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Upgrading the ICT Regulatory Framework: Toward Accelerated and Inclusive Digital Connectivity

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List of Acronyms

3G	third generation
4G	fourth generation
5G	fifth generation
AI	artificial intelligence
ASEAN	Association of Southeast Asian Nations
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BellTel	Bell Telecommunication Philippines Inc.
BSP	*Bangko Sentral ng Pilipinas*
CAR	Cordillera Administrative Region
COVID-19	coronavirus disease 2019
CPCN	Certificate of Public Convenience and Necessity
DICT	Department of Information and Communications Technology
DOST-ASTI	Department of Science and Technology-Advanced Science and Technology Institute
DTI	Department of Trade and Industry
G1	Generation 1
G2	Generation 2
G3	Generation 3
G4	Generation 4
G5	Generation 5
GB	gigabyte
GDP	gross domestic product
GNI	gross national income
GPS	global positioning system
GRDP	gross regional domestic product
ICT	information and communications technology
IoT	Internet of Things
ISPs	internet service providers
ITU	International Telecommunication Union
KII	key informant interview

LGUs	local government units
LTE/WiMAX	Long Term Evolution/Worldwide Interoperability for Microwave Access
Mbps	megabits per second
NCR	National Capital Region
NEDA	National Economic and Development Authority
NGN	next-generation network
NICTHS	National ICT Household Survey
NTC	National Telecommunications Commission
PCC	Philippine Competition Commission
PLC	planar lightwave circuit
PTEs	public telecommunications entities
QoS	quality of service
R&D	research and development
RA	Republic Act
UN	United Nations
VAS	value-added service
VR	virtual reality

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Abstract

Across different metrics, the Philippines continues to demonstrate subpar performance in information and communications technology (ICT) compared to other members of the Association of Southeast Asian Nations and countries at the same level of development. The quality of the country's ICT regulatory environment, composed of regulatory authority, regulatory mandate, regulatory regime, and competition model, is significantly below what is considered international best practice, consequently impeding the use of various technological solutions available to bridge the gap in digital inequality. Although significant policy changes have recently been introduced, more reforms are needed to achieve inclusive and accelerated digital connectivity. Priorities include reforming the licensing regime, formulating a spectrum policy and plan, and reinventing the National Telecommunications Commission to ensure regulatory independence.

Introduction

Background

Only 17.7 percent of households in the Philippines have internet access at home. This is significantly below the global average of 61.5 percent and 52.6 percent for developing countries in 2019 (ITU 2021a). Internet access is also highly uneven across the Philippines. The National Capital Region has the highest proportion of connected households, with 33.2 percent, while the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) has the lowest, with only 4.5 percent (DICT 2019). The lack and need for broadband access became more apparent during the coronavirus disease 2019 (COVID-19) pandemic due to lockdowns and restrictions on in-person interactions, congestion of health facilities, and implementation of alternative learning delivery modalities, among others. The "*Bayanihan* to Heal as One" Act (Republic Act [RA] 11649) included in its provisions the need to accelerate the building of internet infrastructure to address digital connectivity as part of economic recovery. Digitalization is one of the major tools to increase resilience to socioeconomic shocks brought on by the pandemic. It encourages digital transformation of business (e.g., adoption of digital payments, e-commerce). It is also a major factor for a more efficient and coordinated whole-of-government approach to delivering better government services. However, the digital gap could exacerbate existing socioeconomic inequalities (Reyes et al. 2022).

Why has the Philippines performed poorly in achieving widespread internet connectivity? What are the key policy constraints and regulatory gaps? The previous Philippine Development Plan 2017–2022 identified a number of reforms needed to improve information and communications technology (ICT) infrastructure and ensure accessible, affordable, and reliable services. These include strengthening the roles of the Department of Information and Communications Technology (DICT) and the National Telecommunications Commission (NTC) to promote competition and innovation in light of technological advancements, changing market landscape, and convergence of technologies (NEDA 2017). The legislative agenda also covered pursuing a nondiscriminatory open access policy for all telecommunications market segments and fostering effective competition by publishing prices for the broadband and telecom market.

The National Broadband Plan (DICT 2017), which lays out the necessary interventions to provide affordable and fast internet to connect the country digitally, likewise highlighted the need to amend or revise relevant policies and regulations to accelerate investment in the broadband market. These include the Commonwealth Act 146 (Public Service Act), RA 7925 (Public Telecommunications Policy Act), RA 3846 (Radio Control Law), and Article XII, Section 11, of the 1987 Constitution. Additionally, the Plan identified proposed legislation relevant to the ICT sector, including the Open Access and Peering Policy to address interconnection issues and facilitate faster internet connection, and the establishment of a Universal Access and Service Fund to benefit the countryside.

A couple of the reforms proposed in the national and sectoral plans were adopted recently. In 2021, access to satellite services was liberalized, enabling direct access to all satellite systems to provide internet services. In 2022, the Public Service Act amendment was passed, removing foreign equity limitations in key sectors. The amendment of the Public Service Act (RA 11659) is expected to be a catalyst for improving the quality and availability of infrastructure services declassified as public utilities, such as telecommunications and transport services (except public utility vehicles).

While these reforms are significant, they are not sufficient. Expected outcomes from recent liberalization may not be realized or may even have adverse results in the absence of appropriate regulations. How can the regulatory environment be strengthened to achieve widespread connectivity in the Philippines? To identify the key weaknesses, there is a need to draw from international best practices and, equally important, understand the technological changes that shape the industry's evolution. These will help in appreciating how institutions and regulations will need to evolve and adapt.

Objectives

General Objective

The paper's main objective is to update the structure and elements of the regulatory environment for ICT, including the regulatory authority.

Specific Objectives

i. Survey best practice regulatory frameworks or approaches
ii. Examine the gaps and/or weaknesses in the Philippine regulatory environment, including the regulatory authority
iii. Provide specific recommendations, such as changes to existing laws or propose new regulations to improve the regulatory framework for telecommunications and related sectors
iv. Recommend areas for further research

Methodology

Primary and secondary data were gathered through desk reviews and key informant interviews (KIIs) with the telecom regulator (NTC), a government research institute (Department of Science and Technology-Advanced Science and Technology Institute [DOST-ASTI]), a legal specialist, and an ICT advocate. For data analysis, the project compared Philippine regulations and practices with regulatory trackers and benchmarks from the International Telecommunication Union (ITU) and the World Bank and other ICT-related data. Recommendations for policy and further research were based on gap analysis and insights from KIIs.

Organization, scope, and delimitation

This study presents key indicators of ICT performance and compares the Philippines with countries at the same level of development and with the Association of Southeast Asian Nations (ASEAN) members. The rationale for regulating the ICT sector is discussed, looking at technological developments and the evolution of regulatory models. It also reviews the overall Philippine regulatory environment and presents the key elements of the regulatory framework, identifying the gaps and weaknesses compared to international best practices. The key structural issues are then discussed, focusing on the regulator and the critical barriers to entry. The paper concludes with a summary of the key findings and recommendations.

The study focuses on identifying gaps and weaknesses in the ICT regulations that constrain the growth of the ICT industry, consequently impeding the country from achieving inclusive internet connectivity.

It excludes policies and regulations relating to cybersecurity and data protection. The regulatory regime governing consumer protection is also not included. Furthermore, the study does not elaborate on technological developments, such as cloud computing, artificial intelligence (AI), virtual reality (VR), Internet of Things (IoT), and big data. Instead, it enumerates government programs under the DOST-ASTI. Finally, although the general competition framework is mentioned as part of the overall regulatory environment, a review of the state of competition is excluded, as it requires a separate analysis to cover more comprehensively the digital value chain and the ICT market and identify and address competition issues that affect market entry and expansion.

Overview of the Philippine ICT Performance

Minges (2015) reviewed studies on the association between broadband penetration and economic growth in developed and developing countries. For instance, World Bank studies in 2009 reported that an increase of 10-percentage points in fixed broadband penetration would result in gross domestic product (GDP) growth of 1.38 percent in developing countries at a 10-percent significance level. Another research adopting the same methodology used 1980–2011 data from 86 countries and found that an increase in fixed broadband of 10-percentage points led to a 1.35-percent increase in per capita GDP for developing economies. In the case of the Philippines, a 10-percentage point increase in mobile broadband penetration accounts for 0.32 percent of GDP, using data from 2000 to 2010 (see Box 1 for the definition of broadband).

Box 1. Defining broadband

Broadband is high-speed access to the internet, which is always-on and capable of multiple service provisions simultaneously. Entry-level broadband is defined by different entities as having the following minimum internet speed (DICT 2017):

- NTC: 256 Kbps
- ITU-T: 1.5 or 2.0 Mbps
- DICT's National Broadband Plan: 2.0 Mbps

NTC = National Telecommunications Commission DICT = Department of Information and Communications Technology; ITU-T = International Telecommunication Union-Telecommunications Standardization Sector Kbps = kilobits per second; Mbps = megabits per second
Source: DICT (2017)

Mobile broadband users benefit from its portability and mobility features. It is neither limited to fixed-line nor short-range coverage for Wi-Fi access connected to fixed broadband. Due to fixed broadband costs, internet users in developing countries tend to substitute mobile broadband for fixed broadband since the former is cheaper when prices are compared for a minimum threshold speed and capacity. An infrastructure providing fixed broadband access may not always be available for developing countries. The high cost of fixed broadband subscriptions may be due to the need for fixed broadband providers to allot large investments for building fixed-line networks. In addition, a variety of applications are available on mobile phones, such as personal banking, medical information, email communication, and social networking sites. Among these, social media is the most important activity for those who rely on a mobile broadband connection (McDonough 2012).

Despite the features of mobile broadband, its internet speed is significantly slower than fixed broadband. The limited availability of radio frequency spectrum also restrains the performance of mobile broadband. Fixed broadband is faster than mobile broadband since the information path can be assigned to a single customer. Customers with fiber and cable lines may also have the option to increase their speed, consequently increasing costs. When the price is measured by megabits per second (Mbps), mobile broadband is more expensive than fixed broadband. Increased usage of data-intensive activities, such as video streaming, video-related applications, and cloud computing, requires higher speeds and bandwidth, which mobile broadband lacks. Moreover, a mobile subscription includes a limited monthly traffic allowance, making it less reliable than fixed broadband with no limit in traffic data allowances (McDonough 2012; Quaglione et al. 2020).

Apart from bandwidth and speed issues of mobile broadband, some devices at home, such as desktop computers and smart TVs, may not be compatible with or sufficiently supported by a mobile broadband connection. These devices are more suited to using fixed broadband connections. Mobile broadband is less suitable for other activities like learning and job seeking. Data caps and small screens are not as conducive for learning activities, such as attending meetings, conferences, conventions, and online courses. Users relying on mobile broadband connections resort to alternative ways to complete learning

tasks, such as using Wi-Fi in public libraries and computers. Jobseekers filling out job applications using mobile phones encounter difficulties viewing materials, reading content, and submitting documents. Some use mobile broadband to complement fixed broadband, especially in developed countries. For instance, one may access data such as documents, videos, and photos through mobile phones. However, processing data (e.g., editing pictures, writing letters, preparing documents) is done using more powerful devices via computers using a fixed broadband connection (Anderson and Horrigan 2016; Quaglione et al. 2020).

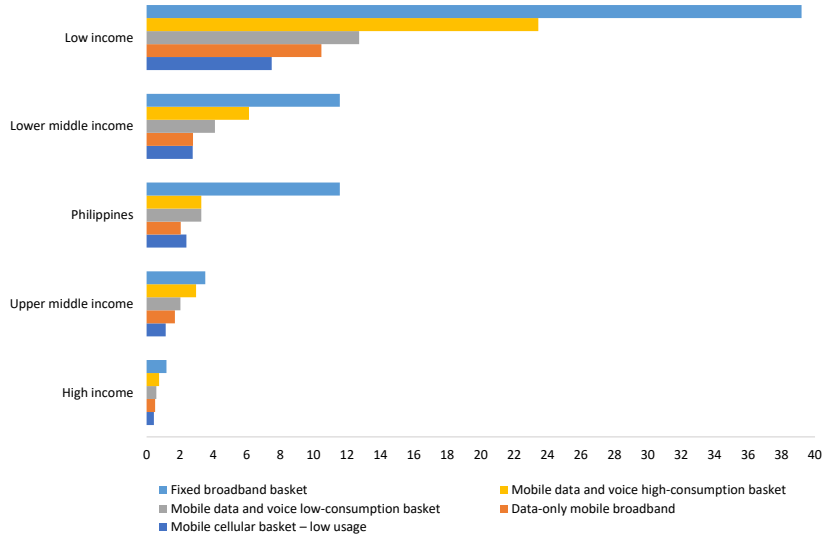
ICT prices

The ITU developed five ICT price baskets[1] to assess the affordability of ICT services in United Nations (UN) member states using the country's gross national income (GNI) per capita. ICT price baskets are updated regularly to adapt to the changing ICT market. The UN Broadband Commission for Sustainable Development set a target of below 2 percent of monthly GNI per capita by 2025 as a goal of pursuing more accessible and affordable ICT services (ITU 2022). Figure 1 shows the five ICT price baskets based on country groups in 2021. High-income countries have affordable ICT services across all ICT baskets, while upper middle-income countries, on average, have affordable data-only mobile broadband and mobile cellular low-usage baskets. Both low and lower middle-income countries, including the Philippines, fall short of the target goal of 2 percent GNI per capita across all ICT baskets.

The fixed broadband basket for the Philippines decreased from 2011 to 2018 and was steady from 2018 to 2019. However, from 2019 to 2021, it increased from 4.16 percent to 11.56 percent, which may be attributed to the COVID-19 pandemic. The most affordable ICT price basket in the Philippines is data-only mobile broadband, with a price below the 2 percent GNI per capita target in 2020. Meanwhile, the fixed-broadband basket is the most expensive ICT basket, with an 11.56 percent share of GNI per capita (see Figure 2).

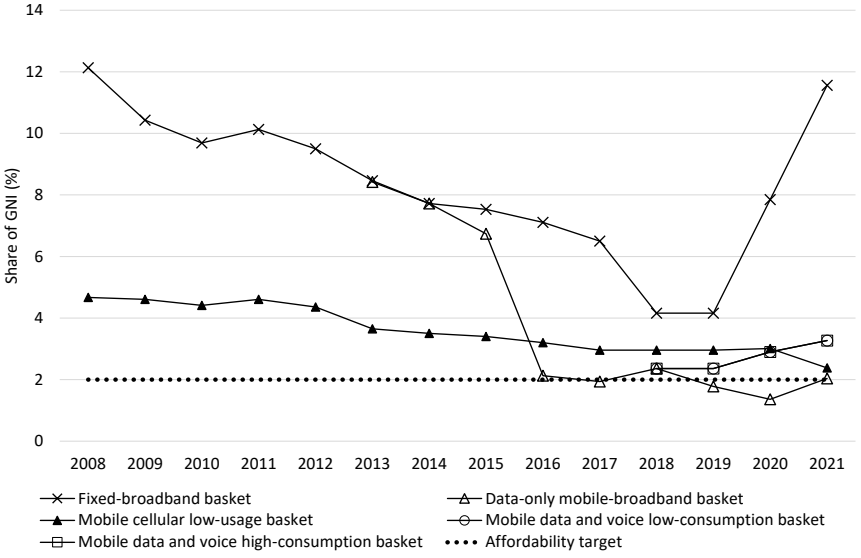
[1] (1) Data-only mobile broadband basket (minimum monthly allowance: 2 gigabytes [GB] data); (2) mobile data and voice low-consumption basket (minimum monthly allowance: 70 voice minutes, 20 SMS, 500 MB data); (3) mobile data and voice high-consumption basket (minimum monthly allowance: 140 voice minutes, 70 SMS, 2 GB data); (4) mobile cellular low-usage basket (minimum monthly allowance: 70 voice minutes, 20 SMS); (5) fixed-broadband basket (minimum monthly allowance: 5 GB data).

