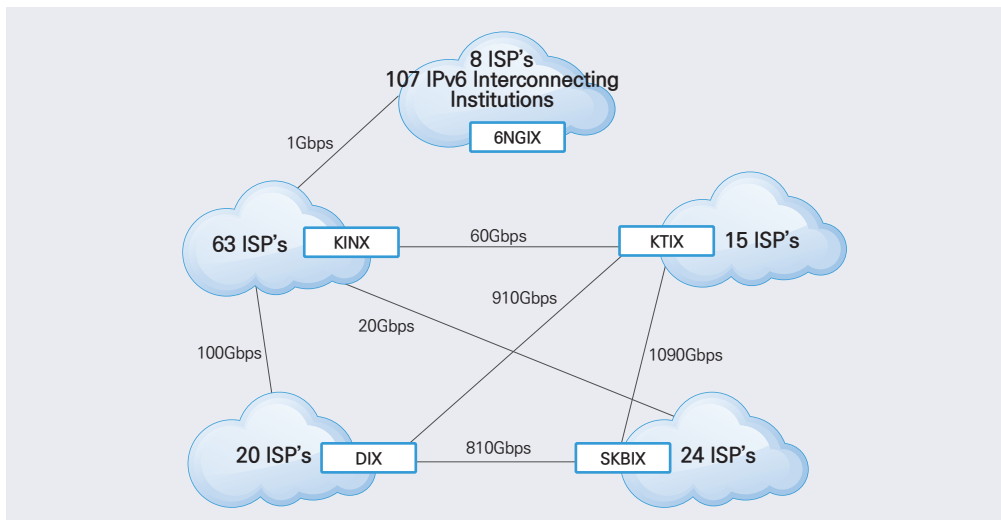
A. Backbone Networks

1) Internet eXchange

To enable the connection between the contents and the user through Internet, direct & indirect connections are required with the ISP (Internet Service Provider) providing Internet access service. There are many ISPs according to the increase in Internet use, and the higher number of ISPs leads to excessive line cost and investment cost & traffic from many connecting lines. Accordingly, IX (Internet Exchange) was developed for efficient line connection.

In Korea, KTIX (KT, www.kornet.net), DIX (LG U+, www.uplus.co.kr), SKBIX (SK Broadband, www.skbbroadband.com), and KINX (www.kinx.net) are currently in operation; the next-generation Internet address of the IPv6 address-based interconnection network of 6NGIX (Korea Internet & Security Agency (KISA), www.vsix.kr) is being operated in non-profit form.

[Figure 3-1-1] Interconnection Network Line Connection Structure for Each IX (as of June 2018)



[(KISA, 2018)]

When we look at the status of IX operation in Korea, KTIX is interconnected with a total of 15

ISPs and 3 IXs, and DIX is connected to approximately 20 ISPs and 3 IXs. SKBIX is connected to 24 ISPs and 3 IXs, whereas KINX is interconnected with 4 IXs and 63 ISPs. 6NGIX, which is operated in non-profit form for the IPv6 address-based traffic exchange, is interconnected with 8 ISPs and 107 IPv6-linked agencies.

2) Commercial Internet Networks

For the Korean Internet commercial service, 94 companies including Kornet (KT), Boranet (LG U+), B-Net (SK Broadband), Sejong-Net (Sejong Telecom), and Dream Max (Dreamline) are allocated with IP address from the Korea Internet & Security Agency (KISA) to provide the services of the exclusive line to the Internet-using agencies and individuals and connection to high-speed Internet, etc.

As a domestic Internet access backbone network provider constructed by KT, Kornet is a high-speed information & communication network referred to as “KORea-telecom-interNET.” A 10G~100Gbps high-speed network has been constructed in 50 regions nationwide from June 1994 to present, and approximately 100 international Internet lines are constructed and serviced globally including 280Gbps level in the US. Since 2008, FTTH (Fiber To The Home) has been supplied, with separate premium network and backbone volume on the general best-dredge network increased and serviced to activate the IPTV service.

Boranet is the Internet network of LG U+; since the exclusive Internet line service was initiated for businesses in October 1994, service has been provided to individual and household customers. Also provided are TPS (Triple Play Service) that realizes Internet phone and IPTV service at the same time for the customer through the Internet network and QPS (Quadruple Play Service) that is combined with the mobile phone service.

Boranet consists of over 1,000 nationwide backbone and subscriber accommodating nodes into the broadband double network to ensure outstanding quality and speed of Internet connection service anywhere in Korea. SDN-WAN and NFV will also be applied to realize an environment where NW can be used easily and conveniently, with the evolution of Boranet to be continued to accommodate various future services such as IoT/M2M, IPv6, etc.

B-Net is the Internet network of SK Broadband, and commercial service was initiated in April 1999 to launch the first IPTV service of “Btv” in Korea in July 2006; this was used to introduce the first TPS product of “B set” in Korea in January 2007. Currently, 167 nodes nationwide are accommodating the traffic in the subscriber section, and Internet service of outstanding quality is being provided in connection with numerous domestic & foreign major service providers.

Submarine cable relay stations in Korea are located in a total of 8 areas including Busan, Geoje, etc. (International Cable Landing Stations: Busan, Geoje, Taean / Domestic Relay Stations: Jeju,

Goheung, Namhae, Hosan & Ulleung). In the 2018 standard, a total of 9 submarine cables are landed and operated in Korea, and the capacity is approximately 120Tbps.

Landing involves connecting the relevant regional submarine cable to the land (Cable connection in Korea), whereas non-landing refers to the relevant regional submarine cable not connected to the land (Non-connection of cable in Korea). The non-landing submarine cables were in the existing international telephone PSTN (Public Switched Telephone Network) method for the purpose of connecting the exclusive international line to secure the capacity of the Korean non-landing (between 3rd-party countries) submarine optical cable, but the utility has decreased greatly due to the high increase in demand for Internet line and decrease in demand for international call and exclusive international line. There are a total of 4 non-landing international submarine optical cables, and the capacity of the submarine cable line is tens of G to hundreds of Gbps. SK Broadband is securing partial capacity on one non-landing submarine optical cable.

B. Subscriber Networks

1) Wired Network

Wired Local Loop refers to the information & communication infrastructure that connects the service network -- such as the phone network and the Internet network through the backbone network -- and the main network to the final subscribers including households, companies, schools, etc.

Optical cable, coaxial cable, and UTP (Unshielded Twisted Pair Cable) are the main medium composing the wired Local Loop; nowadays, the wired local loop is constructed mostly in the optical cable method. Recent main wired Local Loop statistics show that Internet phone and local call lines have decreased in number, but high-speed Internet subscriber lines are increasing consistently.

Internet Local Loop is an information & communication network that enables the actual subscriber device (PC) including households, companies, and schools using the Internet to be connected to the IP devices such as the router through xDSL (x-Digital Subscriber Line), LAN (Local Area Network), FTTx (Fiber to the x), and HFC (Hybrid Fiber Coax) to pass through the IDC (Internet Data Center) located with the main portal service for using the Internet.

The national-level Giga Internet service was commercialized in 2014, and its coverage was expanded according to the rapidly increasing network traffic in Korea and owing to the development of the future network technology & service. In 2018, too, the 10Giga Internet service, which is up

to 10 times faster than the existing Giga Internet, was developed with core technology & equipment and established with the test-bed network, with the service tested & verified to succeed in the commercialization of the 10Giga Internet service of 2.5Gbps, 5Gbps, 10Gbps, etc.

[Table 3-1-1] Comparison Between BcN, Giga Internet and 10Giga Internet Service

Category	Network Speed	Typical Service	Characteristics
BcN	50Mbps~100Mbps	VoIP, IPTV	100Mbps
Giga Internet	Over 100Mbps ~ Max. of 1Gbps	UHDTV, Realistic Communication, Giga Cloud, High-definition IPTV, Smart TV	150Mbps, 200Mbps, 320Mbps, 500Mbps, 1Gbps
10Giga Internet	2.5Gbps or more ~ Max. of 10Gbps	8K UHDTV, Hologram, AR·VR, IoT, AI	2.5Gbps, 5Gbps, 10Gbps (to be commercialized in 2018)

[NIA, 10Giga Internet Service Activation Method (Reconstructed), 2017]

The BcN construction project led by the Korean government was completed during the period 2004 ~ December 2010; the number of subscribers of BcN with speed of over 50Mbps surpassed 14.82 million, exceeding the original goal of 12 million subscribers by more than 20%. Through this BcN project, major cities nationwide, small ~ medium urban areas, and even the Eup & Myeon in agricultural & fishery towns are now able to use the 50M~100Mbps-level FTTH & HFC-based broadband Internet service. In the standard as of June 2018, there are approximately 21.31 million high-speed Internet subscribers in Korea, and Giga Internet subscribers number about 8.17 million; thus, the appropriate technical method will be applied according to the characteristics of each region and business.

2) Wireless Network

Wireless communication refers to the method wherein the communication lines that were laid in the past are now used for electromagnetic waves, sound waves, ultrasonic waves, etc. In the wireless communication environment, there can be changes in the environments of atmosphere, seawater temperature, and solar magnetic field in the process of enabling communication, or the communication quality can differ due to the obstacle on the line of sight to intrude with the wireless network connection.

The wireless communication environment is classified as WPAN (Wireless Personal Area Network) when the normal coverage is several meters, WLAN (Wireless Local Area Network) at the level of tens to hundreds of meters, and WWAN (Wireless Wide Area Network) when the coverage is over several kilometers, etc.

Three major mobile communication service providers in Korea installed the AP actively centering on multi-use facilities to receive a fixed amount of fee, or the service subscribers are granted AP

access authority for free or for a low price.

The government promoted the project of installing open-type free AP from the “Public Wi-Fi” project in 2012 to inhibit the redundancy of AP installation by mobile communication service providers and to narrow the gap in the number of people using the Internet. Through this, 2,000 new APs were installed as of the end of 2012; by the end of 2016, a total of 12,000 new AP sites were installed.

In the standard as of June 2018, there are 65.3 million mobile communication service lines in Korea; this represents an increase of 2.64 million lines compared to June 2017, with the annual average rate of 4% maintained since the subscribed lines exceeded the domestic resident population in 2010. In June 2018, too, lines for the tablet computer and wearable devices exceeded 2 million lines; this represents an increase of more than 20% compared to June 2017. Conversion into LTE was also enabled along with the increase in subscribers; in March 2018, the portion of LTE service users out of the total number of subscribers exceeded 80%.

Along with the introduction of the latest technology in the LTE-series of LTE-Advanced Pro, the speed competition between the mobile communication service providers is intensifying. In the LTE-series, the transmission speed is improved in proportion to the increase in frequency band, and a downward maximum of 75 Mbps can be provided per 10MHz. In June 2016, the LTE-Advanced Pro that secured transmission speed of 500Mbps was serviced for the first time in Korea; at the end of 2017, the service area of the LTE-Advanced Pro was expanded to major cities nationwide to prepare for many subscribers in keeping with the new technology.

C. Research Networks

1) Domestic Networks

Nowadays, leading national research networks in the world are reinforcing the connection with the Super Computer, Big Data, Cloud, etc. to speed up the sophistication of the research & collaborative environment, and there are increasingly more requests for the development of cutting-edge network technology and infrastructure based on data and S/W. The Korean research network of KREONET (Korea Research Environment Open NETwork) constructed and operated by KISTI (Korea Institute of Science and Technology Information) provides next-generation cutting-edge network environment and core infrastructure service to enable researchers in the leading scientific technology and hi-tech application field to perform various domestic & foreign collaborative research efficiently.

KREONET provides a high level of convenience and efficiency in network use to enable 200 scientific technology and academic research institutions including research institutes, universities, government agencies, societies and associations, etc. to derive R&D results. KREONET was constructed in 1988 and has been operated since then as one of the five major basic information networks in Korea; at present, there are ultra-high-performance (max. 100Gbps) scientific technology networking infrastructures centering on 21 domestic network (17EA) / international network (4EA) centers for developing core technology in the hi-tech network field and providing various research network services.

Recently, KREONET promoted the sophistication of the national research network backbone infrastructure that enables world-class point-to-point (PP) 100Gbps transmission; it focuses on expanding the high-speed terminal research institute and on efficient utilization. To enable this, the National Fusion Research Institute (NFRI) and Korea Astronomy and Space Science Institute linked with KREONET with a 100Gbps subscriber/access network, and a networking environment that can transmit ultra-high-performance data of over 40/100Gbps -- which is required when transmitting e-VLBI (electronic Very Long Baseline Interferometry) data, experiment data in high-energy physics, hologram, and decompressed 4K/8K -- was realized. In addition, the split transmission & support environment of the general research / hi-tech research traffic was composed to maximize the operating efficiency of the backbone between the central network center in Seoul & Daejeon and 15 local network centers.

The Eduroam service provides a global wireless research network environment where researchers and scholars around the world can connect to the Wi-Fi network whenever, wherever with just one account and authentication. KISTI has been playing the role of NRO (National Roaming Operator) since 2012 in Korea through an agreement with TERENA (Trans-European Research Education Networking Association). As of 2017, most of the institutions utilizing the domestic Eduroam service are higher education institutions, and more institutions are utilizing the service. Nowadays, there are more private universities utilizing the service and 52 institutions using the domestic global Wi-Fi roaming service.

Advanced countries such as the US, EU, and Japan are promoting the R&D network construction and test-bed operation as a national strategic project to discover and develop the source of national competitiveness in the future network field, such as Internet2/GENI (Global Environment for Network Innovations), GEANT/FIRE, JGNm, etc.

The construction & operation project of KOREN (Korea advanced Research Network) was first started in 1995 with the diagram test network, passing through the broadband integrated R&D network to be in the future network diagram test network in the present. Universities, research institutes, and industries are provided with the hi-tech ICT equipment and application service R&D linked with the future Internet and broadcasting communication convergence technology and high-

quality open test & verification environment to perform a leading role in constructing the ICT infrastructure in Korea.

In the standard as of August 2018, the backbone of KOREN provides backbone lines with speed of 10G~260Gbps between 10 regional access points in Korea and subscriber lines with speed of 77 1G~40Gbps. In 2017, construction of broadband, high-quality lead test network was promoted by adding Jeonju PoP and sophisticating the linkage speed between the regional PoP to a 100G network. The backbone network for the role of lead test network of the future network was composed with the domestic intelligent transmission device of a ROADM-based single backbone network.

In 2017, 208 cases in all and 88.6 billion-volume R&D were supported including lead technology verification, R&D test verification, and national project test & verification through KOREN.

2) International Networks

GLORIAD (Global Ring Network for Advanced Applications Development) started out as one of the IRNC (International Research Network Connection) programs in 2005 by NSF (National Science Foundation) in the US. It is a global network infrastructure where the advanced research network partners of 15 countries including Korea, USA, China, Russia, Canada, and Netherlands, etc. connect the world in ring form.

GLORIAD-KR constructed the logical international exclusive network for the LHC open-type network environment (LHCONE, LHC Open Network Environment) and joint international hi-tech research community based on the 100Gbps international research network already constructed in 2017 to provide the 100Gbps global research network service where the hi-tech researcher can experience improvement in the actual data transmission speed.

