



# White Paper FACILITATING FASTER BROADBAND AND 5G ADOPTION IN MYANMAR

2020



# White Paper: Facilitating Faster Broadband and 5G Adoption in Myanmar

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# 1 EXECUTIVE SUMMARY

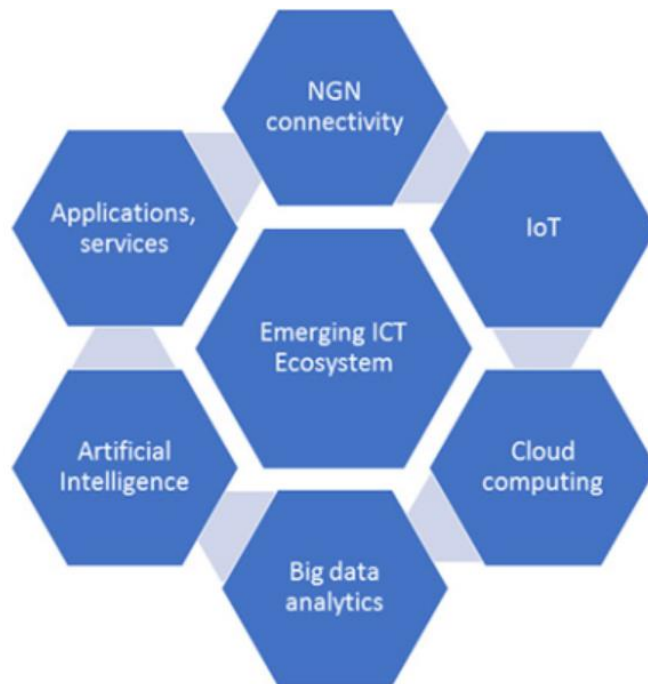
## MYANMAR'S UNIQUE 'POST-INTERNET' DIGITAL ECONOMY OPPORTUNITY

The timing of Myanmar's opening to the world economy and its accelerating economic development offer the Union Government and people of the country an almost unique opportunity. Compared with most other developing countries, Myanmar's economic development will largely take place in the 'post Internet' era. Growing rapidly in a digital world creates unique opportunities for Myanmar. This is why this White Paper on *Facilitating Faster Broadband and 5G Adoption in Myanmar* is critical.

Following the 'false start' of the dot com boom of the 1990s, the Internet and a broad set of related technologies is now firmly in place and widely recognised as central drivers of economic growth and development. In essence, what this means is that if countries, like Myanmar effectively harness the economic power of the Internet, they will be able to grow faster and more efficiently than has been possible in the past, bringing increased competitiveness to their economies and improved living standards to their citizens sooner than previously possible.

The term 'Industrial Revolution 4.0' has emerged recently into common use. It describes the enormous economic significance of a set of emerging Internet-related technologies that, taken together, represent a revolutionary era of productivity improvement, competitiveness and rapid economic development. These technologies include faster and better connectivity in the form of more fibre and better wireless technologies such as 5G; cloud computing; artificial intelligence and machine learning; the Internet of Things ('IoT'); automation and robotics. None of these technologies, however, will influence economic development without new infrastructure, effective policies, and the development of digital skills in the workforce, education system and in the home.

**Exhibit 1: Factors driving Industrial Revolution 4.0**



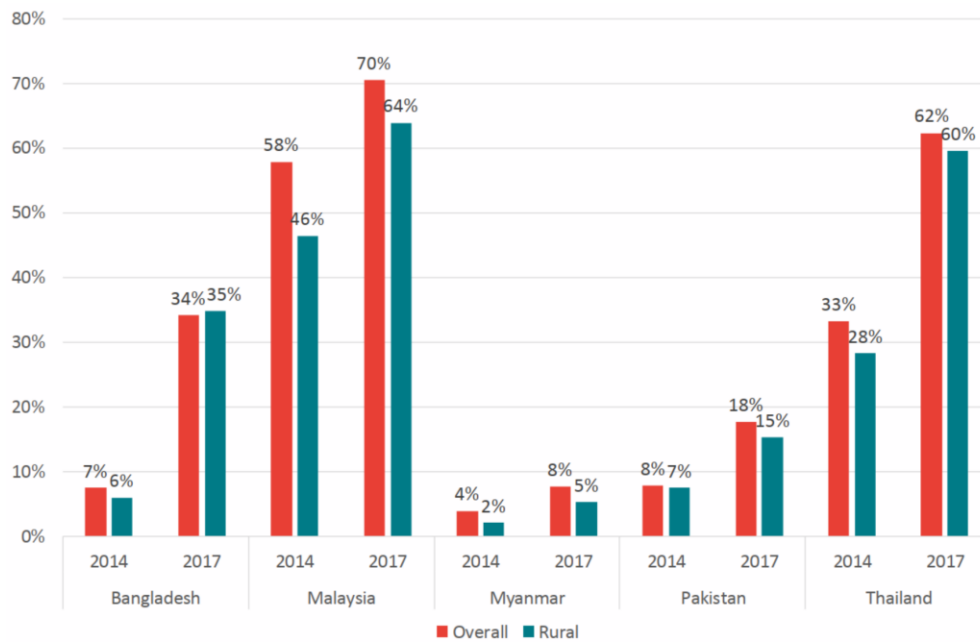
Source: ITU Measuring the Information Society Report 2017 – Vol 1

The benefits of the digital economy should not be taken for granted, however. They will not be realised unless governments are proactive in encouraging digital infrastructure investment, developing modern sophisticated regulatory approaches the digital economy, and ensuring that governments play a leadership role in deploying digital services based on best practice e-government principles. This is why the Union Government announced in early 2019, new Digital Economy Roadmap.

In addition to these high level digital economy policy directions, governments will need to pursue a range of specific policies such as optimising spectrum usage to deliver maximum benefit to consumers citizens and businesses, developing domestic digital entrepreneur ecosystems and ensuring that broader legal frameworks and taxation policies support the growth and development of local digital services and industries. The Ministry of Transport and Communications announcements to release more IMT spectrum by the Post and Telecommunications Department (PTD) are very consistent with that approach.

The impact of the digital economy on economic development extends beyond simply making existing industries more efficient, productive and competitive. While in developed countries the digital economy is often characterised as ‘disruptive’, in emerging economies potential is even more radical. One way to understand this is to appreciate the experience of mobile money in emerging economies. For example, in Kenya mobile money has, in effect, enabled the development of a widespread substitute to traditional banking systems that has been developed very quickly and at very low cost. This has enabled around 70per cent of the Kenyan population to have access to ‘banking like’ services through digital technologies. The alternative to this digital revolution would have been a decades long process of building traditional banking infrastructure, local branches, training large numbers of employees etc. Thus, the Internet coupled with cheap handsets and wide mobile wireless coverage, has enabled the Kenyan economy to leapfrog a whole era of institutional development in banking services. [Exhibit 2](#)

show the high level of use of digital payments in the Asia region and the potential for growth in Myanmar.



**Exhibit 2: Percentage of population who made or received digital payments in the past year**

Source: Frontier Economics, *The mobile effect: how connectivity enables growth*, March 2019

The value being created by the digital economy can be appreciated from another perspective, i.e., that of foreign direct investment (‘FDI’). Investment in telecommunications is leading foreign investment in Myanmar. In the 2016-17 fiscal year, telecom sector investment was the largest source of FDI at over 47 *per cent* of total in-bound investment.<sup>1</sup> This was up from 2014-15 when telecommunications made up 31 *per cent* of total FDI of USD3.3 billion. These investments by telecommunications companies ultimately represent propositions about the value that telecommunications services will create in the Myanmar economy. The premise of these investments is that telecommunications services will create such value for businesses and consumers that telco revenues will justify investment expenditures.

Importantly, the Myanmar telecommunications industry are some of the country’s largest taxpayers. Telenor Myanmar topped the list of Internal Revenue Department’s 2017-18 commercial tax paying private, international companies category as sole foreign firm contributing more than K50 billion. It also ranked second in the category of corporate income tax paying private, international companies for contributing more than K80 billion. Other telecommunications operators have also made substantial tax contributions.

### RAPID PROGRESS OF TELECOMMUNICATIONS IN MYANMAR

Since beginning the process of telecommunications reform in 2012, Myanmar has achieved extraordinarily rapid development of its telecommunications sector. In 2018, mobile coverage extended to over 90*per cent* of Myanmar’s population and almost 60*per cent* of its land area

<sup>1</sup> Telecommunications is biggest attractor of FDI in Myanmar, <https://lirneasia.net/farmhouse/2016/12/telecom-is-biggest-attractor-of-fdi-in-myanmar/>

with a number of mobile base sites/towers having grown from 3,000 to 16,000. Smartphone penetration was at 80*per cent* of the population in the number of Internet users had increased from a mere 2 million persons to almost 47 million or around 91*per cent* of Myanmar’s population. Exhibit 3 show the rapid progress in other telecommunication industry indicators.

**Exhibit 3: Improvements in Myanmar’s telecommunications indicators**

Indicator	Before Telecom Reform	2019
Nationwide Telecom Operator	- MPT	- 4 nationwide licensees plus regional broadband licensees
Telephone density	- About 13%	- 127.75 %
Internet Users / Penetration	- Less than 2 million	- 45.37 million (85.83%)
National Fiber Backbone	- 7600 Km at 2013	- More than 69,000 km
International Submarine Cable	- SEA-ME-WE-3	- SEA-ME-WE-3,(2000) - SEA-ME-WE-5 (13-12-2016) - AAE1 ( Ongoing Project)
Cross-border Fiber	- China (Muse), - Thailand (Myawaddy)	- China (Muse), - Thailand (Myawaddy, Tachilek, Three Pagoda, Mawtaung) - India (Tamu) - Laos (Tachilek)
International Bandwidth	- 30 Gbps in 2013	- 626.3 Gbps
International Gateway	- 1	- 14 Nos (including 4 Operators)
Mobile Sites	- Less than 3,000	- More than 22,000 Sites
Mobile Broadband Speed	Not known	- From Opensignal Report May 2019, download speeds from 14.0 to 18.9 Mbps with 4G availability up to 92.9%
Smartphone penetration	-	- 80% of Total Mobile Handset
Coverage ( Population/ Geographic )	-	- 94.18% (Population) / 64.24% (Geographic)

Source: PTD, 2019

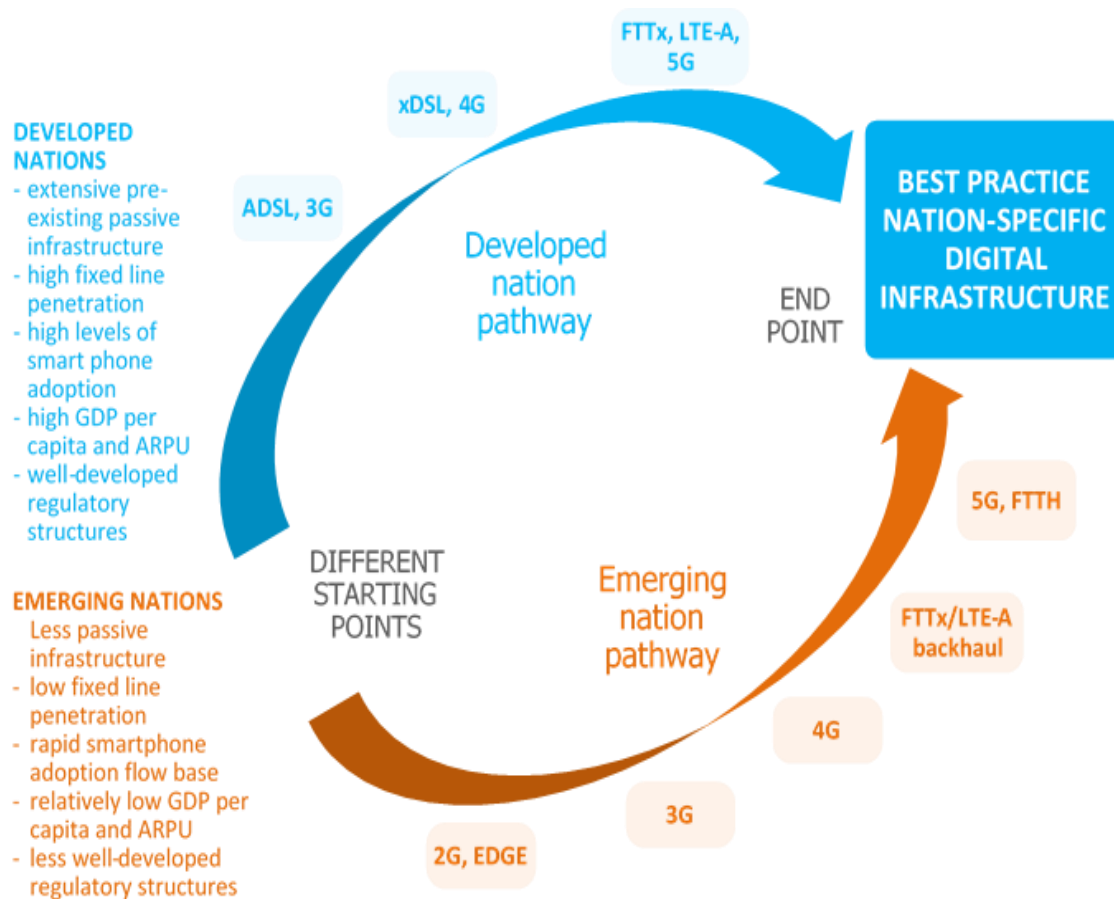
**DEFINING MYANMAR’S PATHWAY TO THE DIGITAL ECONOMY AND SOCIETY**

The fundamental drivers of the digital economy and society are the digitisation of data and information and connectivity. ‘Connectivity’ means broadband connectivity for rapid and reliable transfer of digital information. Governments around the world are seeking ways to ensure that broadband and 5G networks are established and improved over time.