Figure 1. ICT price baskets as share (%) of monthly GNI per capita by income groups, Philippines, 2021



ICT = Information and communication technologies; GNI = Gross National Income
Note: Medians were used for country groups, calculated for the subset of economies with available data.
Source: ITU (2021b)

Figure 2. Philippine ICT price baskets as share (%) of monthly GNI per capita, benchmarked against UN Broadband Commission for Sustainable Development's 2 percent affordability target, 2008–2021



ICT = information and communication technologies; GNI = gross national income; UN = United Nations
Source: ITU (2021b)

Figure 3 compares Philippine ICT price baskets with the Association of Southeast Asian Nations (ASEAN) neighboring countries. In 2021, Myanmar and Cambodia had the most expensive fixed broadband, while Laos and Cambodia had the most expensive ICT services in the remaining ICT price baskets. The Philippines has the third most expensive ICT service across all the ICT price baskets among the ASEAN member states. Laos, Cambodia, Myanmar, and the Philippines are lower middle-income countries. Additionally, Singapore and Brunei Darussalam consistently have the most affordable ICT services among ASEAN countries across all ICT price baskets.

Figure 3. ICT price baskets, Philippines vs. other ASEAN countries (% share of monthly GNI per capita), various years

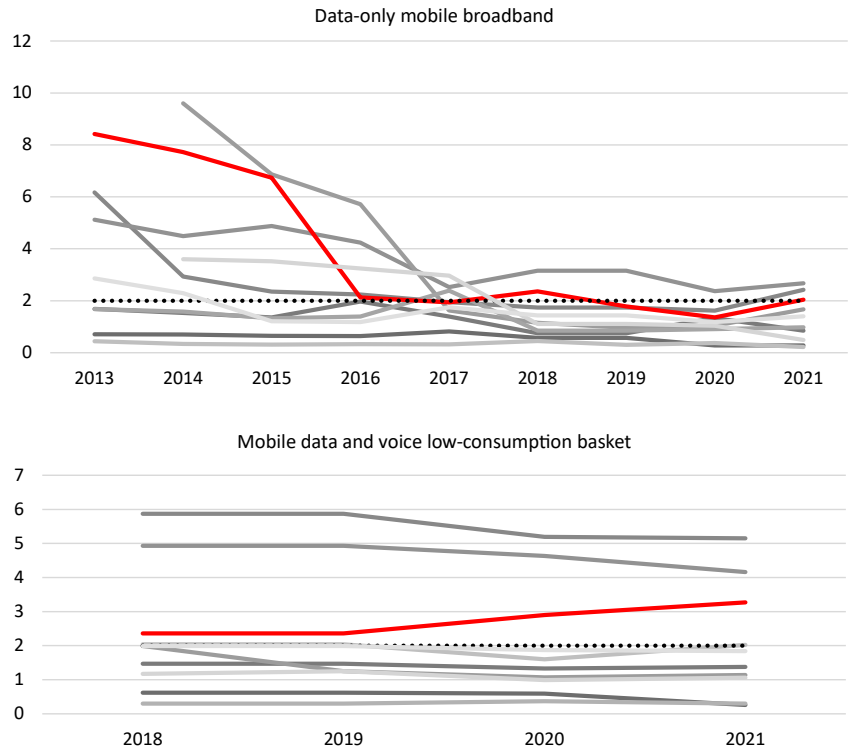
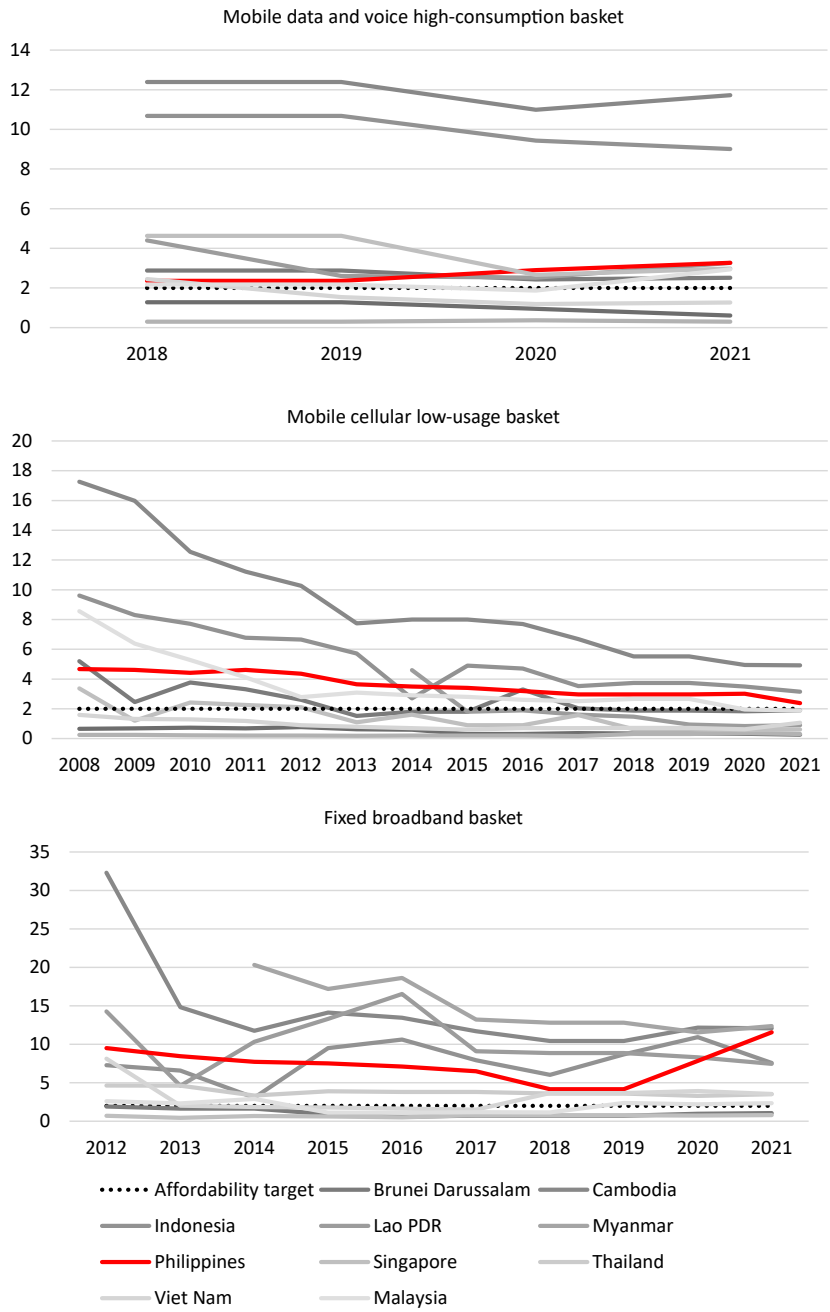


Figure 3 *(continued)*

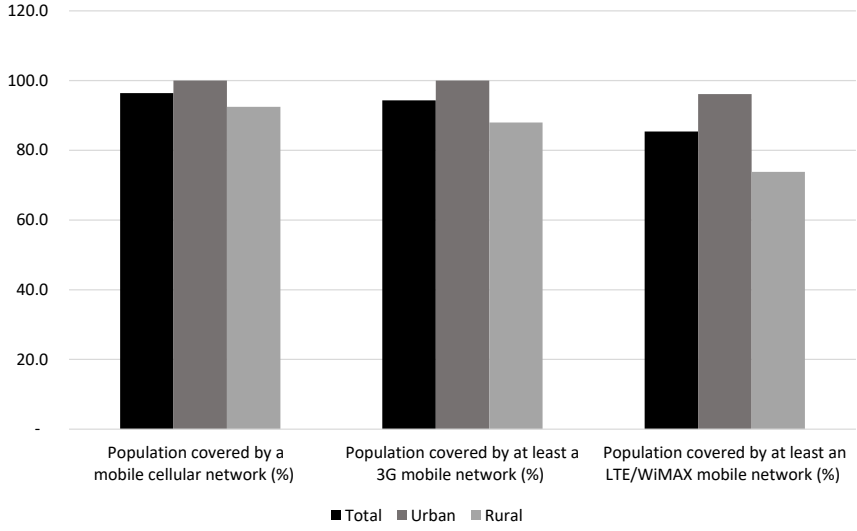


ICT = information and communication technologies; ASEAN = Association of Southeast Asian Nations; GNI = gross national income
Source: ITU (2021b)

Availability

In terms of the population covered by mobile networks worldwide, Figure 4 shows the gap between rural and urban areas. Urban areas are completely covered by a mobile cellular network (100% and 96% are covered by the third-generation [3G] and Long Term Evolution/ Worldwide Interoperability for Microwave Access [LTE/WiMAX] mobile networks, respectively). In contrast, about 93 percent of the rural population is covered by a mobile cellular network. About 88 percent of the rural population is covered by 3G, and 74 percent by the LTE/WiMAX mobile network.

Figure 4. Population covered by a mobile cellular, 3G, and LTE/WiMAX mobile network in developing countries, urban-rural area, 2021

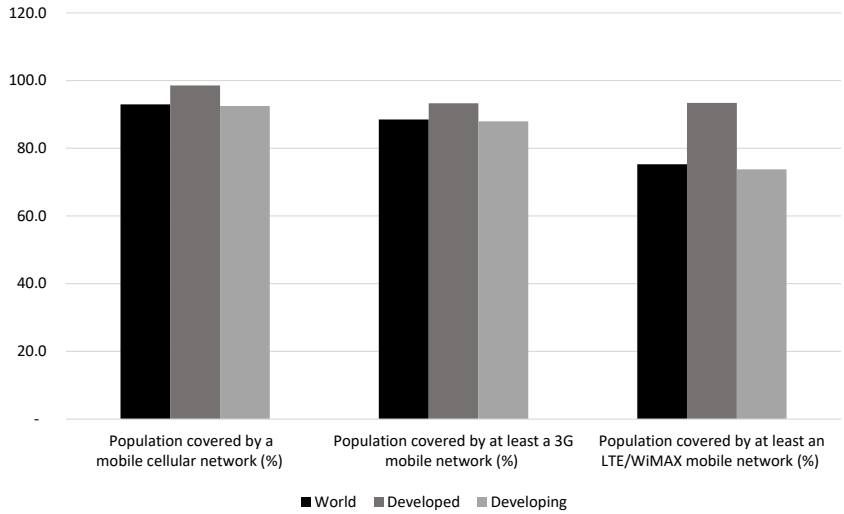


3G = third generation; LTE/WiMAX = Long-Term Evolution/ Worldwide Interoperability for Microwave Access
Source: ITU (2021b)

Regarding development status, as of 2019, 98.6 percent of the population in developed countries is covered by a mobile cellular network, while 92.5 percent are covered in developing countries. Figure 5 shows that about 93 percent of the population in developing

countries are covered by both 3G and LTE/WiMAX mobile networks, while 88 and 73.8 percent are covered in developing countries.

Figure 5. Population covered by a mobile cellular, 3G, and LTE/WiMAX mobile network by development status, 2021



3G = third-generation; LTE/WiMAX = Long-Term Evolution/ Worldwide Interoperability for Microwave Access
Source: ITU (2021b)

In the Philippines, 94 percent of the population is covered by at least a fourth-generation (4G) mobile network as of 2019 (Table 1), while it is ranked third among the countries with the lowest international bandwidth,[2] as shown in Figure 6. Singapore excels in terms of population covered by at least 4G mobile network and international bandwidth (See also Figure 7 for the international bandwidth per internet user [bit/s] in ASEAN countries, except Singapore).

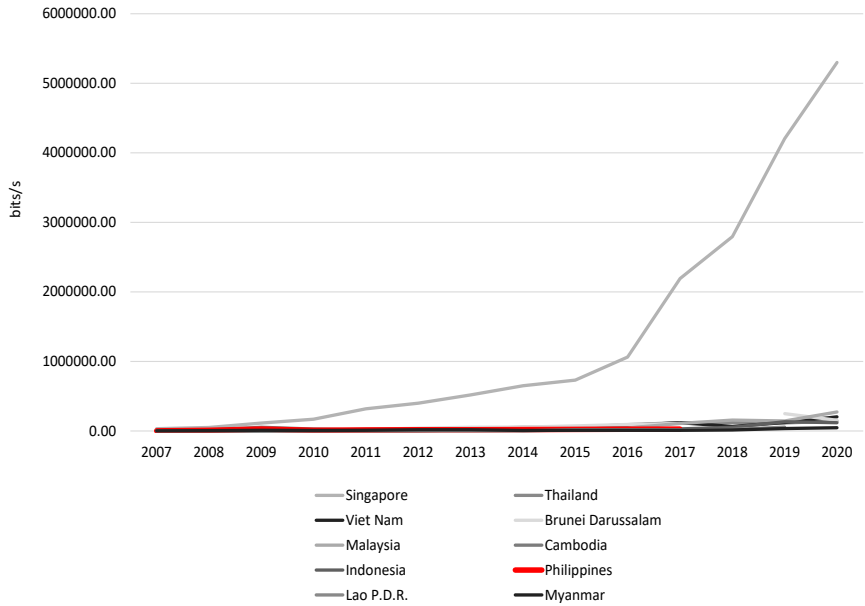
[2] International bandwidth refers to "the total used capacity of international bandwidth in megabits per second (Mbit/s). It is measured as the sum of used capacity of all Internet exchanges (locations where Internet traffic is exchanged) offering international bandwidth. If capacity is asymmetric, that is more incoming (downlink) than outgoing (uplink) capacity, then the incoming (downlink) capacity should be provided" (World Bank 2022b). "International Internet bandwidth (bit/s) per Internet user is calculated by converting to bits per second and dividing by the total number of Internet users" (ITU 2017).