The global collaboration network of connecting the northern hemisphere of the Earth in the ring-type GLORIAD operates the “lambda networking exchange node” of interconnecting the international optical network to connect the participating countries at high speed. Based on the GLORIAD-KR project, the Korean government is operating the KRLight (Korea Lambda Networking Exchange Node) it constructed in Daejeon; along with Korea, 4 exchange nodes operating in China (Hong Kong), USA (Seattle, Chicago), and Netherlands (Amsterdam), etc. are referred to as KRLight.

KRLight is not only the lambda networking exchange node of GLORIAD but is also one of the 19 global lambda networking exchange nodes (GOLE, GLIF Open Lightpath Exchange) of the global lambda network consultative group of GLIF (Global Lambda Integrated Facility) to play the role of “Key GOLE Operator.”

GLORIAD-KR participated in the global LHCOPN (LHC Optical Private Network) and LHCONE (LHC Open Network Environment) to support the key field of the global scientific technology collaborative research of high-energy physics so as to promote collaboration on the

international research network operation with SURFnet and NetherLight in the Netherlands, StarLight in the USA, and CERN of Switzerland.

TEIN (Trans Eurasia Information Network) is an international research network participated in by 24 Asian countries (Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam, Australia, China, Hong Kong, Japan, Korea, New Zealand, Singapore, Taiwan) and 34 European countries; it is an inter-continental international research network provided to promote the Asia-Europe joint collaboration. This project was first initiated as the cooperative project of ASEM (Asia-Europe Meeting) and was first opened between Korea and France in 2001; the 5th project of "Asi@Connect" is currently in progress.

EC (European Commission) promoted the establishment of the TEIN management institution centering on Asia to operate the long-term, sustainable TEIN cooperative project during the TEIN4 project period; finally in 2012, the TEIN Collaboration Center was opened in Korea to manage the Asi@Connect project along with the TEIN4 project.

The Asi@Connect project is a follow-up project of TEIN4 and was initiated in December 2016 through the project agreement between EC and TEIN Collaboration Center. EC (Europe) will be investing EUR 20 million (approximately KRW 26 billion) for 5 years to cover project expenses, with the participating countries sharing the EUR 16.5 million (approximately KRW 21.5 billion) as fund for the Korean government and for line operation for promotion in the total budget of EUR 36.5 million (approximately KRW 47.5 billion) until August 31, 2021.

Regarding the TEIN backbone operation, the National Information Society Agency (NIA) has been investing directly in the international lines of the Korea-Hong Kong and Hong Kong-Singapore section (10G link) since 2009 to participate in the TEIN project; cooperation is also being pursued regarding the TEIN network operation center (NOC) and international research network backbone operation.

The APII (Asia Pacific Information Infrastructure) test-bed was initiated in 1998 as the APEC (Asia-Pacific Economic Cooperation) project for the common prosperity of the Asia-Pacific region and is mostly used for the establishment of future network technology-linked test environment, telemedicine and performance measurement, etc.

Based on an agreement with NICT (National Institute of Information & Communications Technology) in 2011, the National Information Society Agency (NIA) constructed the international line between the two countries for the 10Gbps-level Korea-Japan APII test-bed, and it is being operated jointly; since March 2016, the two research networks have been interconnected through Hong Kong, with the cooperative MOU newly updated to continue the APII test-bed collaboration project.

D. Next-Generation Internet

1) 5G

As the core infrastructure of The 4th Industrial Revolution, 5G mobile communication is becoming more and more important in providing the social aspect wherein all people and things are connected through the network to store and process the data, and AI analyzes and utilizes the data to create a higher level of value.

The Korean government provided the vision as a powerful nation in the 5G mobile communication that leads The 4th Industrial Revolution based on the “5G Mobile Communication Industry Development Strategy” established in December 2016. To enable this, detailed strategies will be established to lead the 5G convergence market in the service, technology, standardization, and ecosystem, and approximately KRW 1 trillion will be invested for 5 years through private & public joint investment. In addition, the high-speed 5G mobile communication commercial network to be constructed beginning 2019 will be used to promote the sophistication into a convergent service network that satisfies low delay and hyper-connectivity, and the Giga KOREA Stage-2 project budget by the government from 2018 to 2020 was utilized to initiate the verification project on the 5G convergence service including the local government and telecommunication service providers. Through this, the Ministry of Science & ICT (MSIT) set the goal of quickly discovering the 5G mobile communication and convergence service between other industries to reduce the investment risk of the private sector and of identifying regulatory improvements at the same time. The support fields are divided into 5 fields -- Smart City, Smart Transportation, Smart Factory, Disaster Safety, and Media -- and total government investment of KRW 86.3 billion will be made for 3 years starting from KRW 23.3 billion in 2018.

In addition, the “Improvement Method of the Joint Construction of New Facilities and Joint Utilization System of Existing Facilities” was announced in April 2018 for the purpose of reducing waste from individual investment by businesses in the new construction of the 5G mobile communication infrastructure to enable the early commercialization of 5G mobile communication and to prevent redundancy in investment; an administrative notice was also served on the amended bill of the relevant notice. Moreover, the detailed price calculation for providing the 5G mobile communication facility will be completed until the end of 2018.

2) Future Internet

Through the diversity in the range of utilizing Internet, many new Internet services were developed; the traffic volume also increased explosively that we entered the period of Big Data.

Korea is promoting the future Internet in collaboration with the industries, academe, research institutes, and government for the purpose of increasing its status as a power nation in Internet. The Korea Communications Commission set “Future Internet Development” as the national agenda; to take the leap from a “Power Nation of Network” to a “Power Nation of Internet,” the Korean government established the “Internet Development Plan in Preparation for the Future” through discussion between industries, academe, and research institutes for 1 year from June 2010 to June 2011.

In this plan, “Next 10 Years, Leap as the Global Leader in Internet” was provided as the vision. The three main goals of “Construction of the world’s fastest & safest Internet infrastructure,” “Reinforcement of global competitiveness in the Internet market,” and “Contribution to the national economy through production and employment” were presented, along with 5 major policy tasks: construction of the world’s top Smart network; development of Smart Internet technology through opening and collaboration; discovery of the service model for leading the future; development of a global test-bed; and reinforcement of industrial foundation and development of a safe use environment.

National R&D investment for realizing the future Internet is also being made actively. In preparation for the explosive increase in data traffic, wired & wireless network sophistication, lead-type R&D promotion, and technology development required for constructing the KOREN-based Smart Internet infrastructure were set as promotion strategies. In addition, for the early realization of the future Internet and to secure global leadership, tasks are being performed including the SDN technology development of reorganizing the recent network market, development of core technology for optic transmission, and development of wired & wireless device integrated control & management system and Smart Internet technology. In December 2012, the Korea Communications Commission provided the “Future Internet Activation Method utilizing the Research Test Network” to secure the executive ability of these promotion tasks. Especially, KOREN was reorganized to focus on inducing systematic cooperation between institutions and for the commercialization of domestic industry products.

Discussions were also held to promote the national master plan in detail and efficiently. In April 2013, the Ministry of Science & ICT (MSIT) established the “Future Internet Business Council” to increase the effectiveness of the future Internet technology development and to provide the base for reinforcing industrial competitiveness. The council is participated in by communication service providers, equipment manufacturers, and academe to provide a virtuous cycle that enables the commercialization of future Internet R&D technology. The council is composed of professionals from the industry, academe, research institute, and government including the Ministry of Science & ICT (MSIT), Korea Internet & Security Agency (KISA), National Information Society Agency (NIA), Korea Communications Agency, Electronics and Telecommunications Research Institute, etc., performing the duty of collecting and exchanging various opinions regarding the future Internet R&D, test & verification, pilot project, and relevant policies.

2. Internet Address Resource

A. IP Addresses and Numbers

In the standard as of the end of July 2018, 3,663,930,000 IPv4 addresses were allocated in the world: 237,1544 (/32)EA (=212,852×296EA) were allocated for the IPv6 address, including 86,886 AS numbers.

In Korea, efforts have been made since the early 1990s to secure IP addresses and AS numbers to provide stable Internet service. In the standard as of the end of July 2018, Korea ranked 6th in the world with 112,440,000 IPv4 addresses, 11th with 5,256 (/32) IPv6 addresses, and 18th with 1,025 AS numbers.

[Table 3-2-1] Number of Internet Addresses Per Country (as of July 2018)

Number of IPv4 Addresses per Country			Number of IPv6 Addresses per Country			Number of AS per Country		
Rank	Country	IPv4 Address (address)	Rank	Country	IPv6 Address (/32address)	Rank	Country	AS Number (as number)
1	USA	1,604,467,456	1	USA	45,155	1	USA	26,410
2	China	340,270,592	2	China	23,590	2	Russia	6,112
3	Japan	203,986,688	3	Germany	18,968	3	Brazil	5,843
4	UK	121,729,304	4	UK	18,565	4	UK	2,563
5	Germany	120,961,664	5	France	12,489	5	Poland	2,488
6	South Korea	112,449,024	6	Japan	9,735	6	Germany	2,426
7	Brazil	84,650,496	7	Australia	8,997	7	Australia	2,381
8	France	82,192,688	8	Italy	7,989	8	India	2,215
9	Canada	70,252,800	9	Russia	7,579	9	Ukraine	2,180
10	Italy	54,261,824	10	Netherlands	6,691	10	Canada	2,043
11	Australia	48,519,936	11	South Korea	5,256	11	China	1,478
12	Netherlands	47,391,968	12	Brazil	5,099	12	France	1,374
13	Russia	45,416,960	13	Argentina	5,014	13	Indonesia	1,350

Number of IPv4 Addresses per Country			Number of IPv6 Addresses per Country			Number of AS per Country		
Rank	Country	IPv4 Address (address)	Rank	Country	IPv6 Address (/32address)	Rank	Country	AS Number (as number)
14	India	41,506,560	14	South	4,690	14	Netherlands	1,271
15	Taiwan	35,537,152	15	Spain	4,556	15	Romania	1,263
16	Spain	30,936,384	16	Poland	4,520	16	Japan	1,092
17	Sweden	30,198,888	17	EU	4,357	17	Italy	1,049
18	South Africa	29,082,624	18	Egypt	4,106	18	South Korea	1,025

[KISA, 2018]

With the use of the Internet spreading rapidly around the world and the use of IPv4 address increasing steadily, international Internet address organization ICANN declared the depletion of IPv4 address on February 3, 2011.

The Korean government established the conversion plan in three stages from 2004 to respond to the depletion of IPv4 address and provided the base for IPv6 conversion. It is promoting the introduction of the IPv6 address to activate the new industries in the Internet of Big Data, Cloud, IoT, etc. For the last 10 years, the 3 stages of “Basic Plan on IPv6 Address Supply & Conversion Promotion” were carried out to provide the base for conversion into IPv6 address, with the “IPv6 Expansion Road Map for the Promotion of the New Internet Industry (hereinafter referred to as “Road Map”) established in March 2014 for official expansion. In the road map, the vision of “Realization of Power Nation in Internet based on IPv6” was set, and two goals were presented: completing the construction of the main ISP IPv6 network by 2017; and initiating Korea’s first wired & wireless Internet and website IPv6-based commercial service by the second half of 2014. Three major tasks -- IPv6 infrastructure · service expansion, IPv6 equipment & service development, and IPv6 conversion promotion & use environment development -- were also provided.

To enable systematic conversion into the IPv6 address, the government is securing and operating a cooperative system with related parties through various consultative groups, and the organized “IPv6 Commercial Service Support Council” is operating to share the status of road map promotion for each business and to discuss the main issues. The government also opened the “IPv6 Comprehensive Support Center (hereinafter referred to as the “Comprehensive Support Center”)” in May 2014 as one of the support systems for small ~ medium enterprises with insufficient professional manpower and technology. The IPv6 Comprehensive Support Center establishes the IPv6 comprehensive support system in the IPv4/IPv6 coexistence environment and provides consultation for IPv6 introduction for each related party including ISP · service providers · business users · software & hardware manufacturers as well as tests, etc. The IPv6 test network for utilization as the test network is also provided free of charge to promote the commercial service.

B. Domain

Domain is method of displaying the address in letters (English, Korean, Numbers, and Hyphen) that people can remember easily to overcome the difficulties of remembering by composing the Internet address only with numbers when connecting to the Internet.

The national domain of Korea is “.kr” in English and “.한국” in Korean; following the introduction of the “.kr” domain for the first time in 1986, the Third level domain (Ex.: kisa.or.kr) was initiated; Second level domain such as “Korean.kr” (Ex.: 한국인터넷진흥원.kr) was introduced in 2003, and Second level domain (Ex.: kisa.kr), in 2006. In 2011, Second level domain (Ex.: 한국인터넷진흥원.한국) of the “.한국” domain was also introduced. By introducing the “.한국” domain, the Korean company name, brand name, and names could be used on the website to increase the Internet accessibility of users who are not familiar with using English; thus contributing to enhancing the benefit of domain use.

In the standard as of August 2018, there are a total of 1,077,277 national domains registered in Korea, and the registration status for each domain system such as “English.kr,” “Korean.kr,” and “Korean.한국” are shown as follows:

[Table 3-2-2] Number of Registered National Domains (as of July 2018)

(Unit : cases)

Category	Second level domain			Third level domain
	English.kr	Korean.kr	Korean.한국	
Registered Case	272,335	56,358	30,059	718,525
Total	358,752			718,525

[KISA, 2018]

The Korean national domain of second level “.kr” and “.한국” can be freely selected and used by the user for the 1-step domain, and the domain in third level can be selected from the first level of “.kr” with the institutional characteristic or region of the second level domain; for the third level domain, the user can select freely for use. The second level selection fields of the domain number 29 in all including “.co (Company),” which shows the profit-making organization or individual, “.or (Organization)” for the non-profit making organization or individual, “.pe (Person),” “.seoul” indicating the region, etc.; registration is possible upon meeting the registration qualification according to each field.

Since requests for the production of new common top-level domain are increasing internationally, ICANN introduced new common top-level domains along with the 23 existing common top-level domains in June 2008. In Korea, “.삼성”, “.samsung”, “.kia” and “.hyundai” were newly registered as common top-level domains.

According to the “5th Basic Plan on the Development and Promotion of Use & Management of Internet Address Resource” promoted since 2018, various methods are under review for the use of national domains and to promote utilization. To enable the number brands possessed by individuals and companies to be utilized as the domain, second level number domain (Ex.: 1588.kr, 118.한국) will be permitted for registration. When the second level number domain is introduced, designating the special number in the “Detailed Rules of Telecommunication Number Management” as the deferred number domain must be reviewed to minimize market confusion such as preoccupying the number domain. In addition, to activate the use of the Korean domain, use by the public sector is being promoted, and various promotions are being reviewed such as discount on the registration fee and bundle sales, etc. for increase in private use.

C. Domain Name System (DNS)

DNS (Domain Name System) is a system enabling the domain name (kisa.or.kr) that the user is trying to access through the Internet to be connected to the IP address (14.49.46.68) recognized by the computer.

The DNS of the national top-level domain in Korea for .kr and .한국 of krDNS is managed and operated by the Internet Address Center of the Korea Internet & Security Agency (KISA); considering its significance, it is designated as the main information & communication infrastructure (2003) and major national facility (2015) for protection. Currently, in 2018, krDNS is a mandatory service for the operation of 1.07 million national domains used in various fields of finance, broadcasting & communication, and e-commerce, and it is functioning as the core infrastructure of the domestic Internet service.

