# Digital Infrastructure Policy and Regulation in the Asia-Pacific Region

September 2019

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# Acknowledgements

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For this paper, Mr Minehane also gratefully acknowledge inputs from administrations and regulators in the Asia-Pacific region and the assistance of a range of industry stakeholders and commentators. Mr Minehane also acknowledges the writing and research undertaken of the staff and associates at his firm Windsor Place Consulting (www.windsor-place.com), including specifically Mr Simon Molloy, Ms Shankari Thananjeyan, Ms Pia Castillo and Ms Sara Wong.

Importantly, the views and opinions expressed are those of the author and may not necessarily reflect those of ITU or its membership. Any errors and omissions are those of the author.

# 1 Introduction and recommendations

## 1.1 Introduction

All nations depend on the quality of their infrastructure to improve their productivity, international competitiveness, economic growth and improvements in living standards of their citizens. The term 'infrastructure' can be defined to incorporate a surprisingly broad range of factors including physical infrastructure such as roads, bridges, ports and communications infrastructure as well as socio-economic institutions such as the legal system, government regulatory systems and even considerations as intangible as social norms of behaviour.

In the 21st century digital economy, the phenomenon described by some as 'Industrial Revolution 4.0', is being enabled by and driven by communications services and the infrastructure required to deliver them. The essence of concepts such as the digital economy and Industrial Revolution 4.0 is that the ongoing improvements in information and communications technology, investments in digital infrastructure, and the increasing ubiquity of connectivity are enabling ever more of the world's economic activity to be undertaken in the digital realm.

As a greater proportion of economic activity is digitized the quality and reach of communications services are becoming a more potent differentiator of national economic efficiency and international competitiveness.

This report describes how the nations of the Asia-Pacific Region can improve the contributions that communications services make to their economic development through better policy and regulation in relation to communications infrastructure. The report emphasises that no two nations in the region face the same circumstances, opportunities or challenges. In fact, the region is characterised by an enormous diversity containing, as it does, the most populous and least populous nations in the world and containing countries at all levels of economic development.

Notwithstanding this enormous diversity, there are a range of policies and programs that can be customised and implemented on a national basis which will encourage investment in telecommunications infrastructure and avoid the implementation of counter-productive policies and their associated unintended consequences. The ITU has, for many years, developed guidelines, best practice an extensive advice on how national governments, competition regulators and telecommunication sector regulators can collaborate to promote the development of their communications industries and improve services for their businesses and citizens.

One of the key high-level choices governments must make is how to navigate the 'equity efficiency trade-off'. Should governments in this in very high-speed communications in their major cities which are, generally speaking, the drivers of national economic growth? Or should they allocate resources to bringing communication services to rural and regional populations who are generally relatively economically disadvantaged compared to urban areas? This is a difficult issue but by employing well-informed smart policy and regulatory design, governments can encourage private investment and pursue both efficiency and equity goals simultaneously.

The Asia-Pacific Region contains countries which are world leaders in some categories of communications services. There is considerable value especially in Asian markets with large urban areas (with generally lower costs of provisioning) to set challenging targets for high speed Internet access (ie gigabit access). For example, ASEAN markets could have common broadband objective in major urban areas such that there is universal residential broadband of 30 Mbps and mandate all households in major urban areas should be connected by 100 Mbps broadband services with the capability to upgrade to further by 2025.

The wider availability of services at this level would spur further innovation in digital economy application development further contributing to productivity and competitiveness in the region. Policy, program and regulatory design and implementation are at the heart of what governments can do to contribute to digital economy-driven economic growth and development.

## 1.2 Recommendations

This ITU Discussion Paper on *Digital Infrastructure Policy and Regulation in the Asia-Pacific Region* makes the following important recommendations.