Table 1. Proportion of population covered by at least a 4G mobile network (%), ASEAN countries

Country	2017	2018	2019
Singapore	100	100	100
Thailand	98	98	98
Viet Nam	95	93.89	97
Indonesia	90.42	97.59	97.59
Brunei Darussalam	90.04	94.94	95.25
Philippines	80	–	94*
Malaysia	77.2	79.7	87.2
Cambodia	57.5	80.3	80.3
Myanmar	29.52	75	–
Lao People's Democratic Republic	9	43	–

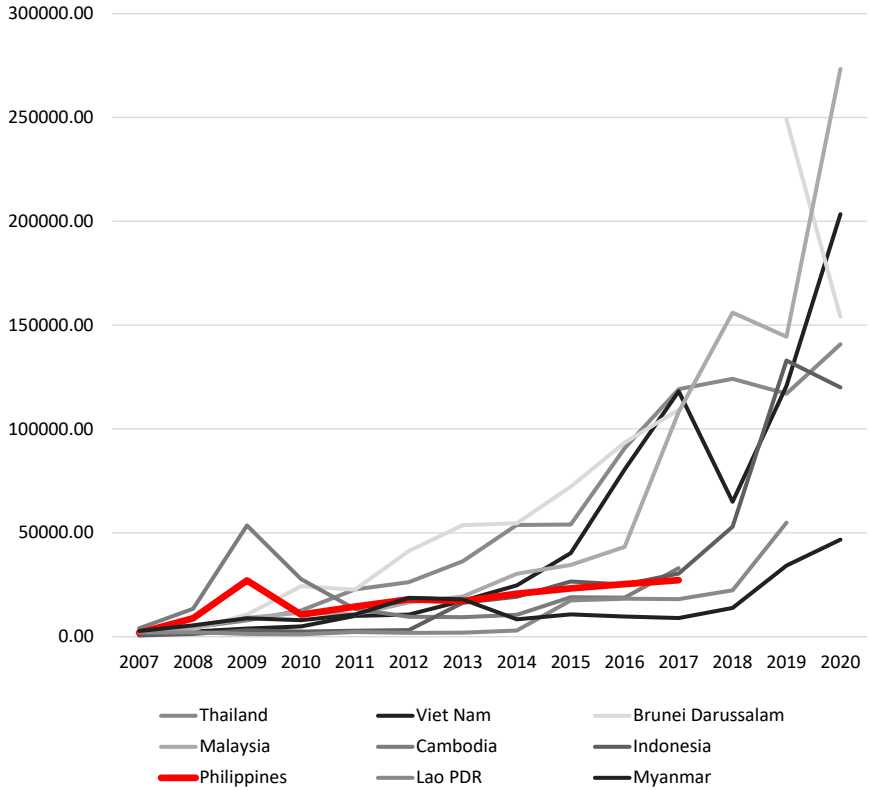
4G = fourth generation; ASEAN = Association of Southeast Asian Nations
"-" = data not available
Sources: Open SDG Data Hub (n.d.) and *DICT (2021)

Figure 6. International bandwidth per internet user (bit/s) in ASEAN, 2007–2020



bits/s = bits per second; ASEAN = Association of Southeast Asian Nations; PDR = People's Democratic Republic
Source: ITU (2021b)

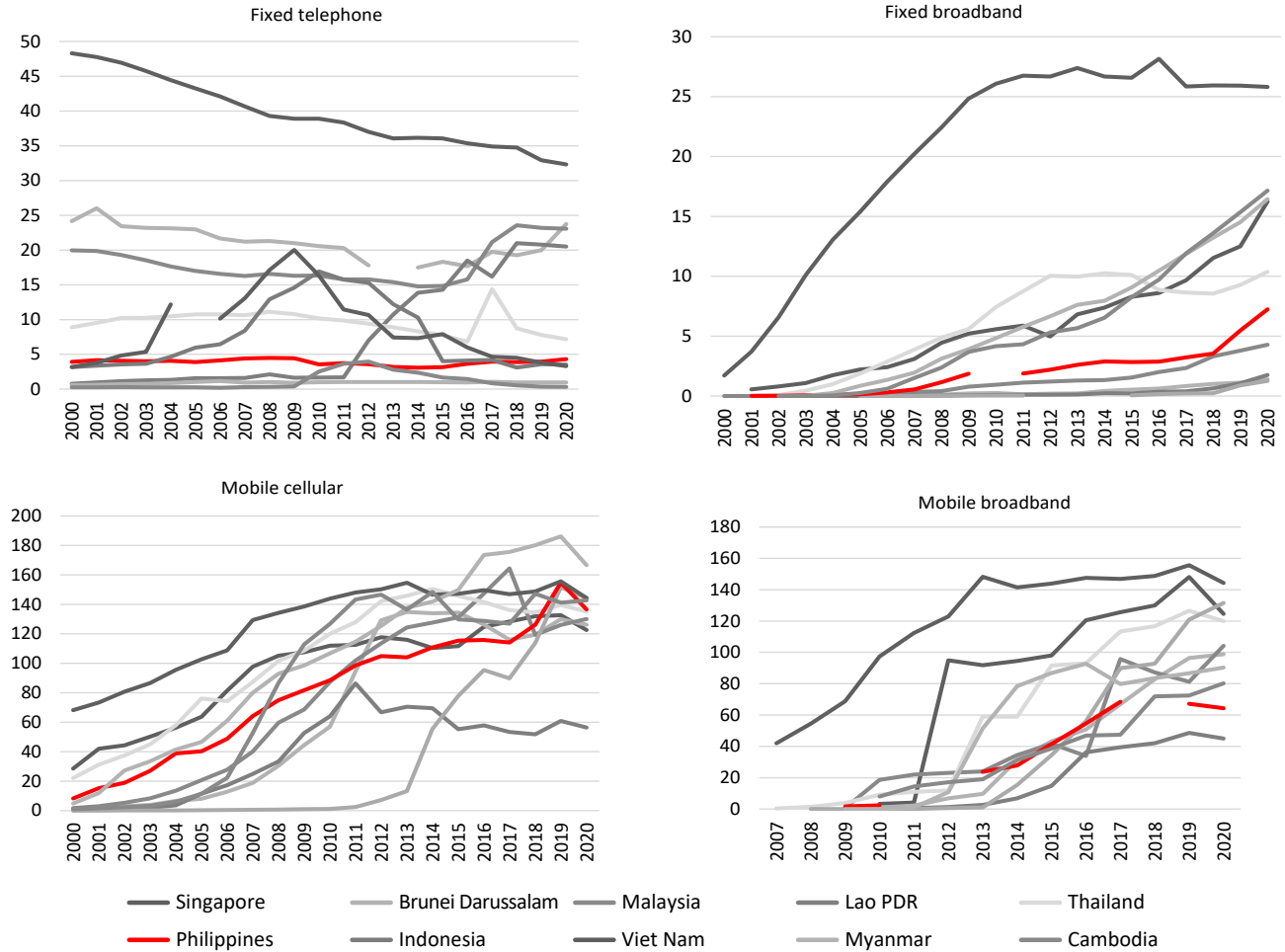
Figure 7. International bandwidth per internet user (bit/s) in ASEAN countries, except Singapore, 2007–2020



bits/s = bits per second; ASEAN = Association of Southeast Asian Nations; PDR = People's Democratic Republic
Source: ITU (2021b)

ICT service subscriptions in ASEAN countries, such as fixed telephone, fixed broadband, mobile cellular, and mobile broadband, per 100 inhabitants from 2000 to 2020 are shown in Figure 8. In the Philippines, fixed telephone subscriptions remained consistently below 5 per 100 inhabitants. Mobile cellular and mobile broadband subscriptions are increasing, except from 2019 to 2020. Finally, the number of fixed broadband subscriptions also shows an upward trend.

Figure 8. Subscriptions per 100 inhabitants in ASEAN countries, 2000–2020



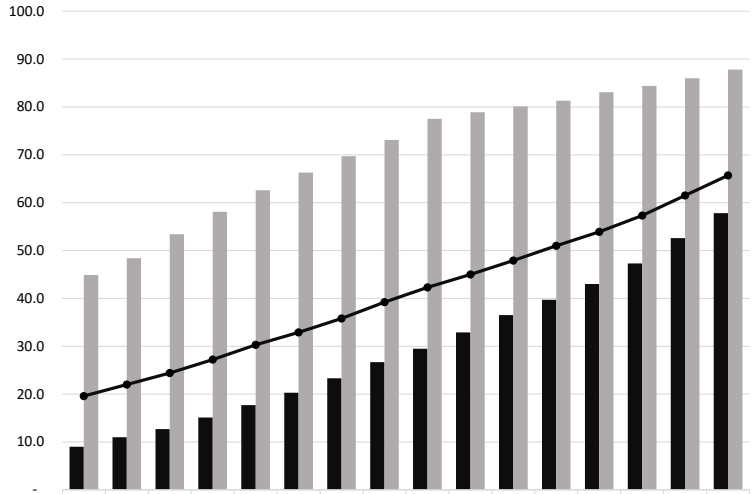
bits/s = bits per second; ASEAN = Association of Southeast Asian Nations; PDR = People's Democratic Republic
Source: ITU (2021b)

As expected, the number of households with internet access in developed countries is higher than in developing countries, as shown in Figure 9. In 2020, only 58 percent of households in the developing country had internet access at home, compared to about 88 percent of households in developed countries.

More than 50 percent of households in 6 ASEAN countries have internet access at home. Meanwhile, 98.4 and 91.7 percent of households in Singapore and Malaysia, respectively, can access the internet at home. The Philippines falls behind 7 countries, with only 17.7 percent of its households having internet access at home (Table 2).

Figure 10 shows the number of internet users in ASEAN countries from 2000 to 2020. Overall, an increase in internet usage can be observed across all countries. Brunei Darussalam, Singapore, and Malaysia are the top three countries with the highest percentage of individuals using the internet. In 2020, the Philippines, along with Cambodia, Laos, and Myanmar, lags behind the other six countries.

Figure 9. Household with internet access at home (%) by development status, 2005–2020



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Developing country	9.0	11.0	12.7	15.1	17.7	20.3	23.3	26.7	29.5	32.9	36.5	39.7	43.0	47.3	52.6	57.8
Developed	44.9	48.4	53.4	58.1	62.6	66.3	69.7	73.1	77.5	78.9	80.1	81.3	83.1	84.4	86.0	87.8
World	19.6	22.0	24.4	27.2	30.3	32.9	35.8	39.2	42.3	45.0	47.9	51.0	53.9	57.3	61.5	65.7

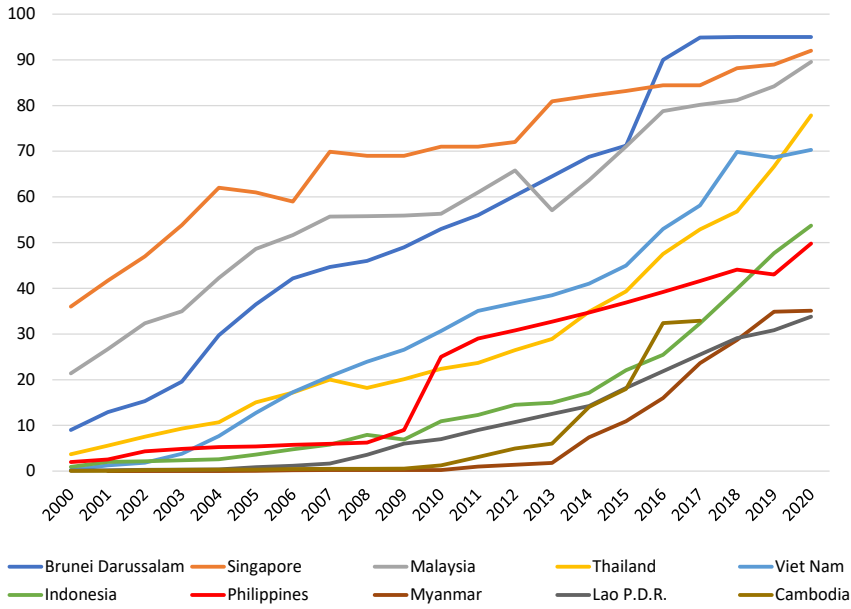
Source: ITU (2021b)

Table 2. Proportion of households with internet access in ASEAN countries

Country	Year	Percent (%)
Singapore	2020	98.4
Malaysia	2020	91.7
Thailand	2020	85.2
Indonesia	2020	78.2
Viet Nam	2020	76.4
Brunei Darussalam	2019	53.6
Cambodia	2017	21.3
Philippines	2019	17.7
Lao PDR	2017	1.7
Myanmar	–	–

ASEAN = Association of Southeast Asian Nations; PDR = People's Democratic Republic
"-" = data not available
Source: ITU (2021b)

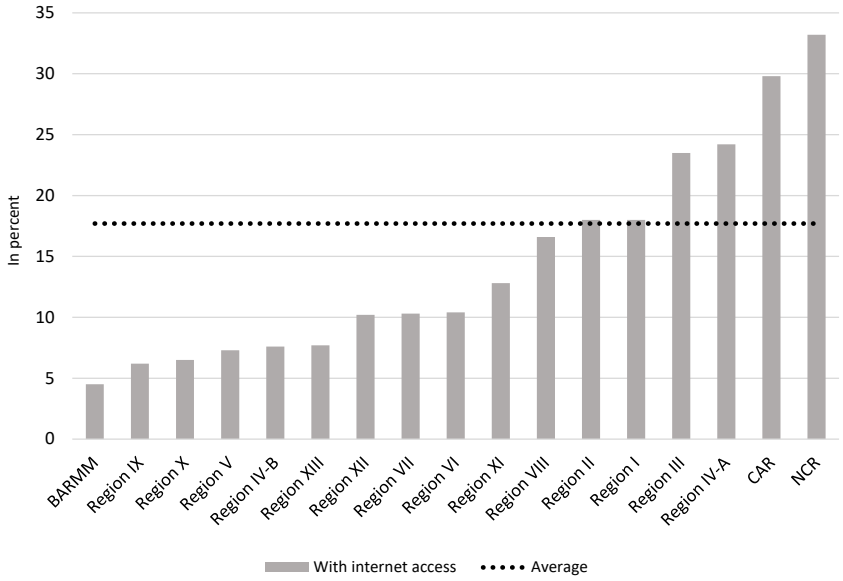
Figure 10. Percentage (%) of individuals using the internet in ASEAN countries, 2000–2020



ASEAN = Association of Southeast Asian Nations; PDR = People's Democratic Republic
Source: ITU (2021b)

In the 2019 National ICT Household Survey (NICTHS), only 17.7 percent of households in the Philippines, on average, have internet access. Six out of 17 regions are above the average number of households in the country with internet access (Figure 11). These are Regions I, II, III, IV-A, Cordillera Administrative Region (CAR), and National Capital Region (NCR). These regions are in the northern part of the Philippines (Luzon). Regions IX, X, and BARMM, which have the least proportion of households with internet access, are in the southern part of the Philippines (Mindanao).

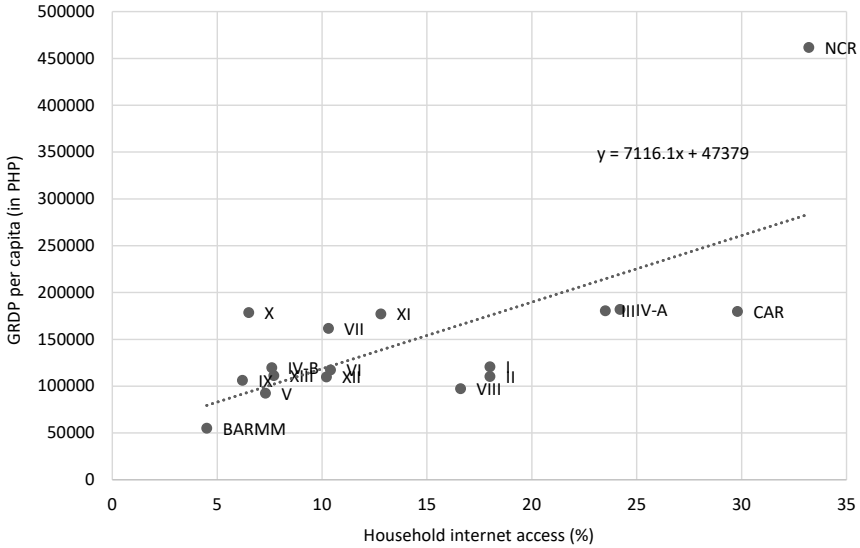
Figure 11. Proportion of households with internet access by region, 2019



Source: ITU (2021b)

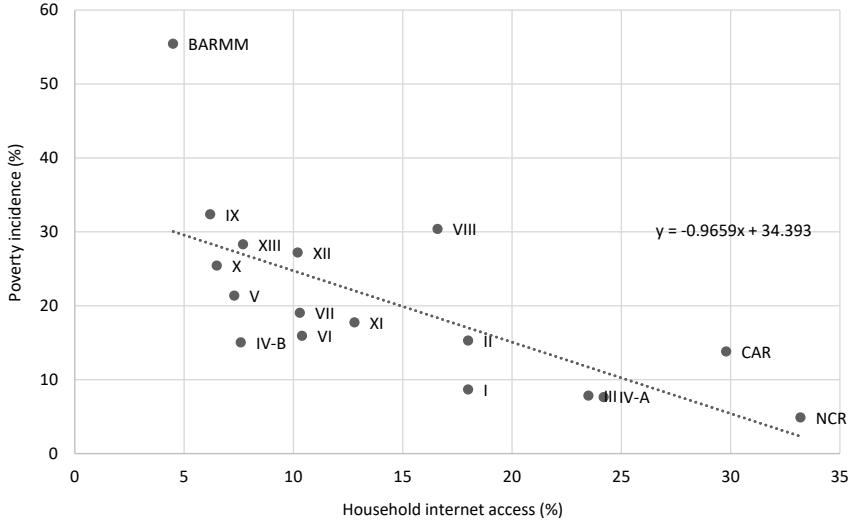
As Figure 11 shows, only 4.5 percent of households in BARMM have access to the internet compared to 33.3 percent in the NCR. As shown in Figure 12, household internet access positively correlates with the gross regional domestic product (GRDP) per capita, while household internet access is negatively associated with poverty incidence (Figure 13).