The Korea Internet & Security Agency (KISA) is expanding and extending the krDNS system continuously in cooperation with related agencies such as domestic & foreign ISP and Internet address management agencies to provide stable krDNS service; to prepare for evolving cyber-attacks, various efforts are made such as sophisticating the monitoring system, reinforcing the DDoS attack response system, and introducing & expanding the DNSSEC (DNS Security Extensions).

Root DNS is a system that serves as the foundation of the hierarchical DNS structure managing the DNS information on all common top-level domains (gTLD) such as .kr, .한국, all national top-level domains (ccTLD), .com, .net, .org, etc.

All TLD data (Root Zone Data) registered to the Root DNS are managed comprehensively by

PTI (Public Technical Identifiers) affiliated with ICANN (Internet Corporation for Assigned Names & Number) according to the private transfer (September 30, 2016) of IANA (Internet Assigned Numbers Authority) by the US government, and the root DNS server operation is enabled through RSSAC (Root Server System Advisory Committee) of ICANN composed of representatives of 13 root DNS operating institutions. Root DNS operates 13 original systems in 12 institutions from 4 countries, and replica servers are dispersed for operation all around the world for the appropriate accommodation of the global DNS traffic and to secure stability of the service. In the standard as of August 2018, there are 1,049 replica servers in operation globally.

krDNS is the DNS service for converting the national top-level domain of Korea of .kr and .한국 domain names into IP address and is the basis of the 1.07 million national domain services.

The Korea Internet & Security Agency (KISA) has dispersed the krDNS system to 15 domestic & foreign websites (11 domestic, 4 foreign) for operation to provide stable service and to secure survival in any circumstances, and utmost efforts are made to prevent any damage from cyber-attacks and to improve the service quality for each region.

In June 2011, the Korean government initiated the DNSSEC signature on the government domain of “go.kr” to complete the DNSSEC signature on the total fields of “co.kr” in September 2012 to finish the DNSSEC introduction in the top-level domain standard. Note, however, that others such as user domain and cash DNS are still in the low standard. The main issues are low awareness of the DNSSEC technology, increase in the management and operation of introduction of DNSSEC compared to the existing DNS operation such as continuous signature key management, etc., and increase in traffic according to the introduction of DNSSEC. The DNSSEC expansion policy must be approached consistently from a long-term perspective.

The Korea Internet & Security Agency (KISA) is providing technical support and consulting related to the application of DNSSEC to expand the application of DNSSEC, and it produced the guideline for DNSSEC introduction & operation for distribution. Domestic DNS operators are also trained consistently on DNS technology so that they will make efforts on improving the standard of domestic operators on the overall DNS operation.

3. Internet Technology

A. Standardization Trend

In 2012, experts have established the big data forum in response to the opinion that there is a need for an engine for the growth and reinforcement of competitiveness of the relevant industries for the productive utilization, standardization, and activation of big data. Thus, in 2014, TTA founded the Special Technical Committee (STC) for cloud computing and development of big data standards. Furthermore, the organization is attempting to develop standards for big data architecture and requirements for application and distribution through the creation of big data PG (SPG22).

The organization established JTC1 WG9 in April 2015 with regard to international standardization and initiated the development of ISO/IEC 20546 and 20547. In 2018, the organization transferred the items of standardization of JTC1 WG9 to SC42, and it is currently developing the standards. In addition, the organization is responding to international standardization through the JTC1/SC42 (AI) expert committee in Korea. The ITU-T SG13 recognized the Y.3600 (definition and requirements of big data) standards in September 2015. Based on this, the organization completed the development of such standard in May 2018, and it is currently developing additional follow-up standards. In addition, the Korean subcommittee of SG13 -- which is affiliated with the ITU research committee of Korea -- is working to cope with international standardization in ITU-T SG13.

The activities for cloud computing standardization in Korea include group standardization through TTA, activities centered on the private sector through the All@CLOUD forum, and activities of the Korean committee for coping with international standardization. TTA has founded the cloud · big data special committee (STC2) and has included the existing cloud computing project group (PG420) in the project group (SPG21) subordinate to the cloud · big data special committee. In addition, the All@CLOUD forum is developing the standards centered on private market demand by constituting a standard development department for cloud/big data/convergence WG. Furthermore, the organizations for international standardization include the ITU-T SG13 research team -- which is supported by TTA and is subordinate to the Korea ITU research committee -- and SC38 expert committee in Korea, which is supervised by KATS (Korea Agency for Technology and Standards).

In September 2013, the Special Technical Committee (STC1) established three project sub-groups (IoT convergence service project group, IoT networking project group, oneM2M project group) for

the technical standardization of IoT·M2M (Machine to Machine) in TTA. This organization will be combined with the cloud/big data Special Technical Committee (STC1) in 2019 and will then become a technical committee based on intelligence information in 2019. In addition, in April 2014, the previous RFID·USN convergence forum was integrated into the M2M·IoT forum, and these two groups were then recreated as the IoT forum. Furthermore, the organization is concentrating on the development of forum standards centered on domestic industries related to IoT issues, focusing on the standard subcommittee.

The standardization for the field of IoT in Korea is receiving attention for the attempts to arbitrate the positions by industry·company for the activation of the domestic IoT industry and the relevant environment, not for the attempts at standardization for the profit making of individual industries and companies. In May 2014, the Ministry of Science & ICT (MSIT) announced the basic IoT plan as well as the promotion plan for IoT R&D in December 2014 as a follow-up measure.

[Table 3-3-1] Main Activities of Internet-Related ICT Standardization Forum

Forum	Activity	Website
SDN/NFV Forum	<ul style="list-style-type: none"> • The ultimate goal is to establish the basis for the activation of SDN/NFV as the core network of the next generation through the following goals: <ul style="list-style-type: none"> - To establish the growth strategy and execution plan for the SDN/NFV industry - To lead the activation of open-type infrastructure through the development of SDN/NFV's common standard framework - To share information on the research outcome and the relevant products and to expand the market through the substantiation·authentication of services that are based on SDN/NFV 	sdnfv.org
HTML5 Convergence Technology Forum	<ul style="list-style-type: none"> • Domestic mirror forum to cope with W3C as the web-related international organization for standardization <ul style="list-style-type: none"> - To reflect the W3C international standard for domestic standard technology and to establish the domestic reference standard of the W3C standard - To perform activities for the distribution of the W3C international standard to support the domestic development of the HTML5 convergence product - To lead the HTML5 convergence industry through cooperation on standardization centered on the private sector 	html5forum.or.kr
IETF Mirror Forum	<ul style="list-style-type: none"> • Domestic mirror forum to cope with IETF as the Internet-related international organization for standardization <ul style="list-style-type: none"> - To reflect the requests from industries in an active manner to support various activities for domestic·overseas standardization - To provide information by analyzing the status of contribution of standard within the latest IETF - To analyze the status of linkage between contribution activity and patent within IETF in the personal proposal stage 	ietf.or.kr

[Each Forum Page]

The fields of IPv6 address/Internet address resources have been integrated into the IPv6 project group (PG210) and IAR project group (PG211) Internet Address Resource/IPv6 Address

Project Group (PG222) of TTA. Since 2014, support for the standardization and policies of IPv6 conversion technology and DNS technology has been provided mainly by the Electronics and Telecommunications Research Institute (ETRI) and Korea Internet & Security Agency (KISA). Since 2015, SK Telecom has officially commercialized the pure IPv6 address technology in the LTE (Long Term Evolution) environment. As a result, the development of domestic standards for the supply and distribution of IPv6 address conversion technology, DNS security technology, and IPv6 address is gaining momentum. Beginning 2019, the range of standard will be expanded from the Internet address resource to the digital address resource.

Domestic standardization is being propelled centered on TTA and ICT standardization forum. The forums for Internet-related ICT standardization include the SDN/NFV forum, HTML5 convergence technical forum, and IETF mirror forum.

B. Authentication Technology

1) Development of Authentication and Encryption

Authentication technology identifies the appropriate user or device within the cyber environment, ensures the reliability of information that circulates, and provides the features of non-repudiation. Such technology includes identification technology such as certificate, device authentication technology for checking the authenticity of the terminal, anonymous authentication technology to guarantee the anonymity of the user, and OTP (One Time Password) authentication technology, which involves using a password only once.

The knowledge-based user authentication method certifies the user based on secret information set in advance by the user and server. This technology does not require separate hardware, so it improves user convenience at low cost. Despite the convenient usage, however, the degree of authentication is lower than that of other methods; hence the lowest level of security. The knowledge-based authentication method can be classified into static and dynamic methods according to whether advance information is shared or not. In the case of the password authentication method, which is one of the widely used knowledge-based authentication methods, various systems certify the user based on password.

The possession-based authentication method possesses the authentication token and certifies the user based on it. For such method, it is difficult to establish a user token-related authentication system. Furthermore, the user must be checked by the certification authority (CA) or registration

authority (RA) at least once. The composition of token includes hardware and software types according to the storage media. Examples of the former and the latter are OTP terminal and accredited certificate, respectively.

The biometric authentication method is a technology for user authentication through biometrics including fingerprint, face, and iris. Biometrics refers to a method of identifying individuals by extracting and storing their physical and behavioral features. The physical feature is the inherent feature of a person including fingerprint, face, iris, and vein recognition. The behavioral features refer to the features that are formed while living according to habit and surrounding environment, including voice, signature, keystroke, and walk.

Biometrics cannot be stolen or copied easily unlike key or password. Furthermore, such technology cannot be lost, so it is easier to use than the other authentication technologies, and it provides a high security level. Therefore, such technology is expected to be the core technology for personal authentication in the future.

Multi-factor authentication technology identifies the user by using two different authentication methods within the aforementioned three authentication methods. It provides a more reinforced authentication service than the one using a single element only. As indicated by examples of password and mobile phone, password and check card, accredited certificate and OTP terminal, and heartbeat and NFC bracelet, the multi-factor authentication method uses the 2-step authentication method in various ways. Since the introduction of smart phone, the user authentication method using PIN or pattern has been used more widely. Furthermore, methods with high security level including USIM (Universal Subscriber Identity Module)-based authentication, fingerprint authentication, and voice authentication -- which are simple but highly secure -- are preferred. FIDO announced FIDO 1.0 in December 2014 as an attempt to utilize smart device for online security in an active manner. The FIDO technology provides FIDO-based fingerprint authentication services in the fields of payment and finance including Samsung pay, KEP Hana Bank, and Shinhan Bank. Currently, FIDO 2.0 is being developed for the technology in web browser. Furthermore, it supports various devices, operation systems, and browsers; therefore, it is expected to be utilized in various application fields as the next-generation authentication platform.

Encryption technology is for safe storage and sending and receiving of information in the cyber environment. This technology forms the basis for information security. The password today can be classified into symmetric key algorithm, public key cryptography, and hash function according to the ways of encryption. In the past, the password has been designed focusing on the safety of the information on the party to be protected (guarantee of confidentiality, integrity, etc.). Recently, however, availability of service has been taken into account as well. Especially, the range of design is expanding to password (format-preserving algorithm, etc.) appropriate for data processing (Database Management System, DBMS) for the security of cloud·big data, homomorphic encryption wherein

cryptogram calculation is supported, lightweight crypto for the security of IoT, and cryptosystem for the next generation for the era of quantum computing.

2) Replacing Resident Registration Number

The development of ICT technology has led to all-out online activities of users. Accordingly, there are many attempts at stealing the IDs of the users. Online service providers can block such acts through the authentication of the users, who in the past have used their resident registration number for online authentication. Note, however, that alternative online methods for such number have been introduced to handle the increasing damage caused by the leak and fraudulent usage of the information. The alternative methods include I-PIN, mobile phone, accredited certificate, and credit card. In order to minimize the indiscreet use of the resident registration number, users can now certify themselves without their registration numbers by using the alternative methods. Furthermore, such methods can be used for the prevention of duplication of users, provision of linked service, and adult authentication.

[Table 3-3-2] Distribution of Alternative Means For RRN

Type		Providing Agency	Content	The Ministry and Office Concerned
i-PIN	Private	Nice Information Service, SCI Information Service, KCB	I-PIN ID/PW, Mobile APP Easy Authentication	KCC
	Public	KLID	I-PIN ID/PW, Mobile APP Easy Authentication	MOIS
Accredited Certificate		Koscom, KICA, Crosscert, KFCT, KTNET, Initech	Accredited Certificate+PW	Ministry of Science & ICT (MSIT)
Mobile		SK Telecom, KT, LGU+	SMS Temporary Password, Mobile APP Easy Authentication	KCC
Credit Card		KB, Lotte, BC, Samsung, Shinhan, Hana, Hyundai Cards	APP Card Easy Authentication, ARS Authentication	KCC

[KISA, 2017]

i-PIN can be issued through the homepage of the issuing organization or i-PIN authentication menu. What the users need to do is enter their personal data to verify their names followed by identification processes including mobile phone, accredited certificate, and face-to-face check. If online identification methods are not available, users can visit the community centers of their residential areas or i-PIN issuing organizations. Users can use i-PIN by using the ID and PW that

they have set while issuing the i-PIN and i-PIN. Other authentication methods include 2nd password, OTP, fingerprint, and voice authentication methods. Users can choose and apply one of these methods.

Mobile phone is a mobile communication method used by most people in Korea. Majority of the public has such device, suggesting that the mobile phone is highly popular. Users can open mobile phones under their names and use them for identification. They can do so by visiting a mobile phone branch or shop.

Users can perform online authentication by entering the authentication SMS number that they receive on their mobile phones. In the case of the easy authentication method, safety has been reinforced by minimizing the personal data entered for mobile authentication and using the mobile APP security channel. For mobile authentication, mobile APP fingerprint or voice authentication methods are used for the convenience of the users.

Accredited certificate is a cyber certificate utilized for e-commerce on the Internet according to the 「Digital Signature Act」. Certificate authorities can issue such certificate, and users can store it in storage media including USB and portable hard drive, and then set the certificate password. Users can perform authentication by using an accredited certificate (storage media) and by entering the certificate password.

MyPIN is a method of offline authentication for users without using their resident registration numbers. Users can use this method mainly in offline stores including airport and large mart. MyPIN is a 14-digit number that users can create while issuing i-PIN or in the “i-PIN Administration” menu. Users can perform authentication without their resident registration numbers by providing their names and MyPIN numbers offline.

C. Certified e-Document Center and Certified Electronic Address

“E-Document” refers to the information that is written, sent, and received in electronic form using the information system. Such type of document is prepared by using document authoring tools including word processor, excel, or electronic payment system. As a merit of the e-document, a much larger quantity of information can be stored than paper documents. Note, however, that counterfeiting and falsifying are easy; hence the difficulty in securing reliability. In order to improve the safety and reliability of creation, distribution, and storage of the e-document, the government amended the 「Framework Act on E-Commerce」 and introduced in 2005 a system that provides

a legal estimation effect wherein the document is neither forged nor falsified as from the time of storage of the e-document by being stored in a certified electronic document center. This center is a confidential 3rd organization that performs various tasks related to e-document under orders from the government including safe storage of e-document and certification of the fact that the document is not changed. In June 2012, the name of the organization was changed to “Certified Electronic Document Center” according to the amendment of e-document and 「Framework Act on E-Commerce」.

