2016

NATIONAL
COMMUNICATIONS
COMMISSION

PERFORMANCE REPORT

NCC

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Chairperson's Foreword

Digital convergence has probably become the most noteworthy trend of the technological development of the communications industry. Consequently, in the face of increasingly innovative applications and services, the National Communications Commission (NCC), as nation's communications regulator, has to be at the forefront and be able to see the bigger picture. The dynamics of the incredible digital transformation that we are all witnessing must be fully grasped and understood so as to improve, facilitate and promote the infrastructure of our communications industry.

In response to this digital revolution, our commissioners have applied themselves diligently to their duties. After a number of commission meetings, the "release, connection and innovation" concept was finalized. We have also been actively cooperating with other regulatory authorities to maintain a good relationship with the public and face future challenges together. Although the challenges are significant, our aim is clear: strengthen the communications infrastructure, encourage innovation, lead in digital applications and transformation through cross-sector governance, and continuing to apply the concept of digital equality and digital inclusion to protect the rights of the public.

One of the commission's statutory duties as stipulated in Article 13 of the Fundamental Communications Act is to publish annual performance reports along with specific recommendations for improvements concerning our core duties: the sound development of communications; protection of citizens' rights and consumer interests; promotion of a culturally diverse environment; protection of minoritys' rights and interests; and the provision of universal services.

In accordance with this stipulation, the NCC has compiled communications market data and relevant regulations, which have been outlined in this performance report with the objective of helping the public gain better understanding of our governance, remain transparent, and staying up to date with the rapid development of the communications industry.

In the 'Highlights' section of the report, we summarize some of the progress made in key areas during 2016. In 'Who we are and what we do' the role of the NCC is explained in terms of our objectives, functions, and authority as established by legislation. To provide greater transparency and accountability, the governance structure of the commission has also been included, highlighting our effective and impartial policy-making process.

Section 1 'Communications' provides statistics and market trends, encompassing both telecommunications and broadcasting in Taiwan. The telecommunications section includes revenue trends and ratios of each telecommunications service, as well as broadband service development and the statistics for the types of telecommunications revenue. The broadcasting section consists of the structure of broadcasting business revenue and the highlights of the digitization of cable TV, which has become

fully implemented. The broadcasting market overview includes the number of operators and licenses, digital media advertisement trends, and broadcasting market statistics categorized as terrestrial TV, cable TV, satellite TV and radio broadcasting channels.

Finally, in Section 2 "**An Overview of General Performance,**" we outline some noteworthy results from improved regulatory mechanisms and practices, including Digital Infrastructure Development: the NCC endeavors to continuously improve the development of its 4G services, providing better connection quality; continue to plan spectrum arrangements for the medium and long-term to meet the needs of Internet broadband and Internet of Things (IoT) services. Reforming of the Legal Framework for Communications Convergence: at the end of 2016, the NCC drafted "the Telecommunications Management Act" and "the Digital Communications Act" to provide a conducive environment for digital convergence. Consumer Rights: by collaborating with operators to ensure the transition from 2G to 4G, the NCC supervised operator proposals for a smooth transition plan and liaised with the Consumer Protection Committee to protect the rights of consumers. To promote multi-cultural development, the NCC also released licenses for "Hakka Radio" and "Alian 96.3" in June and August 2016 respectively. Development of Telecoms Industry: the NCC has planned to release IoT number restriction and cooperate with other departments for IoT and 5Gs' future development. Digital Inclusion and Disaster Resistance/Rescue: the NCC has focused on promoting 100% digitization of cable TV in remote areas. Furthermore, the NCC also promoted high-speed broadband in these areas, resulting in the coverage of broadband services in 2016

increased to 96.08%. Cross-Sector Governance: the NCC actively cooperated with other departments, including the Executive Yuan, the Ministry of Transportation and Communications, the Ministry of Culture, the Ministry of Defense and the Intellectual Property Office to improve the environment of communications industry. International Participation: the NCC has attended various international conferences and participated in discussions on a wide range of communications issues with key international organizations and regulators.

Currently, one of the most crucial issues is determining exactly how broadband can most effectively stimulate the digital transformation and the rapid development of digital economy. In the post-convergence period, the NCC has to break through the current concepts and structures that shape the regulatory policies of telecommunications and create a regulatory system in which telecommunications issues will not be restricted by time, place or a single authority. Whereas relevant government authorities, industries, NGOs and research institutes should all participate in the decision-making, the digital eco-system as a whole should be able to operate independently.

The NCC is committed to maintaining an open attitude towards regulation and to creating an innovative and welcoming digital environment. We are astutely aware of the importance of staying abreast of the global trends, encouraging diverse development, and boosting Taiwan networks globally. As we move into an exciting future together, the NCC will continue to lead and map the best path forward for Taiwan.

Highlights

Digital Infrastructure Development

The NCC endeavors to continuously improve the development of digital infrastructure as it is vital for the digital economy. By the end of 2016, the number of 4G subscribers had increased to 18.07 million. With such a large number of 4G subscribers and considering the needs of both internet broadband and IoT (Internet of Things) services, the NCC aims to release a spectrum licenses appropriately.
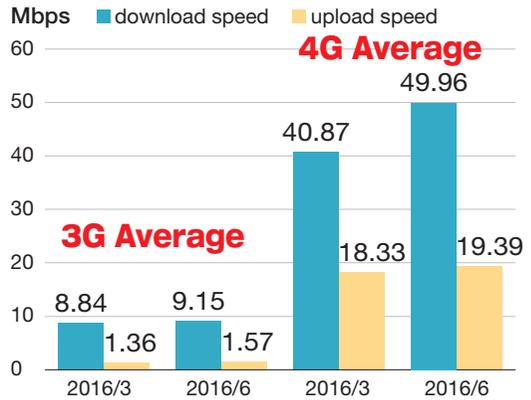
Figure 2: Mobile Broadband Speeds
The average 4G download speed was 49.96Mbps; 5.7 times faster than the average 3G download speed (9.15Mbps).
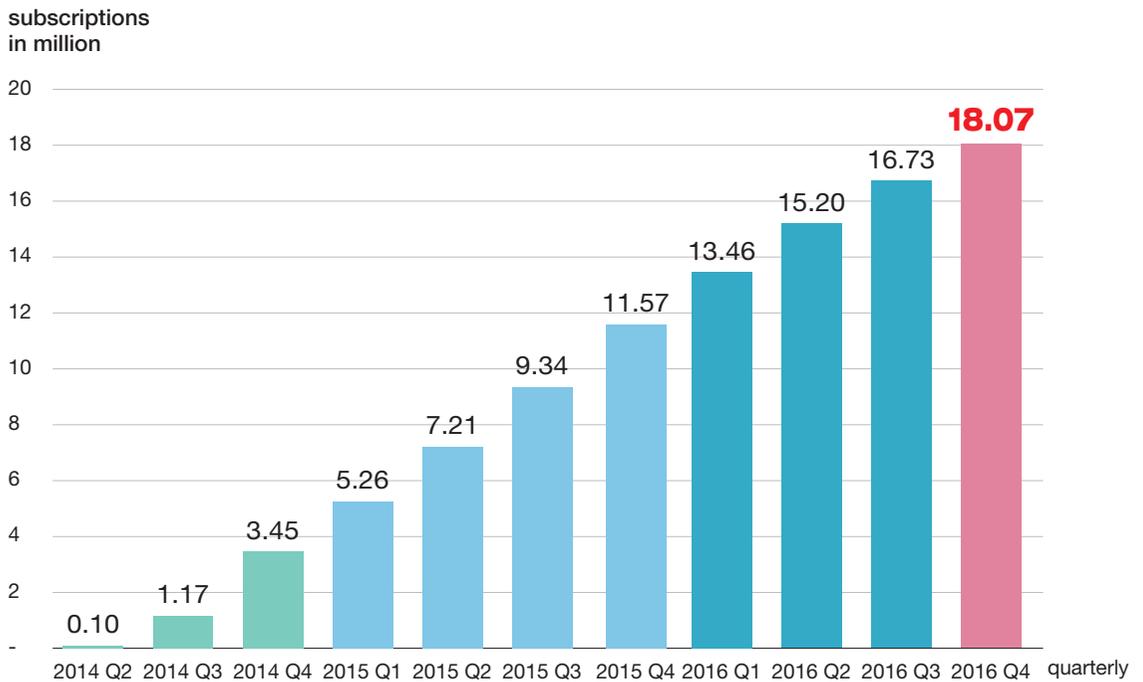
Figure 1: 4G Subscribers
4G subscribers reached 18.07 million, accounting for 62.45% of the total telecommunications subscribers.
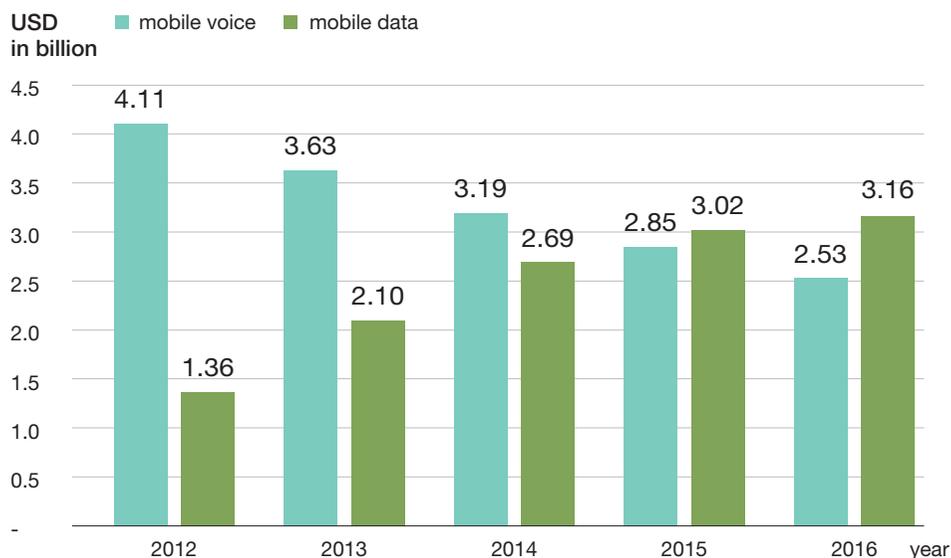
Figure 3: Mobile Voice and Mobile Data Revenue
Mobile data revenue grew steadily to US$3.16 billion, almost US$636 million higher than mobile voice revenue.