### RECOMMENDATION 1: SETTING BROADBAND TARGETS FOR DIGITAL INFRASTRUCTURE

The Broadband Commission's targets for "*Connecting the Other Half*" as shown below in Exhibit 1 are endorsed for Asia-Pacific. Countries ought to adopt a digital agenda or strategy to achieve such targets which are intended to be both aspirational and achievable Such strategies will require all stakeholders to commit to them and to take positive actions towards their achievement. It is also critically important that such broadband services be affordable

**Exhibit 1: Broadband Commission's 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 |

**Source: Broadband Commission, 2018**

There is also considerable value especially in Asian markets with large urban areas (with generally lower costs of provisioning) to set even more challenging targets for high speed Internet access (ie gigabit access). For example, ASEAN markets could have common broadband objective in major urban areas such that there is universal residential broadband of 30Mbps and mandate all households in major urban areas should be connected by 100Mbps broadband services with the capability to upgrade to further by 2025. Fixed Wireless Access (FWA) for regional and rural customers should also be a policy priority.

Although the licensing schedule of 3G and 4G services varied from country to country across Asia-Pacific, facilitating 5G deployment forward (including making key IMT spectrum available) and encouraging its deployment by MNOs is must. While some countries are aiming for timeline of 2021, all countries, depending on demand, should aim to their licensed MNOs to deploy 5G by 2023 to 2025 in line with their national aspirations.

### RECOMMENDATION 2: ENSURING THAT SECTOR LEGISLATION IS UPDATED AND FIT FOR PURPOSE

In Asia-Pacific, depending on conditions in each market, there is a need for regulatory reform and amendments to sector legislation (ie amendments to the applicable Telecommunications Law). Such amendments include, but are not limited to:

- The establishment and maintenance of independent regulatory bodies consistent with WTO trade commitments but also to ensure that sector regulation is done on a fair, non-discriminatory basis especially if the Government is a shareholder in sector licensees;

- Inclusion of open access, improved facilitating telecommunications rights of way regulation, infrastructure sharing, FTTH pre-deployment and QoS/QoE; and
- Updating of outdated Telecommunication Law and legacy subsidiary regulation including regulatory measures focusing on inter alia PSTN, ISDN, copper cables, narrowband services etc.

## RECOMMENDATION 3: PROVISION OF INCENTIVES FOR THE DEPLOYMENT OF DIGITAL INFRASTRUCTURE

Where possible Asia-Pacific Governments should provide incentives for the deployment of digital infrastructure. This is an ongoing challenge for all emerging economies, not just in the telecommunications sector but also in other industries as well.

It is not only regulatory settings for telecommunications that influence the attractiveness of a particular country to foreign investors, but also general economic settings such as taxation levels, rule of law and the quality of monetary and fiscal policy. Some governments have seen telecommunications as an opportunistic source of taxation revenue. If Governments consider that telecommunications critical to economic growth, excessive taxation is almost always counter-productive. It will lower returns and therefore attractiveness to investors and it will usually result in some increased costs due to taxation being passed on to consumers which will impede adoption and penetration of digital technologies. This ought to be avoided.

## RECOMMENDATION 4: ISSUING NEW RULES ADDRESSING TELECOMMUNICATIONS RIGHTS OF WAY

Following industry consultation new rules or regulations addressing *Telecommunications Rights of Way* should be issued based on the guidelines contained in this paper. These rule aim to regulate the establishment of underground and over ground telecommunication infrastructure (including tower sites and infrastructure) in order to address rights of way issues that are currently a key barrier to expanding broadband penetration and coverage in many Asia-Pacific markets.

## RECOMMENDATION 5: FACILITATING FIXED BROADBAND, FWA AND 5G INFRASTRUCTURE DEPLOYMENT

Following industry consultation, national regulators will be tasked to investigate way to facilitated fixed broadband (including 4G/5G FWA) infrastructure deployment including but not limited to:

- Encourage greater infrastructure sharing for broadband and 5G deployment based on exemplar models;
- The establishment of a national infrastructure database to permit ‘check before you dig’ services;
- If possible, adopt a one stop centre approval process for site and other approvals; and
- develop in-building telecommunications standards to facilitate deployment and sharing if needed.