The document stored in the “Certified Electronic Document Center” has a legal estimation effect, i.e., the document is neither counterfeited nor falsified, as from the time of storage of the document. Accordingly, such organization must be qualified with a certain level of requirements related to human resources, skill, finance, facility, and equipment as a “Reliable 3rd Organization” that stores the documents of other people. Furthermore, the organization maintains its reliability through site inspection -- which is aimed at checking if the organization satisfies certain standards -- held every year.

Furthermore, there is a system that enables a certain center to transfer a document to another center for storage, reading, and issuance in case of cancellation of designation of the business or shutdown for the safe storage of the e-document until the date of its expiration. In addition, there is a process for checking if the e-document has been deleted completely after transferring it.

There are increasing demands for the safe storage of e-document. As such, the total quantity of documents stored in the certified electronic document center is increasing every year, too. The documents include various certificates and finance-related e-documents, and their types are gradually diversifying.

[Table 3-3-3] Volume of Stored e-Document at the Certified e-Document Center (Unit: TB)

Year	2012	2013	2014	2015	2016	2017
Volume	124	154	177	215	269	333

[KISA, 2017]

Stored documents are classified into those originally prepared as e-documents and those that have been hard copies but have been converted into electronic ones through methods such as scanning. In case of scanning the paper document and storage in the certified electronic document center according to the “Procedure and Method of Preparation of Electronic Document” (Notified by the Ministry of Science & ICT (MSIT) No. 2015-80), the document can be recognized as a stored one even if the original copy is disused apart from the document as determined in some other laws. Therefore, this method has eased the burden of the certified electronic document center for the storage of paper document.

More files will be created, distributed, and stored in electronic form in the future as in the past. Accordingly, the demands for the safe storage of e-document and authentication of the fact that the stored e-document is neither counterfeited nor falsified are expected to increase, too. It would be more effective to create, distribute, and store the information on finance, medication, various certificates, and other electronic files whose quantity is increasing rapidly due to online and offline transactions -- which are changing in various ways -- in electronic form rather than paper ones with regard to speed, convenience, and data utilization. Accordingly, the importance and demands of the certified electronic document center -- which stores the electronic documents -- will increase further in the future.

4. Legal System for Internet

A. Internet Promotion

There are growing demands for job creation and reinforcement of national competitiveness by coping with the economic and social changes resulting from The 4th Industrial Revolution. In response, the government has established or amended some laws from 2017 to August 2018 in order to prepare the basis for activation of the Internet industry and service. The main laws are presented in [Table 3-4-1]. The amended laws are centered on the deregulation of the relevant laws through the preparation of the propelling system to cope with The 4th Industrial Revolution and easing of personal and location information to activate new business.

The Moon Jae-In government, which was inaugurated in May 2017, has established the presidential committee on The 4th Industrial Revolution in order to build the platform for leading The 4th Industrial Revolution. For this, the 「Government's Act on the Establishment and Operation of the 4th Industrial Revolution」 was enacted in August 2017.

Furthermore, the government has amended the 「Laws on the Protection and Use of Location Information」 for deregulation for easing the entry barrier of the location information of things. In addition, the government has amended the 「Laws on Building of Smart City and Industry Promotion」 for the introduction of a national demonstration city and to recognize the special case of collection and utilization of personal data within the city and the special case of autonomous car and drone industries.

[Table 3-4-1] Enactment and Revision of Internet-related Laws (2017.4~2018.8)

Law	Legislation/Revision Date	Major Points of Legislation/Revision
Laws on the Establishment and Operation of the 4th Industrial Revolution Committee	Establishment (2017.8.22. Announcement·Enforcement)	<ul style="list-style-type: none"> Establishment and constitution of the presidential committee on The 4th Industrial Revolution for deliberation on and adjustment of policies related to social changes according to The 4th Industrial Revolution and defining of particulars for the fixed minimum number of members for decision and resolution
Laws on the Protection and Use of Location Information	Partial Amendment (2018.4.17. Announcement) (2018.10.18. Enforcement)	<ul style="list-style-type: none"> Deregulation of the regulation for entering the business of the location information of things from allowance to report Application of the simplified service business report procedure for small businesses or 1-person creative company Deletion of informed consent for the collection of location information of things
Intelligent Robots Development and Distribution Promotion Act	Partial Amendment (2018.6.12. Announcement) (2018.6.12. Enforcement)	<ul style="list-style-type: none"> Inclusion of software in the definition of intelligent robot Changing the council for the robot industry policy to the council of robot industry policy and reinforcement of its role and function Nurturing of experts related to intelligent robot by the Minister of MOTIE and prescription of recommendation for purchasing intelligent robot products by national organizations, etc. Extension of expiration date of the law to 30th June 2028
Laws on the Construction of Smart City and Industry Promotion	Partial Amendment (2018.8.14. Announcement) (2019.2.15. Enforcement)	<ul style="list-style-type: none"> Preparation of basis for the introduction of the national demonstration city Introduction of special cases of collection and utilization of personal data, autonomous car and drone businesses, and expansion of businesses to participate in the software business in the national demonstration city Recognition of special case for limitation according to the 「Telecommunications Business Act」 in case of telecommunication equipment and facility installed in the national demonstration city

[National Law Information Center (Reconstituted), 2017~2018]

The main issue on domestic laws related to the Internet between 2017 and August 2018 has been how to cope with The 4th Industrial Revolution. The details of such movement are outlined below.

Above all, we need to mention the reorganization of regulations for the innovation of the regulations for new business and technology. In this regard, the government has launched the 5 laws for the innovation of laws: 「Framework Act on Administrative Regulations」; 「Special Act On Promotion Of Information And Communications Technology, Vitalization Of Convergence Thereof, etc.」; 「Special Act on Supporting Financial Innovation」; 「Industrial Convergence Promotion Act」; and 「Act on Special Cases Concerning the Regulation of the Special Economic for Specialized Regional Development」. All these laws define the contents for the introduction of first allowance · post-regulation (comprehensive negative regulation) introduction of regulation sand box for testing and verification of new technology and service in common (see [Table 3-4-2] for the details of the 5 laws for regulation innovation).

[Table 3-4-2] Contents of the 5 Laws on Regulation Innovation

Law	Date of Proposal (Representative Member of Government)	Major Points of Legislation/Revision
Partial Amendment of the Framework Act on Administrative Regulations (Proposal)	2018.3.6. (Min Byeong-Doo)	<ul style="list-style-type: none"> Defining the 1st allowance-post-regulation rule (comprehensive negative regulation) for new service and product utilizing new technology Allowing the head of the central administrative organization to impose the duty for checking and maintaining quickly for the new service and product and to apply the regulation flexibly if needed
Partial Amendment of the Special Act On Promotion Of Information And Communications Technology, Vitalization Of Convergence Thereof, etc. (Proposal)	2017.11.8. (Shin Gyeong-Min)	<ul style="list-style-type: none"> Defining the 1st allowance · post-regulation (comprehensive negative regulation) Introduction of batch licensing process for technology and service businesses including new info-communication convergence Deregulation of conditions for the temporal allowance of the technology and service including new info-communication convergence and expansion of the expiration date Introduction of special case (regulation sand box) for testing and verification of technology and service including new info-communication convergence
Special Act on Supporting Financial Innovation (Proposal)	2018.3.6. (Min Byeong-Doo)	<ul style="list-style-type: none"> Preparation of basis for the introduction and operation of finance regulation sand box for the promotion of entering the financial service market
Partial Amendment of Industrial Convergence Promotion Act (Proposal)	2018.3.6. (Hong Ik-Pyo)	<ul style="list-style-type: none"> Foundation of policy for quick check on regulation Introduction of special case for providing new service and product (regulation sand box) Foundation of temporal allowance of service and product by utilizing new business convergence technology
Amendment of All Parts of Special Cases for Act on Special Cases Concerning the Regulation of the Special Economic for Specialized Regional Development (Proposal)	2018.3.15. (Kim Kyeong-Soo)	<ul style="list-style-type: none"> Introduction of policy for special local innovative growth zone for linkage, utilization, and promotion of resource for local innovative growth and new technology Application of special case for quick checking, temporal allowance, and proving regulation for the special zone for local innovation growth (regulation sand box)

[National Law Information Center (Reconstituted), 2017~2018]

B. Information Security

Laws related to Internet information security include the 「Electronic Government Act」 and “National Cyber Security Management Regulation” in the public section. Laws for the private sector include the 「Act on the Promotion of Information and Communications Network Utilization and

Information Protection」, 「Electronic Financial Transactions Act」, and 「Credit Information Use And Protection Act」. Furthermore, laws regulating both public and private sectors include the 「Act on the Protection of Information and Communications Infrastructure」, which is for the protection of the main info-communication infrastructure from electronic intrusion. Another law is the 「Act on the Promotion of the Information Protection Industry」, which is aimed at building the basis for the information security industry.

[Table 3-4-3] Current Status and Details of the Establishment and Amendment of the 「Act on the Promotion of Information and Communications Network Utilization and Information Protection, etc.」 (including the enforcement date 2017.~2018.8)

Date of Revision	Major Points of Revision
2016. 3. 22. [Enforcement 2017. 3. 23.]	<ul style="list-style-type: none"> • If the developer of the smart phone application program or the company needs access to the smart phones of users, the authorities have been divided into those for performing the original function of the program and the optional ones for the users to recognize clearly each item and the reason for receiving the user's consent (establishment of Clause 1, Section 2, Article 22) • Prohibition of action banning the user from using the program by the smart phone developer or company because the user does not agree with optional access that is not essential for performing the program's original function (establishment of Clause 1, Section 2, Article 22)
2018. 6. 12. [Enforcement 2018. 12. 13., 2018.12.13.]	<ul style="list-style-type: none"> • Allowing KCC to perform an investigation on whether the authority for access has been set according to the relevant regulation (establishment of Clause 4, Section 2, Article 22). • Making the necessary measures available including subscribing to insurance or deducting for execution of the responsibility to cover damages (establishment of Section 3, Article 32). • Prohibition of information including measures or blueprint for manufacturing guns or explosives through the information network (establishment of Section 3, Item 6 of Clause 1, Section 7, Article 44). • Prohibiting the subsidiary duty of the chief officer for information security and having the qualification requirements designated through presidential order (establishment of Clauses 3 and 7, Section 3, Article 45) • Allowing the trader to request for purchaser information if needed to check if the communication fee service has been provided according to the trader's will (establishment of Section 2, Article 58).

[LIKMS (likms.assembly.go.kr/bill/main.do), 2018]

There have been discussions on the need of the institutional system for the fair provision of results from information search in relation to the 「Act on the Promotion of Information and Communications Network Utilization and Information Protection between 2017 and August 2018. Furthermore, there have also been debates on infringement, such as hidden camera, settlement of social problems caused by fake news, restriction on the use of macro program, and initial coin exchanges for the reinforcement of the information security management system. The main and important contents of amendment of the 「Act on the Promotion of Information and Communications Network Utilization and Information Protection」 are presented in [Table 3-4-4].

[Table 3-4-4] Current Status of Proposal of the Amendment Plan for the 「Act on the Promotion of Information and Communications Network Utilization and Information Protection, etc.」 (2017.~2018.8)

Date of Proposal	Major Points
2017. 2. 8 Proposal	<ul style="list-style-type: none"> Increasing the possibility of prediction of cyber defamation of character through the establishment of circumstances precluding wrongfulness for not punishing if pointing out the truth makes a contribution to the public benefit
2017. 8. 4. Proposal	<ul style="list-style-type: none"> Addition of regulation on fake news, foundation of basis for punishment for the distribution of fake news, foundation of duty for the deletion of fake news against the provider of info-communication service, which causes the distribution and spread of fake news, preparation of regulation on the provider of info-communication service that does not perform the duty of deletion to reinforce the eradication of fake news.
2017. 9. 4. Proposal	<ul style="list-style-type: none"> Making the reporting by non-profit organizations, schools, and hospitals -- which provide or mediate information through telecommunication service for infringement -- mandatory in order to minimize the damages from infringement caused by ransomware
2018. 1. 26. Proposal	<ul style="list-style-type: none"> Having the providers of info-communication service provide the search result of the information search service including the contents and rank of search fairly in order to prevent damages caused by unfair search result and to protect the users
2018. 2. 8. Proposal	<ul style="list-style-type: none"> Preparing measures for infringement caused by records to be recommended as mandatory according to Article 14 of the 「Act on Special Cases Concerning the Punishment of Sexual Crimes and having the provider of info-communication service follow this except in special cases If the provider of info-communication service --which has been requested to delete information that infringes the rights of others -- does not take measures, the provider will be punished with imprisonment for not more than 2 years or penalty of less than 20 million KRW in order to prevent infringement on other people caused by illegal information including hidden camera.
2018. 4. 19. Proposal	<ul style="list-style-type: none"> Preventing the publication of information on the notification board for unfair purposes including manipulation of public opinion by using the personal data of other people, which have been rented or stolen, in order to prevent social confusion resulting from distorted public opinion
2018. 4. 23. Proposal	<ul style="list-style-type: none"> Prohibition on the manipulation of information within the information network through macro and implementation of technical and administrative measures for the prevention of manipulation by the provider of the info-communication service to make contributions to a good environment for using the information network system
2018. 8. 24. Proposal	<ul style="list-style-type: none"> Improvement of the level of imposition of fine on the person who violates the duty for authentication of the information security administrative system. For authentication by the person who is not the subject of the duty for authentication of the information security administration system, the Minister of Science & ICT supports all or part of the costs to activate the authentication system for information protection administrative system

[LIKMS (likms.assembly.go.kr/bill/main.do), 2018]

On January 26, 2011, the 「Act on the Protection of Information and Communications Infrastructure」 included electronic infringement by using hacking or computer virus as a new threat to the foundation of the 21st century's knowledge-based country and national security as a result of the increasing level of dependence of major social infrastructures on the info-communication system. Accordingly, such act has been established to build a systematic, comprehensive system for the protection of the main info-communication facility to prevent electronic infringement. The 「Act on the Protection of Information and Communications Infrastructure」 was partly amended on February 21, 2018.

The 「Act on the Promotion of the Information Security Industry」 was established on June 22, 2015 in order to expand the domestic information security market for the reinforcement of competency for information security, to nurture information security experts, and to secure demands for the development of the world's top information security products as well as to create a new market, for the systematic nurturing and management of professional staff for information security and to prepare the legal basis including the worldwide information security enterprises. The goal is to contribute to the improvement of quality of life of the public and sound growth of the national economy through the foundation of the basis of the information security industry and reinforcement of competitiveness. The 「Act on the Promotion of the Information Security Industry」 was partly amended on February 21, 2018. The main contents of the 「Act on the Promotion of the Information Security Industry」 for this are presented in [Table 3-4-5].

[Table 3-4-5] Current Status of Proposed Amendment of the 「Act on the Promotion of the Information Security Industry」 (2017~2018.8)

Date of Proposal	Major Points
2017. 3. 22 Proposal	<ul style="list-style-type: none"> • The heads of public organizations need to comply with the standards set forth by the Minister of Science & ICT with regard to the human resources, organization, and budget in the field of information security to secure the safety of information security and reliability of the organization in order for the public sector to make contributions to nurturing the information security industry.
2017. 3. 30 Proposal	<ul style="list-style-type: none"> • The person who provides information through the info-communication network is responsible for the notification of the current status of information security and will be punished in case of failure to comply with such responsibility for the improvement of the level of administration by enterprises of personal data and for securing the effectiveness of the system of public announcement.