Reforming of Legal Framework for Digital Convergence

In response to the rapid transformation of digital technology, governments have to amend relevant regulations. As a result, internet governance has become a key issue the priority as well as establishing innovative regulations to facilitate the development of digital convergence environment and telecommunications industry. Consequently, the NCC has drafted "Telecommunications Management Act" and "Digital Communications Act" for the purpose of transforming from regulations categorized by business to regulation categorized by behavior, infusing the spirit of internet governance into the digital economy, strengthening internet security and promoting digital economy infrastructure. These two regulations passed through discussions
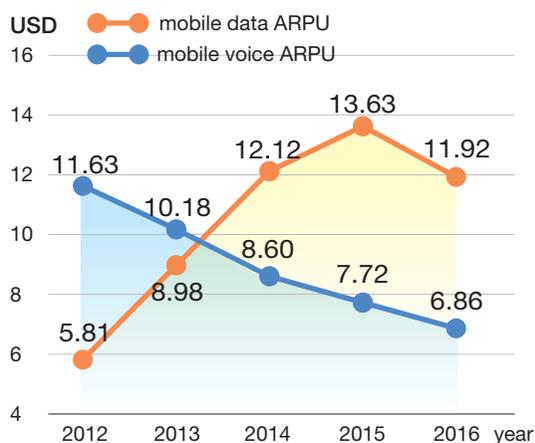
Figure 4: Mobile Voice and Mobile Data ARPU (each Dec.)
ARPU of mobile data decreased for the first time in 2016.

at the Executive Yuan on 15 Nov. have been passed on to the Legislative Yuan for review, ultimately assimilating into the digital economy and complying with relevant future regulatory structures.

Consumer Rights

Protecting consumer rights is one of the principal duties of the NCC. Relevant guidelines have been promoted and the NCC has cooperated with operators to ensure a smooth transition from 2G to 4G and iWin complaint process. The NCC also released licenses for "Hakka Radio" and "Alian 96.3", protecting the rights of minorities and ensuring a more culturally diverse environment.

Development of the Telecommunications Industry

To facilitate IoT development, the NCC has planned to release IoT number restriction and coordinate with other departments for its future development. The Internet of Things (IoT) encompasses a wide range of applications for industry. These innovative technologies have to be equipped with complete radio frequency policy and system, which includes both unlicensed IoT equipment (Bluetooth, LoRa, SIGFOX, Wi-Fi, and ZigBee) and licensed IoT (NB-IoT, LTE-M, and 5G). Therefore, the NCC has cooperated closely with the MOCT and the Ministry of Defense to release extra spectrum for IoT and also for non-telecom purposes. On 22 February 2016, the NCC announced an amendment to the "Regulations Governing Telecommunications Numbers," allowing type I operators to apply for a 13 digit E.163 number for IoT usage. Besides, telecommunications

operators have to pass through a bidding process in order to acquire licensed IoT spectrum. With view to the future era of 5G, we must ensure we are also prepared in advance so as to connect with the world.

Digital Inclusion and Disaster Resistance/ Rescue

With the rapid development of communications, more and more people are able to participate in a variety of convergence services; however, some are in remote areas. Therefore, the NCC established a framework of digital inclusion in order to facilitate the distribution of communications industry. Over the past years, the NCC has actively promoted 100% digitization of cable TV, high speed broadband in remote areas, etc. Regarding the aspect of disaster resistance/rescue, the NCC continues to establish a greater number of disaster resistant communications platforms and cooperates with 4G operators to build a Cell Broadcast Center which allows the public to receive warnings when disaster strikes.
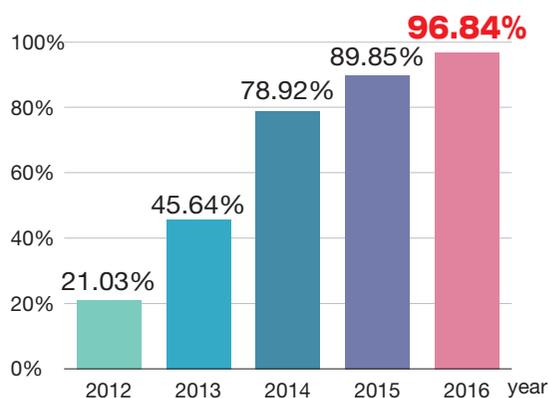
Figure 5: Digital Cable TV Coverage
Digital cable TV penetration increased from 89.85% in 2015 to 96.84% in 2016
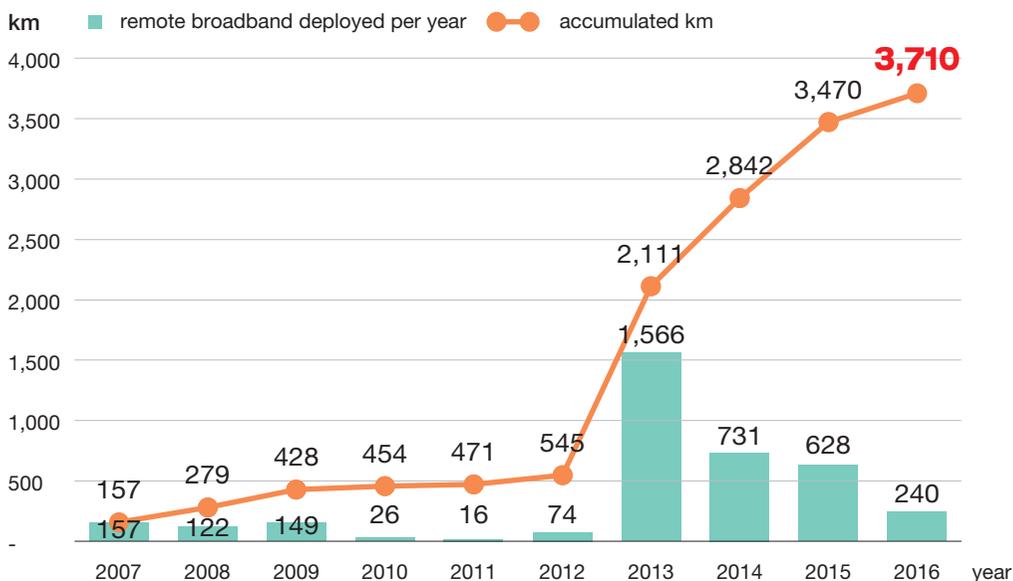
Figure 6: Broadband in Rural Townships/Accumulated Fiber-optical Cable
Coverage of broadband services up to 12Mbps increased to 96.08%, and the amount of deployed fiber optic cable reached 3,710 kilometers in 2016.
Note: Numbers may vary slightly due to different rounding algorithms.
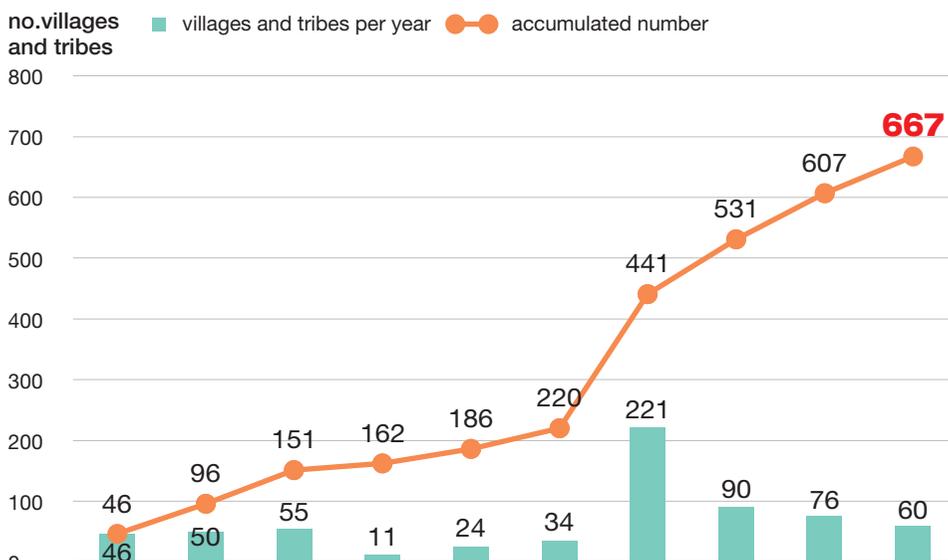
Figure 7: Broadband in Rural Townships, Villages and Neighborhoods
Coverage of broadband services up to 12Mbps increased to 96.08%, reaching 304 rural villages and 363 indigenous neighborhoods.

Cross-Sector Governance

The NCC has actively cooperated with the Ministry of Culture, the Executive Yuan and other relevant authorities with view to stimulating the development of media content. With the objective of the efficient use of spectrum and the development of telecommunications industry, the NCC also coordinated closely with the MOCT and the Ministry of Defense to release extra spectrum for IoT and also for non-telecom purposes. In addition, the NCC worked with the Intellectual Property Office regarding the copyright issues of internet video services, adopting a multi-stakeholder model and establishing a platform for communications for future legal references.

International Participation

With the objective of keeping abreast of the latest global communications trends, the NCC attended international conferences and participated in discussions on a wide range of communications issues with key international organizations and regulators, such as:

- **Participating in International Conferences.**

- 2016 International Regulators Forum and Annual Conference held by the IIC.

- 2017 Ministerial Program held by the GSMA.

- GAC meeting organized by the ICANN.

- APEC TEL55 meeting and WTO TiSA conference.

- **Sharing Experiences on Regulatory Systems**

- Visited by Economic Section Chief Jeffery Horwitz of the AIT and ECCT CEO Freddie Hoeglund.

- Visited by CASBAA's Chief Policy Officer John Medeiros.

- Visited Commissioner Michael O'Rielly of the FCC and MSIP in Korea.

Who We Are and What We Do

Functions and Responsibilities

Legal Duties

Prior to the establishment of the NCC, responsibility for overseeing telecommunications and broadcasting was separated between the Government Information Office and Directorate General of Telecommunications. However, due to the telecommunications and broadcasting sectors steadily converging, the Executive Yuan determined that an independent regulatory agency would be a more appropriate way to govern the communications sector with a broader and more accurate strategic insight, as well as a more open and efficient administration.

Proceeding the promulgation of the Fundamental Communications Act (Jan. 2004) and the National Communications Commission Organization Act (Nov. 2005), the National Communications Commission was officially established on 22 Feb. 2006, which marked a major turning point in the management of communications in Taiwan.

According to Article 1 of the National Communications Commission Organization Act, the purpose of the NCC is to ensure people's freedom of speech, end the state control of the media in order to protect its neutrality, enhance broadcasting standards, ensure fair and effective competition, protect the interests of consumers, respect the rights of minorities and disadvantaged, promote cultural diversity, and enhance national competiveness.

Regulatory Functions and Principles

According to Article 3 of the same act, the NCC is charged with the purview of the following duties:

- Formulate communications supervisory policy, and formulate, draft, amend, abolish and implement communications laws and regulations;
- Manage the supervision of operations of communications enterprises and approve and issue licenses;
- Review and inspect communications systems and equipment;
- Formulate technical standards of communications engineering;
- Regulate the rating system on the content of communications transmission and other legally designated matters;
- Manage communications resources;
- Maintain the order of competitive practices in communications;
- Standardize and manage communications transmission security technology;
- Preside over major disputes between communications operators and consumer protection matters;
- Spearhead international affairs and international exchange and cooperation;
- Manage communications enterprise-related funds;
- Monitor, investigate, and establish rulings on communications operations;
- Penalize and discipline violations of communications-related laws and regulations;
- Oversee other communications-related matters.