Broadband and new technologies such as 5G needs to be thought of in highly dynamic terms. As the performance of broadband and 5G networks improves, and uses develop new services that make use of that capacity and then begin to congest it. Broadband and 5G policy needs to be thought of as an endless cycle of providing additional bandwidth with ever improving performance characteristics. The transition from 4G to 5G technologies is a good example of this. 5G will provide greater capacity, proved contention characteristics and much lower latency. This will enable a range of new services such as autonomous vehicles and advanced time sensitive technologies such as tele-surgery.

Thus, governments need to think in terms of a long-term strategic development path for broadband infrastructure and services and countries such as Myanmar that are at an early stage in the development of this infrastructure have particular opportunities (see Exhibit 4).

Exhibit 4: Developed and emerging national pathways to best practice digital infrastructure



Source: Windsor Place Consulting, 2016 as modified and updated

While advanced economies have benefited from the deployment of previous earlier broadband technologies, Myanmar which is currently at a relatively early stage in the development of its broadband infrastructure have the benefit of deploying new technologies which offer greatly superior cost performance characteristics. This idea is similar to the ‘mobile leapfrogging’ concept whereby developing nations in the 2000s were able to bypass deployments of fixed line voice communications infrastructure and move directly to cellular mobile services, thus saving billions in infrastructure costs and decades in deployment time.

These considerations emphasise the importance of context in developing a national broadband development strategy for Myanmar. The relevant context includes consideration of what are the best current and near-term technologies, how are consumer preferences and behaviour developing, are there sufficient players in the marketplace to ensure competition and a focus on consumer demand, and are the relevant regulatory agencies equipped to develop the required regulation?

While the Ministry and the PTD will continue to fully investigate global best practice in regulating for Myanmar’s digital economy and society, the Union Government considers that it is important that Myanmar as rapidly as possible secure the best possible digital infrastructure which is able to meet and then exceed the expectations of the industry (foreign and domestic) and Myanmar consumers. Exhibit 4 provides a representation of the different paths to best



practice nation-specific digital infrastructure potentially followed by developed and emerging nations.

## 2 RECOMMENDATIONS

This White Paper on *Facilitating Faster Broadband and 5G Adoption in Myanmar* makes the following important recommendations.

### RECOMMENDATION 1: SETTING BROADBAND TARGETS

New broadband penetration targets for country are to be set for the period up to 2024 embracing a number of sub-targets in relation to enterprises, and non-urban areas. Such targets are intended to be both aspirational and achievable. That is, achieving the targets will require all stakeholders to commit to them and to take positive actions towards their achievement including making broadband services in Myanmar affordable.

#### Exhibit 5: Broadband Population Penetration and Speed Targets by Network Platform and Region

Region / Network Platform	BB Penetration Current Estimate	BB Penetration and Speed 2020 Target	Universal Service Strategy 2022 Target	BB Penetration and Speed 2024 Target
<b>Urban</b>				
Mobile BB	90%			95% at 15Mbps
Fixed BB	< 1%	5% at 20Mbps		50% at 100Mbps
Wireless BB	<1%	15% at 20Mbps		50% at 100Mbps
<b>Non-Urban</b>				
Mobile BB	78%			90% at 2Mbps
Fixed BB	< 1%	3% at 10Mbps		20% at 30Mbps
Wireless BB	< 1%	20% at 5Mbps		60% at 30Mbps
<b>Overall</b>				
Mobile BB	82%		95%	95%
Fixed BB	< 1%			20%
Wireless BB	< 1%			25%
BB Speed	2Mbps		5Mbps	

### RECOMMENDATION 2: ISSUING NEW RULES ADDRESSING TELECOMMUNICATIONS RIGHTS OF WAY

By early 2020, following broad consultation the *Facilitating Telecommunications Rights of Way Rules* will be promulgated. These Rules aim to regulate the establishment of underground and overground telecommunication infrastructure (including tower sites and infrastructure) in order to address rights of way issues that are currently a key barrier to expanding Myanmar's broadband penetration and coverage. They are consistent with global practices on

infrastructure approval guidelines. Such Rules will provide for a simplified and transparent process for deploying telecommunications infrastructure throughout the country.

### *RECOMMENDATION 3: FACILITATING FIXED BROADBAND AND 5G INFRASTRUCTURE DEPLOYMENT*

By 2020, the PTD will be tasked to investigate way to facilitated fixed broadband infrastructure deployment including but not limited to:

- the establishment of a national infrastructure database to permit ‘check before you dig’ services;
- encourage greater infrastructure sharing for broadband and 5G deployment based on other ASEAN models;
- develop in-building telecommunications standards customised for Myanmar; and
- allowing businesses to operate in a regulatory sandbox.

### *RECOMMENDATION 4: RELEASING MORE IMT SPECTRUM FOR WIRELESS BROADBAND AND 5G DEPLOYMENT*

To ensure that there is more IMT Spectrum for wireless broadband and 5G deployment by the end of 2021, IMT spectrum availability in Myanmar will have doubled from its current level of almost 400 MHz to approximately 830 MHz (assuming all spectrum offer is taken-up). This would put Myanmar on a spectrum par with countries like Japan and South Korea. Knowing that there will be sufficient spectrum in the future to support both 4G and 5G service offerings, MNOs in Myanmar can confidently make the necessary long-term investments in digital infrastructure.

### *RECOMMENDATION 5: IMPROVING THE QUALITY OF BROADBAND SERVICES*

By early 2020, following industry consultation new requirements in order to improve the quality of service/quality of experience of broadband services provided to enterprises and Myanmar consumers will be promulgated by the Ministry and PTD comprising:

- a new technical standard applying generally in accordance with Section 24 of the Telecommunications Law; and/or
- a requirement to publish quality of service/quality of experience of broadband services Information utilise Condition 13.12 of the Operating Licences.

### *RECOMMENDATION 6: FACILITATING MYANMAR CENTRIC CONTENT AND APPLICATIONS*

In order to facilitate Myanmar centric and customised content and applications, a number of initiatives will be implemented to drive broadband service penetration which are focused directly on consumers. These initiatives are:

- deployment of digital learning centres in regional areas;
- driving Internet based government service delivery; and
- encouraging local language content and applications development.

## 3 BROADBAND AND 5G POLICY ENVIRONMENT

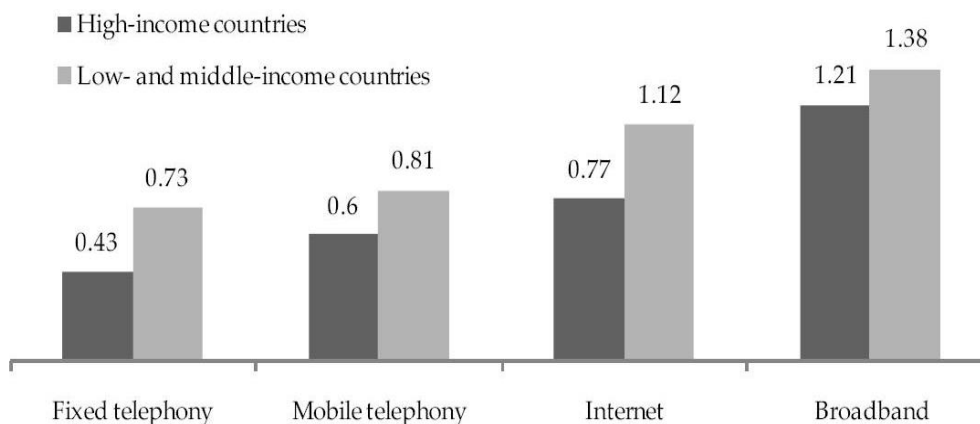
### 3.1 Introduction

The provision of broadband services through the use of information and communications technology ('ICT') has become an essential requirement for governments across the globe as they seek to foster the long-term prosperity of their citizens. This is because broadband and ICT services provide enormous opportunities for advancing social and economic development. ICT significantly improves access to information and learning resources, access to government, health, educational, entertainment and financial services and promotes the creation of a more inclusive society by creating better-connected communities.

Through rapid advances in communications technology, computing, storage and audio-visual systems countries are able to leverage existing areas of comparative advantage and establish new industries, develop new skills, drive productivity and competitiveness, and produce new products for consumers.

A significant body of empirical research demonstrates that the expansion of broadband services is positively correlated with economic growth. One of the earlier studies on the contribution of broadband to economic growth by the World Bank<sup>2</sup> estimated that each 10 percentage point increase in broadband penetration accelerated economic growth by 1.38 percentage points in low and middle-income countries (see Exhibit 6).

**Exhibit 6: Growth impact of telecommunications (GDP percentage point increase due to 10 percentage-point increase in penetration)**



Source: World Bank

Because of the enormous power of ICT services to drive rapid social and economic advancement a wide range of governments, international institutions and ICT industry stakeholders are advocating policies, strategies, initiatives, plans, programs etc. to drive widespread broadband adoption.

<sup>2</sup> Yongsoo Kim, Tim Kelly, and Siddhartha Raja, *Building broadband: Strategies and policies for the developing world*, Global Information and Communication Technologies (GICT) Department, World Bank, January 2010 and Christine Zhen-Wei Qiang and Carlo M. Rossotto with Kaoru Kimura, Chapter 3 Economic Impacts of Broadband, in World Bank, *Information and Communication for Development 2009: Extending Reach and Increasing Impact (IC4D2009)*.

Such actions encompass the deployment of broadband infrastructure, the expansion and development of ICT services and the expansion of digital literacy among consumers. A key objective of these actions is to provide access to ICT services to those among the global population that presently have no access to such services. It is generally accepted that around half of the global population, that is, around 3.8 billion people are “digitally unconnected”.<sup>3</sup>

This section provides a brief overview of some of the major initiatives concerning broadband advocacy at the global, regional and national levels. This discussion provides the context in which this whitepaper makes specific recommendations for fostering the expansion of broadband services to Myanmar’s digitally unconnected citizens.

## 3.2 Global Broadband and 5G Policy Initiatives

At the global level, broadband deployment has been strongly advocated by a number of institutions including the Broadband Commission for Sustainable Development (‘Broadband Commission’) and the International Telecommunication Union (‘ITU’). It is, however, noted that relevant contributions have also been made by many other organisations including the Alliance for the Affordable Internet, the World Economic Forum and the World Bank.

### 3.2.1 Broadband Commission

The Broadband Commission was established in May 2010 as a joint initiative between the ITU and the United Nations Educational, Scientific and Cultural Organization (‘UNESCO’) to promote Internet access. The Broadband Commission was initially working towards achieving the United Nation’s (‘UN’) Millennium Development Goals (‘MDGs’) by 2015 through digital development. However, in September 2015, the Sustainable Development Goals (‘SDGs’) were adopted and superseded the MDGs. Considering the more recent SDGs, in 2018 the Broadband Commission launched a revised framework *2025 Targets: “Connecting the Other Half”*, which outlines seven targets:

2025 Targets: Connecting the Other Half	
#1	All countries should have a funded national broadband plan or strategy, or include broadband in their universal access and services definition
#2	Entry-level broadband services should be made affordable in developing countries, at less than 2% of monthly gross national income per capita
#3	Broadband-Internet user penetration should reach: 75% worldwide, 65% in developing countries, and 35% in least developed countries
#4	60% of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills
#5	40% of the world's population should be using digital financial services.
#6	Un-connectedness of Micro-, Small- and Medium-sized Enterprises should be reduced by 50%, by sector
#7	Gender equality should be achieved across all targets

### 3.2.2 International Telecommunication Union

The *Connect 2020 Agenda for Global Telecommunication/ICT Development* (‘Connect 2020’) is a global agenda adopted by the ITU in 2014. Connect 2020 sets out the shared vision, goals and targets that the ITU’s Member States have committed to achieve by 2020 in collaboration with all stakeholders across the ICT ecosystem. The four goals of Connect 2020 are outlined in Exhibit 7.

<sup>3</sup> Broadband Commission, 2025 Targets: “Connecting the Other Half”

### Exhibit 7: ITU Connect 2020 Agenda



Source: ITU

Regarding advocacy in Myanmar, the ITU sponsored an assistance program that prepared the 2012 Wireless Broadband Masterplan ('WBBMP'). The WBBMP assessed the existing state of Myanmar's telecommunications sector and made a series of recommendations that laid the foundation for securing the delivery of fast and effective broadband services in a short period of time. The Government of Myanmar subsequently adopted these recommendations and they became the blueprint for the reform of Myanmar's telecommunications sector.

## 3.3 Regional Broadband Policy Frameworks

Broadband advocacy in the Asia Pacific region is led by the efforts of the ITU, the Association of Southeast Asian Nations ('ASEAN') and the Asia Pacific Telecommunity ('APT'). In addition, the future Regional Comprehensive Economic Partnership (RCEP) is a major regional trade agreement that will have implications for telecommunications sector and broadband service deployment including here in Myanmar.

### 3.3.1 ASEAN

In November 2015, ASEAN launched the ASEAN ICT Masterplan 2020 (AIM2020) which is being implemented from 2016 to 2020.<sup>4</sup>The vision for the AIM 2020 is to propel ASEAN towards a digitally-enabled economy that is secure, sustainable, and transformative; and to enable an innovative, inclusive and integrated ASEAN Community.

<sup>4</sup> In addition to AIM 2020, ASEAN's contribution to regional broadband advocacy also includes its Masterplan on ASEAN Connectivity 2025 ('MPAC 2025'), which was adopted in September 2016.