[LIKMS (<http://likms.assembly.go.kr/bill/main.do>), 2018]

The 「Electronic Government Act」 was fully amended as the current law on February 4, 2010, initiated from the 「Act on the Promotion of Digitalization of Administrative Tasks for the Realization of Electronic Government (2001.3.28 established, law no. 6439)」.

The 「Electronic Government Act」 was partly amended on October 24, 2017 with the goal of establishment of the “Day of Electronic Government” to promote the incremental development of electronic government including informing the public of the excellence and convenience of electronic government service and to raise the international status. The main contents of the amended 「Electronic Government Act」 are presented in [Table 3-4-6].

[Table 3-4-6] Current Status of the Proposed Amendment of the 「Electronic Government Act」 (2017.~2018.8)

Date of Proposal	Major Points
2017. 4. 6 Proposal	<ul style="list-style-type: none"> • If the leaders of administrative organizations let the businesses establish an information network, the working environment is determined through mutual agreement, and the environment for the smooth performance of the work is considered even if the place is not within the administrative organization or close to the area for the effective foundation of electronic government through the creation of effective work performance environment.
2017. 12. 27. Proposal	<ul style="list-style-type: none"> • Preparation of effective performance management system through the installation and operation of electronic government promotion committee, preparation of the basic plan for the performance management of the electronic government, management of the result, and business performance of the electronic government.

[LIKMS (<http://likms.assembly.go.kr/bill/main.do>), 2018]

C. Personal Data Protection

Before the amendment of the 「Personal Information Protection Act」 in September 2011, the regulations on personal data protection have been managed for each department through the 「Act on Promotion of Information and Communications Network Utilization and Information Protection (hereinafter referred to as the 「Information Network System Act」)」 and 「Credit Information Use and Protection Act (hereinafter referred to as 「Credit Information Act」)」 in the fields of information communication, credit, and finance.

Since the amendment of the 「Personal Information Protection Act」, laws including the 「Information Network System Act」 and 「Credit Information Act」 have been functioning as special laws that regulate the personal data protection of the relevant sector by playing the role of general laws that regulate the blind spots not handled by the laws in the individual laws of each field. Apart from these laws, many other laws including the 「Electronic Financial Transactions Act」, 「Framework Act on Social Security」, 「Medical Service Act」, 「Framework Act on Education」, 「Electronic Government Act」, 「Resident Registration Act」, and 「Housing Act」 regulate personal data protection.

If any problem on personal data occurs in such laws, and if there is a special law for the application of the issue of personal data, this law is applied first. If there are no regulations to be applied for the special law, however, items for the protection of personal data -- which is a general law -- are applied.

D. User Protection

In the case of the 「Act on the Promotion of Information and Communications Network Utilization and Information Protection」 (「information network system act」), one of the main user protection laws in the field of the Internet, a total of 53 amendments have been proposed between June 2017 and July 31, 2018 since the opening of the 20th national assembly. Majority of them are related to user protection. Among them, only one proposal (proposal no. 2013791, currently in effect) was recognized by the national assembly in August 2018; the rest are moored at the standing committee of the national assembly. The main contents of such proposals include: (i) Prior application of the current law if the current law and 「Personal Information Protection Act」 compete with each other; (ii) Whether the access of KCC as established according to the relevant regulation can be investigated; (iii) The measures required for the execution of responsibility to cover damage need to be performed, including membership in insurance and deduction or reserve saving; (iv) Prohibition on the distribution of information including the measures and blueprint of guns and explosives by using the information network system; (v) Reinforcement of the roles of the head of information security to prevent his/her subsidiary duty and designation qualifications by presidential order; (vi) The trader can be requested for provision of the purchaser information if required to check if the person has provided communication fee service of his/her own free will.

There have been numerous proposals related to Internet user protection between July 2017 and July 2018. These bills can be classified into personal data protection, expansion of expression on the Internet, reinforcement of Internet ethics, regulation on macro and fake news, and other information. Many of these are amendments related to personal data protection. With regard to the current trends, however, many proposals have been made for regulation on the manipulation of comments by using fake Internet news, malicious comments, and macro method.

E. Internet Regulations

For 2017, the biggest issue in the field of the Internet industry was the “4th Industrial Revolution.” With ICT convergence using intelligence information technology in the world expanded to all fields of the industry, the government of each country is attempting to reinvent the regulation system strategically to cope with such trend. Note, however, that the excessively high barrier of the Internet and ICT regulation in Korea is making it difficult to cope with the changes in the paradigm of The

4th Industrial Revolution quickly and flexibly.

According to an investigation conducted by Hyundai Research Institute in May 2017, enterprises have pointed out the excessive regulation and lack of infrastructure (22.3%), insufficient experts and human resources (18.6%), and lack of understanding of The 4th Industrial Revolution as the reasons for the insufficient action by the Korean government with regard to The 4th Industrial Revolution. Especially, 20.4% of the businesses in the field of service have been found to want innovation of the industrial regulation and maintenance of the relevant laws among the policies for The 4th Industrial Revolution.

Governments throughout history have attempted regulatory reform through various policies and methods. In the fields of new industry and technology in particular, negative regulations have been propelled in order to reorganize the regulation systems according to the rapid development in technology and convergence between industries. In accordance with the complete enumeration of the activities of enterprises in 2013, however, 17 negative regulations have been converted. Furthermore, there were 9 conversions according to the investigation on all laws in 2016; therefore, the results of the maintenance of regulations have been insufficient. Accordingly, the new government has expanded the existing negative regulation method and introduced a comprehensive negative regulation system that consists of conversion of legislation method and regulation sand box (Sep. 2017). In addition, various systems including meeting, site visiting, and Sinmungo have been initiated in order to find errors in the industrial fields.

On February 27, 2018, the government announced the regulation maintenance plan 2018 in the 「2018 Comprehensive Maintenance Plan」for the fast enforcement of innovation of regulation centered on revolution and public welfare. For the innovation of regulation in the field of ICT convergence industry, the government is propelling the maintenance and spread of the legal system for the comprehensive conversion of negative regulation. Above all, plans for legislation of the basis administrative law and four laws related to regulation sandbox (ICT convergence act, financial innovation support act, industry convergence promotion act, and special regional act) contain the principle and basic direction of the comprehensive conversion of negative regulation.

The Ministry of Science & ICT (MSIT), which directs the ICT-related regulations, is planning to reinvent the regulation that impedes the reinforcement of competence of intelligence DNA (Data-Network-AI) as the core foundation by reflecting the voice from the site and the new demands for the improvement of regulation to lead The 4th Industrial Revolution. Furthermore, the committee of new industry regulation innovation is planning to investigate the errors on legislations found from the new industry site to identify the 91 “Tasks for Reviewing the Errors in the New Industrial Field,” and then complete improvement of the regulation until the end of 2018.



Part 4

International Cooperation

1. Internet Governance
2. Cooperation on Information Security
3. Cooperation on Personal Data Protection
4. International Internet Status

1. Internet Governance

In the WSIS (World Summit on the Information Society) held in Tunisia in 2005, Internet Governance was defined as the “system for developing and applying the common principles, standards, and decision-making procedures for the development and utilization of the Internet through each individual role of the government, private sector, and civil society.” It can be classified into governance in a narrow sense and governance in a wide sense.

In a narrow sense, governance refers to Governance “OF” the Internet; the range is the regulation work of policies related to the Internet address such as IP (Internet Protocol) and domain name, etc.; in a wide sense, however, governance refers to Governance “ON” the Internet to include all issues regarding Internet access cost, spam, network security, contents, e-commerce, privacy and human rights, etc. In the international stage, Governance “OF” the Internet regarding the allocation of the domain name and IP was mostly discussed; recently, however, the issues have been expanded to Governance “ON” the Internet.

In the initial stage of the Internet, the developer and users were of the opinion that the government must not intervene excessively to enable the consistent development of the Internet. Accordingly, instead of the government, ICANN supported the multi-stakeholder model wherein various entities participate in the decision making such as the RIR (Regional Internet Registry) in charge of IP allocation, IETF (Internet Engineering Task Force) proposing the technical standard related to the Internet, W3C (World Wide Web Consortium), Internet service providers, common top-level domain · national top-level domain management organization and ISOC (Internet Society), etc.

From the initial stage of ICANN operation, the international society requested re-review on the Internet governance model because of the non-transparent, Western countries-oriented operation process of ICANN and the US influence on ICANN. Accordingly, the US government announced on March 14, 2014 that the management right of the international Internet address will be transferred to the multi-stakeholder community.

From the Singapore regular meeting in March 2014, ICANN discussed the development of the procedure for establishing the model for transferring the management right of the international Internet address and collected global opinions on the organized IANA Stewardship Transition Coordination Group (ICG) for initiative performance on the discussion of the transfer on the management right of the international Internet address in July 2014.

In Korea, discussions on Internet governance are held actively centering on KISA and KIGA,

including numerous international events related to Internet governance. In September 2013, the Asia-Pacific Region Internet Governance Forum (APrIGF) was held in Songdo, Incheon. In October, the 3rd General Meeting of World Cyber Space was held in Seoul to provide an opportunity for Korea to lead discussions on the cyber field as the leader in policy & diplomacy of the cyber field.

In the NETmundial Meeting held in Sao Paulo, Brazil in April 2014, Korea submitted the principle of Internet governance. Principles of significant value in the discussion on Internet governance were accessibility, multi-stakeholderism, flexibility, engagement, security, and balance to support open, safe global Internet based on the principle of participation by the multi-stakeholders. Moreover, it was also mentioned that Internet governance system based on the discussion by the multi-stakeholders was supported, but that there is also a need to seek various optimized solutions for each sector and issue.

In the 50th ICANN meeting held in London in June 2014, 4 standards were proposed for a successful Internet governance system, including the promotion of transfer of the IANA management right based on comprehensive participation by neglected countries and sufficient amount of discussion, improvement of GAC role, provision of procedure for establishing the responsibilities of ICANN, etc.

To respond to international discussions following the historical announcement on the private transition of the international Internet address management right by the US government in March 2014, the Korean government organized the IANA WG under the KIGA (Korea Internet Governance Alliance) in October 2014 to submit the opinion from the Korean Internet community to ICANN 5 times in December 2014, May 2015, September 2015, December 2015, etc.

The Korean government provided opinions on the main principles in composing the main positions in the new system such as guaranteeing regional diversity, independence of the newly established organization that will take charge of the operation of IANA, and methods of reinforcing the responsibilities of ICANN; these were mostly reflected to the “Final Version of Transition Plan on International Internet Address Management Right” submitted to the US government on March 10, 2016 to contribute to providing the high status of Korea in the future Internet governance system.

The domestic council of KIGA (Korea Internet Governance Alliance) is holding offline meetings once a month to discuss the main issues related to Internet governance and to share information on domestic & foreign trends. In addition, KrIGF (Korea Internet Governance Forum) has been held annually since 2012 to enable various relevant communities in Korea to participate in the discussion of domestic & foreign Internet governance issues.

In addition, KISA has been holding the APIGA (Asia-Pacific Internet Governance Association) forum annually since 2016 jointly with ICANN (International Internet Address Organization) to reinforce the next-generation capabilities in the Internet governance field. This is an Internet governance capability reinforcement program targeting university and graduate school students in

the Asia-Pacific region; discussions are held with the executives of international organizations, and experiences of students in the Asia-Pacific region are shared to discover and develop global next-generation leaders. An opportunity to participate in the international organization is also provided to lay the foundation for advancing into major positions in the future.

2. Cooperation on Information Security

The Korea Internet Security headquarters of KrCERT/CC in the Korea Internet & Security Agency (KISA) is performing a leading role in the international infringement accident response consultative group such as FIRST (Forum of Incident Response & Security Team), APCERT (Asia-Pacific Computer Emergency Response Team), and CAMP (Cybersecurity Alliance for Mutual Progress) and is also participating actively in the cross-border discussions for the solidarity of cyber-security in international society. Educational projects are also implemented to increase the response capabilities with regard to infringement accidents in developing countries.

Since 2005, KrCERT/CC has been conducting invitational training on the establishment and operation of the infringement accident response team annually centering on developing countries in the Asia-Pacific region. In response to cyber accidents, a human network between the personnel for each country must be established as the top priority, and an opportunity is provided to establish mutual trust through this process. In 2017, 19 personnel from 19 countries including Laos, Romania, Mongolia, etc. participated to share know-how on the cyber security system and establishment of CERT. A total of 279 personnel from 50 countries participated in the training until 2017.

To reinforce the cooperation on preventing and responding to international cyber security accidents, the Korea Internet & Security Agency (KISA) renewed the MOU with the Romania Computer Emergency Response Team (CERT-RO), and cooperation was pursued with the relevant agencies on responding to infringement accidents in the US, UK, Spain, etc. to share information on cyber-threat and to seek methods of reinforcing cooperation such as manpower exchange, etc. KrCERT/CC is also maintaining close cooperation with neighboring countries particularly the China Emergency Response Team (CNCERT/CC) and Japan Computer Emergency Response Team (JPCERT/CC). The Computer Emergency Response Teams of Korea, China, and Japan are holding annual meetings every August to check the progress of cooperation and improvements. In 2017, the 5th Annual Meeting of Korea-China-Japan Computer Emergency Response was held in Seoul.

Along with reinforcing the cooperative system between the two parties, the Korea Internet & Security Agency (KISA) established in July 2016 CAMP (Cybersecurity Alliance for Mutual Progress), which is participated in by the relevant agencies such as the foreign Computer Emergency Response Team (CERT), to respond to the increasing demand for multilateral cooperation.

CAMP is a global consultative group composed of 53 organizational members from a total of 40 countries as of 2017; it is a network platform for establishing a safe cyber world and to build up trust.

Especially in 2016, the opening ceremony and 1st annual meeting were successfully held in Korea, and KrCERT/CC of the Korea Internet & Security Agency (KISA) was selected as chairman and secretariat. To activate information sharing on the more intelligent and sophisticated cyber-threats and to support the cyber-security capability reinforcement of the member countries, CAMP is operating the operating committee and working group, publishing a periodic newsletter, and holding annual meetings and conferences.

3. Cooperation on Personal Data Protection

The trend is to recognize data utilization including personal data while creating new added value, and EU, USA, China, etc. are establishing legal systems on personal data protection for regulatory reinforcement. Basically, for a company to advance into the relevant region and country to perform the business, the laws of the relevant region and country must be followed.

In the case of EU GDPR (General Data Protection Regulation), the penalty was increased, and the scope of application was diversified to stipulate that companies not included in the EU can also be covered. The transfer of the personal data collected in the EU outside of the EU is restricted as well. Due to these reasons, many domestic companies are suffering a lot due to insufficient knowledge of the GDPR application and response methods.

In addition, APEC CBPRs (Cross-Border Privacy Rules System) was established led by the US for the purpose of transferring the personal data overseas with more convenience. The US has many global IT companies from various countries and prefers the free transfer of personal data overseas.

Thus, to respond to the rapidly changing environment, the Personal Data Protection Headquarters of the Korea Internet & Security Agency (KISA) is investigating and analyzing the trend of main legal systems in foreign countries to provide accurate information.