Governance Structure

Commission Meeting

The Commission Meeting is the highest policy-making body of the NCC, in which the formation, affirmation, and publication of the minutes of the Commission Meeting are conducted according to the NCC Organization Act and Meeting Rules.

According to Article 9 of the NCC Organization Act, the following items shall be authorized by the commission at the Commission Meeting before proceeding:

- Formulation and review of regulatory policy and systems;
- Review and evaluation of critical communications plans and proposals;
- Review and distribution of communications resources;
- Review of formulation, drafting, amendment, and abolition of communications-related laws and regulations;
- Review of public announcements of the communications industry, concession cases and ruling cases involving the acquisition, modification, or cessation of communications enterprise management rights;
- Review of the organizational chart, meeting rules, and administrative procedures;
- Review of the detailed chart of responsibility among internal units;
- Review and approval of the budget and final accounts;
- Other pertinent matters to be determined and ruled by the commissioners as required by law;
- Declaration of the recruitment and dismissal of unit heads other than that of the Human Resources Office, Accounting Office and Civil Service Ethics Office shall be conducted by the chairperson.

Commission Meetings are held on a weekly basis and additional meetings may be held when deemed necessary. The Commission Meeting is chaired by the NCC chairperson; if the chairperson is unable to attend the meeting, the vice chairperson acts on the chairperson's behalf.

All final resolutions shall be voted on and shall be valid at the consent of over half of the total seats on the Commission Meeting. Commissioners may present concurring opinions or dissenting opinions on particular resolutions, which are announced alongside the minutes of the meeting.

Table 1: Commissioners

Chairperson	Vice Chairperson	Commissioner
Chan, Ting-I (2016/08/01~)	Po-Tsong Wong (2016/08/01~)	Jason C.S. Ho (2016/08/01~) Chen-Ling Hung (2016/08/01~) Wen-Chung Guo (2016/08/01~) Yi-Ning Chen (2014/08/01~) Yaw-Shyang Chen (2016/08/01~)

Departments and Offices

Commission Meetings
(7 Commissioners)
Chairperson
Vice Chairperson

Chief Secretary

Councilors
Technical Superintendents

Department of Planning

Department of Network Infra-
structure

Department of Platforms and
Businesses

Department of Frequency
and Resources

Department of Broadcasting
and Content

Department of Legal Affairs

Department of Central
Regional Affairs

Department of Northern
Regional Affairs

Department of Southern
Regional Affairs

Secretariat

Personnel Office

Civil Service
Ethics Service

Budget, Accounting and
Statistics Office

Figure 8: NCC Organization Chart
Source: NCC

Accountability

Ethics Code

Commissioners are to perform their duties independently and stringently abide by the conflict of interest recusal principle; they may not participate in the activities of political parties or serve in government agencies or state enterprise positions as consultants; they are also forbidden to serve in a communications enterprise or organization in a full or part-time capacity.

At the 503rd Commission Meeting, the commissioners' self-regulation codes of practice were amended. This amendment introduced two main points: firstly, commissioners shall consult and listen to the opinions of the public and relevant organizations during the policy making process. However, all final decisions are to be voted on during Commission Meetings. Secondly, if a commissioner considers that the case to be reviewed involves a conflict of interests, he/she shall report it at the Commission Meeting to determine whether recusal is necessary.

Internal Audit

In order to improve administration efficiency, the NCC established an internal audit panel, in which the vice chairperson serves as the chair and top senior civil servants of each department serve as auditors. The panel routinely carries out cross departmental audits in an objective manner and provides suggestions for improvements to achieve more effective operations so as to reach administrative goals.

An inspection report is released within two months after inspection and its approval by the vice chairperson. It includes both merits and deficiencies and provides suggestions for improvements. After receiving the report, the inspected department is required to begin eliminating deficiencies. Every six months, a regular follow up and progress report of corrections is made until the deficiencies have been completely removed.

Risk Management

To enhance the oversight of risk, the NCC set up risk management frameworks consistent with governance visions. Risk assessment is carefully developed through the process of risk identification, risk analysis and risk evaluation. Risk standards and risk levels are also established; risk assessment and monitoring for any change in the organization's risk profile are continually undertaken.

Stakeholder Engagement

As particular policy initiatives may affect potential stakeholders, prior to passing resolutions, the NCC uses various methods to engage with the public and relevant industry stakeholders, by means of public consultations, holding public meetings, or publishing relevant information online. Reasons behind possible policy options are explained in a way that ensures even the more complicated issues be understood fairly easily by those who are interested.

Section 1
Communications

Telecommunications

13 billion USD

Total Revenue of Telecom USD 11 billion

Mobile

6.6 billion **59%**

Fixed-Line

4.6 billion **41%**

2012   2013   2014   2015   2016   year
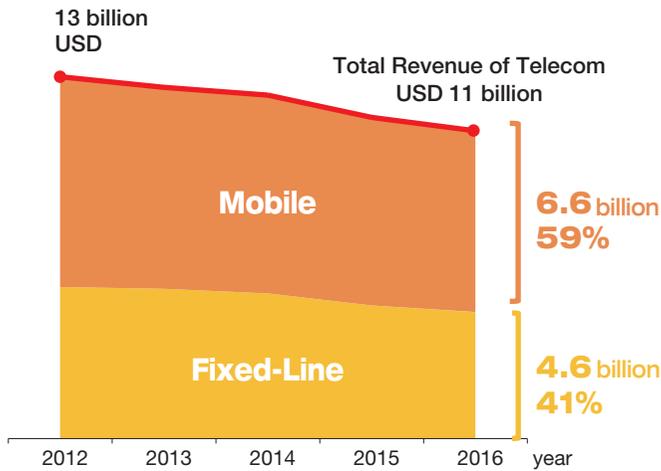
Figure 1.1: Fixed-line and Mobile Service Revenue
Source: NCC

4G +6.5million   **18.07** million subscribers

3G -6.3million   **10.47** million subscribers

2G -0.6million   **0.4** million subscribers
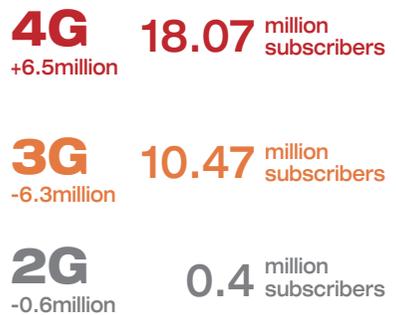
Figure 1.2: Number of Mobile Service Users (2016)
Source: NCC

4G 40.8%

3G 17.6%

2G 0.4%

MOD **1.2%**

International Network **4.2%**

Long-Distance Network **1.2%**

Local Network **9.7%**

Cable Leased-Circuit **9.5%**

Fixed-Line **15.3%**
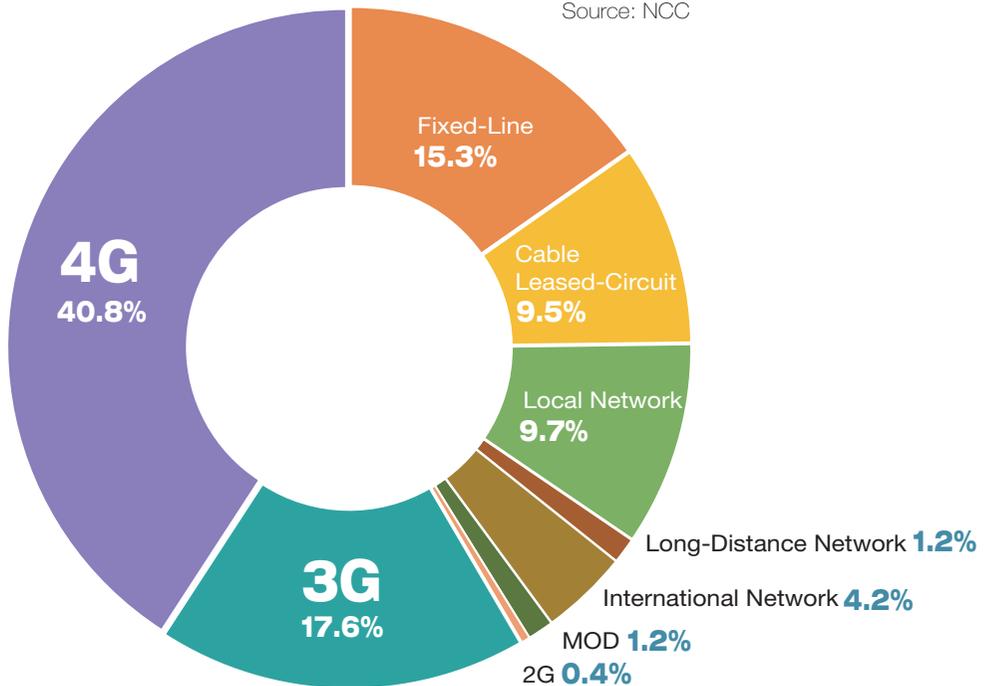
Figure 1.3: Telecom Sectors by Revenue (2016)
Source: NCC
Note: Numbers may vary slightly due to different rounding algorithms.

Overview

Table 1.1: Type I[1] Telecom Services and Operators in Taiwan (2016)

Type of service		No. Licenses	No. Operators
Mobile	2G (Mobile Telephone Business)	3	3
	3G (Third Generation Mobile Communications Business)	5	5
	4G (Mobile Broadband Business)	7	5
Satellite	Fixed-Satellite Service	4	4
Fixed-line	Fixed-line network	4	4
	Local network	12	7
	International network	0	0
	Domestic local and long-distance land cable leased-circuit	66	66
	International submarine cable leased- circuit	4	4

Source: NCC

Table 1.2: Type II Telecom Services and Operators in Taiwan (2016)

Type of Service	No. Licenses	No. Operators
Simple Voice Resale Service	58	409
Non-E.164 Internet Telephony Service	51	
E.164 Internet Telephony Service	4	
Wholesale Resale Service	131	
Intra-corporation Network Communications Service	39	
Bandwidth Resale Service	37	
Audio Conference Service	14	
Internet Access Service	225	
Store and Forward Network	37	
Store and Retrieve Network	63	
Video Conference Service	16	
Packet Switching Service	21	
Premium Rate Service	25	
Mobile Resale Service	4	
Mobile Resale and Value-added Service	10	

Source: NCC

1. Telecommunications enterprises in Taiwan are categorized into two types: Type I and Type II. Type I operators refer to those that install telecommunications line facilities and equipment in order to provide telecommunications services; the other operators are Type II operators.