## RECOMMENDATION 6: RELEASING MORE IMT SPECTRUM FOR WIRELESS BROADBAND AND 5G DEPLOYMENT

Subject to demand, to ensure that there is more IMT Spectrum for wireless broadband and 5G deployment in Asia-Pacific markets availability should be increased to at least 840 MHz of total IMT spectrum plus allocations of mmWave spectrum by the end of 2021 (except smaller markets). Such allocations should be in larger contiguous blocks consistent with future best practice. Knowing that there will be sufficient spectrum in the future to support 3G, 4G and 5G

service offerings, MNOs can confidently make the necessary long-term investments in digital infrastructure. Such spectrum should be allocated on a technology neutral basis and MNOs should also have the flexibility to use their allocated IMT spectrum for mobile broadband and/or FWA services.

## RECOMMENDATION 7: FACILITATING THE SWITCH OFF OF LEGACY 2G/3G SERVICES

While a decision to switch off legacy 2G and 3G services should be a commercial one left to the MNOs, Asia-Pacific industry regulators should facilitate this process given a number of benefits including the higher spectral efficiency of 4G and newer technologies and lower capex and opex costs. This should be subject to coverage and other requirements including communication with consumers on likely switch off dates and schemes to promote migration.

## RECOMMENDATION 8: IMPROVING THE QUALITY OF BROADBAND SERVICES

Subject to domestic telecommunications law requirements, markets which do not mandate broadband quality of service/quality of experience (QoS/QoE) provided to consumers and enterprises should impose new technical standards addressing QoS/QoE and/or impose a requirement for licensed operators to publish information on the QoS/QoE of their broadband services.

Further, it is also important that rules be put in place so that observed broadband speeds are consistent with the actual broadband speed advertised by the operators and ISPs.

## RECOMMENDATION 9: IMPROVING REGULATORY SKILLSETS

In order for Governments, Ministries and sector regulators to develop and apply best practice regulation requires strong regulatory skillsets and capabilities to regulate the sector and promote the digital economy. Regulatory bodies are advised to build skillsets and capabilities to include economics, financial analysis, content regulation, cybersecurity, law, competition analysis, taxation and cross-government experience. Given the pace of change in the industry there is a need for timeliness in regulator decision making. ICT data and statistics collection should be more up to date and extensive including for example, including using crowd sourcing and other techniques which are available.

Strong collaborative regulation is also important as telecommunications sector regulators do not control all of the regulatory tools and/or have a legislative mandate to regulate certain aspects.

# 2 The digital economy and society

## 2.1 Characteristics of the digital economy and society

What are the characteristics of the digital economy and society? One way to form an answer to this question is to consider the historical evolution of information and communications technologies.

The earliest digital computers – used for code breaking in the Second World War – performed calculations on digital data. It was the **digitisation** of input data that enabled high-speed electronic processing of data. So, it is arguable that the first and most important characteristic of the digital economy is the digitisation of information and data.

In the late 1950s, the U.S. Air Force created networking systems for its radar defence system computers. By 1965 packet switching was developed and reliable scalable computer networking was enabled and in 1974 team working under Vinton Cerf developed protocols on which the Internet is based. This enabled the second key characteristic of the digital economy: **connectivity** – the ability of digital processing systems to communicate digitally.

Digitisation and connectivity are fundamental to the digital economy and society. From these characteristics emerge others: **automation, accessibility** and **efficiency**. Ultimately, all of these characteristics contribute to greater efficiency in the creation, collection, storage, manipulation, processing, communication, presentation and publishing of information. The digital economy and society is driven by the ever increasing performance and ever falling cost of these information management functions.