GDPR was enforced as of May 25, 2018, and it had many changes compared to the existing personal data protection guideline by the EU (Directive 95/46/EC). The biggest change is that EU member countries can implement directly without additional legislation because it is a regulation unlike the existing directive. In addition, GDPR reinforced the corporate responsibilities and rights of the entity of the information; the personal data collected in the EU were allowed to be transferred and utilized freely within the EU, and the regulation stipulates that protective measures must be performed when transferring the information to outside of the EU.

GDPR is strictly controlling the transfer of personal data collected within the EU to outside of the EU, and contracts using the standard provisions on personal data protection and corporate rules with binding force are mandatory as appropriate protective measures. In the case of adequacy decision by the EU Commission on the level of personal data protection in a specific country, however, transfer of personal data to the relevant country is possible without other protective measures. In other words, if Korea receives the adequacy decision, our companies that have advanced into the EU can transfer and utilize the personal data collected in the EU to Korea without additional cost or efforts.

From this perspective, the Korea Internet & Security Agency (KISA) promoted the subscription to CBPRs as the inter-boundary personal data protection framework of APEC together with the Ministry of Public Administration & Security and the Korea Communications Commission; in the Cabinet Meeting in December 2016, the details on the application and progress of CBPRs were reported to submit the CDPRs registration application to APEC through the Ministry of Foreign Affairs.

In 2018, the initial report was prepared for the designation of the certificate authority; the certification standard manual and certification judge development method are being prepared to operate the certification system.

CBPRs is a global personal data protection certification system established in 2011 to guarantee the minimum protection level with regard to the personal data transferred between the APEC member countries and to activate the digital economy. Based on the legal enforcement cooperation between the member countries (CPEA), collaboration can be done between the law enforcement agencies for regulation on the companies of other countries and damage relief on the entity of the information. The principle is to be operated through the voluntary participation of the member countries and companies, and the introduction of CBPRs may not have direct influence on the legal system of personal data protection of the member countries.

When CBPRs is introduced, the standard of Korean personal data protection transferred overseas is increased; in the case of infringement accidents such as leak of personal data by a foreign company, damage relief is possible through the cooperative system of the CBPRs-certified organization and the law enforcement agency. The procedure is also simplified; when trading or consigning the work with the companies of a country with insufficient level of personal data protection, CBPRs certification can be requested to secure the minimum standard of personal data protection.

In 2018, there were 5 CBPRs member countries: Korea, USA, Mexico, Japan, and Canada. For the certification agency, TrustArc of the US and 2 agencies received approval. A total of 22 companies were certified, including Apple, Cisco, IBM, etc.

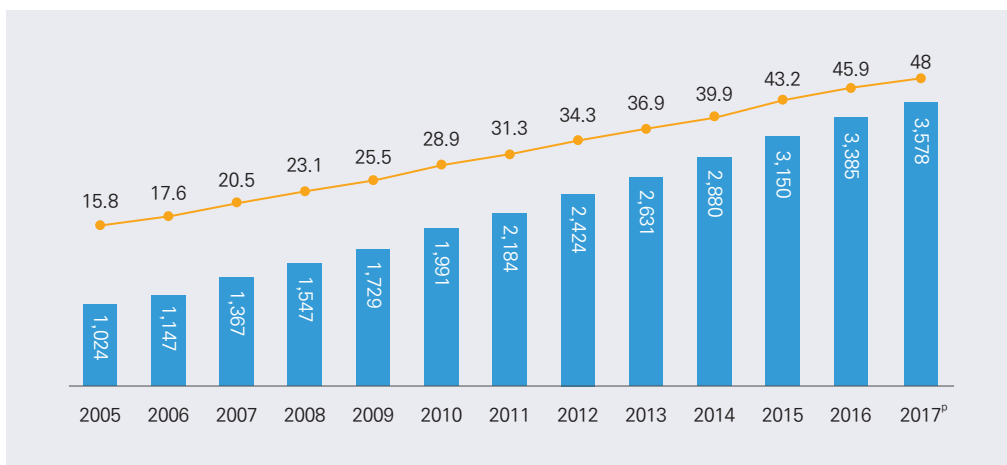
There are a total of 50 CBPRs certification standards, and they are based on the 9 principles of personal data protection on the APEC Privacy Framework. Moreover, additional standards can be developed and applied for each member country according to the legal system and enforcement environment for personal data protection.

4. International Internet Status

A. Internet Usage

The number of Internet users and usage rate have been increasing continuously worldwide from 2005 to 2017. According to the ITU, the number of Internet users in the world as of 2017 increased by 193 million to 3,578 billion compared to the previous year, and the Internet usage rate was found to be 48.0%.

[Figure 4-4-1] Number of Internet Users and Internet Usage Rates in the World (Unit : %, 1 million)



* p : estimate

[ITU, ITU Statistics, 2017]

When we look at the trend of changes in Internet use rate, the Internet usage rate of developing nations is noticeable. The Internet use rate of 7.8% in developing nations in 2005 increased by over 5 times for the last 12 years to 41.3% in 2017. The Internet use rate of developed nations was 81.0% in 2017, but that in the African region was only 21.8%; thus suggesting the need for efforts to improve the Internet use environment in developing nations.

[Table 4-4-1] Internet Usage Rates and High-speed Internet Subscription Rates

(Unit: %)

Year	Internet Usage			Wired High-speed Internet Subscription Rate			Wireless High-Speed Internet Subscription Rate		
	Developed Nations	Developing Nations	International	Developed Nations	Developing Nations	International	Developed Nations	Developing Nations	International
2005	51.3	7.7	15.8	12.3	1.3	3.4	-	-	-
2006	53.5	9.3	17.6	15.5	1.8	4.3	-	-	-
2007	59.1	11.8	20.5	18.0	2.3	5.2	18.5	0.8	4.0
2008	61.3	14.5	23.1	20.4	2.9	6.1	27.5	1.6	6.3
2009	62.9	17.2	25.5	22.0	3.5	6.9	36.6	3.0	9.0
2010	66.5	20.6	28.9	23.5	4.2	7.6	44.7	4.5	11.5
2011	67.7	23.4	31.3	25.2	5.0	8.6	57.3	8.2	16.9
2012	72.0	26.3	34.8	26.3	5.5	9.2	66.5	12.4	21.9
2013	73.8	29.0	36.9	27.4	5.9	9.7	74.1	17.5	27.4
2014	75.6	32.4	39.9	28.3	6.3	10.1	81.1	27.5	36.8
2015	77.4	36.1	43.2	29.5	7.8	11.5	89.1	36.0	45.1
2016	79.6	39.0	45.9	30.3	8.7	12.4	94.4	43.6	52.2
2017p	81.0	41.3	48.0	31.0	9.5	13.1	97.1	48.2	56.4

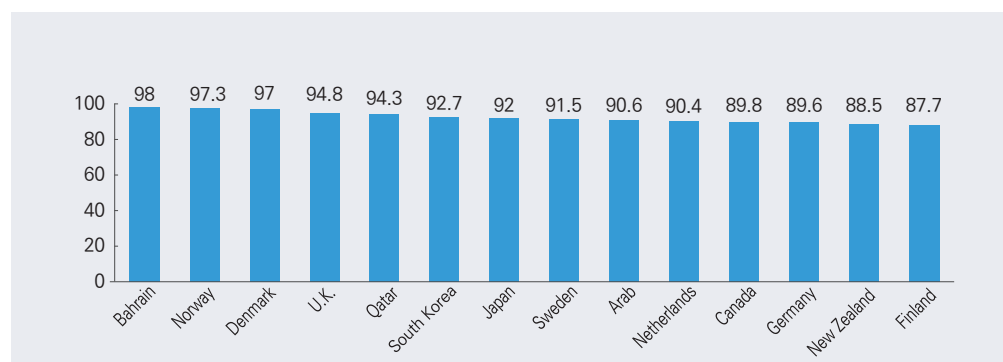
* p : estimate

[ITU, ITU Statistics, 2017]

In 2017, the Internet Usage by Country showed Bahrain topping the list with 98.0%, followed by Norway (97.3%) and Denmark (97.0%); Korea recorded 92.7%.

[Figure 4-4-2] Internet Usage by Country

(Unit : %)



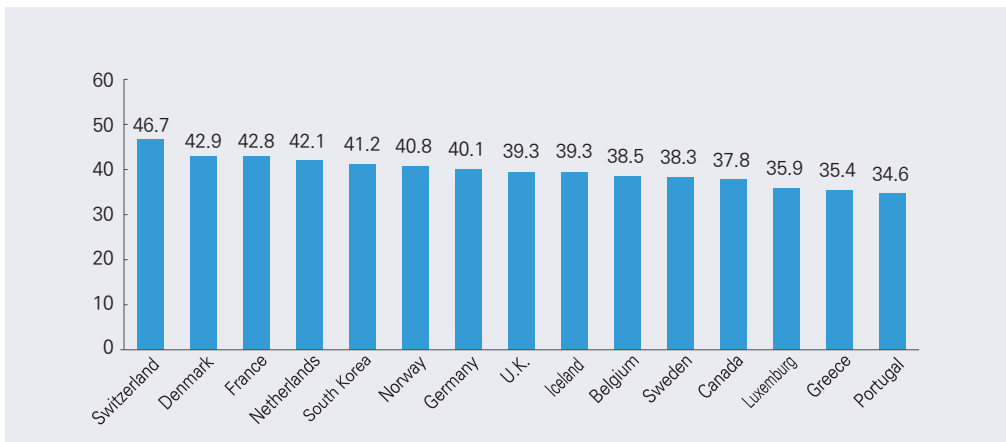
* Excluding cities with less than one million population

[ITU, Measuring the Information Society Report, 2017]

The ratio of wired high-speed Internet subscribers per 100 people in OECD member countries was shown to be in order of Switzerland (46.7%), Denmark (42.9%), France (42.8%), and Netherlands (42.1%), with Korea recording 41.2% followed by Norway (40.8%).

[Figure 4-4-3] Wired High-Speed Internet Subscribers per 100 People in OECD Member Countries
(as of June 2017)

(Unit : %)

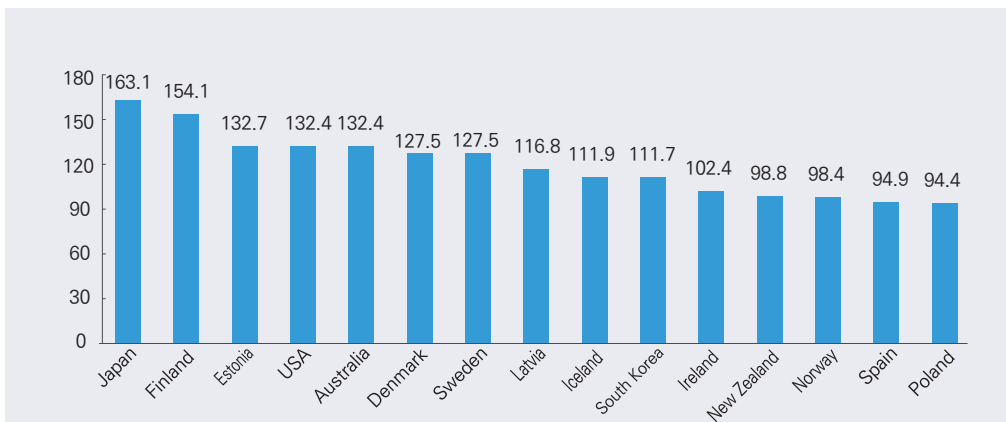


[OECD, <https://data.oecd.org/broadband/fixed-broadband-subscriptions.htm#indicator-chart>, 2017]

The ratio of wireless high-speed Internet subscribers per 100 people in OECD member countries was shown to be in order of Japan with 163.11%, followed by Finland (154.1%) and Estonia (132.7%); Korea recorded 111.7%.

[Figure 4-4-4] Wireless High-Speed Internet Subscribers per 100 People in OECD Member Countries
(as of June 2017)

(Unit : %)



[OECD, <https://data.oecd.org/broadband/wireless-mobile-broadband-subscriptions.htm>, 2017]

B. International Index Status

Korea was ranked in the upper class on the ICT-related international index presented by international organizations UN & ITU and private organizations WEF and IMD (International Institute for Management Development), showing the aspect of a power nation on the Internet.

[Table 4-4-2] Korea Ranking in ICT Related Index

Institution	Index Name	Korean Rank										Remarks
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
UN	e-Government Development Index	6	-	1	-	1	-	1	-	3	-	To be announced in the future
ITU	ICT Development Index	-	2	1	1	1	1	2	1	1	2	Rank 1: Iceland Rank 3: Switzerland
WEF	Network Preparation Index	9	11	15	10	12	11	10	12	13	-	Temporarily Stopped (restructuring of items)
	Global Competitiveness Index Technological readiness	13	15	19	18	18	22	26	27	28	29	Rank 1: Switzerland Rank 2: USA
IMD	World Competitiveness Index Technological Infrastructure	14	14	18	14	14	11	8	13	15	17	Rank 1: Singapore Rank 2: Netherlands

[KISA]

The ICT development index is the index for comparing and analyzing the level of ICT development between ITU member countries, and the purpose is to evaluate the ICT development channel between countries, digital gap, and growth potential. The ICT development level and competitiveness of the country are classified into ICT accessibility, availability, and application capability to collect item evaluation on a total of 11 indices for the calculation of the index.