AIM 2020 encompasses eight strategic objectives that work together to support ICT adoption and enable innovation and advancements in the ASEAN Community. The key initiative is Initiative 2.1 Strengthen Digital Inclusion in ASEAN which focuses on Implement programmes which will enable more ASEAN citizens to use ICT which is summarised in Exhibit 8.

**Exhibit 8: Initiative 2.1 Strengthen Digital Inclusion in ASEAN**

ACTION POINT	DESCRIPTION
<b>2.1.1 Create Initiatives to Address Emerging or Growing Digital Divides in ASEAN</b>	Move beyond focusing only on connectivity, to identifying and supporting communities that are isolated or underserved; and focusing on increasing the demand, usage, affordability and connectivity of broadband services across ASEAN
<b>2.1.2 Develop a Next-Generation USO ('USO 2.0') Framework</b>	A USO 2.0 framework broadens traditional USO goals to focus on services access, delivery and usage, rather than merely connectivity, through the use of next-generation technologies (such as white spaces technologies, 5G networks, etc.)

Source: ASEAN ICT Masterplan 2020, page 19

**3.3.2 Regional Comprehensive Economic Partnership (RCEP)**

RCEP is a regional free trade area initiative between the ten ASEAN member states and its six free trade partners Australia, China, India, Japan, Republic of Korea and New Zealand.

While RCEP negotiations were formally launched in November 2012 at the ASEAN Summit in Cambodia they have not yet been completed. However, there was a resolution to finalise the RCEP by the end of 2019 following the Seventh Intersessional Ministerial Meeting in March 2019.<sup>5</sup> The most recent round of negotiations for the RCEP occurred in July 2019 in Melbourne, Australia and to date, negotiations for seven of the 18 sectors covered by the RCEP talks have been settled including telecommunications.

If and when the RCEP is finalised, it will encompass 3.6 billion people and account for a third of the world's total economic output and will have major implications for broadband service development in Myanmar.

**3.4 National Broadband and 5G Policy Environment**

At the national level of broadband advocacy, the Union Government has actively promoted the growth and development of Myanmar's telecommunications sector through a range of key initiatives, particularly in the past seven years. Such initiatives include, the liberalisation of Myanmar's telecommunications sector from a state-owned and operated monopoly service provider to a competitive model of service provision, enacting new telecommunications legislation, and the promulgation of a range of ICT related policies and plans. Collectively, these initiatives have been a powerful means of achieving rapid growth and development in Myanmar's telecommunications sector.

Furthermore, the Union Government and the Ministry's advocacy for faster broadband adoption has also been formally expressed in a number of policy papers.

<sup>5</sup> See: <https://dfat.gov.au/trade/agreements/negotiations/rcep/news/Pages/seventh-intersessional-ministerial-meeting-2-march-2019-siem-reap-cambodia.aspx>

### 3.4.1 Previous Broadband Policy Initiatives

National advocacy for broadband adoption in Myanmar has taken the form of a number of policy papers including the 2012–2015 Framework for Economic and Social Reform ('FESR'), which acted as a 'reform bridge' linking current reform programs to the Union Government's twenty-year national development plan. The FESR identified two key reforms, which are the full liberalisation of the market and the creating of an effective regulatory system that ensures competition among suppliers and minimises prices charged to customers. The 2011–2015 ICT Master Plan is another policy paper that focused on key objectives across four functional areas, i.e., infrastructure, ICT Industry, ICT Human Resource Development and E- education.

More recent initiatives driving broadband development in Myanmar are the Telecommunications Master Plan 2015, the E-Governance Masterplan 2016-2020 ('E-Government MP') and The Myanmar Digital Economy Roadmap ('MDER').

### 3.4.2 Telecommunications Master Plan 2015

The Masterplan was released for public consultation in July 2015. It is a comprehensive document that sets out ambitious plans and strategies for the on-going reform and the sustained growth and development of Myanmar's telecommunications sector. Its vision was set out in three parts as follows:

*Connect the people of Myanmar nationally and globally, using mobile, fixed and satellite technologies to connect over 90% of the population within 2020 to the internet with 50% having access to high-speed internet services of at least 7.2 Mbps*

*Empower Myanmar's economy with ICT and Innovation, to create social impact in health, education and other sectors by overcoming these constraints in serving all of Myanmar through physical facilities and specialist skills, and to power broader industry and economic growth*

*Enable the journey to digital Government with infrastructure and mobile applications, supporting the Government's initiatives by creating the information architecture, and providing implementation support.*

### 3.4.3 The E-Governance Masterplan 2016-2020

The draft E-Government Masterplan was released in 2015. It is a scoping document that focuses on the use of ICT in the reform of public-sector processes to implement a coherent and systematic approach to the design, evaluation and adoption of the systems underpinning public services to improve their delivery and efficiency. It sets out the key areas that need to be addressed so that an effective e-Government system can be successfully introduced in Myanmar.

### 3.4.4 The Myanmar Digital Economy Roadmap

The most recent addition to the Union Government's broadband advocacy efforts is the MDER, which was promulgated in January 2019 by the Myanmar's Digital Economy Development Committee ('DEDC'). The MDER is the first major output of the DEDC, which was established in June 2017 by the Union Government to drive the adoption of digital technologies in Myanmar's agricultural, livestock and production sectors to improve their competitiveness and productivity.

The MDER has the underlying mission of "enabling digital transformation, digital governance, digital trade and innovation to develop a digital economy and to encourage inclusive and sustainable socioeconomic development".



**Exhibit 9: MDER ‘Enabling digital transformation’**



Source: DEDC

The focus on the growth and development of these specific areas is spurred by the backdrop of Myanmar’s relatively low rankings in these areas at the global level. For example, Myanmar ranks 133 out of 139 for Digital Transformation and Digital Trade according to the World Economic Forum’s Network Readiness Index (NDI) 2016, and ranks 157 out of 193 for Digital Government according to the 2018 United Nations E-Government Development Index.

The mission is supported by four pillars, a 6 plus 1 strategy, nine priority sectors, 14 goals, 32 short term action plans and sixteen longer term action plans, which include drafting a policy to support digital trade and e-commerce, online payments, tax incentives and cybersecurity, and drafting a digital economy development master plan and investment promotion plan.

Regarding priority sectors for digital advancement, the roadmap targets education; healthcare; agriculture, fishery and livestock; tourism and hospitality; manufacturing and small and medium enterprises (SMEs); financial services; technology and the start-up ecosystem; digital trade; and transportation and logistics.

Exhibit 10 details some of the targets the MDER aims to achieve.

**Exhibit 10: MDER Goals and Action Plan**

Goals	Current	2020	2025
<b>Digital transformation across business sectors</b>	-	10%	30%
<b>Effective utilisation of digital technologies by SMEs</b>	-	20%	50%
<b>Digital financial service transactions</b>	0.5%	15%	30%
<b>Unique mobile subscriptions</b>	48%	50%	55%
<b>Internet users in percentage of population</b>	40%	45%	50%
<b>Number of people employed in the digital economy</b>	-	100,000	300,000
<b>FDI in digital industry (USD)</b>	6 billion	8 billion	12 billion

## 3.5 Addressing Emerging Regulatory Issues

### 3.5.1 Regulatory Sandbox

The 5G environment raises key questions about how legislators and regulators such as the PTD should handle fast-changing technologies and industries. How can regulators balance the risks that come with new ideas without stamping on innovation? How can they help to ensure that the benefits of new technologies are widely spread without breaking commercial agreements?

It is necessary to create an appropriate legal framework for 5G technologies, as well as for regulators to adopt new ways of working in order to rise to the modern challenges of a 5G environment. As such, regulators are now considering innovative, out of the box regulatory solutions such as regulatory sandboxes for enterprises wishing to test an emerging technology or innovative service without being bound by all the regulations that would normally apply.<sup>6</sup>

A regulatory sandbox is a tool providing a safe and secure environment for businesses to try out their ideas and test their innovations. Ultimately, a sandbox environment enables digital experimentation by creating a dynamic regulatory environment in which digital market failures and opportunities have space and flexibility to address present and future challenges.<sup>7</sup>

This may in turn foster change within the regulatory environment by pointing the PTD to emerging structures and practices. It also provides well-defined testing fields which are transparent for authorities, allowing them to experiment within a protected regulatory framework.

Examples of regulatory sandboxes which have been launched by national regulators in other countries include:

- On 27 November 2018, the French Telecom Regulatory Authority (ARCEP) launched a regulatory sandbox to allow start-ups to test new technologies with lighter obligations. The regulator states that the sandbox is "an unprecedented device in France, allowing entrepreneurs to test the technical robustness and profitability of a service in real conditions".<sup>8</sup>
- On 14 August 2019, through the issuance of an official Notification, the National Broadcasting and Telecommunications Commission (NBTC) established a sandbox regime to facilitate technology testing for businesses and in preparation for the adoption of 5G technologies in Thailand. This regime is discussed below in Exhibit 11.

#### Exhibit 11:: The Regulatory Sandbox in Thailand

The Notification re: the Criteria for Permitting Frequency Use For Innovation Development and Testing In A Sandbox Area (the "Sandbox Notification") allows sandbox participants to use certain frequencies and conduct frequency testing, within a limited sandbox area, for the development and testing of equipment, network, or system, which is done to obtain a finished product. The sandbox license will be granted for R&D and pre-commercialization purposes, but not for business operation nor any profit-making activities.

<sup>6</sup> [www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Document-Summary\\_English.pdf](http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Document-Summary_English.pdf)

<sup>7</sup> Global Symposium for Regulators (GSR) *Best Practice Guidelines, Fast Forward Digital Connectivity for All, 2019*

<sup>8</sup> [www.linfordurable.fr/telecoms-larcep-veut-faciliter-le-lancement-de-nouveaux-services-572](http://www.linfordurable.fr/telecoms-larcep-veut-faciliter-le-lancement-de-nouveaux-services-572)

The Sandbox Notification permits the NBTC to consider certain areas to be sandbox areas, including areas within the Eastern Economic Corridor (EEC) promotional zones, areas in public and private universities, industrial estate areas, etc.

The sandbox license holder shall have certain obligations, as follows:

- (i) carrying on activities within the specified objectives as provided in its sandbox license application;
- (ii) set in place cybersecurity and data protection measures;
- (iii) report its progress to the sandbox operator every three months; and
- (iv) must not charge any fees from the operation within the sandbox, conduct commercial business, nor provide service in connection with any existing telecommunications services.

The sandbox license has a term of 360 days and is extendable. However, the maximum term of the sandbox license is 720 days (approx. two years).

In October 2019, the NBTC will hold a public seminar in order to provide further details and guidance regarding the sandbox regulatory regime.<sup>9</sup>

### 3.5.2 5G Testbeds

Establishing 5G testbeds focused on the testing and development of applications and products that will make use of the new capabilities of 5G can help drive efficiency and productivity, as well as create the 5G ecosystem. As such, a challenge for Myanmar is how to create and regulate testbeds that allow new products and processes to be developed through collaboration across the sectors.

A number of countries have been utilising 5G testbeds in order to rapidly develop 5G technologies and keep their markets competitive. For example, in October 2017, UK's Department for Digital, Culture, Media and Sport (DCMS) launched its "5G Testbeds and Trials Programme" which provides up to £25 million in funding to encourage the development of a UK 5G ecosystem with technology and deployment, test beds and trials to stimulate the development of 5G use-cases and business models. Open-access, city-based 5G testbeds have also been established in Sweden (Urban ICT Arena) and Germany (5G Berlin).

However, these new models are not without challenges. In launching 5G testbeds, Myanmar will need to be aware of the following considerations:

- The various participants in testbeds report difficulties in learning to work under these new, multi-agency partnership models, citing cultural differences, resistance to change and little shared history of working together as key contributing factors;
- The majority of projects and testbeds reported needing several levels of day to day governance to ensure the successful delivery and operation of projects and testbeds; and
- The ethical sharing of personalised data across agencies and commercial organisations will be central to the success of smart cities. To be successful, testbeds will need to allow the flow of information and data across providers and systems.<sup>10</sup>

<sup>9</sup> [www.bakermckenzie.com/en/insight/publications/2019/09/thailands-nbtc-introduces-regulatory-sandbox](http://www.bakermckenzie.com/en/insight/publications/2019/09/thailands-nbtc-introduces-regulatory-sandbox)

<sup>10</sup> [www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-CII-TelecomConvergence5G-Ecosystem\\_new-noexp.pdf](http://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-CII-TelecomConvergence5G-Ecosystem_new-noexp.pdf)

## 4 MYANMAR BROADBAND MARKET OVERVIEW

### 4.1 Introduction

Myanmar's telecommunications sector has undergone significant transformation in recent years. This follows the bold actions of the Union Government to implement a series of substantial sector reform initiatives. Such initiatives include the release of radiofrequency spectrum to facilitate the introduction of competition, the adoption of industry policies and the introduction of new legislation and regulations. Formerly one of the most underdeveloped telecommunications markets in Asia, Myanmar has experienced unprecedented growth in mobile services and mobile broadband services. For example, Myanmar's mobile telephone penetration in 2011 was around 2 *per cent* while today it is 100 *per cent*.<sup>11</sup>

This section provides an overview of the current state of broadband service delivery in Myanmar. This overview also considers Myanmar in comparison to its regional peers. This assessment is intended to provide a context within which recommendations may be framed to improve the level of broadband service adoption in Myanmar. The key areas that are addressed in this overview are the following:

- economic context;
- broadband service adoption;
- major service providers;
- policy and regulatory framework;
- legislation and regulations; and
- market competition.

### 4.2 Economic Context

Before reviewing Myanmar's broadband service adoption, it is useful to first provide an overall economic context. Exhibit 12 shows some key economic and social data for Myanmar compared to its ASEAN peers.