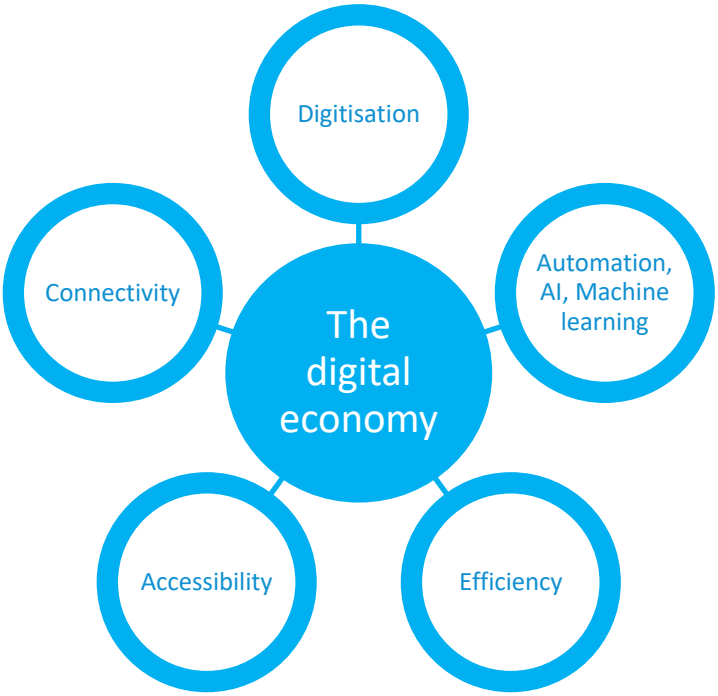
Each of these characteristics interacts with the other and together they drive economic development, productivity and competitiveness in the following ways:

**Digitisation:** essentially, when information is digitised it becomes readable and processable by electronic computers and this means data management and processing tasks that were previously undertaken manually can now be automated. The first types of information to be digitised were numerical but now all forms of information can be converted to digital formats and managed digitally including high resolution audiovisual content. Google has digitised many of the world's books in the process of digitising government records is ongoing and enables significant innovation in the provision of government services.

**Connectivity:** When computers are connected by increasingly fast and reliable networks, digitised data can be shared across multiple systems leading to further efficiency gains this means. Connectivity occurs at many levels: person-to-person, person to machine, and machine to machine. One of the results of the smart phone revolution has been the 'personalisation' of computing nodes at the edge of the network. Smart phone is an intensely personal device and this means that the user experience can be personalised and optimised and that an enormous amount of data reference to individuals can be collected at low cost.

**Accessibility:** accessibility arises from a combination of digitisation in connectivity. Access to a vast landscape of data, information and content, often mediated by search engines, was essential characteristic of the explosion in public use of the World Wide Web that occurred in the 1990s. Access to digitised information over networks vastly decreases the cost of access and leads to further automation and new business models. For example, when a smart phone user calls for a ride on a ride sharing platform, all the user needs to do is specify a destination – the user's identity, location and payment method are all accessible to the ridesharing platform automatically.

**Exhibit 1 Characteristics of the digital economy and society**




**Source: Windsor Place Consulting**

**Automation:** automation is a core goal of the digital economy and, in addition to the examples described above, industry observers are now expecting a revolutionary era of automation in which increasingly sophisticated processes will be undertaken through extensive networks of cloud computing resources that are process using AI and machine learning techniques.

**Efficiency:** automation is not an end goal in its own right; what it achieves is higher levels of efficiency. Higher efficiency or productivity is ultimately directed to transforming scarce resources or inputs into products and services that consumers value. While greater efficiency clearly serves economic goals, it can also be a powerful contributor to the achievement of environmental sustainability.

Because these digital economy characteristics drive productivity, they also drive national competitiveness which in turn drives economic growth and improvements in living standards.

## 2.2 Technology trends and Industrial Revolution 4.0

In 2011 Marc Andreessen, co-founder of Internet pioneer, Netscape, famously proclaimed that 'software is eating the world'. Andreesen was observing that the ongoing improvements in information and communications technology, investments in digital infrastructure, and the increasing ubiquity of connectivity are enabling ever more of the world's economic activity to be undertaken in the digital realm.

At each stage of the ongoing evolution of ICT, new catchphrases are coined to describe the most recent developments. One of the recent descriptions is 'Industrial Revolution 4.0'. The idea behind this description is that a collection of 'big tech trends' will transform the way that business processes are undertaken both in the private and public sectors leading to enormous increases in productivity and great benefits for consumers and citizens.