[Table 4-4-3] ICT Development Index Ranking (based on the year presented)

Rank	Country (Index)		Rank	Country (Index)	
	2017	2016		2017	2016
1	Iceland (8.98)	South Korea (8.84)	8	Norway (8.47)	Netherlands (8.43)
2	South Korea (8.85)	Iceland (8.83)	9	Luxembourg (8.47)	Norway (8.42)
3	Switzerland (8.74)	Denmark (8.74)	10	Japan (8.43)	Japan (8.37)
4	Denmark (8.71)	Switzerland (8.68)	11	Sweden (8.41)	Luxembourg (8.36)
5	UK (8.65)	UK (8.57)	12	Germany (8.39)	Germany (8.31)
6	Hong Kong (8.61)	Hong Kong (8.46)	13	New Zealand (8.33)	New Zealand (8.29)
7	Netherlands (8.49)	Sweden (8.45)	14	Australia (8.24)	Australia (8.19)

[ITU, Measuring the Information Society Report, 2017]



Appendix

- List of major Internet-related organizations
- Status of Domestic ISPs (as of August 2018)
- Abbreviations
- Organization Abbreviations
- About the KISA

List of Major Internet-related Organizations

■ Government Ministries and Related Organizations

	Name	English Service Name	Address	URL
1	Ministry of Science and ICT	MSIT	Government Complex-Gwacheon, 47, Gwanmun-ro, Gwacheon-si, Gyeonggi-do	www.msit.go.kr
2	Ministry of the Interior and Safety	MOIS	209, Sejong-daero(Sejong-ro), Jongno-gu, Seoul	www.mois.go.kr
3	Statistics Korea	KOSTAT	Government Complex-Daejeon, 189, Cheongsu-ro, Seo-gu, Daejeon	www.kostat.go.kr
4	Korea Internet & Security Agency	KISA	IT Venture Tower, Garak-dong 78, Songpa-gu, Seoul	www.kisa.or.kr
5	Electronics and Telecommunications Research Institute	ETRI	218, Gajeong-ro, Yuseong-gu, Daejeon	www.etri.re.kr
6	Korea Information Society Development Institute	KISDI	18, Jeongtong-ro, Deoksan-myeon, Jincheon-gun, Chungcheongbuk-do	www.kisdi.re.kr
7	National Information Society Agency	NIA	53, Cheomdan-ro, Dong-gu, Daegu	www.nia.or.kr
8	National IT industry Promotion Agency	NIPA	10, Jeongtong-ro, Deoksan-myeon, Jincheon-gun, Chungcheongbuk-do	www.nipa.kr
9	Korea Communications Agency	KCA	760, Bitgaram-ro, Naju-si, Jeollanam-do	www.kca.kr
10	Korea Creative Content Agency	KOCCA	35, Gyoyuk-gil, Naju-si, Jeollanam-do	www.kocca.kr
11	Korea Institute of Science and Technology Information	KISTI	245, Daehak-ro, Yuseong-gu, Daejeon	www.kisti.re.kr

■ Associations, organizations, and others

	Name	Org(Abbr)	Address	URL
1	Korea IoT Association	KIOT	10F, Hyundai Bldg, Olympic-ro, Songpa-gu, Seoul	www.kiot.or.kr
2	CONsortium of CERT's	CONCERT	111, Seocho-Jungang-ro 8, Seocho-gu, Seoul	www.concert.or.kr
3	Startup Alliance	-	423, Teheran-ro, Gangnam-gu, Seoul	www.startupall.kr
4	The Korean Council on the Protection of Personal Information	KCPPI	127, Mapo-daero, Mapo-gu, Seoul	www.kcppi.or.kr
5	Korea Internet Service Promotion Association	KISPA	3104, Nambusunhwan-ro, Gangnam-gu, Seoul	www.kispa.or.kr
6	Internet Address Dispute Resolution Committee	IDRC	398, Seocho-ro, Seocho-gu, Seoul	www.kisdi.re.kr
7	Personal Information Dispute Mediation Committee	PICO	209, Sejong-ro, Jongno-gu, Seoul	www.nia.or.kr
8	Personal Information Protection Commission	PIPC	209, Sejong-ro, Jongno-gu, Seoul	www.nipa.kr

	Name	Org(Abbr)	Address	URL
9	Korea Council of Chief Information Security Officers	CISO Korea	25, Mapo-ro, Mapo-gu, Seoul	www.kca.kr
10	National Association of Hacking & Security	NAHS	199, Baekbum-ro, Mapo-gu, Seoul	www.kocca.kr
11	Korea Internet Governance Alliance	KIGA	17F, IT Venture Tower, Garak-dong 78, Songpa-gu, Seoul	www.kisti.re.kr
12	Korea Information Security Industry Association	KISIA	9F, IT Venture Tower, Garak-dong 78, Songpa-gu, Seoul	www.kisia.or.kr
13	Korea Internet Corporations Association	KICA	143-37, Samsung-ro, Teheran-ro, Gangnam-gu, Seoul	www.kinternet.org
14	Korea Onlinead Association	KOA	7-11, Sincheon-dong, Songpa-gu, Seoul	www.onlinead.or.kr
15	The Ethics Council on Internet	-	1002, 10F, 314-1, Hangangno2-ga, Yongsan-gu, Seoul	www.iecoin.or.kr
16	Korea Society of Internet Ethics	KSIE	SBA convention center3F, 3104, Nambusunhwan-ro, Gangnam-gu, Seoul	www.ksie.kr
17	Korea Association for Telecommunications Policies	KATP	18, Jeongtong-ro, Deoksan-myeon, Jincheon-gun, Chungcheongbuk-do	www.katp.or.kr
18	Korea Institute of Information Security and Cryptology	KIISC	SeongjiHeights3, 507, Nonhyeon-ro, Gangnam-gu, Seoul	www.kiisc.or.kr
19	Korea Local Information Research & Development Institute	KLID	18F, 85, Cheonggyecheon-ro, Jongno-gu, Seoul	www.klid.or.kr
20	Korea Association of Smart Home	KASH	1101, 108, Gasandigital2-ro, eumcheon-gu, Seoul	www.kashi.or.kr
21	Korea Cable Television Association	KCTA	5F, Chungjeong Tower, 21, Seosomun-ro, Seodaemun-gu, Seoul	www.kcta.or.kr
22	Korea IPTV Broadcasting Association	KIBA	15F, ChungjeongTower,21, Seosomun-ro, Seodaemun-gu, Seoul	www.kiptv.or.kr
23	Telecommunications Technology Association	TTA	47, Bundang-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.tta.or.kr
24	Korean Bar Association	-	18F, 124, Teheran-ro, Gangnam-gu, Seoul	www.koreanbar.or.kr
25	Korea Association for ICT Promotion	KAIT	2F, 350, Seocho-daero, Seocho-gu, Seoul	www.kait.or.kr
26	Korea Online Privacy Association	OPA	16, Teheran-ro8-gil, Gangnam-gu, Seoul	www.opa.or.kr
27	Korea Mobile Internet Business Association	MOIBA	4F, 18, Apgujeong-ro36-gil, Gangnam-gu, Seoul	www.moiba.or.kr
28	The Korea Internet Corporations Association	Kinternet	7F, 423, Teheran-ro, Gangnam-gu, Seoul	www.kinternet.org
29	Korea Digital CCTV Research Association	KDCA	501, 58, Pangyo-ro255beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	www.digitalcctv.org
30	National Association of Hacking & Security	NAHS	1107, 199, Baekbeom-ro, Mapo-gu, Seoul	www.nahs.or.kr
31	Korea Chief Privacy Officers` Forum	KoreaCPO Forum	5F, 111, Seocho Jungang-ro 8-gil, Seocho-gu, Seoul	www.cpoforum.or.kr

Status of Domestic ISPs (as of August 2018)

No.	Name	English Service Name	Address	URL
1	Gyeonggi Techno Park Foundation	GTP	Gyeonggi Techno Park, 705, Haeae-ro, Sangrok-gu, Ansan-si, Gyeonggi-do	www.gtp.or.kr
2	KERIS	EDUNET	1F, 64, Dongnae-ro, Dong-gu, Daegu	www.keris.or.kr
3	RXN	RXN	32, Digitalro 9-gil, Geumcheon-gu, Seoul	-
4	LG C&S	LG-NET	71, Magokjungang 8-ro, Gangseo-gu, Seoul	www.lgcns.com
5	KCTV Jeju Broadcasting Corporation	CABLENET	2, Ayeon-ro, Jeju-si, Jeju-do	www.kctvjeju.com
6	Gavia Co., Ltd.	GABIA-IP	660, Daewangpangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.gabia.com
7	Daou Technology Co., Ltd.	DAOU	81, Digitalvalley-ro, Suji-gu, Yongin-si, Gyeonggi-do	www.daouidc.com
8	Via Web Co., Ltd.	VIAWEB	38, Digital-ro29-gil, Guro-gu, Seoul	viaweb.co.kr
9	Shinsegae I&C Co., Ltd.	SINC	10F, 48, Sogong-ro, Jung-gu, Seoul	www.sinc.co.kr
10	Shinsegae I&C Co., Ltd.	SSEN	10F, 48, Sogong-ro, Jung-gu, Seoul	-
11	CMB Daegu Broadcasting Co., Ltd.	CMBDONGBU	15, Hwarang-ro, Dong-gu, Daegu	cmbtg.tv
12	CMB Daegu Broadcasting Suseong Branch Co., Ltd.	CMBSUSUNG	15, Hwarang-ro, Dong-gu, Daegu	cmbtg.tv
13	CMB Dongseo Broadcasting Co., Ltd.	CMBPLUSONE	91, Wangsan-ro, Dongdaemun-gu, Seoul	cmbds.tv
14	CMB Chungcheong Broadcasting Co., Ltd.	CMBMUTINET	125, Bonghwang-ro, Gongju-si, Chungcheongnam-do	www.cmbtv.com
15	Africa TV Co., Ltd.	AFREECATV	15, Pangyo-ro 228beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	corp.afreecatv.com
16	LG U+ Co., Ltd.	BORANET	32, Hangang-daero, Yongsan-gu, Seoul	www.uplus.co.kr
17	LG U+ Co., Ltd.	KIDC	32, Hangang-daero, Yongsan-gu, Seoul	www.kidc.net
18	LG U+ Co., Ltd.	LGTELECOM	416, World Cup buk-ro, Mapo-gu, Seoul	www.lguplus.com
19	LG U+ Co., Ltd.	PUBNETPLUS	32, Hangang-daero, Yongsan-gu, Seoul	www.pubnetplus.ne.kr
20	LG U+ Co., Ltd.	Xpeed	32, Hangang-daero, Yongsan-gu, Seoul	www.uplus.co.kr
21	eGOS Co., Ltd.	eGOSNET	158, Eulji-ro, Jung-gu, Seoul	www.egios.com
22	E-Host Data Center Co., Ltd.	EHOSTIDC	98, Gasan digital 2-ro, Geumcheon-gu, Seoul	www.ehostidc.co.kr
23	GDSYS Co., Ltd.	GDSYS	219, Gasandigital 1-ro, Geumcheon-gu, Seoul	www.gdsys.co.kr
24	Purple Stones Co., Ltd.	HCLC	43, Digital-ro 34-gil, Guro-gu, Seoul	www.purplestones.co.kr

No.	Name	English Service Name	Address	URL
25	Flexnet	FLEXNET	61, Digital-ro 31-gil, Guro-gu, Seoul	www.flexnet.co.kr
26	Korea Data Communication Co., Ltd.	KDTIDC	56, Hannae-ro, Geumcheon-gu, Seoul	www.kdtidc.com
27	Korea Trade & Telecommunications Co., Ltd.	KTNET	511, Yeongdongdaero, Gangnam-gu, Seoul, Korea	www.ktnet.co.kr
28	JCN Ulsan Central Broadcasting Co., Ltd.	JCN	76, Sinjeong-ro, Nam-gu, Ulsan	www.jcntv.co.kr
29	SK	SK-NET	9, Seongnamdaero 343-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	www.sk-net.com
30	Kumgang Broadcasting Co., Ltd.	KCNNET	569, Iksan-daero, Iksan-si, Jeollabuk-do	www.kcn.tv
31	NamInchon Broadcasting Co., Ltd.	NIBDIGITAL	14, Juanseo-ro, Nam-gu, Incheon	www.nibtv.co.kr
32	Naver Business Platform Co., Ltd.	NBP-NET	6, Buljeong-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.navercorp.com
33	Duzon Bizon	DOUZONE	130, Beodeul 1-gil, Namsan-myeon, Chuncheon-si, Gangwon-do	www.douzone.com
34	Duruan	DURUAN	55, Digital-ro 33-gil, Guro-gu, Seoul 02	www.duruan.co.kr
35	Dreamline Co., Ltd.	DREAMX	135, Jungdae-ro, Songpa-gu, Seoul	www.dreamline.co.kr
36	Lotte Information & Communications Co., Ltd.	LDCC-SAFEGUARD	179, Gasandigital 2-ro, Geumcheon-gu, Seoul	www.ldcc.co.kr
37	Samsung SDS Co., Ltd.	SAMSUNGSDS	125, Olympic-ro 35-gil, Songpa-gu, Seoul	www.sds.samsung.co.kr
38	Samjung Data Service Co., Ltd.	DIRECT-HOSTING	110, Digital-ro 26-gil, Guro-gu, Seoul	www.sds.co.kr
39	Sejong Telecom Co., Ltd.	SHINBIRO	36, Sangil-ro 10-gil, Gangdong-gu, Seoul	www.sejongtelecom.net
40	CD Networks	CDNETWORKS	37, Teheran-ro 8-gil, Gangnam-gu, Seoul	www.cdnetworks.co.kr
41	ILink Korea Co., Ltd.	INDICLUB	1, Gasan digital 1-ro, Geumcheon-gu, Seoul	www.ilinkkorea.co.kr
42	SK Broadband Co., Ltd.	broadNnet	24, Toegy-e-ro, Jung-gu, Seoul	www.skbroadband.com
43	SK Telecom Co., Ltd.	SK-TELECOM-NET	65, Eulji-ro, Jung-gu, Seoul	www.sktelecom.com
44	SK Telink Co., Ltd.	SKTelink	24, Toegy-e-ro, Jung-gu, Seoul	www.sktelink.net
45	NHN Entertainment	TOAST-NET	16, Daewangpangyo-ro 645beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	www.nhnent.com
46	NTT Korea Co., Ltd.	GIN	10, Gukjegeumyung-ro, Yeongdeungpo-gu, Seoul	www.kr.ntt.com
47	LXN	LXN	서111, Digitalro 26-gil, Guro-gu, Seoul	www.lxn.co.kr

No.	Name	English Service Name	Address	URL
48	UL Networks	ULNETWORKS	31, Tongilro 26-gil, Seodaemun-gu, Seoul	www.ul-net.co.kr
49	Incheon International Airport Corporation	IIAC	47, Gonghang-ro 424beon-gil, Jung-gu, Incheon	www.airport.kr
50	Netropy Co., Ltd.	Netropy	545, Dunchon-daero, Jungwon-gu, Seongnam-si, Gyeonggi-do	www.netropy.co.kr
51	NEXINNO Co., Ltd.	NEXINNO	233-5, Mokdongdong-ro, Yangcheon-gu, Seoul	www.nexinno.co.kr
52	NEX-G	VAAN	396, Worldcupbukro, Mapo-gu, Seoul	www.nexg.net
53	DotName Korea Co., Ltd.	DOTNAME	234, Teheran-ro, Gangnam-gu, Seoul	www.dotname.co.kr
54	DLive Co., Ltd.	DLIVE	9, Teheran-ro 103-gil, Gangnam-gu, Seoul	www.cnm.co.kr
55	Vtopia Co., Ltd.	VTOPIA	18, Ahasan-ro 7na-gil, Seongdong-gu, Seoul	www.vtopia.co.kr
56	BS ITC	EXANET	66, Chungminro, Songpa-gu, Seoul	bsitc.kr
57	Seokyeung Broadcasting Co., Ltd.	SCSNET	532, Jinyangho-ro, Jinju-si, Gyeongsangnam-do	www.iscs.co.kr
58	Smile Serv	SMILESERV	86, Daewangpangyo-ro 644beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	www.cloudv.kr
59	CMB Co., Ltd. Broadcasting Co., Ltd.	CMBKWANG -JUNET	13, Sangmujungang-ro 104beon-gil, Seo-gu, Gwangju	www.cmbkj.tv
60	CMB Daejeon Broadcasting Co., Ltd.	CMBI-NETDJ	20, Daejong-ro 584beon-gil, Jung-gu, Daejeon	www.cmbdj.co.kr
61	CMB Hangang Cable Co., Ltd.	CMBI-NETHK	22, Yangpyeong-ro 17-gil, Yeongdeungpo-gu, Seoul	-
62	CJ Hello Vision Co., Ltd.	CJ-HELLOVISION	19, World Cup buk-ro 56-gil, Mapo-gu, Seoul	www.cjhelloworldvision.com
63	Areum Broadcasting Network Co., Ltd.	DITIZONE	14, Seongnam-daero 343beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do	www.abn.co.kr
64	Inet Co., Ltd.	KPIN	9, Nonhyunro 81-gil, Gangnam-gu, Seoul	www.kpin.net
65	INET Hosting Co., Ltd.	INET	40, Nambusunhwan-ro 337ga-gil, Seocho-gu, Seoul	www.inet.co.kr
66	INT Management Co., Ltd.	INTCOMPANY	416, World Cup buk-ro, Mapo-gu, Seoul	www.intcompany.co.kr
67	IP4 Networks Co., Ltd.	IP4NET	13, Eonju-ro 81-gil, Gangnam-gu, Seoul	www.ip4.co.kr
68	ElimNet Co., Ltd.	ELIMNET	15, Gyeonggidae-ro, Seodaemun-gu, Seoul	www.elim.net
69	WITH Systems Co., Ltd.	WITHSYSTEMS	233-5, Mokdongdongro, Yangcheon-gu, Seoul	-
70	J&D Telecom Co., Ltd.	JNDINFO	21, Gyeongsu-daero 338beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do	www.jndinfo.com
71	Geo Raynet Co., Ltd.	RayNet	33-33, Gasandigital 1-ro, Geumcheon-gu, Seoul	www.raynet.co.kr
72	KINX Co., Ltd.	KINXINC	13, Eonju-ro 30-gil, Gangnam-gu, Seoul	www.kinx.net