USD
in billion

13.10   **12.72**   **12.44**   **11.64**   **11.14**

2.25 — Others
1.36 — Mobile Data
2.91 — Fixed-Line Data
4.11 — Mobile Voice
2.47 — Fixed-Line Voice

2012   2013   2014   2015   2016

1 billion, **9%**

3.1 billion, **28%**

2.8 billion, **25%**

2.5 billion, **23%**

1.7 billion, **15%**
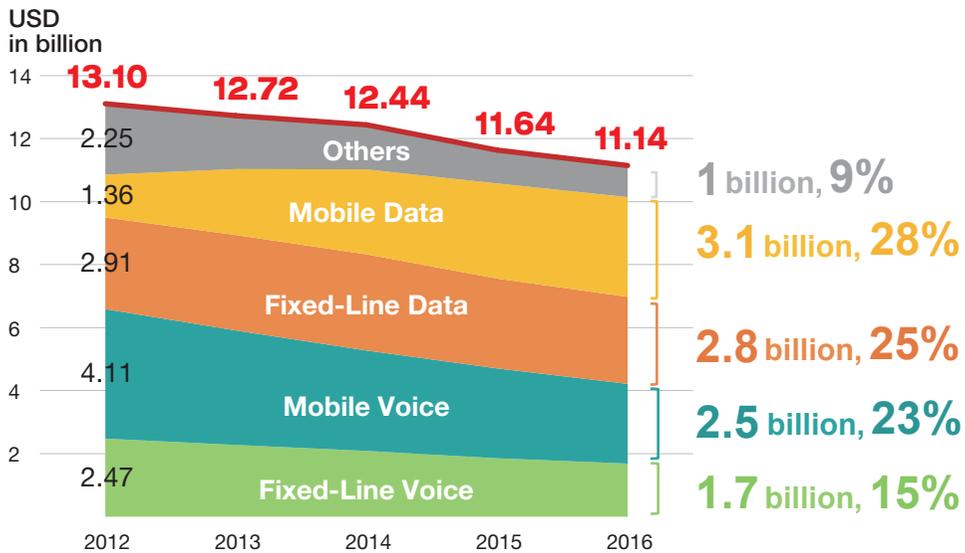
Figure 1.4: Total Revenue of Telecom
Source: NCC
Note 1: 4G services included from 2014.
Note 2: According to NCC, data revenue does not include SMS.

Telecom Operators and Revenue

Mobile broadband has become the primary means of communication. Revenue from landline, mobile voice and fixed-line services have therefore decreased annually, with only mobile data revenue increasing (Figure 1.4).

Mobile and Fixed-line Users and Penetration Rates

The increase of fixed-line users and its penetration rate reflected the development of mobile broadband. Mobile broadband subscribers increased significantly to 21.8 million in 2016 as the stability and convenience of 4G services and operators assisted users upgrading from 2G services to 4G services (Figure 1.5).

subscriptions in million

mobile   mobile broadband
landline   fixed-line

35

30   29.6   29.8   30.1   29.4   28.9

25   21.8

20   17.8   18.1   19.0   19.1

15   12.4   12.2   12.1   11.9   11.7

10   6.4   7.0   7.4   7.6   5.8

5

0
   2012   2013   2014   2015   2016   year
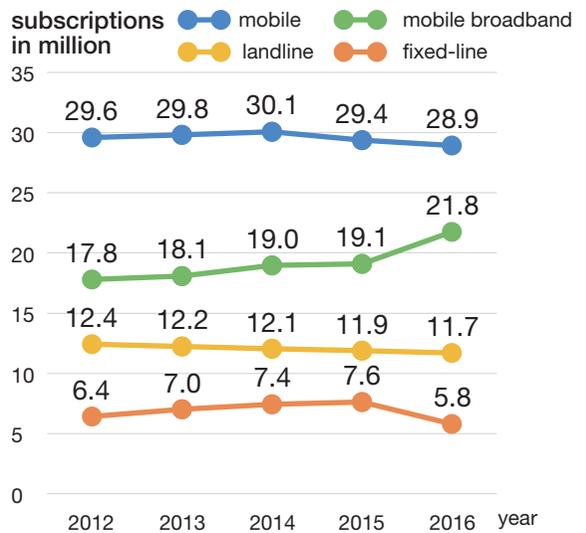
Figure 1.5: Telecommunications Subscriptions
Source: NCC

Fixed-line subscriptions declined from 7.6 million in 2015 to 5.8 million in 2016, and the penetration rate decreased to 25% (Figure 1.6). The main reason for the drop in fixed-line subscriptions was operators reporting the numbers that included free PWLAN subscription, whereas the NCC was asking for the numbers without. The operators recalculated paid PWLAN subscriptions, which resulted in the decline from 1.96 million in 2015 to just 106,000 in 2016.

Fixed-line Networks

Fixed-line Revenue

As the popularity of mobile network increases, fixed-line revenue has decreased annually, falling to US$4.59 million in 2016, accounting for 40% of the total telecommunications revenue. Mobile voice and internet services have reduced the importance of landline services, including fixed-line internet (Figure 1.7).
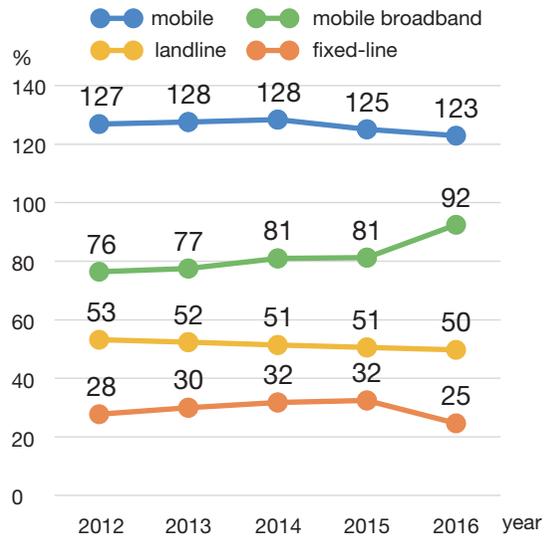

Figure 1.6: Penetration Rate
Source: NCC
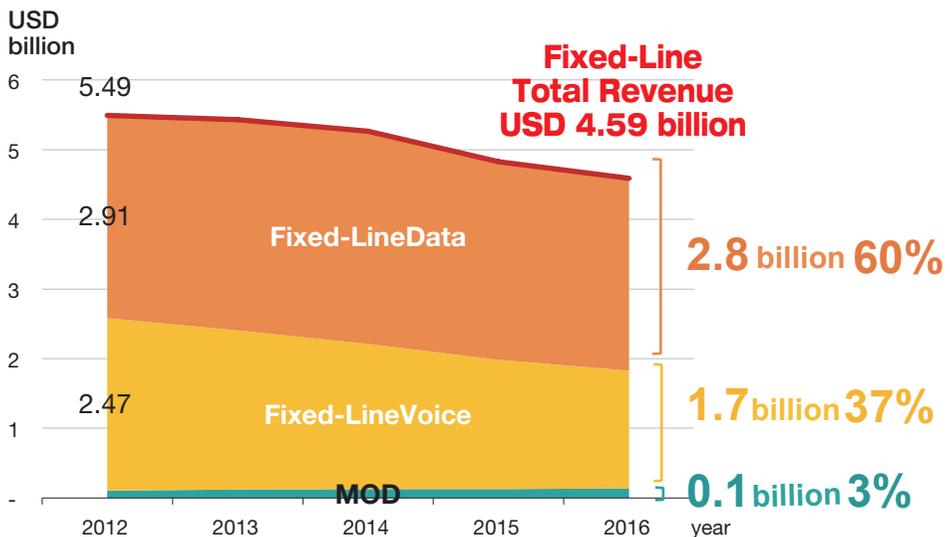
Figure 1.7: Fixed-line Revenue
Source: NCC
Note 1: Fixed-line data revenue includes the internet revenue, add on and cable lease services.
Note 2: Add-on service numbers may vary slightly due to different rounding algorithms.

Multimedia Content Platform

"Multimedia content platform service" refers to a service that provides subscribers with accessibility to multimedia content offered by content service providers through an interactive media platform installed by a local network business operator. Currently, there is only one service provider: Chunghwa Telecom. There were 1.33 million subscribers to this service in 2016 (Figure 1.8). Its revenue was US$136 million, just 3% of the total fixed-line revenue.

Mobile Networks

Mobile Telecommunications Revenue

Mobile telecommunications revenue declined from USD 7.61 in 2012 to USD6.56 in 2016, accounting for 60% of the total telecommunications revenue (Figure 1.9). With the impact of instant

subscribers
in million
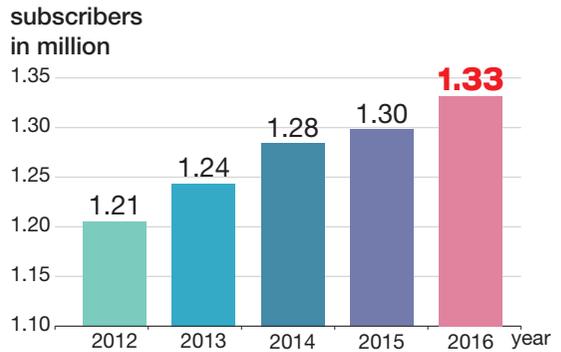
Figure 1.8: Multimedia Content Platform Subscribers
Source: NCC