The idea behind Industrial Revolution 4.0 is that a confluence of big technological trends is about to deliver large and unprecedented – in effect 'revolutionary' – productivity

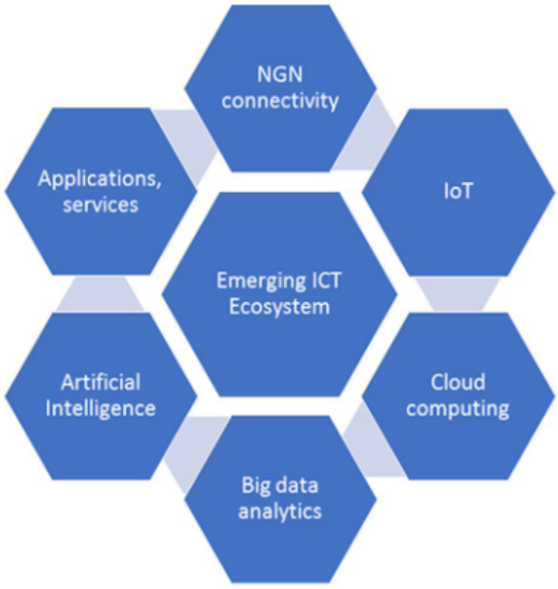
improvements. These big trends include: AI and machine learning, automation (including autonomous vehicles and robotics), big data, cloud computing, AR and VR, Internet of things among others.

The fundamental proposition of Industrial Revolution 4.0 is that the current confluence of technological changes will result in an unprecedented increase in productivity driven by the mutually reinforcing positive impacts of all of these technological changes. If this prognosis is correct, it is inevitable that significant disruption will be associated with this projected explosion in productivity. Such disruption will include:

- existing business models and business structures
- existing skill sets will be made less relevant or even obsolete
- potentially very large levels of unemployment at least while labor markets adjust to new economic circumstances
- pressure on existing government policy and regulatory models and the need to innovate these
- various types of associated social disruption.

These types of disruptions emphasise the fact that there are winners and losers from technological change. There is significant potential for various types of inequality to be created via these changes and governments will need to be alert to addressing these.

**Exhibit 2 Factors influencing the optimal strategic infrastructure development path**




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

Nonetheless, there is an element of 'inevitability and irresistibility' to these changes. Because improvements in information and communication technologies are invariably aimed at improving productivity, adoption of new technologies will lead to improved national competitiveness and faster economic growth. Conversely, countries that do not embrace technological change or fall behind, will experience falling relative, or even absolute, living standards. Thus, technology driven economic growth represents a set of policy challenges regarding efficiency equity trade-offs in the modern economy. Resisting rapid technological change on the basis of its equity outcomes is likely to be, in the long run, negative for any nation and a better approach is likely to be the rapid embrace of technological change accompanied by a keen focus on equity issues as they arise.