No.	Name	English Service Name	Address	URL
73	KT Co., Ltd.	KORNET	90, Buljeong-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.olleh.com
74	Korea Center DotCom Inc.	KOREACENTER	168, Gasandigital 1-ro, Geumcheon-gu, Seoul	koreacenter.com
75	Koscom Co., Ltd.	KOINS	76, Yeouinaru-ro, Yeongdeungpo-gu, Seoul	www.kosocm.co.kr
76	Tbroad Co., Ltd. Suwon Broadcasting	TBROAD	336, World cup-ro, Paldal-gu, Suwon-si, Gyeonggi-do	www.tbroad.com
77	Highline DotNet Co., Ltd.	HINETWORKS	48, Teheran-ro25-gil, Gangnam-gu, Seoul	www.hilineisp.net
78	Hyundai HCN Co., Ltd.	HCN	19, Banpo-daero, Seocho-gu, Seoul	www.hcn.co.kr
79	Cafe 24 Company	CAFE24	15, Boramae-ro 5-gil, Dongjak-gu, Seoul	www.cafe24.com
80	KDDI KOREA CO., LTD.	TELEHOUSE-SEOUL	14, Cheonggyecheonro Jung-gu, Seoul	www.kddi.co.kr
81	CrossoNNet Co., Ltd.	CROSSONNET	309, Gangnam-daero, Seocho-gu, Seoul	www.crson.net
82	Pine Asset Service Co., Ltd.	PAS	100 Euljiro, Jung-gu, Seoul	-
83	Famers Walker	FW-IDC	219, Gasandigital 1-ro, Geumcheon-gu, Seoul	f-worker.co.kr
84	Piranha Systems	PIRANHA	30, Songdomirae-ro, Yeonsu-gu, Incheon	www.piranha.co.kr
85	HaionNet Co., Ltd.	HAIONNET	38-21, Digital-ro31-gil, Guro-gu, Seoul	www.haion.net
86	KISTI	KREONet	245, Daehak-ro, Yuseong-gu, Daejeon	www.kreonet.re.kr
87	Korea Education Network	KREN	1, Gwanak-ro, Gwanak-gu, Seoul	www.kren.ne.kr
88	Korea Data	KDATA	438, Gyeongsu-daero, Paldal-gu, Suwon-si, Gyeonggi-do	-
89	KICA Co., Ltd.	SIGNGATE	242, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.signgate.com
90	National Information Society Agency (NIA)	KOREN	53, Cheomdan-ro, Dong-gu, Daegu	nia.or.kr
91	Korea Cable TV Gwangju Broadcasting	KCTVNET	146, Geumnam-ro, Buk-gu, Gwangju	www.kctv.co.kr
92	Korea Cable TV Pureun Broadcasting Co., Ltd.	GCS	1611, Dalgubeol-daero, Dalseo-gu, Daegu	www.gcs.co.kr
93	Hostway IDC Co., Ltd.	HOSTWAY	36, Jangmi-ro, Bundang-gu, Seongnam-si, Gyeonggi-do	www.hostway.co.kr

Abbreviations

3D 3 Dimension

5G 5th Generation

6NGIX IPv6 Neutral Generic Internet Exchange

A

ADSL Asymmetric Digital Subscriber Line

AI Artificial Intelligence

ANN Artificial Neural Network

AON Active Optical Network

AP Access Point

API Application Programming Interface

APII Asia Pacific Information Infrastructure

AR Augmented Reality

ARPANET Advanced Research Projects Agency
Network

AS Autonomous System

ATM Asynchronous Transfer Mode

B

BASE Blockchain And Sharing Economy

BcN Broadband convergence Network

BGP Border Gateway Protocol

C

CA Carrier Aggregation

ccTLD country code Top Level Domain

CES Consumer Electronics Show

CIX Commercial Internet Exchange

CNDP Content, Network, Device, Platform

CMS Compact Muon Solenoid

CoMP Coordinated Multipoint

CPE Customer Premises Equipment

CPS Cyber Physical Systems

D

DBMS Database Management System

D2D Device-to-Device

DDoS Distributed Denial of Service

DNS Domain Name System

DNSSEC DNS Security Extensions

DT Data Technology

DTN Data Transfer Node

E

EBPP Electronic Bill Presentation and Payment

Eduroam Education Roaming

ENUM Elephone Number Mapping

eMBB Enhanced Mobile BroadBand

EoC Ethernet of Coax

EoS Ethernet over SONET

F

FIA Future Internet Architecture

FTA Free Trade Agreement

FTTH Fiber To The Home

G

G2B Government to Business

G4B Government for Business

GE Gigabit Ethernet

GEANT Grand European Academic Network

GENI Global Environment for Network Innovations
 GGE Group of Governmental Experts
 GIPO Global Internet Policy Observatory
 GLORIAD Global Ring Network for Advanced
 Applications Development
 GNSS Global Navigation Satellite System
 GPS Global Positioning System
 GPU Graphic Processing Unit
 gTLD generic Top Level Domain

H

HFC Hybrid Fiber Coax
 HMD Head Mounted Display
 HSDPA High Speed Downlink Packet Access
 HTML HyperText Markup Language

I

IaaS Infrastructure as a Service
 IAR Internet Address Resource
 ICO Initial Coin Offering
 ICT Information and Communications Technology
 IoT Internet of Things
 IP Internet Protocol
 i-PIN internet Personal Identification Number
 IPTV Internet Protocol TV
 IPv4 Internet Protocol version 4
 IPv6 Internet Protocol version 6
 IRNC International Research Network Connection
 ISP Internet Service Provider
 IST Internet of Small Things
 ITER International Thermonuclear Experimental
 Reactor
 ITR International Telecommunication Regulations
 IX Internet eXchange

J

JTC1 Joint Technical Committee1

K

KAFE Korean Access Federation
 KIX Korea Internet eXchange
 KOCW Korea Open Course Ware
 KOREN KOREa advanced REsearch Network
 KPI Key Performance Index
 K-PION Korea Patent Information Online Network
 KREONET Korea Research Environment Open
 Network
 KWCAG Korean Web Content Accessibility Guidelines

L

LAA Licensed Assisted Access
 LAN Local Area Network
 LBS Location Based Service
 LBSP Location Based Service Platform
 LHCOPN LHC Optical Private Network
 LHC Large Hadron Collider
 LTE Long Term Evolution
 LPWA Low Power Wide-Area network

M

M2M Machine to Machine
 MCN Multi Channel Network
 MIMO Multi User Multiple Input Multiple Output
 MOOC Massive Open Online Course
 MTC Machine-Type Communications
 mVoIP mobile Voice over Internet Protocol
 MWC Mobile World Congress

N

NCS National Competency Standards
 NFC Near Field Communication
 NFV Network Function Virtualization
 NII National Information Infrastructure
 NOC Network Operations Center
 NR New Radio

O

O2O Online to Offline
 ONOS Open Network Operating System
 OTN Optical Transport Networking
 OTT Over The Top
 OTP One Time Password

P

P2P Peer To Peer
 PaaS Platform as a Service
 PBFT Practical Byzantine Fault Tolerance
 PKI Public Key Infrastructure
 PON Passive Optical Network
 PP Program Provider
 PRP Pacific Research Platform
 PS-LTE Public Safety-LTE
 PSD Payment Services Directive
 PSTN Public Switched Telephone Network

Q

QC Query Count
 QKD Quantum Key Distribution
 QPS Quadruple Play Service

R

RFC Request For Comment

RFID Radio Frequency Identification
 ROADM Reconfigurable Optical Add-Drop
 Multiplexer
 RPG Role Playing Game

S

SaaS Software as a Service
 SDN Software Defined Network
 SGCC Study Group on Cloud Computing
 SINET Science and Information Network
 SLA Service Level Agreement
 SLD Second Level Domain
 SMF Single Mode Fiber
 SMS Short Message Service
 SNMP Simple Network Management Protocol
 SNS Social Network Service
 SON Self Optimizing Networks
 SQL Structured Query Language
 SSN Social Security Number
 SSP Supply Side Platform
 STB Set Top Box
 STEM Science, Technology, Engineering and
 Mathematics
 SWG5 Special Working Group 5

T

TCP/IP Transmission Control
 Protocol/Internet Protocol
 TDM Time Division Multiplexing
 TEIN Trans Eurasia Information Network
 TLD Top Level Domain
 TPS Triple Play Service
 TWDM Time and Wavelength Division
 Multiplexing

U

UGC User Generated Contents
UFB Ultra-Fast Broadband initiative
UHD Ultra High Definition
UoV, User-oriented Visibility
USIM Universal Subscriber Identity Module
USN Ubiquitous Sensor Network
URLLC Ultra-Reliable Low Latency Communication
UTP Unshielded Twisted Pair Cable

V

VDN Virtually Dedicated Network
vDHCP Virtual Dynamic Host Configuration Protocol
vNAC Virtual Network Access Control
VOD Video On Demand

VoIP Voice over Internet Protocol
VR Virtual Reality
VRF Virtual Routing and Forwarding

W

WAN Wide Area Network
WDM Wavelength Division Multiplexing
WLAN Wireless Local Area Network
WPAN Wireless Personal Area Network
WWAN Wireless Wide Area Network
WWW World Wide Web

X

xDSL xDigital Subscriber Line

Organization Abbreviations

3GPP 3rd Generation Partnership Project

5GMF 5G Mobile Communication Promotion Forum

A

AfriNIC Africa Network Information Center

APCERT Asia-Pacific Computer Emergency Response Team

APEC Asia-Pacific Economic Cooperation

APNIC Asia-Pacific Network Information Center

ARIN American Registry for Internet Numbers

ASEM Asia-Europe Meeting

C

CAICT CHINA Academy of Information and Communications Technology

CAMP Cybersecurity Alliance for Mutual Progress

CERN The European Organization for Nuclear Research

CNNIC China Internet Network Information Center

CWG Council Working Group on Internet Public Policy related Issues

E

ERCIM European Research Consortium for Informatics and Mathematics

EC European Commission

ETRI Electronics and Telecommunications Research Institute

ETSI European Telecommunications Standards Institute

F

FBC Federal Blockchain Community

FCC Federal Communications Commission

FIRST Forum of Incident Response and Security Teams

FSA Financial Service Authority

FTC Federal Trade Commission

G

GAC Governmental Advisory Committee
GLIF Global Lambda Integrated Facility
GLORIAD Global Ring Network for Advanced Applications Development
GSA General Services Administration

I

IANA Internet Assigned Numbers Authority
ICANN Internet Corporation for Assigned Names and Numbers
ICG IANA Stewardship Transition Coordination Group
IDC Internet Data Center
IEC International Electrotechnical Commission
IEEE Institute of Electrical and Electronics Engineers
IERC IoT European Research Cluster
IETF Internet Engineering Task Force
IGF Internet Governance Forum
IMD International Institute for Management Development
ISO International Organization for Standardization
ISOC Internet Society
ITU International Telecommunication Union

K

KAIST Korea Advanced Institute of Science and Technology
KISA Korea Internet & Security Agency
KISDI Korea Information Society Development Institute
KISTI Korea Institute of Science and Technology Information
KRNIC Korea National Information Center

L

LACNIC Latin American and Caribbean Internet Address Registry

N

NICT National Institute of Information and Communications Technology

NIR National Internet Registry
NSA National Security Agency
NSF National Science Foundation
NTIA National Telecommunications and Information Administration

O

OASIS Organization for the Advancement of Structured Information Standards
OECD Organization for Economic Cooperation and Development
OIC Open Interconnect Consortium

P

PNWGP Pacific NorthWest GigaPoP

R

RIPE NCC Réseau IP Européen Network Coordination Center
RIR Regional Internet Registry

S

STC Special Technical Committee

T

TTA Telecommunications Technology Association
TPG Trial Promotion Group

W

W3C World Wide Web Consortium
WCIT World Conference on International Telecommunications
WEF World Economic Forum
WSIS World Summit on the Information Society
WTPF World Telecommunication/ICT Policy Forum
WTSA World Telecommunication Standardization Assembly

About the KISA

Korea Internet & Security Agency



Korea Internet & Security Agency, KISA, is the only Internet and Information Security promotion organization in Korea with an aim to improve global competitiveness of Korea's Internet industry as the task of our time.

KISA has set 'Internet promotion' for the future and 'Information Security' for our safety as its primary tasks and is focusing on enhancing the information security capacity of Korea's ICT industry and expanding global cooperative partnership based on the K-ICT Security Development Strategy, so that these two pillars can equally and harmoniously serve as the core competencies of the future Korea.

Based on these efforts, KISA aims to help Korea cement its position once again as a competitive global future Internet powerhouse and help the Korean economy make another leap forward through ICT industry promotion.

KISA will strive to become an innovative and future-oriented organization that contributes to public happiness and national economic development through creating a sound and safe Internet environment.

Protecting the industry from the risk of cyber attacks and preventing privacy infringement

- Operation of the Korea Internet Security Center and KrCERT/CC
 - Monitoring of cyber threats such as DDoS attacks and distribution of malicious codes on a 24/7/365 basis.
 - Operation of the DDoS Response System (DDoS Cyber Shelter Service).
 - Detection of and response to Websites hosting malicious codes.
 - * The KISA has searched the 2.5 million Korean domains to protect local Internet users from infection with malicious codes by accessing web pages that host them.
- Research & Development of Information Security Technology
- Information Security Management System (ISMS) Certification
- Education of elite cyber security experts (Cyber Security Training Center)
- Operation of the Privacy Infringement Report Center and the Illegal Spam Response Center

Promoting the Internet and Information Security Industries

- Evaluation and certification system for information security products (CCRA)
- Support Center for the IPv6
- Korea Domain Name System (KrDNS)
- Korea National Biometric Test Center
- Regional information security bases
- IoT Convergence Security Innovation Center

Expanding International Cooperation and Business Overseas

- Global cooperation network with ITU, OECD, World Bank, FIRST, APCERT, ICANN, APNIC, etc.
- Initiation of a new global cooperation platform named CAMP
 - * CAMP : Cybersecurity Alliance for Mutual Progress
- A total of 45 MoUs signed with foreign counterparts (as of December, 2018)
- Running 5 regional offices around the world

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