Figure 12. Household internet access versus GRDP per capita by region, 2019



GRDP = Gross Regional Domestic Product; NCR = National Capital Region; CAR = Cordillera Administrative Region; ARMM = Bangsamoro Autonomous Region in Muslim Mindanao
Source: Authors' computation using data from DICT (2019) and PSA (2019)

Figure 13. Household internet access versus poverty incidence among families



NCR = National Capital Region; CAR = Cordillera Administrative Region; ARMM = Bangsamoro Autonomous Region in Muslim Mindanao
Note: The first semester of 2018 data was used for the poverty incidence among families, while household internet access was based on the 2019 NICTHS.
Source: Authors' computation using data from DICT (2019) and PSA (2018)

Speed

As of March 2022 data, only Singapore, Viet Nam, and Thailand are the ASEAN countries with above the global average mobile speed. Regarding fixed broadband, Singapore, Thailand, Malaysia, and Viet Nam scored higher than the global average download speed of 62.52. The Philippines' median scores are 19.38 and 52.16 for mobile and fixed broadband, respectively (see Table 3).

The National Broadband Plan (DICT 2017) cited the Akamai quarterly connectivity reports from the first quarter of 2015 to the first quarter of 2017 to show the internet speeds of the ASEAN-5 countries (see Figure 14), noting that the average internet speed has generally increased. Indonesia initially had the lowest internet speed among the ASEAN-5 countries but has outperformed the Philippines since the third quarter of 2015.

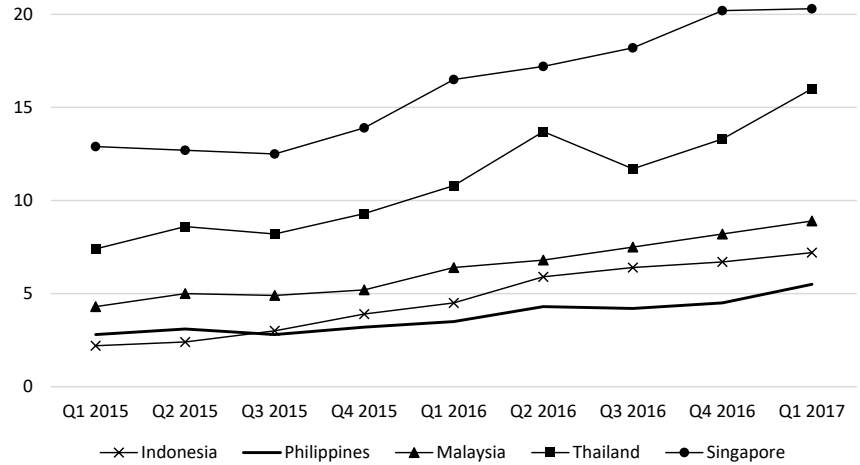
The fixed broadband internet speed in the Philippines has been increasing since December 2021. It jumped from a global ranking of 66 in May 2021 to 58 in May 2022. Its global ranking in mobile internet speed increased from 95 to 91 from April 2022 to May 2022. The mobile download speed gradually increased to 19.26 Mbps in May 2022 from 16.26 Mbps in May 2021. However, the performance of mobile upload speed is lagging, which has been consistently under 5 Mbps for the period from May 2012 to May 2022 (see Figure 15).

Table 3. Median download speeds (Mbps) in ASEAN countries as of March 2022

Country	Mobile	Fixed Broadband
Singapore	67.99	197.97
Thailand	33.49	187.80
Vietnam	33.90	67.96
Lao PDR	23.41	28.32
Malaysia	25.87	84.61
Myanmar	24.06	16.86
Cambodia	16.12	19.33
Philippines	19.38	52.16
Indonesia	17.70	21.23
Global average	29.96	62.52

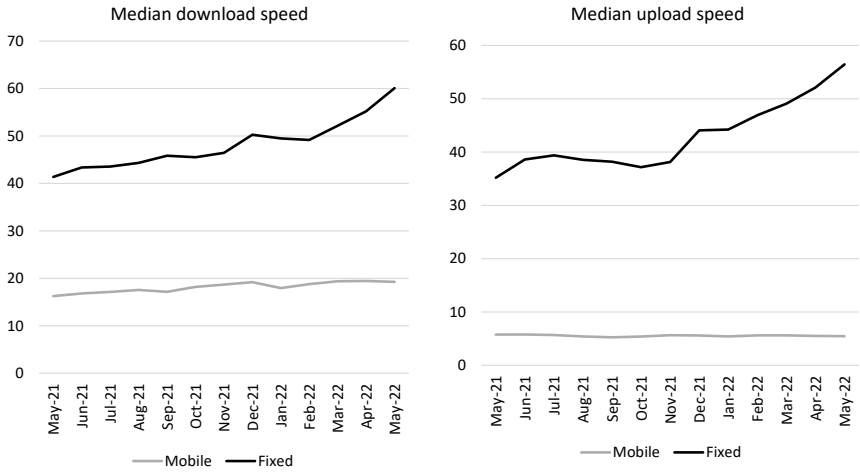
Mbps = megabits per second; ASEAN = Association of Southeast Asian Nations
Source: Ookla (2022a)

Figure 14. Average connection speed (Mbps) in ASEAN-5 economies, Q1 2015–Q1 2017



ASEAN-5 = Indonesia, Malaysia, the Philippines, Singapore, and Thailand; Q1 = first quarter
Note: The latest data available is only until the first quarter of 2017
Source: Akamai (n.d.)

Figure 15. Philippines' mobile and fixed broadband internet speeds (Mbps), May 2021–May 2022



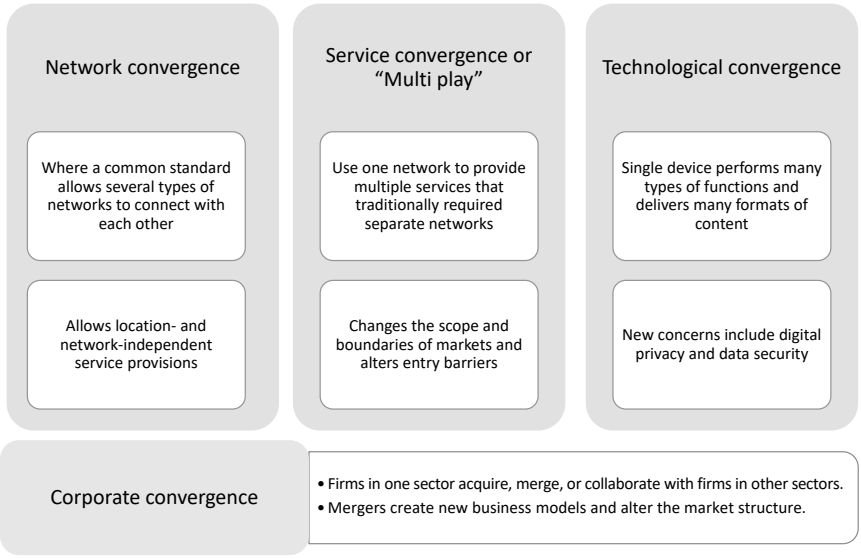
Mbps = megabits per second
Source: Ookla (2022b)

The Regulation of ICT

Technological changes and implications for regulation

According to World Bank et al. (2011), the transition to next-generation networks (NGN) and convergence are the two innovations that have had the most influence on the ICT sector. Various forms of convergence have shaped the telecommunications and ICT industries, which have implications for government policy and regulation (Figure 16). See Box 2 for the meaning of convergence.

Figure 16. Types of convergence



Sources: Singh and Raja (2010); Park (2019)

Box 2. What is convergence?

> In general, convergence refers to the erosion of boundaries among previously separate networks, services, and business practices. These include service convergence, network convergence, corporate converge, and technological convergence.

Sources: Singh and Raja (2010); Park (2019)

According to Singh and Raja (2010), forms of convergence include:

- **Service convergence or 'multiple play'** – where multiple services traditionally provided by separate networks can now be offered by firms using one network. For instance, communication companies provide multiple services such as television, telephony, and internet via cable, telephone, or wireless networks. In terms of benefits, service convergence enables providers to expand into new markets, utilize existing networks more efficiently, offer discounted bundles, and enhance access to new ICT services. However, subscribers could become tied to a single provider. Smaller firms, particularly those that do not own network infrastructure, might not thrive in the market. *The implication for policy is that convergence changes the scope and boundaries of markets and alters entry barriers.*
- **Network convergence** – where a common standard enables the connection of different types of networks, allowing communication service to travel over multiple networks. Skype is an example of an internet telephony service that carries voice telephony via the internet and traditional networks. Reduced costs result in lower tariffs, and network integration expands user mobility and coverage. However, it could lower investment in building networks. *Connecting different networks enables location- and network-independent service provision.*
- **Corporate convergence** – when firms from one sector acquire, merge, or collaborate with firms from another sector. Examples include partnerships, mergers, or expansion of internet, broadcasting, and telecommunication firms. Mergers expand individual firms, increase prospects for new services or markets, and reduce costs and tariffs. However, mergers may result in market dominance and reduced competition and diversity of media content. *Corporate convergence or mergers create new business models and alter the market structure, changing the dynamics of the sector.*

In addition, Park (2019) identified another form of convergence:

- **Technological convergence** – when functions of different technologies are combined and interoperate as a single system.

> Typically, a converged unit can handle multiple media formats corresponding to each technology that is merged. Technology convergence also involves devices and systems with user interface. For instance, to access materials distributed over a network, a user interacts with converged devices like a smart TV. Several technologies, such as a computer, a regular TV, and various additional gadgets that once had a single purpose, have all been merged into one smart TV. In addition to broadcasting TV channels, smart TVs allow users to browse the internet, view photos taken with smartphones and stored in the cloud, show feeds from home security cameras connected to a network, play music, get alerts for incoming calls and messages, and host or join video teleconferencing. Multiple tasks may be carried out by smart TVs by processing a range of media formats. *In addition to the issue of regulatory jurisdiction, concerns about digital privacy and data security may be areas where legislative and/or oversight actions will be needed.*

According to the DOST-ASTI,[3] the country's leading research institution for scientific research and development in the advanced fields of ICT and microelectronics, new technological developments are expected to enhance various industries and domains, including the ICT sector (Table 4). At least eight of these trends are covered by the DOST-ASTI flagship programs under the ICT & Electronics R&D Roadmap 2022–2032: (1) Environment for Extreme Computing Performance, Networks, and Data, (2) Emerging Research and Applications, and (3) Intelligent Systems Initiative for the Philippines.

While these new technologies offer significant benefits, their impact on industries and the economy could be limited due to the presence of restrictive and outdated regulations or the absence of an enabling environment. To remain relevant and effective, the regulatory framework, composed of the institutions and specific regulations, needs to be updated to respond to changing technological and market conditions.

[3] Dr. Franz A. de Leon (Director, DOST-ASTI), in response to authors' questions on June 7, 2022

Table 4. New technological developments

Trends	Technologies beneath the Trend	Implications	Covered by DOST-ASTI
Next-level process automation and virtualization	Industrial internet of things (IoT) Robots/collaborative robots (cobots)/robotic process automation (RPA) Digital twins 3D/4D printing (additive manufacturing)	Streamline routine tasks, improve operational efficiency, and accelerate time to market	ERA
Future of connectivity	5G and IoT connectivity	Enable faster connectivity across longer distances, with exponentially faster download and latency reduced to nearly nothing	EXPAND
Distributed infrastructure	Cloud and edge computing	Reach data-hungry devices with far-less latency in a greater number of locations that are even more remote and accelerate decisionmaking with advanced analytics on demand	EXPAND
Next-generation computing	Quantum computing Neuromorphic chips (application-specific integrated circuits)	Cut development time of chemicals and pharmaceuticals through simulations, accelerate autonomous vehicles with quantum AI, and transform cybersecurity	ISIP
Applied AI	Computer vision Natural-language processing Speech technology	Improve customer satisfaction through new customer interfaces and interaction methods (e.g., searching for products based on photos) and more seamless human-machine interactions (e.g., translating speech, text, and images into machine-readable instructions).	ISIP

Table 4 *(continued)*

Trends	Technologies beneath the trend	Implications	Covered by DOST-ASTI
Future of programming	Software 2.0	Replace programmers with neural networks that use machine learning to develop software, customize existing code, and automate mundane programming tasks through low-code and no-code approaches	EXPAND
Trust architecture	Zero-trust security Blockchain	Reduce the risk of breaches, lower operating and capital expenditures associated with cybersecurity, and enable more cost-efficient transactions	EXPAND
Bio Revolution	Biomolecules/"-omics"/biosystems Biomachines/biocomputing/augmentation	Promise a significant impact on economies and our lives and will affect industries from health and agriculture to consumer goods, energy, and materials	EXPAND
Next-generation materials	Nanomaterials Graphene 2D materials Molybdenum disulfide nanoparticles	Enable new functionality and enhanced performance in pharma, energy, transportation, health, semiconductors, and manufacturing. Next-generation materials will be critical for tomorrow's sustainable economies because they have a lighter environmental impact.	–
Future of clean technologies	Nuclear fusion Smart distribution/metering Battery/battery storage Carbon-neutral energy generation	Address the rapidly growing need for clean energy generation. These include systems for smart energy distribution in the grid, energy-storage systems, carbon-neutral energy generation, and fusion energy.	–

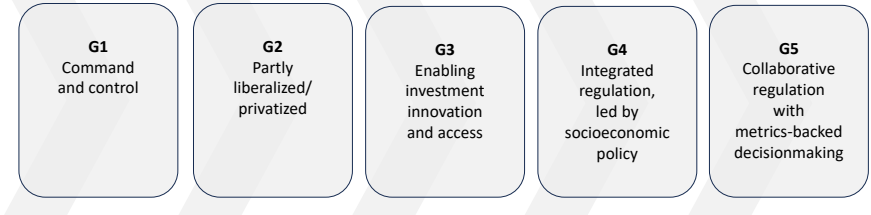
DOST-ASTI = Department of Science and Technology-Advanced Science and Technology Institute; ERA = Emerging Research and Applications; EXPAND = Environment for Extreme Computing Performance, Networks, and Data; 3D = three dimensional; 4D = four dimensional ; 5G = fifth generation; IoT = Internet of Things; ISIP = Intelligent Systems Initiative for the Philippines; 2D = two dimensional
"–" = not captured by the DOST-ASTI's flagship programs
Sources: Mckinsey & Company (2021); Dr. Franz A. de Leon, Director, DOST-ASTI, via personal communication with the authors on June 7, 2022

The evolution of ICT regulation and its impacts

The requirements of telecommunications regulation have evolved over time (ITU and WB 2020). In the 2000s, with the emerging trends toward privatization and liberalization of telecommunications markets, promoting fair competition was the main concern, along with related issues such as licensing, interconnection of networks, price regulation, and universal service. A decade later, with the rapid adoption of the internet and mobile cellular communications globally, the new focus of regulation shifted to spectrum management and value-added services. Today, the greatest regulatory challenges arise from the emergence of a data-driven economy. Although the fundamental aspects of telecommunications and ICT regulation remain important, regulations need to catch up with the advancement of new technologies and applications, such as big data, IoT, and associated new business models. With digitalization, the regulation of data (i.e., who is responsible for data and how it is collected, stored, processed, and shared) is considered the latest challenge for governments. There is no consensus yet on whether ICT and broadcasting regulators have the authority to regulate digital services, digital platforms, and other emerging technologies.