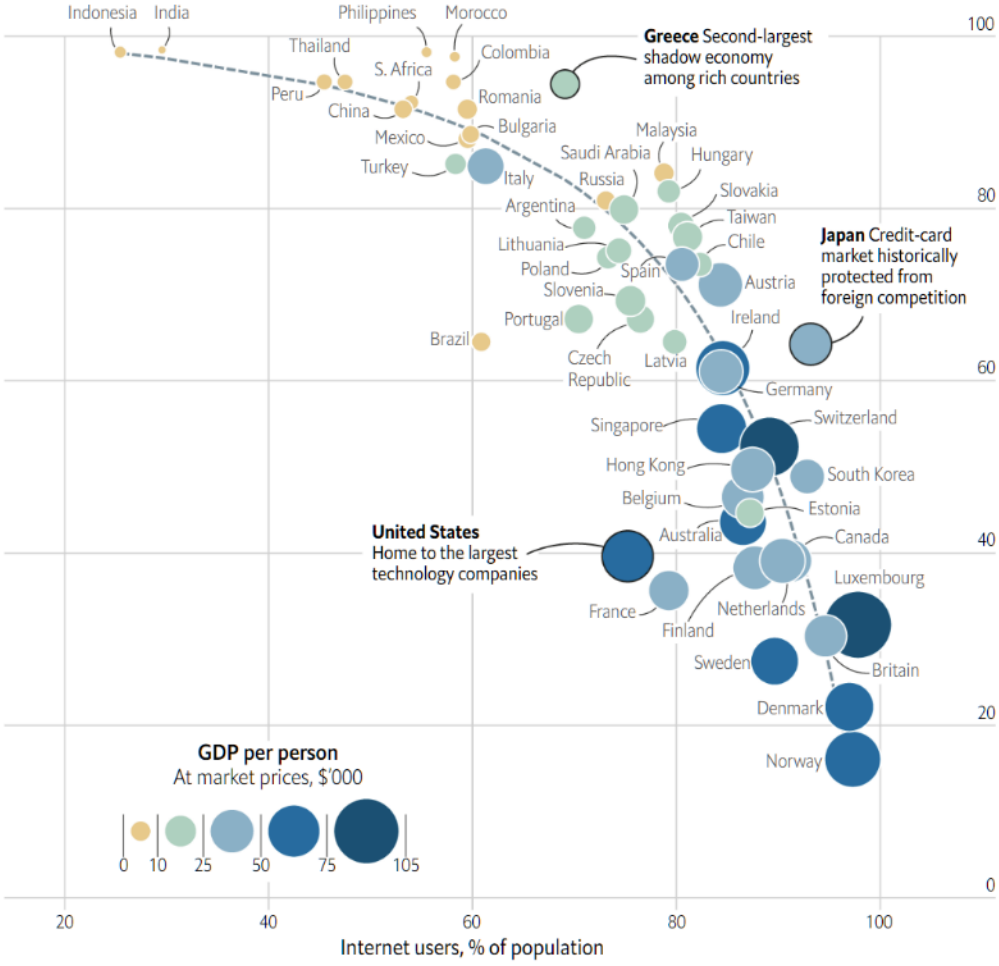
While Andreessen is right in identifying the central role of software in these developments, this is a simplification and only part of the story. Software is of little use without hardware. The hardware of the digital economy that will support this New Industrial Revolution includes, not only all the computing platforms of the pre-Internet era, but all the additional infrastructure that supports the connected digital economy in the 21st century – that is extensive and highly integrated end-to-end information and communications infrastructure.

## 2.3 Possibilities and risks in the digital economy and society

What are the differences between the digital economy and society and the traditional world? How does the transition to a digital connected world affect business, the functions of government and people's lives?

These are complex questions and refer to changes in the socio-economic fabric that go beyond the advent of connected digital technologies. All societies change over time with profound implications for individuals. For example, the transition from rural life in small communities to large anonymous cities represents a significant change in the human experience. Likewise, as shown in Exhibit 3 below, the percent of total transactions conducted in cash in a country would seem to fall as country Internet penetration increases. This fundamentally changes the medium of exchange of the region's economies creating new opportunities for financial participation by groups who previously had no access to financial services.

**Exhibit 3: Impact on cash use as a medium of exchange arising from higher Internet penetration: % of total transactions conducted in cash**




Source: The Economist, August 3, 2019

The digital connected economy is the latest phase of humanity's ongoing drive to achieve improved living standards through technological change. Previous changes in technologies such as the steam engine in the English Industrial Revolution or the diffusion of electricity in the early 20th century have involved changes in physical production processes – processes that have to do with 'atoms', in the terminology of Nicholas Negroponte of MIT. The digital revolution is to do with the manipulation of information or 'bits'. In fact, the digital revolution has shone a light on the, perhaps unexpected, extent to which traditional physical production and economic activity are underpinned by significant information manipulation processes. These technology-driven change processes are, however, by no means restricted to the commercial dimensions of society and economy – they also encompass governments and the ways that citizens with our lives.