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<sup>11</sup> This measure represents active mobile SIMs per 100,00 population. Source: ITU and GSMA Intelligence.

**Exhibit 12: Key Economic and Social Data by ASEAN Member State**

Country	Population (Millions)	GDP per Capita (USD)	Urban Population (%)	Gross National Income per Capita (USD)	Adult Life Expectancy (Years)	Adult Literacy (%)
Brunei Darussalam	0.4	28,290	77	29,600	77	96
Cambodia	16.0	1,384	23	1,230	69	81
Indonesia	263.9	3,846	55	3,540	69	95
Lao PDR	6.8	2,457	34	2,270	67	85
Malaysia	31.6	9,951	75	9,650	75	94
Myanmar	<b>53.4</b>	<b>1,257</b>	<b>30</b>	<b>1,210</b>	<b>67</b>	<b>76</b>
Philippines	104.9	2,989	47	3,660	69	96
Singapore	5.6	57,714	100	54,530	83	97
Thailand	69.0	6,955	49	5,950	75	93
Vietnam	95.4	2,342	35	2,160	76	94

Source: World Bank, 2017

The data in the above exhibit indicates that Myanmar is among the least economically developed economies in ASEAN. Key implications arising from this data for broadband service development in Myanmar are the following:

- Myanmar's low GDP and GNI per capita suggests that the affordability of broadband services will be challenging for many consumers;
- Myanmar's low GDP and GNI per capita imply low average revenue per user (ARPU) which may not be attractive to service providers who need sufficient revenue streams to finance their investments in infrastructure;
- Myanmar's relatively low level of urbanisation suggests that the cost of infrastructure to serve Myanmar's unconnected population will be relatively high; and
- the low level of adult literacy suggests that relatively fewer consumers in Myanmar may have the skills to adopt broadband services.

Exhibit 13 shows SIM penetration and mobile broadband penetration for Myanmar compared to its ASEAN peers.

**Exhibit 13: SIM and Mobile Broadband Penetration by ASEAN Member State**

Country	SIM Penetration (%)	Mobile Broadband Penetration* (%)
Brunei Darussalam	128	74
Cambodia	126	59
Indonesia	121	83
Lao PDR	80	58
Malaysia	126	87
Myanmar	<b>104</b>	<b>76</b>
Philippines	124	86
Singapore	144	99
Thailand	134	95
Vietnam	148	45

Source: GSMA Intelligence, Q4 2018, \* Mobile broadband penetration equates to the number of 3G and 4G mobile services.

The data in the above exhibit shows that while Myanmar ranks among the lowest of the ASEAN economies in terms of SIM card penetration, it has a much higher mobile broadband penetration. That is, Myanmar ranks 9<sup>th</sup> in SIM penetration and 6<sup>th</sup> mobile broadband penetration. This most likely reflects the relatively late liberalisation of Myanmar’s telecommunications sector compared with other markets.

### 4.3 Broadband Service Adoption

In this White Paper broadband is considered to be a high-speed Internet connection which is delivered over mobile, fixed and fixed-wireless networks. In the case of mobile networks this is taken to be 3G and 4G services, for fixed networks this means services delivered by fibre optic cable and for fixed-wireless this means services delivered over wireless networks using spectrum in various ranges such as the 2.6 GHz spectrum range.

Although fixed broadband services were first offered by incumbent operator MPT, the deployment of broadband services in Myanmar largely began when new mobile network operators (MNOs) were introduced and began operating in 2012. Wireless broadband services followed the release of spectrum in the 2.6 GHz spectrum range in 2016. Service providers including the MNOs have also begun providing broadband services over fibre optic cable networks and wireless networks that make use of unlicensed spectrum bands. Exhibit 14 shows the estimated number of broadband service customers in Myanmar by network type.

**Exhibit 14: Broadband Services by Network Type**

Network	Active Services	Share (%)	Penetration (%)
Mobile Broadband (3G and 4G)	44,544,000	99.5	82.3
Wireless Broadband	137,500	0.3	0.25
Fixed Broadband	73,000	0.2	0.13
<b>Total</b>	<b>44,754,500</b>	<b>100</b>	

Source: GSMA Intelligence, Huawei, 2019

The data in the above exhibit clearly shows that Myanmar’s broadband services are predominantly 3G and 4G mobile broadband services. Fixed and wireless broadband services clearly have a very low share of the broadband service market and very low market penetration. The high market penetration of mobile broadband services indicates that Myanmar’s consumers have an appetite for broadband services. This suggests that there is considerable potential for fixed and wireless broadband services to grow.

### 4.4 Policy and Regulatory Framework

The Union Government has long recognised the fundamental importance of Myanmar’s telecommunications sector as a key driver of Myanmar’s economic and social development. This recognition is reflected in the various national policy developments that the Union Government has adopted over the past seven years as discussed above in section 1.3. The key policy position that the Union Government adopted is the introduction of competition in the telecommunications sector to deliver new and cheaper services to consumers in line with global best practice.

In order to facilitate the introduction of competition, the Union Government has also taken a number of necessary and inter-related initiatives. These include the reform of policy and regulatory institutions, the introduction of new telecommunications legislation and the making of regulations.

The Ministry of Transport and Communications ('MOTC') has overall responsibility for policy setting and implementation in respect of the telecommunications sector. The MOTC has some specific regulatory responsibilities including the establishment of a National Table of Frequency Allocations, establishment of a universal service fund ('USF') and approving Myanmar's numbering plan. The MOTC also has responsibility for overseeing the operations of Myanmar Post and Telecommunications ('MPT'). To assist with the discharge of this responsibility the MOTC is authorised to form the National Telecommunications Advisory Committee ('NTAC'). The NTAC is an advisory body which may make recommendations on technical standards, consumer protection and the strategic development of the telecommunications sector in Myanmar.

The Posts and Telecommunications Department ('PTD') is the telecommunications sector regulator in Myanmar. The PTD is housed within the MOTC and operates within the policy and administrative framework as set by the MOTC and the provisions of the Telecommunications Law. The responsibilities of the PTD include:

- issuing and renewal of service provider licences;
- regulation of the frequency spectrum and numbering plans;
- ensuring consumer protection;
- inspection and supervision of service providers; and
- initiating administrative actions against service providers.

The Union Government is delivering on plans for further institutional reform in the telecommunications sector. In particular, MPT was corporatised in August 2019 and will operate independently of the MOTC.<sup>12</sup> In addition, the policy functions of the MOTC and the regulatory functions of the PTD will be formally separated with creation of a new Myanmar Communications Commission. This will mean that the regulation of Myanmar's telecommunication sector will become independent.

## 4.5 Legal Framework

An essential requirement for the introduction of competition to Myanmar's telecommunications sector was the establishment of a robust legislative platform. In October 2013, the *Telecommunications Law* came into effect which paved the way for further structural, institutional and regulatory reforms. The law provides a broad-based framework governing the conduct of telecommunications related activities in Myanmar and has the following objectives:

- (a) *To enable to support the modernization and development of the nation with telecommunications technology;*

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<sup>12</sup> See *Myanmar Telecommunications Corporation Law 2019*, Pyidaungsu Hluttaw Law No. 23, 5 August 2019

- (b) *To enable to bring out Telecommunications Services that will be able to provide high quality and worthy services to the users by allowing fair and transparent competitions from domestic and abroad in the telecommunications sector which is developing;*
- (c) *To enable to give more opportunities to the general public to use Telecommunications Service by expanding the Telecommunications Network in the entire country along with the telecommunications technology which is developing;*
- (d) *To enable to protect the Telecommunications Service providers and users in accord with law;*
- (e) *To enable to supervise Telecommunications Service, Network Facilities and Telecommunications Equipments which require license for national peace and tranquillity and for public security.*<sup>13</sup>

The *Telecommunications Law* provides for the issuing of licences for the provision of network facilities, network services and application services. In addition, the law contains enabling provisions for detailed regulations to be made regarding a range of matters including operator licensing, interconnection and access, spectrum, numbering and competition. In this regard, the following Rules have been established:

- *Interconnection and Access Rules 2015;*
- *Competition Rules 2015;*
- *Numbering Rules 2015;*
- *Spectrum Rules 2016;* and
- *Licensing Rules 2014.*

In addition to the above, the Union Government is currently developing a universal service strategy. This is discussed in section 2.5.4 of this whitepaper.

With regard to the provision of broadband services, there are some provisions within the legislative and regulatory framework that are particularly relevant. These provisions include those concerned with the following matters:

- operator licensing;
- infrastructure sharing;
- spectrum management; and
- universal service.

The relevant provisions concerning these matters are addressed in the following discussion.

#### 4.5.1 Operator Licensing

Operator licensing is governed by provisions in the *Telecommunications Law* and the *Licensing Rules 2014*. Under Chapter III of the *Telecommunications Law* any person who wants to provide telecommunications facilities and/or telecommunication services shall apply to the PTD for

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<sup>13</sup>Telecommunications Law (English translation)



permission and an appropriate licence. With the approval of the Ministry, the PTD may issue a number of different licence types.

The *Licensing Rules 2014* establishes a multi-service operator licence framework. Under this framework, the PTD may issue individual and class licences for network facilities services, network services and applications services. Within this structure, the types of licences that may be issued the PTD and the services that they allow are summarised in Exhibit 15.

**Exhibit 15: Operator Licensing Structure**

Licence Type	Services Allowed
<b>Network Facilities Service (Individual) Licence (NFS (I) Licence)</b>	<ul style="list-style-type: none"> <li>• Terrestrial fixed line transmission facilities</li> <li>• Terrestrial radio transmission facilities</li> <li>• Mobile base station facilities</li> <li>• Submarine cable facilities</li> <li>• International Gateway Services facilities</li> <li>• Satellite earth station facilities</li> <li>• Other satellite facilities located in Myanmar providing capabilities for transmission of telecommunications services</li> </ul>
<b>Network Services License (NS Licence)</b>	<ul style="list-style-type: none"> <li>• Resale of wireline connectivity services</li> <li>• Resale of terrestrial wireless connectivity services</li> <li>• International and domestic network transport and switching services</li> <li>• Resale of International Gateway Services</li> </ul>
<b>Network Facilities Service (Class) Licence (NFS (C) Licence)</b>	<ul style="list-style-type: none"> <li>• Towers, masts, ducts</li> <li>• Trenches and poles</li> <li>• Dark fibre</li> <li>• Radio equipment installed to send, receive and route communications</li> <li>• Construction, deployment and maintenance of Telecommunications Networks and the self-provision of Telecommunications Services used solely for internal communications</li> </ul>
<b>Application Services Licence (AS Licence)</b>	<ul style="list-style-type: none"> <li>• Public payphone services</li> <li>• Public switched data services</li> <li>• Audiotext hosting services provided on an opt-in basis</li> <li>• Directory services</li> <li>• Internet service provider services</li> <li>• Public access center services</li> <li>• Messaging services</li> <li>• Private line voice and/or data services</li> <li>• Value-added services</li> </ul>

Source: PTD

The licensing framework is hierarchical which means that a person can hold maximum of two telecommunications licences (eg. NFS (C)Licence+ NS Licence or NFS (C)Licence+ AS License ). A holder of an individual network facilities licence is permitted to undertake all those activities that are permitted under the other licence types.

Inter alia this reflects the relatively high scrutiny that applies to the application process for such licence and the degree of regulatory scrutiny that subsequently applies to holders of such licences. Other features of the licensing regime include the following:

- there is no limit on the number of licences of any type that may be issued except Nationwide Telecommunications Licence;
- a schedule of fees including application, initial, annual and renewal fees applies to each licence type;
- the operator licensing framework is independent of the process for spectrum allocation, i.e., a holder of an individual network facilities licence has no right swith regard to the use of spectrum; and
- licences are issued for a period of 15 years with a presumption of renewal for a further 15 years.

The key implication for the provision of broadband services arising from the licensing regime is that subject to the availability of spectrum, there are no regulatory barriers *per se* that would prevent new operators from entering the market and building infrastructure to support broadband services. As such, the licensing framework is considered sufficient and conducive to broadband expansion.

#### 4.5.2 Infrastructure Sharing

As the rollout of network infrastructure expands to reach more customers, operators increasingly look to infrastructure sharing as means for managing their costs. This is because the business case for investing in further infrastructure becomes increasing marginal. That is, the revenue to be generated from an investment in infrastructure in areas that are sparsely populated and user incomes are low may not be sufficient to recover costs. To the extent that infrastructure can be shared it reduces costs for operators.

At the same time, the Union Government recognises that the detrimental environmental impact of additional infrastructure deployment can be reduced through infrastructure sharing. For example, multiple roadway openings and multiple hilltop towers can be minimised. Moreover, infrastructure sharing promotes efficient use of national resources.

Infrastructure sharing is specifically addressed in the *Interconnection and Access Rules 2015* ('IA Rules'). The definition of "access" from the IA Rules includes infrastructure sharing as shown below.

*"Access" means the making available of Network Facilities Services and Network Services to another Qualifying Licensee, under defined conditions, for the purpose of providing Telecommunications Services. Access includes such arrangements as infrastructure sharing, international gateway access, national roaming, provision of leased lines on a wholesale basis and collocation.*

While licenses can voluntarily negotiate access agreements, various provisions in the IA Rules empower the PTD to direct licensees to negotiate access agreements. The basis on which costs

of access are determined depends on the circumstances in which access is negotiated. The key provisions are summarised below.