Figure 17 depicts the progression in telecommunication and ICT regulation from Generation 1 (G1) to 4 (G4), starting from the command-and-control regime (usually related to state-owned monopolies) to privatization, liberalization, promoting investment, and meeting socioeconomic goals. Building on World Bank et al. (2011), ITU and WB (2020) developed a new set of metrics suitable for digital regulation.

Figure 17. Generations of regulations: G1 to G5



G = Generation
Note: Generations 1 through 4 are measured through the ICT Regulatory Tracker. Generation 5 is measured through the G5 Benchmark.
Source: Lifted in full from ITU and WB (2020, p.2)

Generation 5 (G5), or the Fifth-Generation Collaborative Regulation, is considered complementary to the previous generations, which stresses the growing significance of more flexible and collaborative regulatory frameworks capable of tackling the digital economy's impacts across sectors (ITU 2020a).

A comprehensive study by the ITU (2021c) examined the relevance of policy and institutional factors on the performance of the ICT sector, particularly in terms of network deployment. Based on data from 145 countries, consisting of 50 initiatives of policy reforms and institutional characteristics and 13 indicators of ICT sector performance between 2008 and 2019, the study found that the regulatory framework consisting of regulatory mandate, regulatory authority, regulatory regime, and competitive model, is associated with a significant increase in investment (defined as the aggregate capital spending of fixed and mobile operators). Specifically, a 10-percent increase in the overall Tracker score is associated with a 7-percent increase in fixed and mobile investment. The results with respect to the individual components of the Tracker are as follows (ITU 2021c, p.6-7):

- A 10-percent increase in the regulatory authority pillar score is associated with an increase of almost 8 percent in investment. This means that having a separate ICT regulatory agency with the desired characteristics (in terms of independence, accountability, and enforcement power) contributes to creating a suitable framework that spurs investment.
- A 10-percent increase in the regulatory mandate pillar score is linked to an increase of 11 percent in investment. This suggests the relevance of the scope of attributions to the regulatory agency (in terms of being in charge of quality of service [QoS], licensing, interconnection rates and price regulation, radio spectrum, universal service, broadcasting, internet, IT, and consumer issues).
- A 10-percent increase in the regulatory regime pillar score is associated with an almost 4-percent increase in investment. This pillar refers to the adoption of good practices related to specific regulations in terms of licensing, interconnection, QoS infrastructure sharing, access regulation, and number portability, among others. This points out the relevance of adopting best regulatory practices to accelerate investment.

- A 10-percent increase in the competition framework pillar score is linked to an increase of almost 7 percent in investment. This score measures competitive intensity in local and long-distance, mobile, and broadband services, among others, the criteria for determining dominance or significant market power, plus the allowance of foreign presence in the ICT sector.

The ITU (2021c) study also showed that the regulatory pillars complement each other. For example, the relevance of the regulatory authority and regulatory mandate to explain investment levels is largely weakened in the absence of sound policies. Similarly, Ortiz et al. (2017), who also used the Tracker scores in analyzing the effect of the regulatory environment on fixed broadband subscriptions, found that the regulatory regime (or specific rules) and the competition framework, while essential, will only work if an effective regulatory authority with the right mandate exists.

Overall Philippine Regulatory Environment

ITU's ICT regulatory tracker

Although the generations of regulation developed by the ITU do not necessarily reflect the Philippines' experience,[4] the ITU Tracker is a useful tool for understanding the gaps in a country's regulatory environment. Ortiz et al. (2017) reviewed the formal regulatory landscape in the Philippine telecommunication/ICT sector based on the methodology of the ITU ICT Regulatory tracker. The authors found that the quality of the Philippine ICT regulatory environment is significantly below what is regarded as international best practice. With 100 points representing the best possible scenario, the Philippines was only midway toward the ideal with a score of 52.50 (G2). More recently, as assessed by the ITU, the Philippines scored 74.5 (G3) (see Table 5).

[4] For example, following the US model, telecommunications service in the Philippines has always been provided mainly by private companies and not by the government or state-owned enterprises.

Table 5. ICT regulatory tracker: Philippines

Cluster	2017 PIDS Study	2020 ITU*
Regulatory authority (maximum possible: 20 points)	13	18
Regulatory mandate (maximum possible: 22 points)	10.5	17.5
Regulatory regime (maximum possible: 30 points)	7	17
Competition framework (maximum possible: 28 points)	22	22
Total (maximum possible: 100 points)	52.5	74.5

ICT = Information and communication technologies; ITU = International Telecommunication Union; PIDS = Philippine Institute for Development Studies
*Note: The ICT Regulatory Tracker is based on self-reported information gathered via official ITU Surveys to Member States Administrations, datasets compiled by international organizations, as well as desktop research based on official government sources and direct outreach to national telecom/ICT regulatory authorities. Official data received from Member States Administrations has been verified to the extent reasonably feasible.
Sources: Ortiz et al. (2017); ITU (2020b)

The seeming improvement in the scores from 2017 to 2020 is due primarily to differences in the assessments, as these were conducted by two different groups, although some changes occurred over the period. For example, the Mobile Number Portability Act (RA 11202) was passed in 2019, which allows consumers to switch to another provider using the same mobile number. See Appendix A for the breakdown of the ITU ICT Regulatory Tracker.

With the recent passage of the Public Service Act amendment (RA 11659) allowing full foreign ownership in telecommunications except by foreign state-owned enterprises, the Competition framework is expected to achieve a full score.

ITU's G5 collaborative regulation

With respect to G5, which is complementary to the other generations of regulation, the Philippines obtained a score of 68.98 out of 100 in 2021 (Table 6). See Appendix B for details.

Table 6. ITU Collaborative regulation(G5) benchmark: Philippines, 2021

Subcomponent	Score
National collaborative governance	24.70
Digital development toolbox	17.13
Digital economy policy agenda	14.74
Policy design principles	12.04
Total (maximum possible: 100 points)	68.98

G5 = Fifth-generation collaborative regulation
Source: ITU (2021d)

The G5 Benchmark, released in 2021, is based on various sources, such as surveys of state administrators, datasets from international organizations, desk research, and ICT regulatory authorities. It shows the following results for the Philippines:

National collaboration governance

The NTC is mandated to regulate spectrum and broadcasting. It informally or semiformally collaborates with the DICT for cybersecurity, postal regulation, and ICT regulation, as well as with the health and environment departments. It also has a formal collaboration with the National Privacy Commission for data protection, *Bangko Sentral ng Pilipinas* (BSP) for finance, Energy Regulatory Commission for energy matters, Philippine Competition Commission (PCC) for competition, Department of Trade and Industry (DTI) for consumer protection, and National Economic and Development Authority (NEDA) for economic development matters. NTC has no collaboration with transport regulators.

Digital development toolbox

The Philippines has a national digital strategy, yet it lacks mechanisms for implementation or operational objectives. The government is also

transitioning into e-government. Existing regulations and policies cover ICT accessibility for persons with disabilities, child online protection, cybersecurity/cybercrime, public service (i.e., smart cities, e-health, and e-education), and data protection laws. The digital strategies and policy development incorporate Sustainable Development Goals, support sustainable consumption and production, and create strategies for youth employment. The provision of broadband services includes women, while it still needs to extend to persons with disabilities and youth.

However, the country lacks regulations or policies for emergency telecommunications (i.e., National Emergency Telecommunication Plans)[5] and infrastructure sharing, such as an official register or mapping of all telecommunications infrastructure in the country and cross-sector infrastructure sharing or fiber co-deployment. Furthermore, regulations or policies are not in place for digital identity framework and e-waste regulations/management standards. Recognizing the social and economic contribution of the digital economy, especially during the COVID-19 pandemic, these tools are essential to sustain its development with the evolving needs of consumers and businesses and changing market dynamics (ITU 2021e). Regarding the ITU's G5 Benchmark in 2021, it should be noted that the new government administration's plans for the next six years include institutionalizing the National Broadband Plan, policies in using passive infrastructure, and public safety and emergency telecommunications (NEDA 2023).

Digital economy policy agenda

The country joined initiatives in regional integration, which included ICT chapters, and made commitments to facilitate trade in telecommunication services. Policies and regulations exist for innovation, digital market, e-commerce or e-transactions, and competition. Digital strategies include multiple economic sectors, and digital market players are offered incentives. The Philippine digital economy needs forward-looking strategies or policies focusing on spectrum (e.g., 5G, IMT-2000, satellite), IoT, spectrum management, cloud computing, and AI. Specific taxes for the digital sector or internet services are yet to be implemented.

[5] https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/2022/NETP%20baseline%20one-pager.pdf

Policy design principles

Decisions pass through administrative procedures, and affected stakeholders may request reconsideration or appeal. Mechanisms for regulatory experimentation and regulatory sandboxes for digital financial inclusion are also in place. Enacted laws and policies are available on government websites. Public access to information and ethics rules are in place. Public consultations are one of the tools used to gather feedback from stakeholders. However, the mechanisms of how and when they are considered or incorporated remain unclear. National policies and regulations are not entirely technology and service-neutral for authorization or operating licenses or spectrum. There is no regulatory impact assessment before decisions are made. In addition, regulatory agencies neither conduct policy rolling reviews nor ex-post policy rolling reviews.

Specific Structural Issues in the Philippine ICT Regulatory Environment[6]

According to Chaoub (2021), various technologies are now available to address the digital divide, including:

- Non-terrestrial networks, which are remote-ready, long-range, and robust technologies, such as satellites (e.g., low earth orbit satellites), unmanned aerial vehicles, and high-altitude platform stations;
- TV or GSM WS tower: long-range wireless technology that delivers ICT services over less power and penetrates difficult terrains;
- Cost-effective software-defined technology, such as integrated access and backhaul-based satellite station; and
- Other connectivity solutions: Free space optical unit, ground stations, wireless towers and Wi-Fi technology, and PLC [planar lightwave circuit] or fiber connections.

In addition, business models, such as the mobile virtual network operator model, community network model, and hybrid model, are

[6] See Appendix C for the list of the relevant laws and regulations discussed in this chapter, listed in chronological order.

possible options for providing internet connectivity in the countryside. Some rural areas in the Philippines use signal repeaters, makeshift towers, and directive antennas to improve connectivity. The DOST has developed the Robust and Rapidly Deployable GSM Base Stations and Backhaul for Emergency Response as a backup communication channel during disasters. Other private sectors deployed community cellular networks and mobile telephony in rural areas, similar to other countries.[7]

Although various solutions are now available to address the digital divide in the country, an enabling regulatory environment is still lacking. Instead, outdated laws have stifled the expansion of digital infrastructure and access to the internet (Mirandilla-Santos 2021). This section focuses on structural issues highlighted in past studies and validated in the KIIs as the key impediments.

Weak regulatory authority and independence

Regulatory mandate

Three primary institutional design models exist for regulators overseeing the ICT sector—the sector-specific regulator, the multisector regulator (e.g., a utilities-based regulatory authority), and the converged regulator. In 2017, more than 70 percent of regulators globally were converged (ITU and WB 2020). International best practices call for creating a consolidated regulator with jurisdiction over ICT and media/broadcasting. The requirement for formal coordination procedures across agencies/authorities is no longer necessary because one authority regulates various services, which often makes planning and launching converged technologies and services more effective. As a result, converged regulators help enable market integration in a converged system (ITU 2020b).

As indicated in Box 3, the NTC could be considered a converged regulator, as it is responsible for telecommunications, media/broadcasting, and spectrum. Its mandate is based on several laws and executive orders (EOs).

[7] Dr. Franz A. de Leon (Director, DOST-ASTI), in response to authors' questions on June 07, 2022

Box 3. Mandate of the National Telecommunications Commission

- To regulate the installation, operation and maintenance of radio stations both for private and public use (Radio Control Law, Act 3846, as Amended).
- To regulate and supervise the provision of public telecommunications services (Radio Control Law, Act No. 3846, as Amended and Public Telecommunications Policy Act of 1995, RA 7925).
- To manage the radio spectrum (Radio Control Law, Act 3846, as Amended and Public Telecommunications Policy Act of 1995, RA 7925)
- To regulate and supervise radio and television broadcast stations, cable television (CATV) and pay television (EO 546 and EO 205).
- Regulate, supervise and control all radio communications, telecommunications and broadcast, including cable television, facilities and services, and promote consumer welfare and protection.

RA = Republic Act
Source: Lifted in full from NTC (n.d.)

As stated in EO 546 and RA 7925, part of the functions of the NTC covers the protection of consumers and industry participants.[8] The National Broadband Plan (DICT 2017) proposed to amend and revise RA 7925 to strengthen the roles of DICT and NTC to promote competition by redefining the market structure, revising the law to accommodate technology advancements (e.g., shifting from telephone to internet paradigm), and setting specific clauses to protect consumer rights, among others. The amendment should also include the role of the PCC in upholding competition in the telecommunications and ICT market.

[8] EO 546, Section 15-g (Functions of the Commission): "Promulgate such rules and regulations, as public safety and interest may require, to encourage a larger and more effective use of communications, radio, and television broadcasting facilities and to maintain effective competition among private entities in these activities whenever the Commission finds it reasonably feasible"; RA 7925, Article III (Administration), Section 5 (Responsibilities of the National Telecommunications Commission): "(b) Ensure quality, safety, reliability, security, compatibility, and interoperability of telecommunications facilities and services in conformity with standards and specifications set by international radio and telecommunications organizations to which the Philippines is a signatory; (d) Foster fair and efficient market conduct through, but not limited to, the protection of telecommunications entities from unfair trade practices of other carriers; (e) Promote consumers welfare by facilitating access to telecommunications services whose infrastructure and network must be geared towards the needs of individual and business users; (f) Protect consumers against misuse of telecommunications entity's monopoly or quasi-monopolistic powers by but not limited to the investigation of complaints and exacting compliance with service standards from such entity".

Regulatory authority and independence

There is a perception that the NTC is a powerful agency, given its mandate and the functions assigned to it by various laws. However, it is the regulatory independence or lack thereof that better reflects its authority.

The establishment of an independent regulator is one of the key determinants of private investment in digital development. Together with privatization and competition, they provide investors with confidence in the quality of the regulatory environment of a country. The existence of an independent regulatory agency, in particular, signals impartiality in decisionmaking and regulatory certainty regardless of changes in government (UNCTAD 2017). An effective regulatory authority with the proper mandate is necessary to enforce the regulatory regime (or specific rules) and competition framework (Ortiz et al. 2017). Countries need to have strong regulatory institutions and improve their capacity to implement and enhance rules (Montenegro and Araral 2020).