USD
in billion
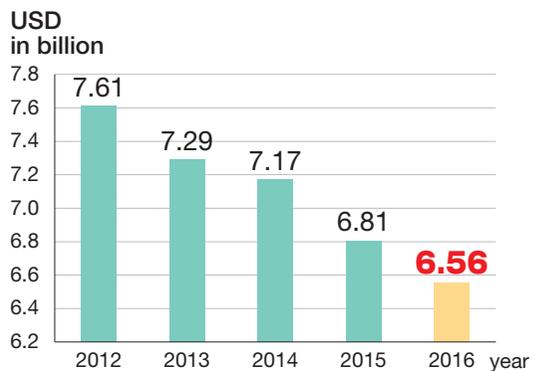
Figure 1.9: Mobile Telecommunications Revenue
Source: NCC
Note 1: 4G services included from 2014.
Note 2: PHS services ended March 2015; WBA services ended November 2016.
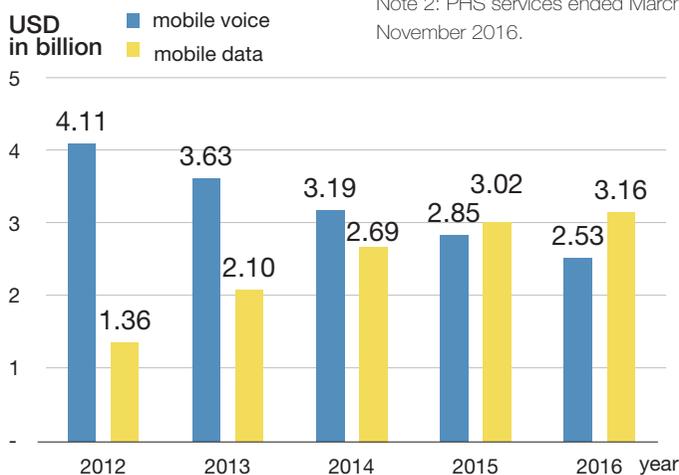
Figure 1.10: Mobile Voice and Mobile Data Revenue
Source: NCC
Note 1: 4G services included from 2014.
Note 2: Amended by NCC, data revenue does not include SMS revenue.
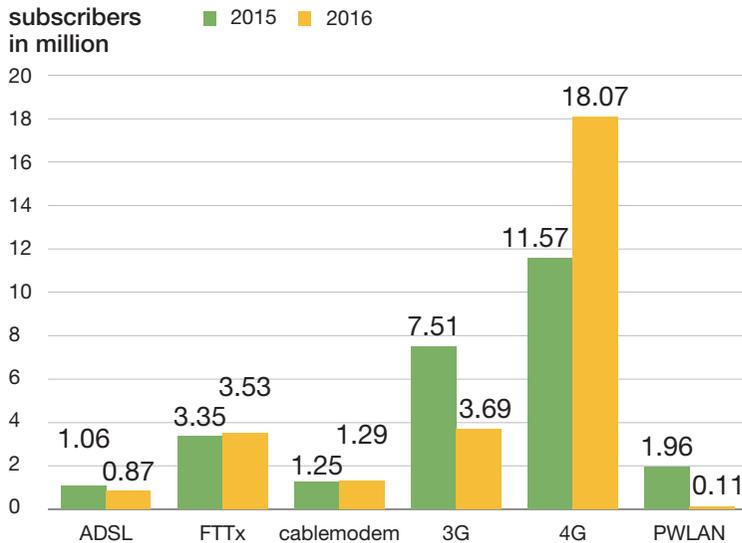
Figure 1.11: Number of Subscribers of Broadband Services (2015-2016)
Source: NCC
Note: The reason for the drop of PWLAN subscribers was that operators included the free PWLAN subscriptions whereas the NCC was asking for the numbers without. The operators recalculated the paid PWLAN subscription in 2015.

messaging applications, mobile voice revenue continued to decrease to US$2.53 billion in 2016, whereas mobile data revenue grew steadily, reaching US$3.16 billion (Figure 1.10).

Broadband Services

Subscribers of main broadband services (including ADSL, FTTx, cable modem, leased line, 3G, 4G and PWLAN) was 27.55 million in 2016. From 2015 to 2016, 4G subscribers increased dramatically to 18.07 million, while 3G subscribers dropped to 3.69 million (Figure 1.11). Subscribers to the four main fixed-line operators offering 100Mbps reached 1.17 million in 2016 (Figure 1.12).
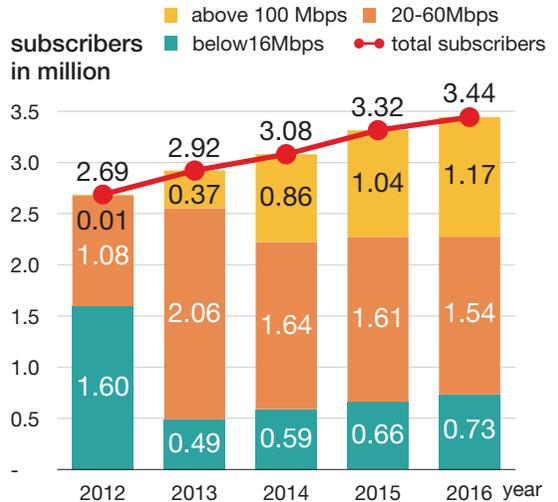
Figure 1.12: Number of Fiber-Optic Subscribers from the Four Fixed-Line Internet Operators
Source: NCC
Note: The main fixed-line operators are Chunghwa Telecom, Taiwan Fixed Network, Asia Pacific Telecom and New Century InfoComm Tech.

Broadcasting

3.2 billion USD

**Total Broadcasting Revenue
3 billion USD**

SatelliteTV

1.49 billion **50%**

CableTV

1.19 billion **40%**

TVBroadcasting

0.19 billion **7%**

RadioBroadcasting

0.1 billion **3%**

2012   2013   2014   2015   2016
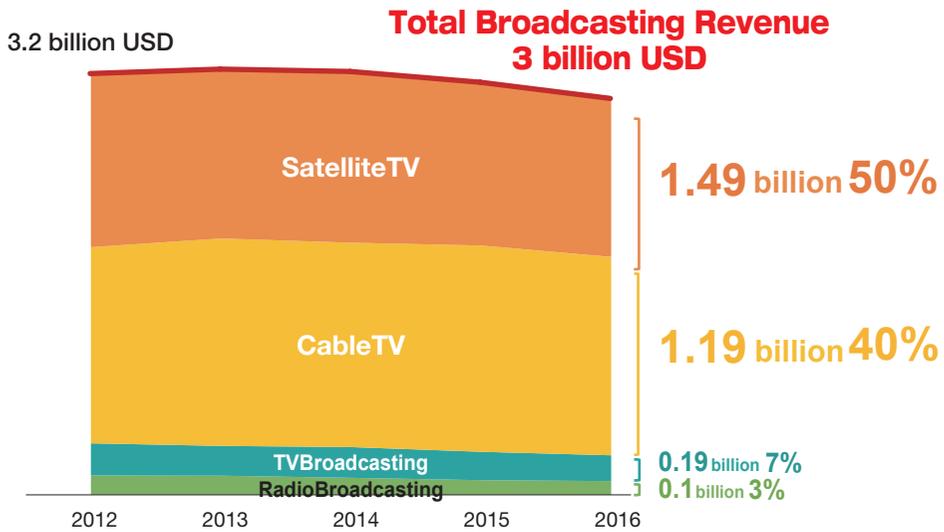
Figure 1.13: Broadcasting Revenue
Source: NCC

Advertising **2%**

Advertising **58%**

Others **42%**

Others **23%**

Basic Channels **76%**

TV Broadcasting

Cable TV

Others **5%**

Advertising **95%**

Advertising **40%**

Others **60%**

Radio Broadcasting

Satellite TV
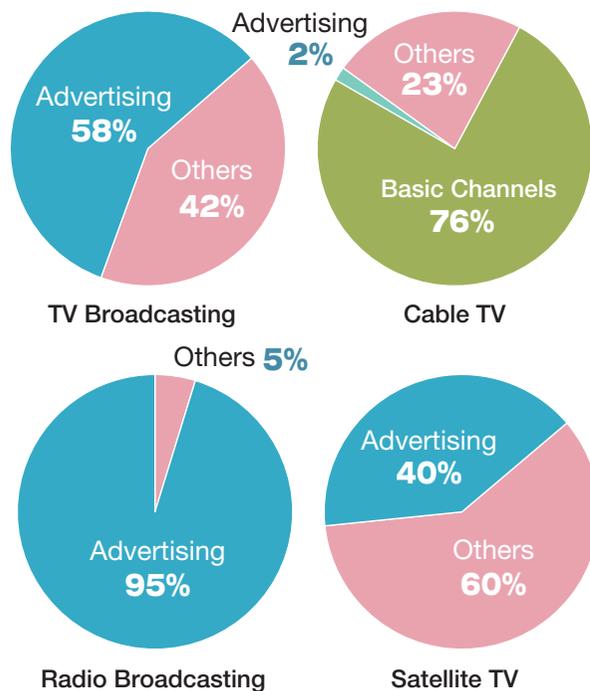
Figure 1.14: Revenue Percentage of Each Broadcasting Service
Source: NCC
Note: The numbers may vary slightly due to different rounding algorithms.

Digital Cable TV
96.84%

4.99 million

5.21 million

1.2 million

1.3 million

2012

2016

Subscribers of Cable TV

**4** X Subscribers of Multimedia Content
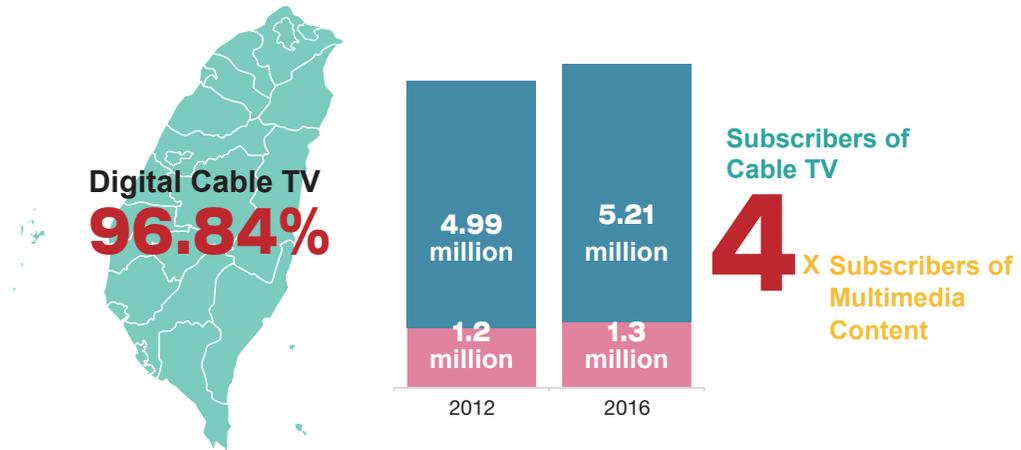
Figure 1.15: Percentage of Digitization of Cable TV
Source: NCC

Figure 1.16: Subscribers of Cable TV and Multimedia Content Platform
Source: NCC

Overview

Table 1.3: Broadcasting TV Licenses

Categorization	Type	Licenses	Licenses (Total)	No. Operators/ No. Channels	Total No. Operators/ No. Channels
Terrestrial TV	Terrestrial TV Stations	6	181	5	175
	Broadcasting Stations	175		170	
Cable TV	System Operators	65	65	65	65
Satellite Broadcasting	Live Satellite Broadcasting Operators	6	320	6	130
	Satellite Broadcasting Channel Providers	304		118	
	Other Broadcasting Channel Providers	10		6	
Total			566		370

Source: NCC

Terrestrial TV

Terrestrial TV revenue fell to US$194 million, the lowest point in the last five years. Terrestrial TV advertisement revenue decreased to US$113 million, but still accounted 58% of terrestrial TV revenue (Figure 1.17).

Legend:
- other revenue
- revenue of terrestrial TV advertisement

USD in million

year	other revenue	revenue of terrestrial TV advertisement	Total
2012	105	137	241
2013	80	143	223
2014	94	136	230
2015	93	120	213
2016	82	113	194
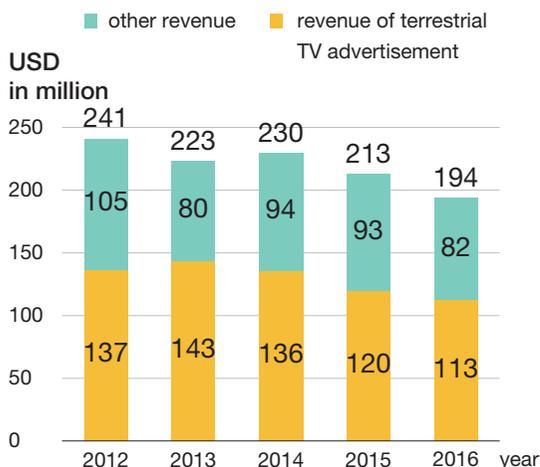
Figure 1.17: Revenue of Terrestrial TV and Advertising
Source: NCC
Note: The numbers may vary slightly due to different rounding algorithms.