- the PTD has a role to encourage and ensure suitable timely interconnection and access aimed at promoting efficiency and sustainable competition and at providing tangible and lasting benefits to end users (Section 6);
- a licensee is not obliged to negotiate an access agreement if requested by another licensee (Section 7(e));
- the PTD may direct a licensee to negotiate an access agreement (Section 7(d)) in which case costs of access shall be shared equitably between the licensees (Section 10 (e));
- the PTD may direct a dominant licensee to negotiate an access agreement (Section 7(c)) in which case costs shall be cost-based (Section 10 (e)) and borne by the access seeker (Section 10(c)); and
- licensees may voluntarily negotiate an access agreement in which case costs shall be cost-based (Section 10 (e)) and borne by the access seeker (Section 10(c)).

The PTD recognises that Myanmar's regulatory framework for facilities sharing is not particularly rigorous compared those that have emerged in other jurisdictions, for example, those in India and Japan. This suggests that consideration should be given to developing a more comprehensive regulatory framework for infrastructure sharing in Myanmar.

#### 4.5.3 Spectrum Management

Under Chapter VI of the *Telecommunications Law*, the MOTC has an overall responsibility to manage and supervise the national frequency spectrum in accordance with international telecommunications conventions. In addition, the *Telecommunications Law* makes provision for the PTD to determine the terms and conditions under which persons may use spectrum as set out in the National Frequency Allocation Plan.

In order to provide for the effective and efficient management of Myanmar's scarce national spectrum resources, the PTD promulgated the *Spectrum Rules 2016*. The Spectrum Rules provide a comprehensive and rigorous framework addressing the rights and obligations of licensees, the MOTC and the PTD and the process for authorising the use of spectrum. Some of the key provisions of the Spectrum Rules are the following:

- the MOTC shall create and maintain a National Table of Frequency Allocations which shall be publicly available (Section 7);
- transmission of radio frequencies is prohibited except where there is a valid licence or the transmission occurs in specified licence exempt spectrum (Section 10);
- the use of spectrum may be authorised by a range of methods including auction, tender or fixed price (Section 11);
- the authorised use of spectrum is subject to general terms and conditions such as no ownership interests, non-discrimination, technology neutral, adherence to technical standards (Section 13); and
- there is a presumption of licence renewal on expiry (Section 14);
- there is a schedule of spectrum fees (section 15);and
- licensees may enter into agreements to share spectrum (Section 42).

Myanmar's spectrum management framework has already been proven effective as demonstrated by many successful spectrum allocations including the following:

- the auction of spectrum in the 2.6GHz band in 2016;
- the fixed-price allocation of spectrum in the 1800 MHz band in 2017;and
- the allocation of E-GSM spectrum in 2018.

The PTD has recently engaged in consultation with industry stakeholders on the release of additional IMT and 5G spectrum that would support further broadband development.<sup>14</sup>The consultation focusd on the review of Myanmar's spectrum roadmap with regard to IMT and 5G spectrum. In particular, this view addresses various matters that have implications for the provision of broadband services. Such matters include the following:

- the provision of spectrum that supports advanced 5G services including 3.5 GHz band;
- the review of the band plan for 2.6 GHz spectrum;
- review of the 850 MHz band and the reservation of spectrum for public protection and disaster relief ('PPDR') broadband; and
- the availability of spectrum to support high speed backhaul transmission.

Based on the success of recent activities of the Union Government with regard to spectrum management, the PTD is of the view that Myanmar's existing spectrum management framework is sufficient to ensure the availability of spectrum to support further growth in broadband services. As such, the PTD does propose to make changes to the existing regulatory framework for spectrum management.

#### 4.5.4 Universal Service

Chapter XV of the *Telecommunications Law* makes specific provision for the establishment of a universal service regulatory framework in Myanmar. Under this framework, the MOTC may direct the PTD to adopt plans to promote the widespread availability of telecommunications services throughout Myanmar by encouraging the provision of basic infrastructure and the expansion of telecommunications services in underserved areas. Such plans are subject to the approval of the MOTC and must address the designation of universal service areas, setting of universal targets and the determination of universal service obligations which are applicable to licensees.

The MOTC is required to establish a universal service fund ('USF') and this has now been implemented. Three MNOs currently contribute 2 *per cent* of their annual relevant revenue to the USF. No other operators make any contribution to the USF. The PTD uses the USF to implement its universal service plans.

In accordance with the universal service regulatory framework, the PTD has recently developed a comprehensive universal service strategy ('USS').<sup>15</sup> The USS defines universal service to specifically include broadband services:

*For Myanmar, mobile voice and broadband data services are defined as universal services.*

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<sup>14</sup> See: MOTC and PTD, *Review of IMT Aspects of Myanmar's Spectrum Roadmap*, Consultation Paper, , 8 March 2019 and *Myanmar's IMT and 5G Spectrum Roadmap preliminary positions*, 25 June 2019

<sup>15</sup> See: PTD MOTC Universal Service Strategy, Draft for Public Consultation, January 2019

The USS identifies strategic goals proposes three programs to meet them. The Program are the following:

- Program 1 - Infrastructure deployment for voice and broadband services
- Program 2 - Broadband connectivity and ICT training - Enabling the digital future
- Program 3 - Special Projects including content, applications, pilots, disability

The PTD considers that the USS provides a comprehensive framework for the successful promotion of widespread access to universal services (which definition specifically includes broadband services) in Myanmar.

## 4.6 Major Service Providers

Myanmar's telecommunications services were first provided by the State-owned and operated MPT. Following market liberalisation, there is now a wide range of active service providers in Myanmar's telecommunications sector.

Under Myanmar's operator licensing structure, operators need only have an individual network facilities licence to offer telecommunications services that are permitted under the other licence types. However, operators require a separate licence to use radio spectrum. Myanmar's flexible operator licensing structure allows operators the freedom to offer a wide range of services. The major operators in Myanmar's telecommunications sector by operator type are discussed in this section.

### 4.6.1 Mobile Network Operators

Myanmar has four mobile network operators ('MNOs') which collectively account for the major share of market activity. They are:

- Myanma Post and Telecommunications ('MPT');
- Ooredoo Myanmar Limited;
- Telenor Myanmar Limited; and
- Telecom International Myanmar Co. Ltd ('Mytel').

MPT is the former incumbent operator which offers a full range of fixed and mobile telecommunications services. In July 2014, MPT entered into a 10-year agreement with Japan's KDDI and Sumitomo Group to jointly operate a mobile phone service in Myanmar. MPT provides mobile services in the 900, 1800 and 2100 MHz spectrum bands. MPT continues to be a State-owned entity operating under the supervision of the MOTC. A law to corporatise MPT has recently been passed.

Following the decision of the Union Government to liberalise Myanmar's telecommunications sector, licences to build and operate nationwide telecommunications networks for 15 years were issued to Ooredoo (formerly Qatar Telecom) and Norway's Telenor in 2013 and each became operational in 2014. Both were issued with spectrum in the 900 MHz and 2100 MHz spectrum ranges to enable them to provide communications services. Further, spectrum allocations were made to all operators in the 1800 MHz range in 2017. Importantly their licenses are both technology and service neutral and allow the construction/provision of both wired and wireless networks and services.

Ooredoo Myanmar is one of many MNOs owned and operated by Ooredoo QSC which is an international telecommunications business based in Qatar. Ooredoo QSC has business

activities in the Middle East and Africa. Likewise, Telenor Myanmar is one of many MNOs owned and operated by the Telenor Group which is based in Norway. The Telenor Group also operates MNOs in Scandinavia and other parts of Asia.

Mytel became Myanmar’s fourth MNO when it was licenced in January 2017. Mytel is a joint venture between the Viettel Group (Vietnam) (49%), Star High Telecom Limited (28%) (Myanmar) and Myanmar National Telecom Holding Company (23%) and began operations in 2018. Star High Telecom Limited is a subsidiary of Myanmar Economic Corporation (‘MEC’) and through this relationship provides Mytel with access to substantial telecommunications infrastructure assets, in particular, fibre optic cable and towers. Mytel supports both 2G and 4G networks, and uses spectrum in the 900, 1800 and 2100 MHz spectrum bands. Mytel now claims to be Myanmar’s third ranked MNO by customer numbers.<sup>16</sup>

The MNOs all have network rollout commitments as part of their operator licences. Currently, the proportion of Myanmar’s population covered by the networks operated by the MNOs is 95.15 per cent.

#### 4.6.2 Wireless Broadband Operators

To drive the deployment of broadband services and to create competitive tension, the Union Government auctioned spectrum in the 2.6 GHz spectrum range in 2016. The spectrum was auctioned in lots which related to geographic regions. Such spectrum was ideal for wireless broadband as it supported the predominant 4G technology, i.e., long term evolution (‘LTE’). The spectrum auction enabled three operators to emerge in the wireless broadband (‘WBB’) space. These operators and the regions in which they hold 2.6 GHz spectrum are summarised in Exhibit 16.

**Exhibit 16: Wireless Broadband Operators by Spectrum Region**

Operator	2.6 GHz Spectrum Region
<b>Fortune International Ltd</b>	Region 1 (Nay Pyi Taw, Magwe, Bago, Mon, Kayin, Tanintharyi)
<b>Global Technology Co. Ltd</b>	Region 1 (Nay Pyi Taw, Magwe, Bago, Mon, Kayin, Tanintharyi)
<b>Amara Communications Co. Ltd</b>	Region 2 (Yangon, Ayeyawaddy, Rakhine) Region 3 (Mandalay, Saigaing, Chin, Shan, Kachin, Kayah)

These operators provide “data-only” broadband services over their wireless networks in their respective licensed regions. In addition, these operators also provide broadband services over their own fibre-based networks which are not subject to regional restrictions. These operators are also able to leverage their infrastructure assets and provide co-location services.

In addition to the above licensed spectrum WBB operators, Myanmar also has a number of WBB operators which use public or unlicensed spectrum. The use of such spectrum carries a number of operating risks such as interference and congestion.

<sup>16</sup> <https://en.vietnamplus.vn/mytel-becomes-third-biggest-telecoms-operator-in-myanmar/152505.vnp>

### 4.6.3 Fixed Infrastructure Providers

There are also a number of operators that provide broadband services over their own fibre optic cable networks. These are known as fibre to the home ('FTTH') service providers and supply broadband services to business and residential customers throughout Myanmar. Major suppliers in this market segment include Myanmar Speedlink, Welink and Ocean Wave. Such operators deploy fibre optic cable underground or overhead on their own or existing poles. Underground cable is typically "direct buried" through the exercise of "rights of way" granted to them by local government authorities.

### 4.6.4 Internet Service Providers

Myanmar also has a large number Internet Service Providers (ISPs) who provide retail broadband services to end users. Such operators do not operate their own networks as such. Instead they buy wholesale broadband network capacity from the fixed and wireless broadband infrastructure providers and re-package this for their retail customers. ISPs compete for customers on the basis of service and pricing packages.

### 4.6.5 Infrastructure Providers

Growing specialisation of infrastructure operation has led to emergence of licensees who simply own and lease network infrastructure such as towers and fibre optic networks. Such operators provide lease access to their network assets to a wide range of other service providers. As such, these infrastructure providers do not have their own retail broadband service customers. Major infrastructure providers in Myanmar include Irrawaddy Green Towers ('IGT'), Apollo, edotco<sup>17</sup>, Myanmar Fibre Optic Communications Network Co. Ltd ('MFOCN') and Eager Communications.

IGT, Apollo and edotco known as "towercos" specialise in building and operating communications towers and have operations in a wide number of markets. These operators typically build towers in Myanmar "on request" of the MNOs. MNOs also own and operate their own towers. Once a tower is built, the operators may lease space on the tower to other MNOs. Recent estimates indicate that Myanmar has around 16,000 towers of which about 60*per cent* are owned by towercos.<sup>18</sup>

As MNOs approach their network rollout commitments as set out in their operating licences, the growth in new tower construction is expected to slow. New towers will increasingly be focused on "in-fill" in areas where network capacity has been reached and in rural and remote areas where an investment in tower infrastructure can be economically justified. As such, towercos will increasing focus on the efficient and effective management of their infrastructure assets.

Operators such as MFOCN and Eager Communications focus on operating and maintaining fibre optical networks and related infrastructure services. Each provides services under lease agreements to customers which are typically broadband service providers. However, they do not supply broadband services to retail customers.

Myanmar currently has more than 50,000 kilometres of installed fibre optic cable with a further 17,000 kilometres under construction. This suggests that the market is responding to demand

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<sup>17</sup> The PTD notes that Axiata Group (which is majority owner of edotco Group) has recently entered into discussions with Telenor Asia on a possible merger of their businesses.

<sup>18</sup> See: *A Deep Dive into Asia Towers, Tower Exchange Asia Dossier, 2018*

for fibre optic cable and that *prima facie* this should be adequate to meet support further growth in Myanmar’s broadband services.

It is evident that the vast majority of Myanmar’s mobile towers are not connected to terrestrial transmission or backhaul networks. Ideally, such backhaul networks should fibre optic cable networks given their superior capacity and reliability compared to microwave backhaul networks. The “fiberisation” of Myanmar’s mobile is likely to drive future business activity for Myanmar’s infrastructure providers.

#### 4.6.6 International Capacity Providers

In 2016 the Ministry began accepting applications from foreign owned operators for licences to supply International Gateway (‘IGW’) services. Previously this market was served by only a very limited number of players. As a result of this liberalisation, Myanmar now has a large number of operators that provide IGW services for service operators based in Myanmar. Operators in Myanmar can access IGW services from a variety of submarine and terrestrial cable systems. The available cable systems are summarised in Exhibit 17.