The independent regulator is the gold standard in regulation, especially for infrastructure services such as telecommunications, where credibility and stability are of paramount importance. Regulators need to be sufficiently insulated from short-term political pressure and regulatory capture by industry.

According to Brown et al. (2006), the key characteristic of the independent regulator model is decisionmaking independence, which means that its decisions are made without the prior approval of any other government entity, and only a court or a preestablished appellate panel can overrule the regulator's decisions. Furthermore, the institutional building blocks for decisionmaking independence consist of (1) organizational independence (organizationally separate from existing ministries and departments), (2) financial independence (an earmarked, secure, and adequate source of funding), and (3) management independence (autonomy over internal administration and protection from dismissal without due cause).

Table 7 shows the key characteristics of the NTC when benchmarked against the independent regulator standard (Ortiz et al. 2017; Barcenas and Serafica 2018).

Table 7. Characteristics of an independent regulator versus the NTC

Independent Regulator (the gold standard for the regulation of infrastructure services)	NTC
Created by law	Executive Order 546 (s.1979)
Board of commissioners (decisionmakers)	Headed by a commissioner and two deputies
Fixed terms for regulatory agency commissioners	NTC officials do not have a fixed term of office
Personal independence	NTC officials are not shielded from litigation
	NTC does not pay for the costs related to the litigation of its officials
Financial and organizational independence	Administrative structure and personnel decisions require approval by the DBM
Stable and reliable sources of revenue; Diverse sources of funding	Source of funding is solely from government annual appropriations from Congress

NTC = National Telecommunications Commission; DBM = Department of Budget and Management
Source: (Ortiz et al. 2017; Barcenas and Serafica 2018)

A regulatory agency should be created by law as such legal standing enhances its independence by precluding any legal interference. Moreover, decisionmaking should be done by a board of commissioners (vs. a single regulator). The National Telecommunications Commission was created by EO 546 (s.1979) on "Creating a Ministry of Public Works and a Ministry of Transportation and Communications" (see Box 4). The NTC is headed by a commissioner and two deputies following Sec. 16. Although there is only one commissioner, the Supreme Court ruled in 1997 that the NTC is a collegial body and that decisionmaking is not vested in the commissioner alone.

The President can overrule NTC's decisions, and as an attached agency to the DICT, the DICT can question NTC's policies and programs. Also, the NTC officials are not shielded from litigation in the exercise of their functions. NTC is not required to conduct public consultations, except for quasi-judicial issues (Ortiz et al. 2017; Barcenas and Serafica 2018).

The EO provides some guidance on the professional qualifications or technical backgrounds of the commissioners, but it is not required.

Box 4. Creation of the National Telecommunications Commission

> Sec. 14. National Telecommunications Commission. The Board of Communications created under Article III, Chapter I, Part X of the Integrated Reorganization Plan, as amended, and the Telecommunications Control Bureau created under Article IX, Chapter I, Part X of the same Plan, as amended, are integrated into a single entity to be known as the National Telecommunications Commission and hereinafter referred to as the Commission.
>
> Sec. 16. Organization of the Commission. The Commission shall be composed of a Commissioner and two Deputy Commissioners, preferably one of whom shall be a lawyer and another an economist. The Commissioner and Deputy Commissioners shall be of unquestioned integrity, proven competence, and recognized as experts in their fields, related, as much as possible, to communications.
>
> The Commission shall determine its organization structure and personnel subject to the approval of the Ministry and other authorities concerned.
>
> The Commission shall be under the supervision and control of the Ministry, except that with respect to its quasi-judicial functions, its decisions shall be appealable in the same manner as the decisions of the Board of Communications had been appealed. The Commission may have regional offices in places and of such number as may be authorized under Article I, Chapter III, Part II of the Integrated Reorganization Plan, as amended.

Source: Executive Order 546 (s. 1979)

Commissioners or directors of regulatory agencies should be appointed to fixed terms of office, and their tenure should not be concurrent with the term of office of government officials and legislators. Unlike other regulators, such as the National Privacy Commission, the Energy Regulatory Commission, or the Philippine Competition Commission, NTC officials do not have a fixed term of office.

The regulatory agency must have the power to establish the administrative structure of the agency and make all relevant personnel decisions. In the case of the NTC, the creation or reclassification of all positions requires the approval of the Department of Budget and Management.

The regulatory agency must have a stable and reliable source of revenue for its operations. Moreover, it should be able to offer competitive compensation packages and career opportunities, including training and education. Multiple funding sources generally provide the regulator with more financial independence and autonomy in decisionmaking (ITU 2020b).

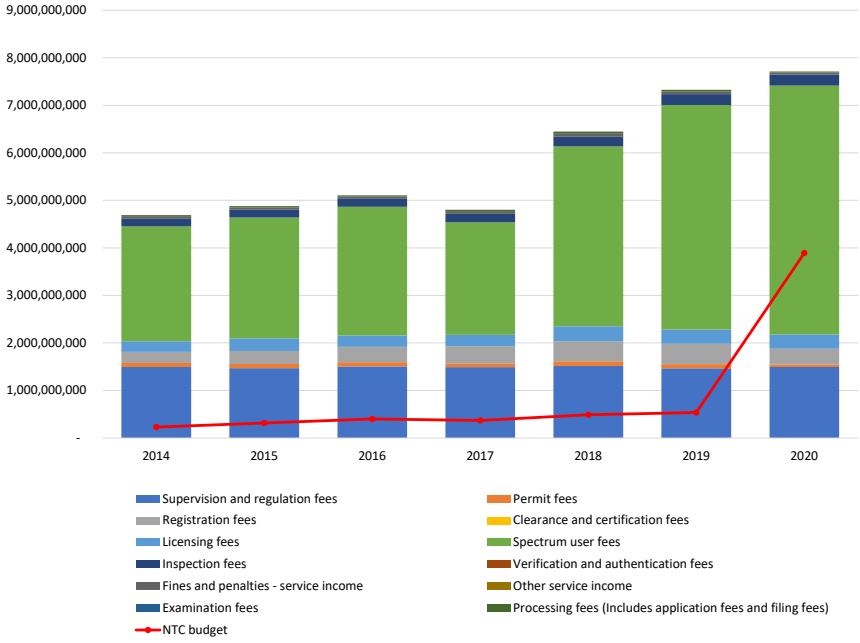
The NTC only relies on annual appropriations from Congress. Fees collected are remitted to the National Treasury in line with the

One Fund concept. The annual budget of the NTC is less than 10 percent of its revenues.

Unlike other regulators such as the BSP, PCC, and the SEC, the NTC is not exempt from the Salary Standardization Law.

As shown in Figure 18 and Table 8, the NTC receives the highest proportion of revenue from spectrum user fees, with an increasing trend from 2017 to 2020, collecting about PHP 5 billion in 2020. Supervision and regulation fees also provide earnings of about PHP 1.3 to 1.5 billion from 2014 to 2020. Revenues from registration, licensing, and inspection fees in 2020 amounted to an estimated PHP 232–328 million each. Other revenue sources are permit fees, fines and penalties-service income, filing fees, application fees, other service income, clearance and certification fees, examination fees, and verification and authentication fees. In 2020, the NTC collected a total revenue of PHP 7.7 billion (PHP 3 billion more than the PHP 4.7 billion in 2014).

Figure 18. NTC sources of revenue (PHP) vis-à-vis NTC budget, 2014–2020



NTC = National Telecommunications Commission; PHP = Philippine peso
Sources: NTC (2014-2020); DBM (various years)

Table 8. NTC budget, 2017–2020

NTC Budget (in million PHP)	2017	2018	2019	2020	2020*
General administration and support	99	112	120	185	185
Operations	271	377	417	3,706	431
Total appropriations	370	489	537	3,891	616
*Without locally funded project					
NTC revenues (in million pesos)					
Supervision and regulation fees (SRF)	1,490	1,517	1,465	1,495	1,495
Spectrum user fees (SUF)	2,365	3,785	4,720	5,235	5,235
Other fees	888	1,077	1,089	939	939
Service income (fines and penalties; others)	59	66	53	42	42
Total NTC revenues	4,802	6,446	7,328	7,712	7,712
As a share of revenues from supervision and regulation fees (%)					
General administration and support	6.67	7.39	8.21	12.34	12.34
Operations	18.17	24.88	28.47	247.91	28.85
Total appropriations	24.84	32.26	36.68	260.25	41.19
As a share of total NTC revenues (%)					
General administration and support	2.07	1.74	1.64	2.39	2.39
Operations	5.64	5.85	5.69	48.06	5.59
Total appropriations	7.71	7.59	7.33	50.45	7.98

NTC = National Telecommunications Commission; PHP = Philippine peso
Sources: NTC (2014, 2015, 2016, 2017, 2018, 2019, 2020); DBM (various years)

Restrictive and burdensome licensing and authorization regime

Entry and establishment

Following international best practices, the regulator should have the sole authority for licensing. An unbiased and independent regulatory authority will have the competence to assess technical and financial qualifications. Additionally, being the lone authority, it can more readily respond to market needs and determine entry conditions. Among members of the Asia-Pacific Economic Cooperation, the Philippines is the only country that requires legislative approval before applying for a certificate to operate from the regulator (Ortiz et al. 2017). Although Congress can delegate to an administrative agency such as the NTC any franchise or certificate necessary for the operation of public service, RA 7925 (1995) specifically requires a legislative franchise to enter the Philippine market. A Certificate of Public Convenience and Necessity (CPCN) must also be obtained from the NTC.

The requirement to obtain a franchise applies to the six types of telecommunications entities listed in RA 7925: local exchange operator, inter-exchange carrier, international carrier, VAS, mobile radio services, and radio paging services. However, for value-added service providers, a franchise is not a requirement if it does not put up its own network. RA 3846 (An Act Providing for the Regulation of Radio Stations and Radio Communications in the Philippine Islands and for Other Purposes, enacted on August 10, 1963), as amended, also requires a legislative franchise to construct, install, establish, or operate a radio station. Considering the industry's fast-changing landscape, DICT (2017) has proposed to delineate the ICT sector into three categories: (1) content or applications provider, (2) network provider, and (3) service provider. It also recommends amending the Radio Control Law (RA 3846) to provide guidelines for emerging players such as mobile virtual network operators. The requirements should be reduced and the procedures simplified for the entry of market players who want to build and operate internet-based networks.

Barcenas and Serafica (2018) observed that securing a legislative franchise takes significant time and resources, as the process is similar to the passage of any ordinary law. As described, "the passage of a law granting a legislative franchise could take approximately two years

and may extend to five years if not approved within a given term, as members of Congress are elected every three years" (p.30). By the time approvals have been obtained from Congress and the NTC for the franchise and CPCN, respectively, technology and market conditions may have already changed substantially.

Securing a legislative franchise is not aligned with international best practices as it duplicates the function of the regulator. Removing the requirement could be a challenge, however, not only in terms of the willingness of Congress to give up this authority but also from the perspective of existing franchise holders. For example, it was noted in one interview conducted for this study that enfranchised entities such as telcos enjoy tax breaks for the purchase of equipment, while internet service providers (ISPs) who are value-added service (VAS) operators that do not have a legislative franchise are not accorded the same privilege (presumably because they are not building a network). There may be other perks enjoyed by franchise holders, which are extended indefinitely or as long as the legislative franchise system exists. Section 23 of RA 7925 on the Equality of Treatment in the Telecommunications Industry states that "any advantage, favor, privilege, exemption, or immunity granted under existing franchises, or may hereafter be granted, shall ipso facto become part of previously granted telecommunications franchises and shall be accorded immediately and unconditionally to the grantees of such franchises: Provided, however, that the foregoing shall neither apply to nor affect provisions of telecommunications franchises concerning territory covered by the franchise, the life span of the franchise, or the type of service authorized by the franchise." Equality of treatment is reflected in the respective laws granting the franchise.

More recently, EO 127 (s. 2021) on Expanding the Provision of Internet Services through Inclusive Access to Satellite Services, Amending EO 467 (s. 1998), was signed, which allows enfranchised telecommunications entities as well as ISPs and VAS providers registered with the NTC to directly access all satellite systems for fixed or mobile and international or domestic access. Broadcast service providers may also be permitted direct access to international fixed satellite systems subject to NTC rules, regulations, and authorizations. The satellite system providers should be accredited by the DICT.

The Public Service Act (RA 11659) amendment, signed into law in March 2022, removed foreign equity restrictions in the ownership of telecommunications and other industries considered public services but not public utilities. Safeguards were put in place (e.g., in the case of foreign state-owned enterprises) in the interest of national security. Previously, the 40 percent maximum foreign ownership limit was a major barrier to entry into the sector.

The NTC issues service-specific and multiservice individual licenses (Ortiz et al. 2017). However, issuing service-specific licenses is a lengthy process since it only applies to a particular type of service over a specific kind of network. Multiservice individual licenses are considered better than service-specific licenses to facilitate service innovations. However, unified or global licenses are preferred best to increase market liberalization, keep up with the growth and innovation of the ICT sector, and equalize all service providers to promote competition. It should be noted that issuing individual licenses for radio spectrum authorizations is still a common practice worldwide, especially when the demand for a specific frequency band exceeds availability (ITU 2020b).

As discussed earlier, NGN and convergence have removed the traditional market barriers and increased the value of neutrality and flexibility in authorization regimes. Traditional authorization processes and techniques need to be carefully reconsidered as the parameters of the ICT sector evolve. Network operators and access providers seek regulatory certainty as they invest in building new infrastructure and upgrading equipment. With this, regulators need to ensure the regulatory framework is flexible to allow technological innovations for the ICT industry to provide efficient and new services (World Bank et al. 2011).

Ongoing operations

ICT operators are subjected to various requirements and permits from the regulator and other agencies, including local government units (LGUs). As shown in the previous section, the NTC imposes various fees on ICT operators. The acquisition of the right-of-way and other permits from LGUs is also one of the constraints to establishing telecommunications networks (Barcenas and Serafica 2018).

World Bank (2020a, p.42) notes that some bureaucratic procedures, such as arbitrary fees and permits, might be viewed as "institutionalized barriers to competition" since they inhibit timely and cost-effective infrastructure expansion in the last mile. Service providers are required to comply with an estimated average of 25 permits, depending on the location of the cell site and other requirements imposed by the authorizing institution. Streamlining processes in obtaining permits and licenses among pertinent organizations, LGUs, and associations and simplifying administrative registration and qualification procedures for the assignment of radio spectrum and entry broadband network providers should be considered.

To enable faster rollout, LGUs are encouraged to streamline permits and processes by establishing offline and online one-stop-shop facilities. Likewise, the national government may also consider the review of existing permits and licenses perceived as unnecessary and redundant requirements (DICT 2017).

Other issues

Quasi-judicial vs. administrative process. Based on the KIIs, the quasi-judicial nature of decisionmaking by the NTC also acts as a significant barrier to entry and operations of telecommunications entities. For example, before you can be authorized to build the network, it goes through a quasi-judicial process, which could take from 6 months to a couple of years. This slows down the ability of the industry to respond to market changes.

Impact on research and development (R&D) and innovation. DOST-ASTI, which conducts R&D in ICT and electronics, is bound by the same policies and regulations as any service-oriented, operations-focused, and profit-oriented public or private entity. For example, in granting spectrum assignments or radio frequency permits and licenses, there is no special consideration for activities that fall under R&D. If the Institute applies for such permits and licenses, it is subjected to the same evaluation criteria as other non-R&D companies, which lead to delay or denial of permits crucial to carrying out R&D.