Cable TV

After cable TV revenue reached a peak of US$1.28 billion in 2014, it fell to US$1.19 billion in 2016. The primary income comes from basic channel subscription, accounting for 76% of total cable TV revenue (Figure 1.18).

Legend:
- other revenue
- revenue of basic channels
- revenue of terrestrial TV advertisement

USD in billion

year	other revenue	revenue of terrestrial TV advertisement	revenue of basic channels	Total
2012	0.23	0.02	1.04	1.30
2013	0.26	0.02	0.99	1.27
2014	0.28	0.02	0.98	1.28
2015	0.27	0.02	0.94	1.22
2016	0.27	0.02	0.90	1.19
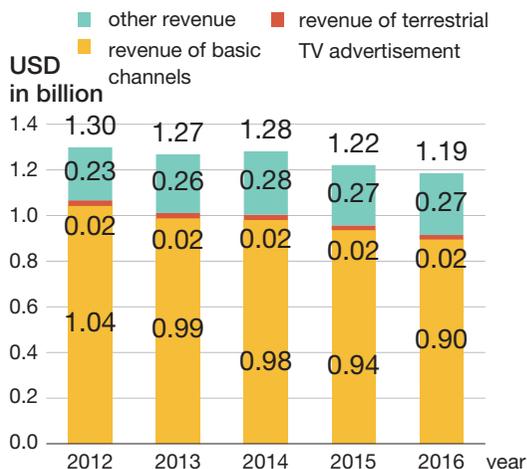
Figure 1.18: Cable TV Revenue
Source: NCC
Note 1: Other revenue includes paid channels, paid programs, installation and channel lease fee.
Note 2: The numbers may vary slightly due to different rounding algorithms.

Radio

Radio broadcasting revenue has decreased year-on-year to US$102 million in 2016, the lowest point in the past five years (Figure 1.19). Between 2014 and 2016, 95% of radio broadcasting revenue came from advertising.

Legend:
- other revenue
- revenue of radio broadcasting advertisement

USD in million

year	other revenue	revenue of radio broadcasting advertisement	Total
2012	48	98	146
2013	23	121	144
2014	6	122	128
2015	0.04	110	110
2016	5	97	102
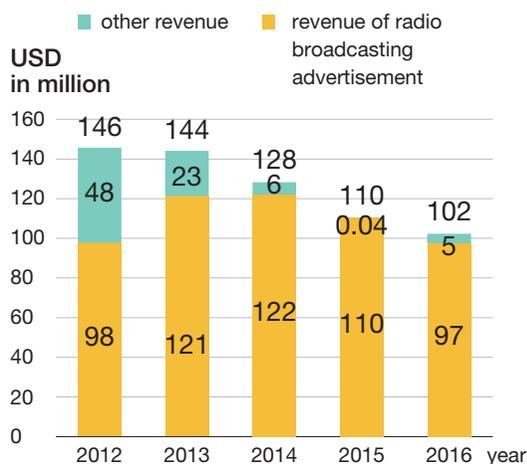
Figure 1.19: Radio Broadcasting Revenue
Source: NCC

Satellite Broadcasting

From 2012 to 2015, satellite broadcasting revenue has grown steadily. In 2013, it peaked at US$1.56 billion. However, advertising revenue in 2015 from satellite broadcasting fell to the lowest point in the last four years. Satellite broadcast revenue in 2016 declined slightly to US$1.49 billion, although advertising revenue from satellite broadcasting increased to US$0.6 billion (Figure 1.20).

Percentage of Domestic and Foreign Channels

The Satellite Broadcasting Act was amended on 6 January 2016, and added Other Type Channel and Program Supply Business. To year-end 2016, there was a total of 124 suppliers, 314 channels that successfully acquired a license for satellite program broadcasting (includes Other Type Channel and Program), comprising of 190 domestic channels, 124 foreign channels (Figure 1.21).
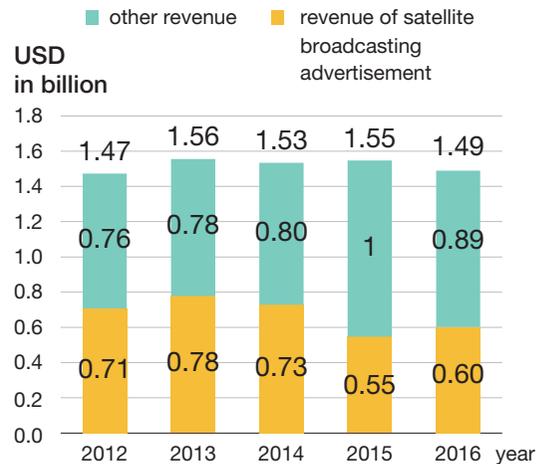

Figure 1.20: Satellite Broadcasting Revenue
Source: NCC
Note: The numbers may vary slightly due to different rounding algorithms.
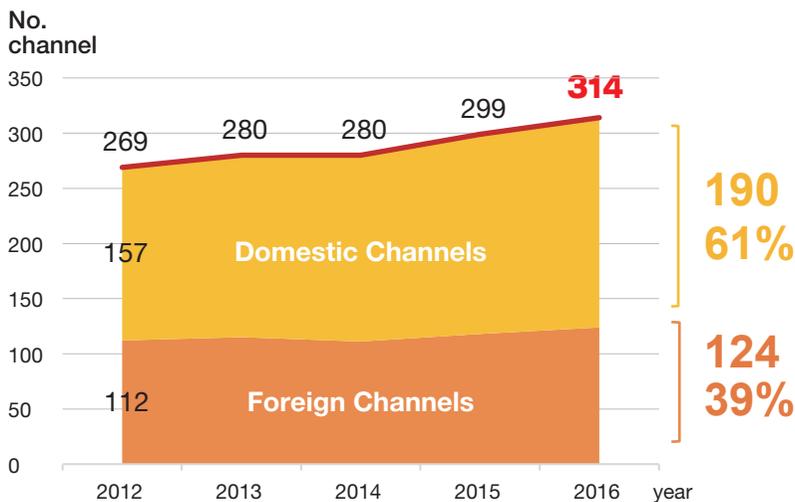

Figure 1.21: Percentage of Domestic and Foreign Channels (2016)
Source: NCC

Communications Resources

Spectrum

Mobile Telecommunications

With the advancement of mobile technology, 2G, PHS, 3G, WiMAX (WBA) and 4G licenses have been awarded accordingly. The spectrum for mobile use can be seen in Table 1.4.

Table 1.4 Spectrum Usage

Spectrum(MHz)	Usage
703-748, 758-803	4G service, license expires 2030
825-835, 870-880	3G service, license expires 2018
885-915, 930-960	910-915, 955-960 for 2G service, license expires June 2017 885-915, 930-960 for 4G service, license expires 2030
1710-1785, 1805-1880	1721.3-1732.5,1753.7-1755,1816.3-1827.5,1848.7-1850 for 2G service, license expires June 2017 1710-1785, 1805-1880 for 4G service, license expires 2030
1885-1915 1975-1985	1905-1915 was for 1900MHz Digital Low-Power Wireless Telephone Business, from March 2015 this license ended, undergoing further planning
1920-1980, 2110-2170	1920-1975, 2110-2165 for 3G service, license expires 2018 1920-1980, 2110-2170 for 4G service, license expires 2033
2500-2690	for 4G service, license expires 2033

Source: NCC
Note: The spectrum usage in this table was compiled up to 30 Jun. 2017.

Internet Protocol Address and Domain Name Registry

Address and Domain Name Registry TWNIC

The Taiwan Network Information Center (TWNIC) is responsible for country code Top Level Domain registration. To align with the global development of the internet development and meet the needs of domain name market, TWNIC released four types of registration services, in English, Chinese, general Chinese and general English (Table 1.5).

Table 1.5 Type of Domain and Number of Registrations

Type		Type	Process registration facility	Released date	The number of accumulated registration
English Characters	Specific	.gov.tw	National Development Council	87/12/01	2,272
		.edu.tw	Ministry of Education	78/07/31	513
		.mil.tw	Ministry of Defense	--	--
		.com.tw	Accredited Registrars	86/05/01	222,926
		.org.tw			11,428
		.net.tw			1,533
		.idv.tw		89/05/01	132,952
		.game.tw		91/10/01	210
		.club.tw		92/01/01	275
		.ebiz.tw		92/03/01	70
	Generic	.ascii.tw		94/11/01	93,797
Chinese Characters	Specific	商業.tw	Accredited Registrars	89/05/01	183,880
		組織.tw			7,486
		網路.tw			1,150
	Generic	中文.tw		90/02/16	38,045
		中文.臺灣		99/10/24	38,045
Total					734,582

Source: Data collected from TWNIC, summarized by NCC.

IPv4 and IPV6

To year-end 2016, a total of 33,700,096 (131,641 x 2^8) addresses had been issued (Figure 1.22), which was the 15th highest globally, and 5th in the Asia Pacific area. For IPv6, a total of 2,344x 2^{96} addresses were issued (Figure 1.23), the 18th highest globally and 5th in the Asia Pacific area.

$x2^8$

Total number of IPv4
131,641 x 2^8
until 2016
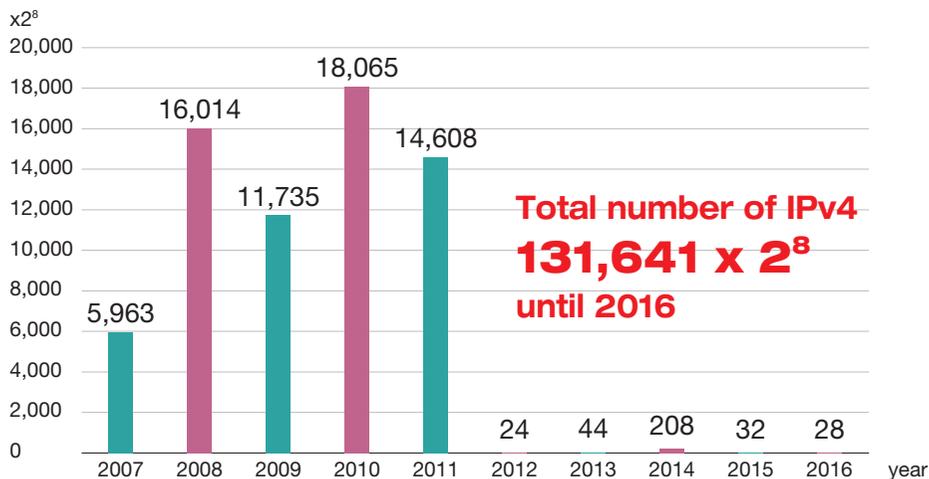
Figure 1.22: IPv4
Source: Data collected from TWNIC, summarized by the NCC.
Note: From 2016, the NCC IPv4 addresses refer to the number of addresses issued by TWNIC.