**Exhibit 17: Available Submarine and Terrestrial Cable Systems**

Submarine Cable Systems	Terrestrial Cable Systems
<ul style="list-style-type: none"> <li>– SeaMeWe3</li> <li>– SeaMeWe5</li> <li>– Asia Africa Europe 1 (AAE1)</li> <li>– Campana Group (expected to be available in 2020)</li> </ul>	<ul style="list-style-type: none"> <li>– India - Tamu</li> <li>– China - Muse</li> <li>– Laos - Tachilek</li> <li>– Thai - Myawaddy</li> <li>– Thai - Three Pagoda</li> <li>– Thai - HteeKee</li> <li>– Thai - Mawtaung</li> <li>– Thai - Seikhpu</li> </ul>

These cable systems provide a high degree of international bandwidth capacity to support the provision of broadband services in Myanmar. The Ministry or the PTD is not aware of any concerns with the adequacy of international bandwidth capacity to continue to support the anticipated growth in Myanmar’s broadband services.

### 4.7 Market Competition

The Union Government’s primary objectives in market competition are to improve accessibility, affordability, quality of service and ability of choice. At the retail level choice means giving consumers the option to choose a service provider from among multiple competing service providers. Further, this choice also means providing consumers a choice from among different service and pricing offerings. At the wholesale level, choice means providing service providers with the options to source access to wholesale services from multiple access providers.

The policies that the Union Government has adopted and actions taken by the Ministry and PTD in recent years has promoted a strong degree of competition in the provision of broadband services. At the retail level, consumers can have their broadband service delivered via mobile, wireless and fibre optic networks. It is, however, recognised that not all consumers have a choice between all three options given that the fibre optic cable and wireless broadband networks are concentrated in the cities of Yangon, Mandalay and Nay Pyi Taw. Moreover, consumers can choose between multiple MNOs, fixed and wireless based broadband service providers and other retail service providers to access broadband services.



These choices among service providers result in consumers being offered multiple service and pricing packages. For example, there are broadband service offerings that cover a range of service differentiations including:

- services targeted to business and consumer segments;
- pre and post-paid payment options;
- a range of data limits and unlimited data; and
- a range of contract periods.

At the wholesale level, it should be noted that there is a range of wholesale service providers which provide network services to retail ISPs. Moreover, there are multiple IGW service providers available to the retail ISPs. The availability of these choices ensures that pricing and services are competitive.

There are a number of recent media reports which comment on the state of competition for broadband services in Myanmar. The Ministry and the PTD are encouraged by such media reports that highlight competitive market outcomes in the telecommunications and broadband market in Myanmar. This in turn results in the delivery of benefits to consumers in the form of lower prices and better quality of services.

## 5 NATIONAL BROADBAND VISION

### 5.1 Introduction

The Union Government recognises the fundamental importance of broadband services to drive Myanmar's economic and social development. This recognition has played out in the adoption of various broadband policy positions and various actions including the introduction of competition, the introduction of new laws and the release of frequency spectrum in recent years. This has resulted in a significant uptake of broadband services in Myanmar to the point where broadband penetration currently stands at around 82 *per cent*.

While this is a significant achievement there is more that can be done. In particular, Myanmar's broadband penetration is:

- below that of many of its ASEAN peers (see Exhibit 18);
- heavily skewed to mobile (3G and 4G) broadband; and
- skewed to the major population centres of Yangon, Mandalay and Nay Pyi Taw.

Accordingly, this section sets out the Union Government's proposed broadband vision. In particular, it sets out a timetable for the achievement of various broadband penetration targets. Importantly, these targets are set in the context of a clear understanding and an appreciation of the challenges that lie ahead and which must be met in order to drive broadband expansion in Myanmar.

### 5.2 Challenges in Broadband Expansion

The GSMA has identified four enablers to mobile internet adoption to create the drivers of supply and demand for mobile Internet to flourish.<sup>19</sup> While the four enablers in the GSMA's framework focus on mobile broadband, the PTA considers that they are also relevant to broadband services irrespective of the network platform on which broadband services are provided. The GSMA's four enablers are the following:

- **Infrastructure:** the availability of network coverage for high-performance mobile Internet;
- **Affordability:** mobile services and devices at price points commensurate with average levels of national per -capita income;
- **Consumer readiness:** the awareness and digital skills to value and use the internet and a cultural environment that promotes gender equality in use of mobile; and
- **Content:** the availability of online content and services that are accessible and relevant to the local population.

With regard to each of these enablers and the challenges that they imply for Myanmar, a number of observations can be made. These are discussed below.

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<sup>19</sup> GSMA, Mobile Connectivity Index

**Exhibit 18: Broadband Population Penetration and Speed Targets among ASEAN countries**

	Malaysia	Indonesia	Thailand	Vietnam
<b>Overall - BB Coverage and Speed Targets</b>	-	-	- 95% HH at 2Mbps (download speed) by 2020	- 60% of internet subscribers at 25Mbps - 100% of public internet access points (Fixed BB) - Fixed BB to 40% of households and individuals by 2020
<b>Urban - BB Coverage and Speed Targets</b>	- By 2020: 95% in populated areas - By 2023: 30Mbps for 98% of populated areas	- By 2019: 100% of population at 1Mbps (Mobile) - 71% HH at 20Mbps (Fixed)	- By 2020: 100Mbps minimum speed (Fixed)	- -
<b>Suburban/Rural - BB Coverage and Speed Targets</b>	- By 2020: 20% premises in sub-urban and rural at up to 500Mbps -	- By 2019: 49% rural HH at 10Mbps (Fixed) - 52% rural population at 1Mbps (Mobile)	- -	- 95% of residential areas (3G/4G networks at 4Mbps) - Rural: 2Mbps speeds
<b>Public Sector Broadband Infrastructure Targets</b>	- By 2020: Fibre network passes 70% of schools & govt offices, hospitals & police stations near schools - By 2020: 100% premises passed in State Capitals & selected high impact areas with up to 500Mbps	- By 2019 (BB infrastructure): - E-Education: 22% - E-Gov: 12% - E-Health: 17% - E-Logistics: 16%	- E-Education: Fiber to the University at 1-2Gbps; Fiber to the school and public libraries BB at 10-100Mbps - E-Health: access for sub-district hospitals and health centers - E-Gov: services available through the broadband network - E-Agriculture: Focus on connecting remote poor farmers	- E-Gov: 100% of public services online

Source: Compiled from Government sources by WPC, 2019

### 5.2.1 Infrastructure

The availability of network infrastructure to support broadband service delivery is a fundamental requirement. As noted earlier in this whitepaper, the networks operated by the MNOs cover 95.15% of Myanmar's population. As such, there are few concerns with mobile infrastructure to support broadband service provision. However, the fixed and wireless network infrastructure to support broadband service is a different matter.

It is evident that where fixed and wireless network infrastructure to support broadband service is available, it is predominantly in the urban areas of Yangon, Mandalay and Nay Pyi Taw. This suggests that mechanisms must be adopted to encourage the deployment of fixed and wireless network infrastructure in Myanmar's rural areas. The deployment of such infrastructure in these areas is problematic given that in general population is sparse and incomes are low in rural areas. Moreover, there are various rural areas of Myanmar where it is not practical to deploy infrastructure due to security concerns. As such, the business case for infrastructure

investment in rural areas is often difficult to mount but over time need to be addressed to support national economic growth and cohesiveness.

### 5.2.2 Affordability

In areas where infrastructure is available to support broadband services, services must be priced at affordable levels. Such affordable pricing must also take into account the cost of a user device, e.g., smart phone or tablet, installation charges (where they may apply) and the financial impact of a minimum term contract. Affordability is particularly problematic for Myanmar given its relatively low GDP and GNI per capita. In particular, Myanmar ranks lowest among ASEAN member states for these measures. This concern with affordability is exacerbated to the extent that Myanmar has a large rural population and this is where incomes are generally the lowest. This suggests that digital learning centres ('DLCs) which provide Internet access might be an appropriate strategy for ameliorating affordability concerns. The PTD notes that Program 2 of its USS specifically supports the establishment of DLCs.

### 5.2.3 Consumer readiness

Recognising that consumers need to have sufficient awareness of the Internet and digital skills before they will commit to purchase broadband services even if such services are affordable. In Myanmar's case, consumer readiness is probably constrained by its relatively low level of adult literacy and its large rural population. This suggests that strategies to overcome this may lie in education, e.g., introducing digital skills as part of the national education curriculum.

### 5.2.4 Myanmar Content

Myanmar people prefer local language content. For Myanmar ensuring local language Internet content is a significant challenge. In particular, while the English language is the predominant language of the Internet although this predominance is declining.<sup>20</sup> Moreover, there are around 100 languages spoken in Myanmar. While Burmese is Myanmar's official language it is spoken by only two-thirds of the population. The challenge of local language content on the Internet is particularly acute in Myanmar's rural areas where neither English or Burmese are widely spoken or read.

## 5.3 Myanmar's Broadband Targets

The Union Government proposes to set broadband penetration targets for Myanmar to achieve over the next five years. These targets have been set with regard to a range of factors including the current state of Myanmar's broadband penetration, Myanmar's broadband penetration and economic position compared to that of its ASEAN peers and the targets set in the USS. In addition, these targets are intended to be both aspirational and achievable. That is, achieving the targets will require all stakeholders to commit to them and to take positive actions towards their achievement.

### Universal Service Strategy (2019-2023) in Myanmar

The objectives of the USS include the availability of broadband internet services to all people in Myanmar and the specific target of 95 percent coverage at 5Mbps by 2022 has been set. When the USS was promulgated in January 2018, coverage was at approximately 80 percent. In providing support towards this target, the Ministry established the Universal Service Fund (USF)

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<sup>20</sup> See: [https://w3techs.com/technologies/overview/content\\_language/all](https://w3techs.com/technologies/overview/content_language/all)

which is charged with implementing the USS and providing subsidies to facilitate achieving targets.

This White Paper endorses a target average speed of 100Mbps by 2024 for 50 percent of fixed and wireless broadband services, which would align Myanmar with regional exemplars. Target speeds between fixed/wireless broadband (largely for households and businesses) and mobile broadband (largely for individuals) will differ greatly given the differing use cases, which is why a target for 15Mbps for mobile broadband by 2024 is endorsed.

**Exhibit 19: Broadband Population Penetration and Speed Targets by Network Platform and Region**

Region / Network Platform	BB Penetration Current Estimate	BB Penetration and Speed 2021 Target	Universal Service Strategy 2022 Target	BB Penetration and Speed 2024 Target
<b>Urban</b>				
Mobile BB	90%			95% at 15Mbps
Fixed BB	< 1%	5% at 20Mbps		50% at 100Mbps
Wireless BB	<1%	15% at 20Mbps		50% at 100Mbps
<b>Non-Urban</b>				
Mobile BB	78%			90% at 2Mbps
Fixed BB	< 1%	3% at 10Mbps		20% at 30Mbps
Wireless BB	< 1%	20% at 5Mbps		60% at 30Mbps
<b>Overall</b>				
Mobile BB	82%		95%	95%
Fixed BB	< 1%			20%
Wireless BB	< 1%			25%
BB Speed	2Mbps		5Mbps	

In setting these targets the Ministry has made an estimate of the current broadband penetration level split between urban and non-urban areas. The estimate is based on discussions with operators. Going forward, the Ministry and the PTD intends to work closely with operators to ensure that relevant and appropriate data concerning broadband penetration is captured which will enable progress towards achieving the targets to be closely monitored.

### Public Sector Targets

To promote alignment with other ASEAN countries, this White Paper recommends setting broadband targets related to public sector services including those related to e-Governance, e-Education, and e-Health. This White Paper endorses a target of 50 percent government services provided online by 2024 and speeds of 1-2Gbps at universities, and speeds of 10-100Mbps at schools and public libraries. These would be similar targets to those Thailand has set.

## 6 STRATEGIES FOR ACHIEVING BROADBAND TARGETS

### 6.1 Introduction

In the previous section, the Union Government has set some ambitious broadband service penetration targets for Myanmar. In order to reach such targets and ensure the on-going benefits to Myanmar's citizens from broadband service, multiple coordinated strategies need to be implemented. This section proposes four key strategies which aim to promote and encourage the wider deployment of broadband services in Myanmar. These strategies are designed to address various obstacles and impediments that, if not overcome, limit Myanmar's broadband service capacity. These strategies are the following:

- reduce the costs of network infrastructure;
- provide more radio spectrum to support broadband services;
- enhance quality of service; and
- facilitate the development of Internet content and usage.

These strategies are discussed in further detail below.

### 6.2 Reducing the Cost of Network Infrastructure

The priorities for Myanmar's broadband infrastructure development predominantly lie in fixed and wireless network infrastructure in rural areas. This reflects the very low population coverage of these networks and the concentration of existing fixed and wireless network infrastructure in urban areas. It is, however, recognised that there remains a need to encourage infrastructure deployment in urban areas.

There are various obstacles and impediments that impair broadband infrastructure deployment in Myanmar and drive up the costs of infrastructure deployment and on-going operation. The deployment of network infrastructure typically involves a number of activities including:

- erection of towers and poles to accommodate telecommunications equipment such as base stations and repeaters;
- suspension of fibre optic cable on poles;
- digging trenches and direct burying of fibre optic cable;
- digging trenches and constructing ducts for the laying of cable; and
- installation of telecommunications equipment and cables within commercial and residential buildings.

Prior to any of the above activities taking place, permission must be obtained from public and private land owners as applicable to access land for the erection of towers and poles. In addition, "rights of way" must also be obtained to allow fibre optic cable to be suspended or laid underground through public and private land. Permission must also be obtained from building owners for the installation of telecommunications equipment and cables.

It is evident that the process for obtaining such approvals is cumbersome, time consuming and inefficient. Depending on the location of the land and rights of way, the process may involve seeking approval from multiple local government authorities and communities. Other evident concerns are that approval processes differ between local government authorities and that there is often a lack of understanding of the approval process among government officials leading to unnecessary delays in obtaining approvals.