Lack of coherent framework and transparency in spectrum management
Radio spectrum is used to transmit information wirelessly for many vital services such as television and radio broadcasts, mobile phones, and Wi-Fi, as well as baby monitors, global positioning system (GPS), and radar (See Box 5). As the world becomes more reliant on this expanding range of services, the demand for the limited supply of usable radio waves is quickly increasing. Radio spectrum easily lacks supply due to the public's need for more information, faster connectivity, and higher-definition media. In addition, there is a greater chance of service interference since radio spectrum is used more often. Governments employ spectrum management to "ensure there is sufficient spectrum for the services which need it the most and provide the greatest socioeconomic benefits, encourage spectrum efficiency so the scarce resource can be maximized, and minimize interference nationally and internationally" (GSMA 2017a, p.8).

Box 5. Defining spectrum and radio spectrum

A **spectrum** is a "range of different electromagnetic waves which vary according to frequency and includes radio waves, x-rays, infrared waves, and visible light rays, among others. In the mobile industry, it tends to refer to the portion occupied by radio waves that extend from those at low frequencies such as 10 kHz up to high frequencies such as 100 GHz" (p.37).

A **radio spectrum** is a "portion of the electromagnetic spectrum below 300 GHz, which, by virtue of its natural characteristics, is suitable for the propagation of radio waves. The radio spectrum is divided into a number of designated blocks, called bands, which are assigned to various user categories for specific purposes (e.g., mobile services or TV broadcasting) and may be assigned by a national regulator to a particular user" (p.34).

kHz = kilohertz; GHz = gigahertz; TV = television
Source: GSMA (2017b)

National governments largely influence the quality and accessibility of wireless services, which include high-speed mobile broadband with broad coverage, high-definition television and radio broadcasts, navigation systems (e.g., GPS, Galileo), and efficient air traffic control, among others. At an international level, governments from different countries come together to decide on allocating spectrum to particular services. This minimizes global and local interference,

reduces equipment costs, and enables roaming onto foreign networks. National governments then employ different types of licenses to use these frequency bands for particular service providers. A fair and transparent licensing regime attracts investments in ICT services, benefitting consumers and businesses (GSMA 2017a). Because the radio spectrum is a national resource, each country's government has the authority and responsibility over its use (see Box 6).

Box 6. Differentiating spectrum allocation and assignment

A national regulator has the power to allocate and assign spectrum.

Spectrum allocation means designating a frequency band to a particular type of service, whether for mobile, satellite, broadcasting, or other services, based on the National Frequency Allocation Table and in conformity with the ITU's Radio Regulation.

Spectrum assignment refers to assigning a specific frequency channel within a specific frequency band to a specific user.

Example: A particular frequency band might be allocated for mobile services and then divided into frequency channels which can be assigned to different mobile service operators.

Goals in assigning spectrum: The national regulators are guided by various goals in assigning spectrum, which may be prioritized depending on the market conditions. These involve optimizing economic value, maximizing societal value, increasing tax revenue, encouraging investment, impacting market structure, maximizing the value of services, and creating fair assignments.

Source: (GSMA 2017a)

Despite having the authority, the DICT has yet to establish a spectrum management policy for the NTC to adopt (Galla 2018). Currently, spectrum management is a function carried out by the NTC, which grants permits for the use of radio frequencies for wireless telephone and telegraph systems and radio communication systems, including amateur radio stations and radio and television broadcasting systems (EO 546 s. 1979, Sec. 15c). Under section 15 of RA 7925, the NTC can collect a reasonable fee for the use of the spectrum. Currently, spectrum fees are based on three factors: (1) bandwidth—the wider the bandwidth, the more expensive; (2) where it will be used—the fees are lower if used in rural areas; and (3) the demand for spectrum—the lower the demand, the lower the fees. Where demand for specific frequencies

exceeds availability, the Commission is mandated to hold open tenders to ensure wider access.

In the Philippines, all frequencies have been assigned through a simple administrative procedure comparable to a "beauty pageant", which will likely benefit incumbents and major telecommunications companies and leaves little chance for spectrum to be allocated to a new entrant. Additionally, "inefficiencies and underutilization of spectrum bandwidth, not to mention limiting the flexibility in service provision and impeding technological developments" exist due to the administrative approach to frequency assignment (World Bank 2020a, p.45). While spectrum is assigned through an administrative process, it is recalled through a quasi-judicial process. For example, a telco can request for spectrum, and the NTC can give an additional five (5) megahertz in the 900-megahertz band, and no letter is needed. However, if the state wants to recall it, the NTC will need to conduct hearings.

The lack of transparency in spectrum management and its implication on competition was illustrated in 2016 when the NTC approved, within four days, the co-use by Globe Telecom Inc. and Smart Communications Inc. of the radio frequencies assigned to Bell Tellecomunication Philippines Inc. (BellTel). BellTel is a subsidiary of Vega Telecommunications Inc., the telecommunications business of San Miguel Corp., which was sold to the Globe and Smart (Cabuenas 2016). Concerns about the viability of a third player that could improve competition in the market prompted the Senate to conduct an inquiry (Senate Resolution 213) (see Box 7).

Senate Committee Report 78 (s. 2017) recommended boosting competition by implementing a more transparent system for spectrum assignment, refarming, and allocation, as well as creating, promoting, and implementing a competitive selection process for allocating publicly owned spectrum. Following good regulatory practice, all applications, approvals, and decisions for test permits, demonstration permits, assignments, reassignment, or co-use of the spectrum should be published. Additionally, the NTC should conduct public consultations before issuing any approvals. The policy should specify the procedures NTC shall follow in recalling and reassigning spectrum to ensure enough spectrum for various operators. Setting the timeframe for a spectrum assignment review and disclosing the outcomes of such a review improves transparency. The NTC and DICT can explore using

innovative spectrum management practices, including dynamic spectrum allocation (World Bank 2020a).

The system must be updated in a way that best meets the needs of the general public and encourages greater market competition. As stated in the National Broadband Plan (DICT 2017), the government must explore the following strategies to ensure that the existing spectrum can supply and support current and future applications: (1) repurpose or recall assigned but unutilized and underutilized spectrum, (2) encourage co-use of spectrum, and (3) implement dynamic spectrum allocation.

It has also been noted that in other countries, priority in the use of spectrum is given to the military, law enforcement, and emergency services, but there is no such policy in the Philippines. Support for R&D activities in the ICT sector, especially those conducted by the public sector, is also not prioritized. When granting spectrum assignments or radio frequency permits and licenses, DOST-ASTI must follow the same rules and regulations as any other public or private entity. The government does not give special treatment to DOST-ASTI even though it is a government agency that conducts important research and development work.

Box 7. When a public property is treated as a private asset

During the Senate's public hearing on the "model of operation and regulation of the telecommunication industry", the National Telecommunications Commission (NTC) stated that there is sufficient spectrum allocation for a third player to enter the telecommunications industry. The regulator admitted however that "the entry of a third player will require massive capitalization and would most likely require government support—a position strikingly similar to that of Globe and Smart" (p.11).

The NTC believed that Globe and Smart's co-use of the frequencies previously assigned to BellTel would be beneficial to consumers, as this would significantly improve the services of the two telcos. However, in acquiring the 700MHz frequencies which are considered "workhorse frequencies", the entry of a third player that could viably compete was effectively prevented.

The joint acquisition of the 700 MHz frequencies demonstrates the NTC's failure to effectively govern publicly owned spectrum, which has led to the practice of private trading of spectrum. Private corporations have treated spectrum assignment as their own property, allowing relatively easy and effective "spectrum trading" through corporate mergers and acquisitions.

Source: Senate of the Philippines (2017)

Research entities with approved funding from the Philippine government act as quasi-public telecommunications entities (PTEs). However, such groups experience difficulty importing and deploying radio equipment, as these activities are limited to PTEs. This situation severely hampers the implementation of their research projects. As a recourse, government-implemented projects have sought assistance from frequency assignees for concurrence to co-use their assigned frequencies in areas where they have no network presence and deployments (see Box 8 for examples).

Box 8. R&D activities of the government

Case 1: Project ROGER used GSM frequencies assigned to EXTELCOM. Project ROGER [Robust and Rapidly Deployable GSM Base Station and Backhaul for Emergency Response] requested EXTELCOM to allow the project to use their GSM frequencies in areas where they have no network presence. EXTELCOM agreed and ROGER was granted an NTC Demo Permit on a strictly non-interference basis.

Case 2: The Village Base Station Project used GSM frequencies assigned to Globe Telecom. The University of the Philippines, representing The Village Base Station Project, signed a memorandum of agreement with Globe Telecom, though its corporate social responsibility program, to "provide financial and infrastructure support, such as SIM cards, network-in-a-box equipment, radio frequencies, and other forms of assistance for the completion of the one-year pilot study".

These workarounds present a significant delay in the implementation of projects. National government agencies performing R&D to provide access in unserved and underserved areas should be (1) given the authority to import radio communication equipment operating at assigned bands for mobile broadband internet access; (2) granted the use of the said bands on a secondary and non-interference basis, specifically for use in unserved and underserved areas; and (3) considered as PTEs only for the purposes of implementation of relevant policies such as the revised Telco JMC of 2021.

R&D = research and development; ROGER = Robust and Rapidly Deployable GSM Base Station and Backhaul for Emergency Response network; EXTELCOM = Express Telecom; GSM = Global System for Mobile communication; SIM = Subscriber identity module; JMC = Joint Memorandum Circular

Source: Based on the authors' interview with Dr. Franz A. de Leon, director, DOST-ASTI on June 7, 2022

The NTC is also tasked to "Sub-allocate series of frequencies of bands allocated by the International Telecommunications Union to the specific services" (EO 546 s. 1979, Sec. 15d). It has been suggested, however, that following the spectrum allocation set by the ITU could

be quite limiting. As an archipelago, radio frequency interference with other countries is not a problem for the Philippines. It was noted that the standards for Wi-Fi, Bluetooth, and 5G were developed by other organizations.

Conclusion and Recommendations

Across different metrics, the internet performance of the Philippines remains subpar compared to ASEAN and other countries at the same level of development. The Philippines falls short of the affordability target for broadband services of less than 2 percent of monthly GNI per capita by 2025 set by the UN Broadband Commission. In 2021, the price of data-only mobile broadband in the Philippines was at 2.04 percent of GNI per capita, making it the most affordable broadband service, while fixed broadband was the most expensive at 11.56 percent. Moreover, in 2019, only 17.7 percent of Philippine households were connected to the internet. This means that roughly 4 in 5 households in the country are excluded from participating in the digital economy. Furthermore, internet access across regions is also disproportionate. Households in NCR are seven times more likely to have internet access than those in the BARMM. Bold measures are needed to achieve accelerated and inclusive digital connectivity.

An effective regulatory framework, composed of regulatory authority, regulatory mandate, regulatory regime, and competition model, is linked to a positive and significant improvement in ICT performance. The quality of the ICT regulatory environment in the Philippines falls short of global standards, especially in light of technological changes. This paper reviewed the overall regulatory environment and identified specific structural issues relating to the regulator, the licensing regime, and the management of radio spectrum. These issues are interrelated and complement each other. For example, regulatory independence cannot be fully achieved unless it is given the sole authority to grant licenses to operate and use radio spectrum. In turn, management of the radio spectrum must be based on a national policy that promotes the greatest socioeconomic benefits. According to ITU-R (2018), a legal framework for spectrum management should be

developed as a prerequisite for licenses or authorization since it is a scarce resource and can be influenced by market pressure.

The policy recommendations discussed in this paper are not new. Various studies, as well as the government's own development and sectoral plans, have already identified the same issues and policy prescriptions, including the specific laws to be amended or repealed, namely, the Public Telecommunications Policy Act (RA 7925) and the Radio Control Law (RA 3846). A separate charter for the regulator may also be needed. These laws were either adopted or last amended before the advent of broadband. Amending or creating laws should aim to speed up the adoption of various technological developments, especially in rural areas; attract more investment; and enhance the quality of service in ICT to bridge the gap in digital inequality. Various steps could be undertaken to move forward with these reforms.

Ensure the regulatory independence of the NTC

The independent regulator model is the gold standard in regulating infrastructure services such as telecommunications. The agency responsible for regulating ICT, which is the foundation of the digital economy, must be strengthened to carry out its role effectively. To replace EO 546 s.1979, which created the NTC, a new charter may be needed to consolidate the mandate of the NTC based on various laws, clarify the scope of its quasi-judicial and administrative functions and processes, and define its relationship with other agencies (e.g., the Philippine Competition Commission), among other things.

Most importantly, the principles of regulatory independence and key attributes of an independent regulator must be embedded in the NTC. The charters of ICT regulators in other countries, as well as cross-sectoral (transversal) and sector-specific regulators in the Philippines, could be examined. Insights and lessons could also be drawn from the experience of previous institutional reforms, particularly the creation of an independent central bank (see Stern and Trillas 2003 for similarities). The New Central Bank Act (RA 7653) contains specific provisions to ensure regulatory independence (in terms of institutional, personal, functional, and operational, as well as financial and organizational independence) while also incorporating good governance principles of transparency and accountability (Bagsic and Glindro 2006; SEPO 2011).

Reform the licensing regime to facilitate ICT development

The licensing regime is restrictive and burdensome, resulting in costs and delays in network buildup and the deployment of new technology. The types of licenses issued should be reviewed to liberalize market entry further. A main barrier to entry is the legislative franchise requirement. Moreover, obtaining and renewing a franchise, which is inherently a political process, contributes to uncertainty and increases the risks of investing in the digital infrastructure in the Philippines.

A study of the legislative franchise system could help convince policymakers to adopt international best practices in licensing where authority is given solely to the regulator. Additionally, a comprehensive assessment of the "advantage, favor, privilege, exemption, or immunity granted under existing franchises" (RA 7925, art. VIII, sec. 23) should also be conducted to develop a transition plan, if needed, and ensure that current franchise holders will not be worse-off under a simpler system.

Establish a policy framework for the management of radio spectrum

When 3G was state of the art in wireless technology, Llanto (2006) advocated reexamining the country's spectrum management policy. The review should involve, among others, "the allocation and assignment of current radio spectrum bands, a determination of the optimal allocation and assignment method, and a reallocation of the spectrum to its most efficient allocation and assignment" (p.8).

Almost two decades later, with 5G already commercially available and 6G on the horizon, a national spectrum policy has yet to be formulated for the NTC to implement. In consultation with multiple stakeholders, the DICT should develop the policy and framework to ensure that the spectrum is used efficiently and benefits everyone. A spectrum plan or roadmap should also be developed by the DICT, together with other agencies, such as the DOST and DTI, to ensure alignment with relevant technology and industry roadmaps, forecast demand, encourage long-term investment, and ensure that spectrum use contributes to achieving national socioeconomic goals.

Conduct further research and analysis on the barriers to entry and expansion in the ICT sector to reduce the digital divide

This study examined the regulatory environment and identified the constraints in radio frequency licensing regime and management.

Institutional issues were highlighted, specifically the need to strengthen the regulator.

Several other issues need continuous assessment. These include monitoring the evolving competition landscape, which may result in market disruption, and the impact of new and emerging technologies to ensure that regulations can adapt without stifling innovation. Given the challenge of reducing the digital divide in the country, exploring various approaches to ICT service provision in unserved and underserved areas would also be a useful policy research focus. Moreover, research on cybersecurity would be relevant, as the country is gaining an increasing awareness of its vital role in the digital economy.