$x2^{96}$

Total number of IPv6
**2,344 x 2^{96}**
until 2016
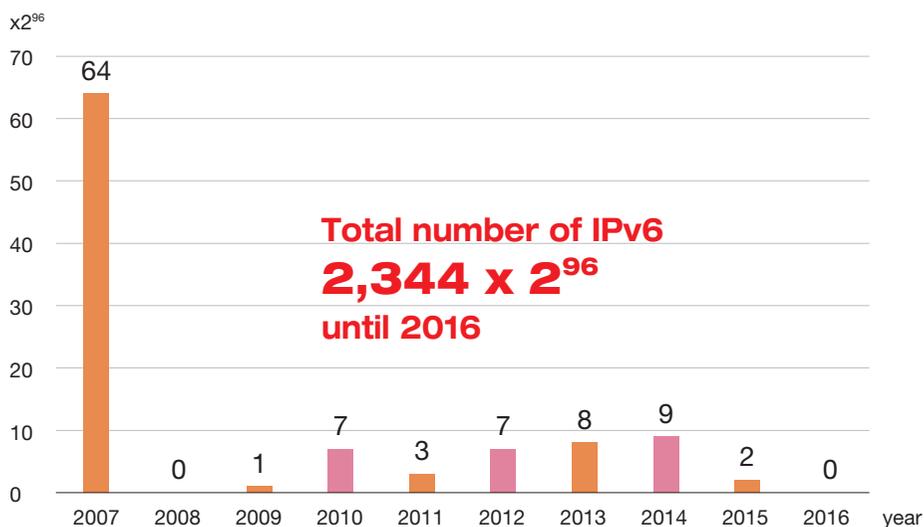
Figure 1.23: IPv6
Source: Data collected from TWNIC, summarized by the NCC.
Note: From 2016, the NCC IPv6 addresses refer to the number of addresses issued by TWNIC.
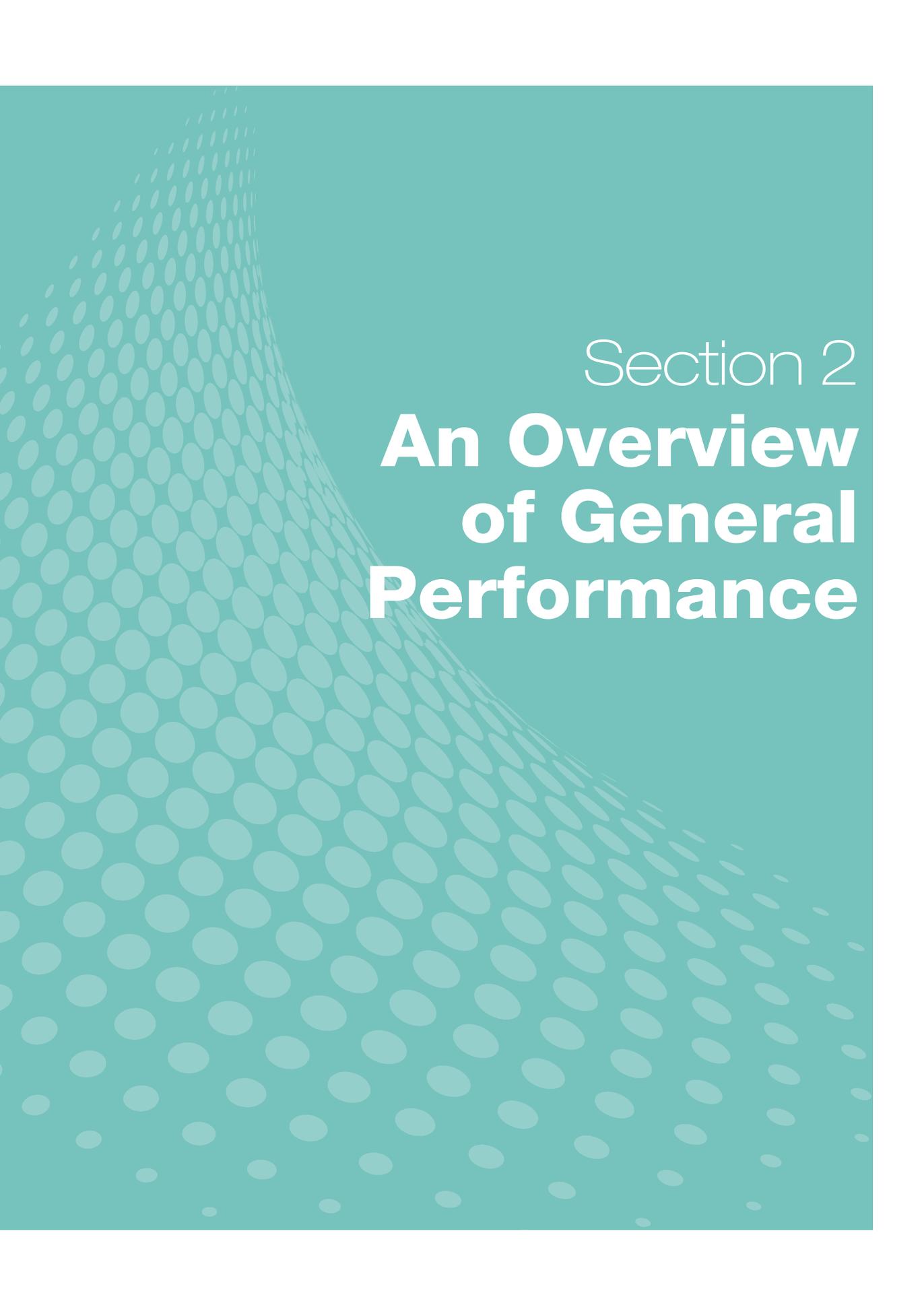
Section 2
An Overview of General Performance

Digital Infrastructure Development

4G Adoption Accelerated

After the launch of 4G services in May 2014, 4G subscriptions surged, reaching to more than 18 million (Figure 2.1) in 2016 and accounting for 62.45% of total mobile subscribers, an increase of 23.04% compared with 2015.

The NCC commissioned the Telecom Technology Center (TTC) to conduct two phase measurements of mobile broadband speeds covering 7,851 villages and tribes from January to June, 2016. The results show that up until June 2016, the average download /upload speed for 3G was 9.15/1.57Mbps while 4G was 49.96/19.39Mbps (Figure 2.2).

More Spectrum for 4G

Spectrum Planning

In accordance with the final decision of the World Radio Communication Conference in 2015, the NCC will release extra spectrum for 4G services and evaluate the schedule for spectrum release. The Executive Yuan announced an amendment to the service, schedule and number of operators of Type I Telecommunications Businesses, adding the release of 2100MHz and 1800MHz spectrums for future mobile broadband demand.

subscriptions in million
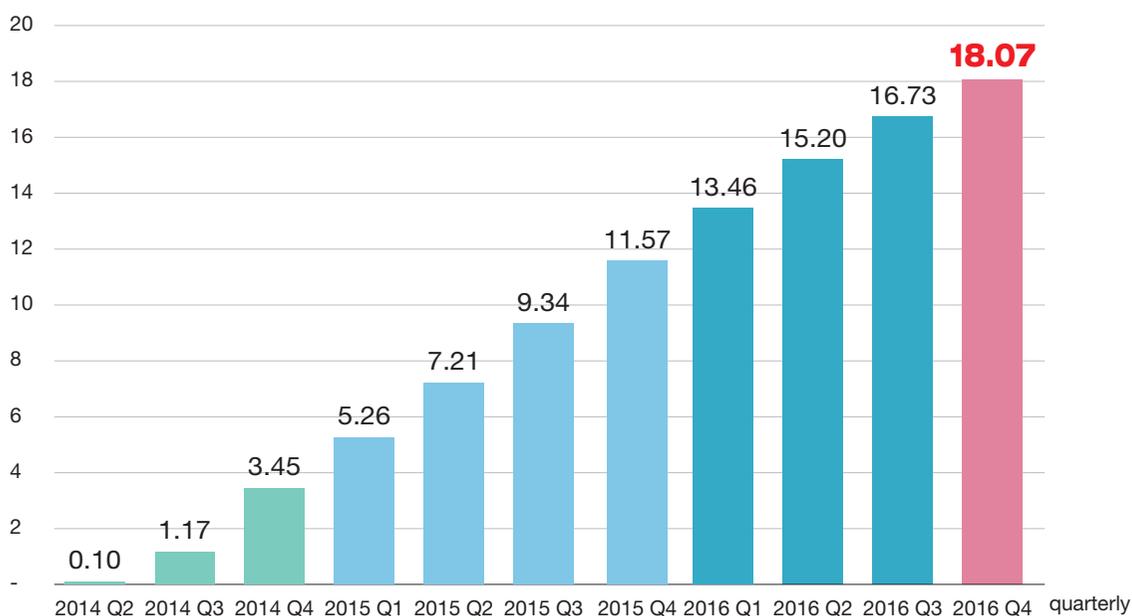
Figure 2.1: 4G Subscribers
Source: NCC

download speed upload speed

Mbps
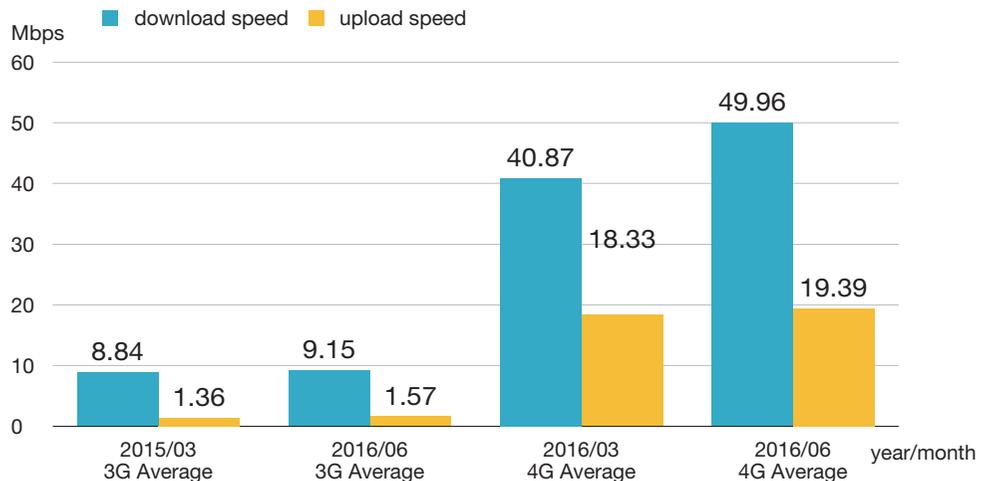
Figure 2.2: Mobile Broadband Consumer-end Speed Results
Source: TCC

Reforming of Legal Framework for Digital Convergence

Amendment of Convergence Bill

Digital Convergence Communications Bill

In accordance with the Fundamentals of Communications Act, the NCC, on 28 Dec. 2016, proposed a lenient regulatory system with respect to consumer rights and digital infrastructure, as well as to indicate the responsibilities of service providers. The proposed draft of the Digital Communications Act lays solid foundations for future internet regulations.