In addition to a cumbersome approval process, infrastructure deployment is also hampered by other factors including:

- existing fibre infrastructure being damaged by subsequent construction works which are not aware of the existing infrastructure; and
- an absence of in-building standards for telecommunications equipment.

To address the evident concerns with infrastructure deployment and to assist in reducing the cost of infrastructure deployment the following actions are proposed:

- adopt national guidelines for obtaining approvals;
- adopt a one stop approval process;
- create a national database of telecommunications infrastructure;
- encourage infrastructure sharing; and
- develop in-building telecommunications standards.

### 6.2.1 National Rules for Infrastructure Approvals

The deployment of telecommunications infrastructure has a wide range of potential negative impacts on the environment and public safety, e.g., noise, public amenity, radiation. In addition, the construction process may also involve considerable disruption to day to day activities, for example road closures. It is therefore understandable that infrastructure deployment projects are subject to a range of necessary approvals to ensure that the environment and public safety is protected and disruption kept to a minimum. However, the Union Government believes that the existing infrastructure approval processes can be vastly improved through the development of national infrastructure approval rules.

Infrastructure rules would provide a common reference point for all stakeholders involved in the infrastructure approval process, i.e., operators, PTD, government (at national, state and local government levels). Such Rules would establish a framework in which approval requirements for different types of projects, e.g. tower construction, fibre deployment, different types of land, e.g., private or public, different types of public land, e.g., roads, airports, schools, etc. can be identified and assessed.

The Rules would set out a generic set of practices and procedures that need to be observed in the application approval process. These would include:

- necessary supporting information concerning each project application and whether supporting information such as a certification of structural design is required;
- the timelines that must be observed for considering each application;
- where an application is rejected detailed reasons must be provided in writing;
- identification of situations where community consultation must take place and the process that must be observed;

- a schedule of fees for applications and approvals and the process for making payments; and
- the process to be followed where a dispute arises between an applicant and an approving authority.

These Rules provide details relating to:

- The establishment of low-impact facilities;
- The procedures for obtaining permission from the PTD to establish telecommunications infrastructure;
- The obligations in undertaking work to establish such infrastructure;
- Additional requirements imposed by government bodies and the administrative divisions in Myanmar;
- Dispute resolution procedures and the appeals process for disputes arising out of the Rules

It is expected that the adoption of these Rules will improve existing infrastructure approval processes in Myanmar. It will do so by creating a common understanding of the requirements and the overall process for obtaining approval from the PTD prior to the establishment, installation and deployment of telecommunication infrastructure.

The Rules also encourage a speedy approval process by providing timelines that must be observed by the PTD when considering applications. As part of the objective to clarify and expediate the approval process, licensees under these Rules may install low-impact facilities without seeking prior approval from the PTD.

The PTD may, in addition, publish guidelines or models in order to support all stakeholders in navigating and complying with these Rules.

### 6.2.2 One Stop Approval Process

It is further proposed that the infrastructure approval guidelines could be complemented by the establishment of one stop centre (OSC) model.

The OSC model is used in some markets to facilitate more efficient rollout of telecommunications infrastructure (see, for example, Exhibit 20 below on Greece). The OSC model involves the establishment of a government body that facilitates the licensing process by obtaining co-current permission from the relevant authorities (which may include local planning bodies as well as civil aviation and other authorities) on behalf of the infrastructure provider. Where the infrastructure provider must obtain multiple permits for site planning and installation, this model is especially useful and provides a practical means of dealing with bureaucratic inefficiencies.

For example, the OSC could manage all interaction with Myanmar's Ministries on behalf of applicants. The PTD has been tasked with researching whether Myanmar should adopt such a model.

#### Exhibit 20: Greece's one-stop centre for BTS planning and permission

Requirements and conditions that operators face in order to be granted a permit for base station deployment vary across Europe. Procedures can be defined at different government levels, even though generally the local authority (municipality) is the main point of referral for the process. In addition, general requirements relating to regional or national levels of legislation usually have to be met.



As the GSMA notes, it takes on average one year for an applicant to receive all permits necessary to deploy single base station antennas in Europe. As a general observation, most delays are caused by bureaucratic and time-consuming administrative processes and a lack of co-operation with operators. In Greece, the EETT (Hellenic Telecommunications and Post Commission) assumes the role of a one-stop licensing body, whereby applications are filed through the Electronic Submission of Applications System ('ESAS') and subsequently forwarded to the various competent authorities and agencies for co-current issuance of the relative authorizations or approvals. The final approval is then issued by the EETT. The competent authorities should respond back to the EETT through the EAFS within four months.

Greece introduced the Law 4053/2012 on licensing antenna constructions to improve the approval process. Under the new provisions, the EETT facilitates approval across a number of agencies, including the Civil Aviation Authority and the Greek Atomic Energy Commission, and ensures compliance with the Standard Environmental Conditions and applicable city planning provisions. Authorities involved are obligated to update the EETT through the ESAS platform on whether the application is approved or rejected. If all authorities approve, then the EETT issues the final approval. However, if one authority rejects the application, then the operator or provider must renew the application process through the EETT.

### 6.2.3 National Infrastructure Database

To avoid costly damage to infrastructure, disruption of service and possibly personal injury it is important to ensure that underground infrastructure such as fibre optic cable and ducts are protected from subsequent construction projects. International best practice is to create a national infrastructure database so that before any new project commences the location of existing infrastructure can be identified. Such a database provides the base for creating a 'dial before you dig' organisation. These types of organisations are supported by electricity, gas, communications and water companies – as well as many other private enterprises. They provide an "on call" service which provides very detailed information of the location of underground infrastructure in a given location.

The creation of national infrastructure database could initially focus on telecommunications infrastructure owned and operated under licences issued by the PTD. Operators would essentially need to share their existing records and agree on common practices in the recording of infrastructure related data.

The development of a national telecommunications infrastructure database would be facilitated by the PTD but developed by the local industry. That is, the PTD would establish the objectives, outcomes and coverage of the database and convene initial meetings of stakeholders. However, the detailed arrangements of how the database would work would be for the industry to develop.

### 6.2.4 Encourage Greater Infrastructure Sharing

While there are many examples where Myanmar's telecommunications operators share infrastructure, there are also many instances where infrastructure sharing has been far from optimal. As such, there that more could be done to encourage infrastructure sharing.

In particular, the PTD will investigate whether Myanmar's regulatory framework could be strengthened through the adoption of an infrastructure sharing guideline or set of rules. In particular, this could involve adopting a requirement for operators to negotiate infrastructure sharing if requested rather than allowing operators to refuse to negotiate. Such a requirement would require operators to engage in negotiation and as such would encourage them to

explores ways to share infrastructure in the national benefit. Such approaches are consistent with other ASEAN markets like Indonesia<sup>22</sup> and the Philippines (see Exhibit 21 below).

#### Exhibit 21: Rules on the Accelerated Roll-out of Common Towers in the Philippines

On May 2019, the Department of Information and Communications Technology (DICT) in the Philippines issued Rules on the accelerated roll-out of common towers in the country. These Rules are designed to provide 'strategic, reliable, and cost-efficient infrastructure and citizen-centric' infrastructure to facilitate good governance and global competitiveness. They also target increasing access and availability of ICT services in remote and unserved areas. As part of this, the DICT will streamline the issuance of licenses for the deployment of any telecommunications radio or equipment in towers that are not built by Independent Tower Companies (ITCs). In order to encourage the sharing of all passive infrastructure, the DICT also incentivises a Mobile Network Operator (MNO) that voluntarily offers to share its existing towers by allowing it to build towers on government properties.

Under these Rules, it is expected that at least 2,500 common towers will be built or converted in identified DICT-owned properties, as well as in other government agencies' properties and hard-to-access areas identified by Telcos. ITCs that build common towers can have ownership of these towers and facilities on such properties for 15 years, which may be extended for another 15 years. As of 21 May 2019, there are 22 tower firms that have signed a Memorandum of Understanding (MOU) with the DICT and MNOs for the initiative.<sup>23</sup> These ITCs and MNOs can conduct surveys and studies on the identified sites to initiate commercial agreements with each other. MNOs can then notify the DICT of its intent to establish a network in any of the specified 2,500 sites.

The DICT requires ITCs to lease its telecom towers for a specified lease term that is transparent, equal and non-discriminatory to access seekers. The Rules also require all negotiations for infrastructure sharing between the contracting parties to be done in good faith. This means that access providers must not obstruct or delay negotiations in resolving disputes; nor should they refuse to provide information relevant to the agreement. The DICT will monitor compliance of the ITCs and MNOs with the rollout plan. It may rescind the MOA for failure to comply, or for any violation of the Rules.

#### 6.2.5 Develop In-Building Telecommunications Standards

The Ministry and the PTD understands that there is a need to develop standards that apply to making provisions for telecommunications equipment which is installed in multi-tenanted office and residential buildings. This need arises from various instances of insufficient and inconsistent provisions for telecommunications equipment being made. This situation reportedly results in inadequate telecommunications services being provided, inefficient use of building space and risk of personal injury. The need for applicable standards is increasingly important as new buildings are being constructed.

An in-building telecommunications standard would include a wide range of matters. These would typically include the following:

- provision of adequately sized, MDF, storage and plant rooms as part of building design;
- provision of adequately sized riser shafts for cable installation;
- ensuring that telecommunications equipment and is secure and accessible only by authorised personnel;

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<sup>22</sup>On 31 December 2018, the Indonesian Ministry of Communications and Informatics ('MoCI') issued a *Joint Ministerial decree entitled Guidelines for Joint Development and Utilization of Passive Telecommunications Infrastructure* No. 555/11560/SJ, No. 3 of 2018 between MoCI and Ministry of Internal Affairs as a guideline for local government to regulate the ducting, poles and towers.

<sup>23</sup><https://dict.gov.ph/dict-issues-rules-on-common-tower-sharing-2019/>

- ensuring that a building has adequate electric equipment installed to support telecommunications equipment; and
- ensuring that telecommunications equipment is readily accessible for routine maintenance with regard to physical access and people and equipment movement.

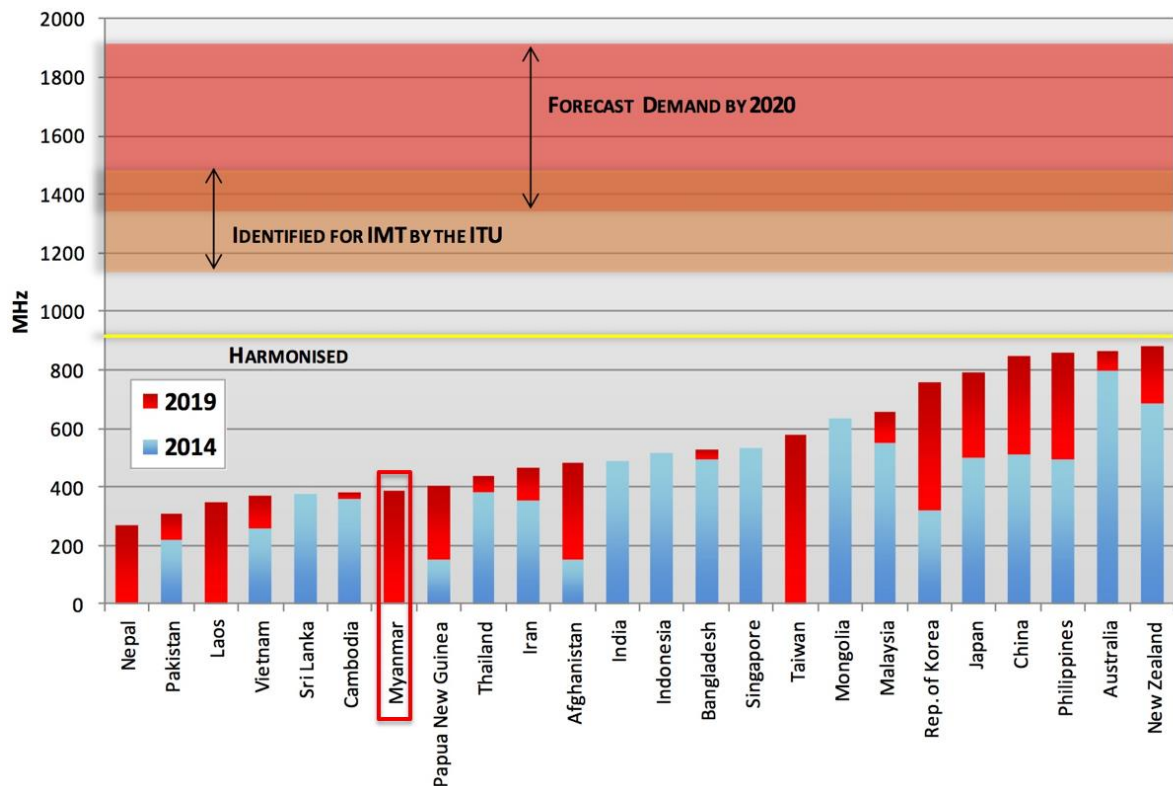
The development of an in-building telecommunications standard would be facilitated by the PTD but developed by the local industry. That is, the PTD would establish the objectives, outcomes and coverage of the standard and convene initial meetings of operators. However, the detailed contents of the standard would be for the industry to develop. Ultimately, the standard could be formalised as a voluntary industry code of practice. It is preferable that operators voluntarily agree to comply with the code rather than the PTD intervening and enforcing compliance.

### 6.3 Releasing Spectrum for Broadband Deployment

Ensuring that there is sufficient radio spectrum available to operators is essential for effective broadband service deployment.

As of April 2019, Myanmar has released almost 400 MHz of IMT spectrum. This puts Myanmar ahead of Vietnam, Cambodia, and Lao PDR, and not far behind Thailand (see Exhibit 22).