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Appendix A. ITU ICT regulatory tracker: Philippines

Regulatory authority

Indicator	PIDS Study 2017	ITU 2020
Separate telecom/ICT regulator	A separate regulator exists – the National Telecommunications Commission. However, it has no fiscal autonomy, and the Commissioners have no security of tenure.	Yes
Autonomy in decisionmaking	Yes	Yes, for some decisions
Accountability	Reporting Requirements: Annual report to the sector Ministry (DICT) Budget: DBM recommends, while it is Congress that approves Appointment of head and members: the President appoints	Two different entities approve regulator's budget, appoint the members/head, and require reporting
Percentage of diversified funding	Government appropriation (100%)	Minimal influence
Public consultations mandatory before decisions	Yes, for its quasi-legislative powers	Yes
Enforcement power	NTC has sufficient enforcement power based on enabling laws (RA 7925, Act 3846, CA 146, EO 546, EO 125), and the rules and regulations it promulgates.	Yes
Sanctions or penalties imposed by regulator	Administrative fines and penalties and license revocation	Strong sanction
Dispute resolution mechanism	Yes	Yes
Appeals to decisions	Yes	Yes
Existence of competition authority	Yes. The Philippine Competition Commission was established in 2015	Yes
Total for cluster 1 (Maximum possible: 20)	13	18

ITU = International Telecommunication Union; ICT = information and communications technology;
Sources: Ortiz et al. (2017) and ITU (2020b)

Regulatory mandate

Indicator	PIDS Study 2017	ITU 2020
Traditional mandate: entity in charge of quality of service obligations measures and service quality monitoring	Enforcement of quality of service obligations measures – NTC	Regulatory authority/authorities
	Service quality monitoring – NTC	
Traditional mandate: entity in charge of licensing	Congress (Franchise) and NTC (CPCN)	Regulatory authority/authorities
Traditional mandate: entity in charge of interconnection rates and price regulation	Interconnection rates - None. It is negotiated by the parties.	Government and regulatory authority
	Price regulation – NTC	
Spectrum: Entity in charge of radio frequency allocation and assignment	NTC	Regulatory authority/authorities
Entity in charge of Spectrum Monitoring and Enforcement	NTC	Regulatory authority/authorities
Entity in charge of universal access/service	Operators	Regulatory authority/authorities
New mandate: entity in charge of broadcasting (radio and TV transmission)	NTC	Regulatory authority/authorities
New mandate: entity in charge of broadcasting content	Self-regulation (KBP)	Government and regulatory authority
New mandate: entity in charge of Internet content	Not regulated	Government and regulatory authority
New mandate: entity in charge of IT	Not regulated	Government and regulatory authority
Consumer issues: entity responsible for comparative tariff information, consumer education, and handling consumer complaints	Providing comparative tariff information – None	Regulatory authority/authorities
	Informing consumers of their rights (consumer education) – DTI	
	Handling consumer complaints – NTC (for regulated services) and DTI	
Total for cluster 2 (Maximum possible: 22)	10.5	17.5

NTC = National Telecommunications Commission; KBP = *Kapisanan ng mga Brodkastrer ng Pilipinas*; CPCN = certificate of public convenience and necessity; IT = information technology; DTI = Department of Trade and Industry
Sources: Ortiz et al. (2017) and ITU (2020b)

Regulatory regime

Indicator	PIDS Study 2017	ITU 2020
Types of licenses provided	Service-specific individual licenses - Yes Multi-service individual licenses - Yes Unified/global licenses - No General authorizations - No Registration - Yes for Value Added Services and license-exempt equipment	Unified/global licenses, General authorizations, or Simple notification
License exempt		License-exempt regime exists
Operators required to publish Reference Interconnection Offer	No	No
Interconnection prices made public	No	Yes
Quality of service monitoring required	No	Yes
Infrastructure sharing for mobile operators permitted	Yes	Yes
Infrastructure sharing mandated	No. It is considered by NTC as a business decision of the operators.	No
Co-location/site sharing mandated	It is encouraged by NTC.	No
Unbundled access to the local loop required	No	No
Secondary trading allowed	No	No
Band migration allowed	No	Yes
Number portability available to consumers and required from fixed-line operators	No	No
Number portability available to consumers and required from mobile operators	No	Required by law but currently unavailable to consumers
Individual users allowed to use VoIP	Yes	Yes
National plan that involves broadband	Yes, through DICT.	Yes
Total for cluster 3 (Maximum possible: 30)	7	17

NTC = National Telecommunications Commission; DICT = Department of Information and Communications Technology
Sources: Ortiz et al. (2017) and ITU (2020b)

Competition framework

Indicator	PIDS Study 2017	ITU 2020
Level of competition in local and long-distance (domestic and international) fixed-line services	Local fixed line services - Full competition Domestic fixed line services - Full competition International fixed line services - Full competition	Full competition
Level of competition in IMT (3G, 4G, etc.) services	Full competition	Full competition
Level of competition in cable modem, DSL, fixed wireless broadband	DSL - Full competition Cable modem - Full competition Fixed Wireless Broadband - Full competition	Full competition
Level of competition in leased lines	Full competition	Full competition
Level of competition in International Gateways	Full competition	Full competition
Status of the main fixed line operator	Fully privatized or private	Fully privatized/ Private
Legal concept of dominance or Significant Market Power (SMP)	The term "dominance" is fully recognized in the Philippine Competition Act (Republic Act 10667, Section 4) and its IRR. As stated in Rule 2 of the IRR, "Dominant position refers to a position of economic strength that an entity or entities hold which makes it capable of controlling the relevant market independently from any or a combination of the following: competitors, customers, suppliers, or consumers."	Yes
Criteria used in determining dominance or SMP	Rule 8, Section 2 of the Philippine Competition Act's IRR. The criteria are listed as follows: a. The share of the entity in the relevant market and the ability of the entity to fix prices unilaterally or to restrict supply in the relevant market	Three or more criteria

Competition framework (continued)

Indicator	PIDS Study 2017	ITU 2020
	b. The share of other market participants in the relevant market	
	c. The existence of barriers to entry and the elements that could foreseeably alter both the said barriers and the supply from competitors	
	d. The existence and power of its competitors	
	e. The credible threat of future expansion by its actual competitors or entry by potential competitors (expansion and entry)	
	f. Market exit of actual competitors	
	g. The bargaining strength of its customers (countervailing power)	
	h. The possibility of access by its competitors or other entities to its sources of inputs	
	i. The power of its customers to switch to other goods or services	
	j. Its recent conduct	
	k. Its ownership possession or control of infrastructure which is not easily duplicated	
	l. Its technological advantages or superiority, compared to other competitors	
	m. Its easy or privileged access to capital markets or financial resources	
	n. Its economies of scale and of scope	
	o. Its vertical integration	
	p. The existence of a highly developed distribution and sales network	

Competition framework (continued)

Indicator	PIDS Study 2017	ITU 2020
Foreign participation/ ownership in facilities-based operators	Minority interest	Moderate control
Foreign participation/ ownership in spectrum-based operators	Minority interest	Moderate control
Foreign participation/ ownership in local service operators/long-distance service operators	Local service operators - Minority interest Long-distance service operators - Minority interest	Moderate control
Foreign participation/ ownership in international service operators	Minority interest	Moderate control
Foreign participation/ ownership in Internet Service Providers (ISPs)	Minority interest	Moderate control
Foreign participation/ ownership in value-added service providers	Minority interest	Moderate control
Total for cluster 4 (Maximum possible: 28)	22	22

Sources: Ortiz et al. (2017) and ITU (2020b)

Overall score

	PIDS Study 2017	ITU 2020
Overall score	52.5	74.50

PIDS = Philippine Institute for Development Studies; ITU = International Telecommunication Union
Sources: Ortiz et al. (2017) and ITU (2020b)

Appendix B. ITU collaborative regulation (G5) benchmark: Philippines, 2021

National Collaborative Governance	24.07
Collaboration with (independent) spectrum authority	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority
Collaboration with (independent) broadcasting (content) authority	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority
Collaboration with cyber security agency	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority
Collaboration with CERT	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority
Collaboration with (independent) data protection authority	Yes, formal collaboration (MOU or joint program or committee)
Collaboration with ICT ministry or ICT regulator and information society agency	Yes, informal or semiformal collaboration or activities carried out under the same ministry
Collaboration with (Independent) finance regulator	Yes, formal collaboration (MOU or joint program or committee)
Collaboration with energy regulatory authority	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority
Collaboration with transport regulatory authority	No collaboration, no entity in charge, or no data
Collaboration with (independent) competition authorities	Yes, formal collaboration (MOU or joint program or committee)
Collaboration with postal regulation authority	Yes, informal or semiformal collaboration or activities carried out under the same ministry
Collaboration with (independent) consumer protection authority	Yes, formal collaboration (MOU or joint program or committee)
Collaboration with the ministry of health (e-health)	Yes, informal or semi-formal collaboration or ICT regulator has the mandate/same authority or activities carried out under the same ministry
Collaboration with the ministry of education (e-education)	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority

Appendix B *(continued)*

Collaboration with the ministry of environment (e-waste)	Yes, informal or semiformal collaboration or activities carried out under the same ministry
Collaboration with ministry of economic development or similar focusing on a single or a subset of economic sector/s (e.g., industry, agriculture, fishery)	Yes, formal collaboration (MOU or joint program or committee) or ICT regulator has the mandate/same authority.
Digital Development Toolbox	**17.13**
Is there an overarching digital strategy in place?	Yes
Does the digital strategy have mechanisms for implementation/ operational objectives?	No/ No strategy
Is broadband considered part of the UAS definition?	No
Is there a digital identity framework in place?	No
Is there an e-gov/digital first government National e-government strategy or equivalent?	High development
Has your country adopted e-waste regulations or e-waste management standards?	No
Does a regulatory framework exist for ICT accessibility for persons with disabilities?	Yes
Is there legislation/regulation for child online protection?	Yes
Has your country adopted any policy/legislation/regulation related to smart cities?	Yes
Has your country adopted any policy/legislation/regulation related to e-health or smart health?	Yes
Is there cybersecurity/cybercrime legislation or regulation?	Yes
Has your country signed or ratified the Budapest convention on cybersecurity?	Yes
Are there formal data protection rules (e.g., laws, regulations)?	There is a law, and a data protection agency has been established
Has your country signed international agreements determining jurisdiction and/or managing cross-border flows on data privacy?	Yes, either determining jurisdiction or managing cross-border flows

Appendix B *(continued)*

Has your country signed or ratified the Tampere convention for communications in emergency situations?	No	
Does a national emergency (telecommunications) plan exist?	Yes	
Does an official register or a mapping exist in your country of all telecommunication/ICT infrastructure?	No	
Are there any cross-sector (ICT and other) infrastructure sharing or fibre co-deployment regulations/agreements/ promotion initiatives in your country?	No	
Is the digital strategy SDG-oriented or has mention of SDGs or other international development goals (e.g., MDGs, WSIS goals, EU Strategic objectives)?	Yes	
Are there policy instruments aimed at supporting the shift to sustainable consumption and production or coordination mechanisms for sustainable consumption and production?	Yes	
Is there a developed and operationalized global strategy for youth employment and to implement the Global Jobs Pact of the ILO?	Yes	
Broadband plan/initiative includes to promote the provision of broadband services to women and girls?	Yes	
Broadband plan/initiative includes to promote the provision of broadband services to persons with disabilities?	No	
Broadband plan/initiative includes to promote the provision of broadband services to young people?	No	
Digital Economy Policy Agenda		**15.74**
Does your country belong to regional integration initiatives with ICT chapters?	Yes	
Has your country made a commitment to facilitate trade in telecommunications services?	Yes	
Is there a holistic innovation policy or one tailored to the ICT/digital sector?	Yes	

Appendix B *(continued)*

Is there a forward-looking competition policy, law or regulation applied to digital markets?	Yes
Has your country adopted a forward-looking or innovative national strategy, policy or initiative focusing on spectrum (e.g., IMT-2000, 5G, FWA, satellite, HAPS, 6 GHz)?	No
Are there policies and regulations for e-commerce/e-transactions?	Yes
Has the Fund financed projects for connecting schools (primary, secondary, post-secondary, universities, specialized training, institutions, etc.) or multi-purpose telecenters?	No
Does the digital strategy include the educational sector?	No
Does the digital strategy include multiple sectors of the economy?	Yes
Does it includes a strategy, policy or initiative focusing on IoT? Or applied any measure regarding spectrum management and availability for IoT?	No
Has your country adopted any policy/legislation/regulation related to cloud computing?	No
Has your country adopted a national strategy, policy or initiative focusing on AI?	No
Are there specific taxes on the telecom/digital sector or on internet services?	No
Are there regulatory incentives targeted at network operators or other digital market players?	Yes, for all
Do codes of conduct exist (voluntary or enforceable/required by a regulator)?	Yes
Policy Design Principles	**12.04**
Are public consultations designed as a tool to gather feedback from national stakeholders and guide regulatory decisionmaking?	Yes, but there is no requirement/ it is unclear what the timeline and process are and whether the regulator incorporates results in their decisionmaking/there is no obligation to consider/respond to all comments

Appendix B *(continued)*

Is there a formal requirement for regulatory impact assessment (RIA) before regulatory decisions are made?	No
Are the decisions of the regulatory authority (entity in charge of regulation) subject to a general administrative procedures law?	Yes
Can affected parties request reconsideration or appeal adopted regulations to the relevant administrative agency (all sectors)?	Yes, administrative review by the regulatory body
Are national policy and regulatory frameworks technology and service-neutral ?	Yes, for authorization/operating licences or spectrum, but not for both/ There are exceptions to which bands of the spectrum are technology-neutral
Are there mechanisms for regulatory experimentation?	Yes
Are there regulatory sandboxes for digital financial inclusion?	Yes
Do ministries/regulatory agencies conduct ex-post policy reviews?	No
Do ministries/regulatory agencies conduct policy rolling reviews?	No
Are the laws (all sectors) that are currently in effect available on a single website managed by the government?	Yes
Is public access to information ensured and fundamental freedoms protected in accordance with national legislation and international agreements?	Yes
Are there ethics rules in place that apply to the regulator's staff, including head/chairperson and members/ commissioners (e.g., improper acceptance of gifts, personal and financial conflicts of interest, post-employment obligations, etc.)?	Yes

ITU = International Telecommunication Union; G5 = Fifth-generation collaborative regulation; MOU = memorandum of understanding; CERT = Computer Emergency Response Team; ICT = Information and communication technologies; SDGs = Sustainable Development Goals; MDGs = Millennium Development Goals; WSIS = World Summit on the Information Society; EU = European Union; 5G = fifth-generation; FWA = Fixed wireless access; HAPS = High-altitude platform station; GHz = gigahertz; IoT = Internet of things; AI = Artificial intelligence
Source: ITU (2021d)

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Across different metrics, the Philippines continues to demonstrate subpar performance in information and communications technology (ICT) compared to other members of the Association of Southeast Asian Nations and countries at the same level of development. The quality of the country's ICT regulatory environment, composed of regulatory authority, regulatory mandate, regulatory regime, and competition model, is significantly below what is considered international best practice, consequently impeding the use of various technological solutions available to bridge the gap in digital inequality. Although significant policy changes have recently been introduced, more reforms are needed to achieve inclusive and accelerated digital connectivity. Priorities include reforming the licensing regime, formulating a spectrum policy and plan, and reinventing the National Telecommunications Commission to ensure regulatory independence.

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