Figure 2.3: Public Meeting for the Draft of Digital Communications Act (24 Jan. 2017)
Source: NCC

This draft prescribes a regulatory system of the internet, a plan for the development of digital communications, and allows for participation of the public so as to facilitate communications between all stakeholders.

Telecommunications Management Act

The development of telecommunications plays a critical role in both the society and economy. The NCC actively has amended regulations, referring to opinions from relevant foreign regulators. To loosen the regulation of telecommunications, the proposals by the EU in 2002 and 2009 divided the structure into three parts: telecommunications infrastructure, operation and content application services. The draft Telecommunications Management Act was proposed on 28 Dec. 2016 with the goal of creating a fair, liberal and innovative competitive environment.

Figure 2.4: Public Meeting for the Draft of Telecommunications Management Act (24 Jan. 2017)
Source: NCC

The amended draft removes conventional thinking, allowing a more flexible approach. The draft is divided into three sections: (1) lower the operation pre-requisite, (2) state clearly the obligations of operation and (3) main service operators adopt a different approach.

Consumer Rights

Smooth Transaction of 2G to 4G

2G services were ended on 30 June 2017. The NCC assisted users with the smooth transfer from 2G to 4G and protected the rights of consumers. Up to 30 June 2017, there was a total drop of 83.7% users.
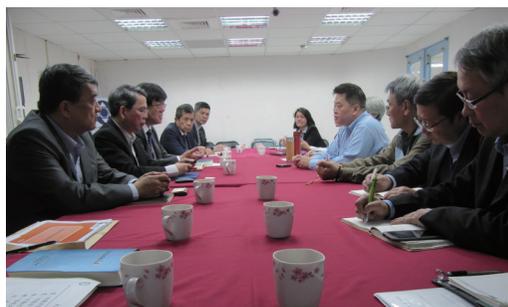
Figure 2.5: Meeting with Consumers' Foundation (30 Mar. 2017)
Source: NCC

Figure 2.6: Opening Ceremony for the Hakka Radio
Source: NCC

Protect the Rights of Minorities and Create a Multicultural Environment

Licenses for Radio Stations

To ensure cultural diversity, in August 2016, the NCC agreed to set up the Hakka Radio and Alian 96.3 radio stations. Later, in June and August 2017 respectively, both stations received their licenses and were on air (Figure 2.6, Figure 2.7).

Figure 2.7: Opening Ceremony for Alian 96.3
Source: NCC

Improve Internet Access for Disabled People

In order to protect the legal rights and interests of people with disabilities, in November 2016, the NCC proposed the "Accessible Communications Environment for Disable People Action Plan" to the Executive Yuan; the plan hinges on the principle of ensuring disabled people receive respect, equal opportunities and a user-friendly environment.

Improve Complaint System

As the regulatory authority of our communications industry, the NCC understands our responsibilities and influence on the public. During the fourth quarter of the Content Complaints Reports a total of 3,276 complaints were received, 3,244 of which were relating to TV content (99%) and 32 broadcasting complaints (1%). Relevant conferences and public meetings are held in order to improve content quality and the rights of the viewers.

iWin Complaints Process

With the ubiquity of the internet and connected devices, children and youths are easily exposed to inappropriate contents. Therefore, the NCC along with other ministries launched the Institute of Watching Internet Network (iWIN), an Internet content self-regulation platform (Figure 2.8). In 2016, iWIN received 16,427 complaints, 15,339 of which violated youth regulations.

Figure 2.8: iWIN Conference
Source: NCC

Development of the Telecommunications Industry

Telecommunications Numbers and Spectrum Resources for IoT and 5G

The Internet of Things (IoT) has a wide range of applications for industry, such as wholesale, education, finance, travel and the transportation industries. These innovative technologies have to be equipped with complete radio frequency policy and system, includes unlicensed IoT equipment (Bluetooth, LoRa, SIGFOX, Wi-Fi, and ZigBee) and licensed IoT (NB-IoT, LTE-M, and 5G). Therefore, the NCC cooperated closely with the MOCT and Ministry of Defense to release extra spectrum for IoT and also for non-telecom purposes, such as the spectrum for the smart meter infrastructure released by Taipower Company in February 2017. On 22 February 2016, the NCC announced an amendment to the "Regulations Governing Telecommunications Numbers," allowing type I operators to apply for a 13 digit E.163 number for IoT usage. Moreover, telecommunications operators have to pass a bidding process in order to acquire licensed IoT spectrum. For the purpose and need of future 5G era, we need to prepare in advance to connect with the world.

Digital Inclusion and Disaster Resistance/Rescue

Cable TV Digitization in Remote Areas

With the cable TV digitization being fully implemented, the number of set-top subscribers increased from 1.05 million in 2012 to 4.99 million in 2016. Furthermore, due to the success of promoting digitization on offshore islands, Hualien and Taitung, the penetration rate of digital cable TV reached 96.84% (Figure 2.9).
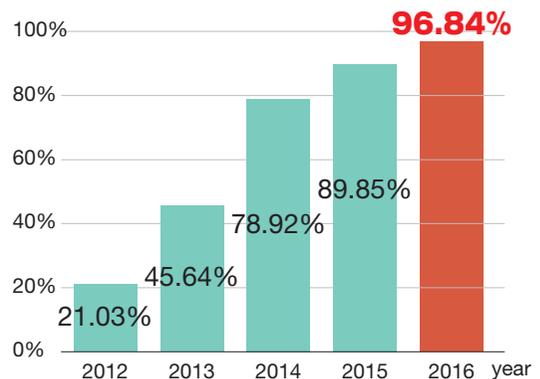

Figure 2.9: Digital Cable TV Penetration Rate
Source: NCC

Accelerating High Speed Broadband, Shortening the Digital Divide

There have been promising achievements in promoting broadband infrastructure, especially in the "Broadband for All Villages" and "Broadband for All Tribes" projects, which continue to supervise telecom operators concerning particular villages and tribes, to ensure that broadband speeds are above 12Mbps. The penetration rate in remote areas increased from 96.02% (98.98% among aboriginal villages/tribes) to 96.08% (98.98% among aboriginal villages/tribes); a total of 3,500 kilometers of fiber-optic cable has been deployed, reaching 304 villages and 363 tribes at a cost of US$16.89 million (Highlight, Figures 6-7).

4G Cell Broadcast Center

The NCC cooperated with 4G operators to build the Cell Broadcast Center, which was completed in January 2016 (Figure 2.10) and is an important piece of infrastructure in case of emergencies. The system sends out an SMS and warning messages to the public when disaster strikes.
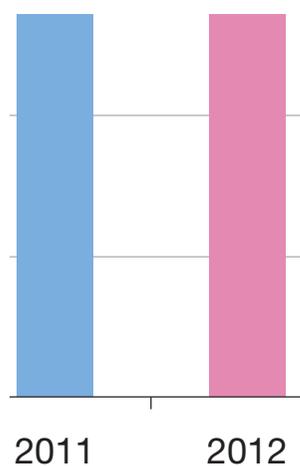

Figure 2.10 Disaster Warning Message
Source: NCC

Figure 2.11: Minister Cheng from the Ministry of Culture Attends a Cross-sector Meeting Regarding Media Content Industry
Source: NCC

Cross-Sector Governance

As the regulator of communications industry, the NCC is eagerly carrying out cross-sector governance and cooperating with the Ministry of Culture, the Executive Yuan and other relevant authorities with view to developing media content and structures and ultimately improving the quality of media content and self-produced programming (Figure 2.11).

The protection of copyright is fundamental to the development of Over-The-Top (OTT) telecommunications, directly affecting the competitiveness of local, foreign operators and our digital economy. Therefore, on 16 February 2017, the NCC invited the Intellectual Property Office to share experiences concerning copyright issues relating to internet audio/video services (Figure 2.12).

Figure 2.12: Meeting with Intellectual Property Office Concerning Copyright Issues
Source: NCC

Figure 2.13: Chairperson Ting-I Chan (third right) and Commissioner Chen (second left) at the 2016 International Regulators Forum and Annual Conference (Oct. 2016)
Source: NCC

International Participation

Participating in International Conferences

With the objective of keeping abreast of the latest global communications trends, the NCC attended international conferences and participated in discussions on a wide range of communications issues with key international organizations and regulators throughout 2016 and 2017. In October 2016, Chairperson Chan and Commissioner Chen attended the 2016 International Regulators Forum and Annual Conference held by the International Institute of Communications (Figure 2.13). From 27 February to 2 March 2016, Chairperson Chan led the NCC officials to Barcelona, Spain, to attend the 2017 Ministerial Program held by the GSMA (Figure 2.14).

Figure 2.14: Chairperson Ting-I Chan (right) Heads the NCC Delegation to Barcelona, Spain to Attend the 2017 Ministerial Program Held by GSMA, (27 Feb. - 2 Mar. 2016)
Source: NCC

In March 2017, the NCC led officials from the MOTC and Ministry of Foreign Affairs in participating at the Governmental Advisory Committee meeting organized by the Internet Corporation for Assigned Names and Numbers in Copenhagen, Denmark. Moreover, between 31 March and 9 April 2016, the NCC attended the Asia-Pacific Economic Cooperation TEL55 meeting. The NCC also actively engaged in the WTO Trade in Services Agreement conference in Mexico, expecting to increase industrial competitiveness.

Sharing Experiences on Regulatory Systems

Apart from participating at various international organizations and conferences throughout 2016, NCC remains committed to expanding its international relations, so as to align itself with other regulations and regimes. For instance, Economic

Figure 2.15: The American Institute in Taiwan Economic Section Chief Jeffery Horwitz Visits Chairperson Ting-I Chan (1 Sep. 2016)
Source: NCC

Section Chief of the American Institute in Taiwan, Cable and Satellite Broadcast Association of Asia's Chief Policy Officer and European Chamber Of Commerce Taiwan CEO visit Chairperson Ting-I Chan (Figure 2.15, 2.16); Commissioner Yi-Ning Chen visits FCC and Commissioner Wen-Chung Guo visits MSIP to share regulatory experiences.

Figure 2.16: CEO Freddie Höeglund (sixth left) of the European Chamber Of Commerce Taiwan Visits Chairperson Ting-I Chan (fifth left) (Nov. 2 2016)
Source: NCC

National Communications Commission