**Exhibit 22: Spectrum licensed for IMT services in ITU Region 3**



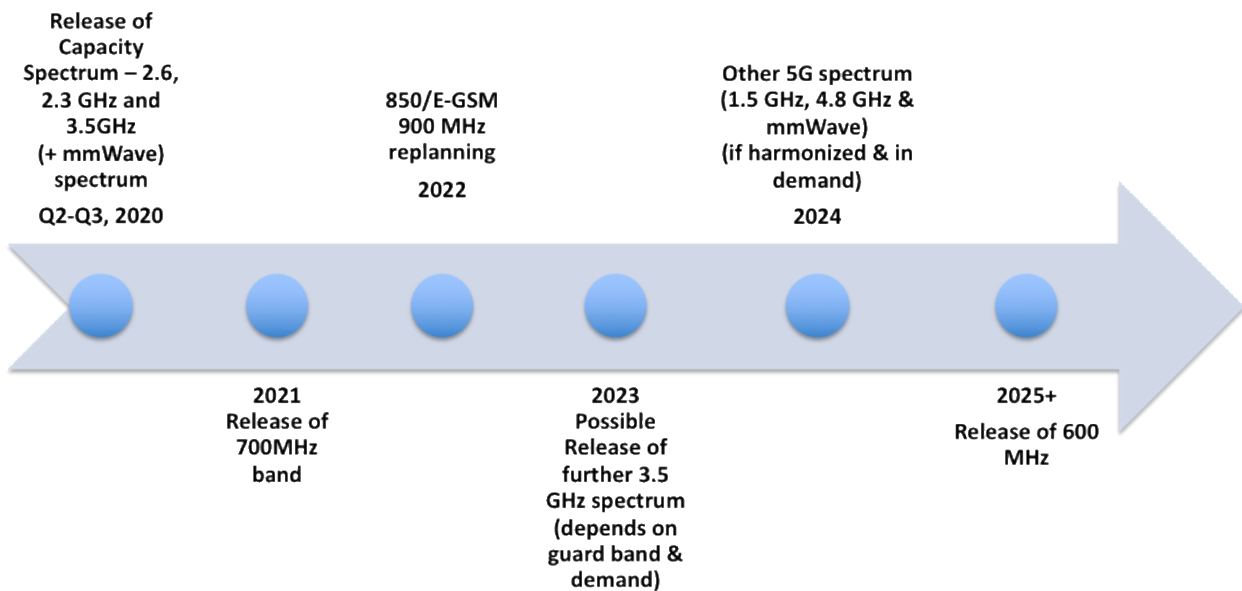
Source: LS Telcom, 2019

However, in the next 12 months, a number of ASEAN markets, including Thailand, Indonesia, Malaysia, and Vietnam), are planning to release significantly more IMT spectrum.

Myanmar is following suit. According to the current release schedule, as per Exhibit 23, 350 MHz of capacity spectrum<sup>24</sup> will be released to the market in 2020 and 90 MHz of sub-1 GHz coverage spectrum in 2021. By the end of 2021, IMT spectrum availability in Myanmar will have doubled to approximately 830 MHz (assuming all spectrum is allocated). This would put Myanmar on par with countries like Japan and South Korea. More detail will be provided with the IMT and 5G Spectrum Roadmap is released.

Knowing that there will be sufficient spectrum in the future to support both 4G and 5G service offerings, MNOs and all market players in Myanmar can confidently make the necessary long-term investments in digital infrastructure.

**Exhibit 23 Release Schedule of additional IMT Spectrum in Myanmar**



**6.3.1 IMT capacity spectrum in 2020**

In Q2/Q32020, the PTD, on behalf of the Union Government plans to auction the 2.3, 2.6 and 3.5 GHz spectrum bands or conduct a beauty contest to assign them, with price being a criterion depending on the level of demand.

**6.3.2 700 MHz spectrum in 2021**

There are also plans to auction spectrum in the 700 MHz band in 2021, subject to demand.

This follows the likely regional release of this band in a number of ASEAN markets in2019 and 2020, including Malaysia, Singapore, Thailand and Vietnam. The launch of APT700 services in other ASEAN markets will accelerate the availability of affordable Band 28 smartphones and other devices in Myanmar. Furthermore, it is likely that China and India will release or auction 700 MHz band spectrum in the new future, which would significantly increase device availability and affordability.

<sup>24</sup> Plus any mmWave spectrum allocations if in demand.

The release of the 700 MHz band will facilitate additional coverage in Myanmar as part of the Union Government's universal service obligation (USO) strategy<sup>25</sup>. However, it is key to note that many customers will not be able to take advantage of the extended coverage until affordable devices are available.

Given the delay of the release of this spectrum until 2021, MNOs will have time to make informed decision on whether to utilise all or party of the 700 MHz band for 5G coverage. Regardless of whether MNOs decide to deploy 5G initially, Myanmar's technology neutral regime gives MNOs the option to do so in the future. The delay will also allow an assessment whether any of the 700 MHz spectrum band should be reserved for PPDR broadband or other Government uses.

### 6.3.3 Spectrum releases in 2022 and beyond

If there is demand, the PTD may offer further capacity band spectrum (namely the 1500 MHz, 4.8 GHz and further mmWave spectrum) in 2023 and beyond. Additional 3.5 GHz spectrum could also be released in 2023 if technical studies determine that less than 105 MHz is needed as a guard band to fixed satellite services.<sup>26</sup>

The 850 and 900 MHz spectrum bands may also be available by 2022/3, as these bands will need to be re-planned prior to the expiry of the current E-GSM licences and the switch-off of legacy CDMA networks.

In 2024 and beyond, if there is demand for other 5G spectrum including in the mmWave bands and the 4.8 GHz band, spectrum in those bands could be released.

Lastly, decisions about the release of 600 MHz (n71) would occur post-2025, as Myanmar will first need to undertake the switchover from analogue to digital television.

## 6.4 Enhancing Quality of Service

In general terms, quality of service ('QoS') refers to the ability of a network or service to satisfy the end user. Various definitions of QoS exist, although the term is often used to refer to all aspects of the customer's experience of a particular service. According to ITU, 'quality of service' is defined as:

*"The totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service."<sup>27</sup>*

Quality of Service is conceptually similar to Quality of Experience ('QoE'), although the two are technically distinguishable.

QoS refers to the performance of technical aspects of a network that affect the ability of users to make use of the network. This includes aspects such as the connection speed available to users and the level of network congestion. QoE by contrast refers to the level of satisfaction a user is likely to enjoy in using a network, including the user's interactions with the network

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<sup>25</sup> The release of 700 MHz spectrum, would if deployed extend using existing sites the current mobile coverage by a couple of percentage points given the greater cell size of 700 MHz versus 900 MHz spectrum.

<sup>26</sup> See GSMA, *Roadmap for C-Band Spectrum in ASEAN*, August 2019 which examines such issues and provides summaries of a number of technical studies.

<sup>27</sup> [www.itu.int/rec/T-REC-E.800-200809-1](http://www.itu.int/rec/T-REC-E.800-200809-1)

provider and the quality of customer service that is not related to the technical performance of the network. Examples of such services may include:

- Satisfaction with dispute or fault resolution processes;
- Ease of access to billing mechanisms;
- Access to customer service personnel; and
- User-friendly access guides.

QoS is important for wireless broadband networks. A significant part of the utility of broadband services comes from its ability to provide access to data at the user's convenience. QoS naturally has a direct and profound impact on the user's ability to access mobile broadband services in a satisfactory manner. If a network has poor QoS characteristics, it is unlikely that users will be satisfied with the service and will likely be inclined to seek access to an alternative network or discontinue using the network completely.

By early 2020, the Union Government proposes, following industry consultation to be lead by the PTD to impose additional requirements in order to improve the QoS/QoE of services provided to industry and Myanmar consumers by either:

- (i) promulgating a new technical standard in accordance with Section 24 of the Telecommunications Law; and/or
- (ii) the utilise Condition 13.12 of the Operating Licences to require the Publication of Quality of Service Information.

## 6.5 Facilitating Content and Applications

The Union Government proposes a number of initiatives to drive broadband service penetration which are focused directly on consumers. These initiatives are based on the recognition that for users that can afford to purchase a broadband service they will not make a purchase unless they have a basic level of digital skills, access to digital content in a language that they understand and a broad awareness of the relevance of access to the Internet to them. The proposed initiatives are the following:

- deployment of digital learning centres ('DLCs') in regional areas;
- driving Internet based government service delivery; and
- encouraging local language content and applications development.

These are discussed in further detail below.

### 6.5.1 Deployment of Digital Learning Centres

The deployment of DLCs would be effective in exposing unconnected users to the Internet. This initiative is consistent with Program 2 of the USS which specifically supports the establishment of DLCs.

DLCs may be known by a variety of names but essentially refer to a free, friendly and safe public place where people of all ages and abilities can come to learn about computers, access the Internet, explore new careers, further their education, participate in community activities or develop technology skills etc. DLCs are particularly effective in overcoming affordability and digital skill barriers to Internet access.

DLCs are usually located in public community centres, schools, libraries, etc and focus on offering individuals in the community the use of a smartphone, tablet or computer which is connected to the Internet. In addition, DLCs typically also provide basic training courses in the use of digital technology together with a range of related services, such as printing, photocopying etc. The services provided by DLCs are usually free of charge or subject to a low nominal charge. It is, however, evident that there is widespread diversity between DLCs with regard to the services they provide, the level of funding they receive and the policy objectives that they seek to fulfil.

As a new initiative which is consistent with the USS, the Union Government proposes to scope out a pilot project to deploy DLCs in Myanmar's rural areas. The PTD on behalf of the Government will consult with industry stakeholders including operators, community groups and possible donors to assess the feasibility of DLCs and the options that are available for establishing DLCs.

### 6.5.2 Driving Internet Based Government Service Delivery

The Union Government considers that it can drive Internet penetration by taking a "lead by example" approach to government service delivery. This sentiment is integral to the Union Government's *e-Governance Master Plan 2016 – 2020* as discussed above in section 1.4.5.

The use of the Internet for government service delivery is efficient and effective for citizens and government alike. For example, time consuming government related tasks such as voter registration, passport applications, registering children into school, applying for healthcare can all be done via the Internet. This saves people valuable time otherwise wasted in commuting to government offices and waiting in line for their turn. This also means that governments can save the costs of employing staff and providing office space to perform these tasks. In addition, by providing public services online, governments make information more readily available to the public thereby promoting transparency and accountability and limiting opportunities for misappropriation of public resources.

For its part, the PTD as the sector regulator is committed to make greater use of the Internet in the performance of its activities. In particular, the PTD will undertake to review its activities to identify opportunities which can be performed electronically and thereby promote its operational efficiency and effectiveness. Activities with high potential in this regard include the following:

- receiving submissions in response to public consultations;
- lodgment of licence applications and applications for rights of way, tower construction etc.;
- electronic payment of licence and application fees; and
- dissemination of information, e.g., annual reports, consultation papers.

### 6.5.3 Encouraging Local Language Digital Content and Applications

The Union Government believes that Myanmar's broadband penetration will be enhanced through the development of local language digital content and applications. Broadly the pathway to achieve this is through a multi-level educational approach integrated within Myanmar's existing schooling system. This would create new and improved digital learning opportunities at basic, intermediate and advanced levels. However, this would take considerable time to implement and deliver results.

In the near term, the establishment of focussed training programs developed in partnership with public and private institutions is favoured. The aim of such programs would be to work with public and private enterprises to translate existing websites and applications into local languages. Ultimately this gives users of existing websites and applications the option to choose local language content and applications. This is particularly relevant with regard to the marketing of goods and services.

This initiative is consistent with Program 3 of the USS. In particular, Program 3 makes provision for a range of “special projects” which are eligible for funding under the USF.

*The USF will consider supporting projects that focus on development of content and applications of value to regional or rural and underserved communities, as well as lower-income parts of the population. These could include web sites, mobile apps, online educational and training materials, interactive and multimedia applications for users, and other targeted ICT content.*

As a new initiative of this White Paper, the PTD will engage with industry stakeholders to encourage them to develop proposals which might be considered for USF financial support.



## 7 LIST OF ACRONYMS AND ABBREVIATIONS

ASEAN	Association of South East Asian Nations
FTTH	Fibre-To-The-Home
GDP	Gross Domestic Product
GNI	Gross National Income
GSMA	GSM Association
ICT	Information Communication Technology
ICT4D	ICT for Development
IMT	International Mobile Telecommunication
IoT	Internet of Things
ITU	International Telecommunication Union
LDCs	Least Developed Countries
LTE	Long-Term Evolution
LTE-A	Long-Term Evolution Advanced
MDGs	Millennium Development Goals
M2M	Machine-to-Machine
NBN	National Broadband Network
NBP	National Broadband Plan
NGN	Next-Generation Network
OECD	Organisation for Economic Cooperation and Development
Opex	Operating Expenditure
PPP	Public-Private Partnership
QoS	Quality of Service
RCEP	Regional Comprehensive Economic Partnership
SDGs	Sustainable Development Goals
SMEs	Small- and Medium-Sized Enterprises
UNESCO	United Nations Educational, Scientific and Cultural Organization
USF	Universal Service Fund

USS	Universal Service Strategy
USOs	Universal Service Obligations
VoLTE	Voice over Long Term Evolution
WDR	World Development Report
WRC	World Radiocommunication Conference
xDSL	Refers to different variations of DSL, such as ADSL, SDSL, VDSL
2G	Second-generation mobile
3G	Third-generation mobile
4G	Fourth-generation mobile
5G	Fifth-generation mobile