Importantly as highlighted recently in GSR-19 digital connectivity can provide the canvas for achieving UN Sustainable Development Goals (SDGs) in our societies by 2030. Thus:

> *Technology paradigms and business models challenge existing regulatory patterns and frameworks. From the imminent entry in markets of 5G and the Internet of Things, to the profusion of cloud services and artificial intelligence, regulatory response requires a new perspective. Unleashing the full potential of digital will require an actionable, agile, collaborative, innovative, and outcome-based approach to regulation. In the increasingly complex and dynamic digital transformation, it is important to agree on common principles and put forward clear and simple rules – and follow them forward.*[1]

## DIGITISATION AND BUSINESS

What factors influence nature and extent of the impact of digitisation on businesses? The impact of the shift to digital economy on any particular business will depend on many factors:

- what extent is the business dependent on information processing rather than executing physical processes?
- is the business willing or able to incorporate new technologies to boost its competitiveness?
- to what extent is the business vulnerable to new disrupting businesses adopting alternative business models?
- what are the skill sets of the existing owners, managers and workers in the business how quickly can these be adapted to the required forward-looking digital skill sets?
- does the business have the resources to transform its business model and require digital skills and assets quickly enough?
- does the business have a viable value creation business model in the digital world?

These are the challenges faced by almost all businesses in the transition to the digital economy. The disruptive power of digitisation is now so well established that some consulting organisations are claiming that the post digital era has already arrived[2] the underlying concept being that, digitisation of business is universally compulsory and that now competitive advantage has shifted that operate within the context of a universally digitised marketplace.

> *Companies already face a new level of expectations from consumers, employees and business partners. Businesses have used the power of digitally driven mass customization to sell two different options of a good or service, then 10 different options, then 100 different options. Companies' success with this approach has*

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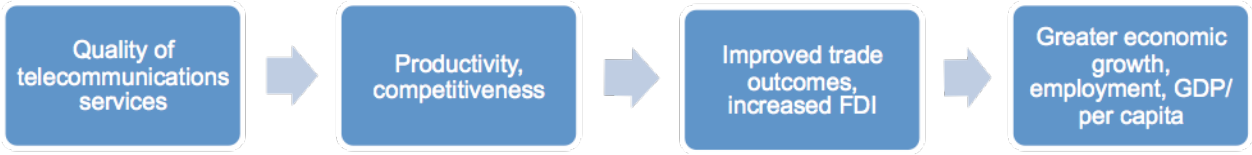
1 ITU, Global Symposium for Regulators, GSR-19, *Fast Forward Digital Connectivity for all*, July 2019, page 1

2 The post-digital era is upon us, Accenture, February 7, 2019, www.accenture.com/us-en/insights/technology/technology-trends-2019

> *fostered for them the illusion that they can meet any need, no matter how personal or custom.*
>
> *Businesses will need to turn that illusion into reality if they want to meet rising expectations. The coming era will be characterized by massive pressure as customers, employees and society make their demands known. But it will also provide tremendous opportunities for those companies that can deliver the appropriate experience at just the right time.*

In this vision of digital or post-digital business era, the consumer is the big winner. From a business perspective, the outcome is heightened and unrelenting competition. This perspective of benefits to consumers, however, needs to be balanced against potential increases in potential for market power in the digital economy. Large-scale digital businesses have the potential to realise significant economies of scale, network economies and financial power which can be used to resist competitive pressures.

**Exhibit 4: Communications driving economic development**




**Source: Windsor Place Consulting**

In 2017, regulators around the world began to appreciate and act on competitive threats arising from the growth of 'big tech' companies such as Facebook, Google, Amazon and Apple. While the threat to consumers through a loss of competitive pressure is obvious in the case of these very large companies, loss of competition can also occur less obviously on a smaller scale in smaller industries or sectors. For example, a single vendor in a particular nation may dominate advertising for job vacancies. Governments and regulators need to be alert to potential for digital technologies to create greater returns to scale as well as greater competitive pressures.

## DIGITISATION AND GOVERNMENT

Obviously, if it is possible for the private sector to execute its information-based business processes more efficiently using digital technologies the same is possible for governments. Indeed, it is arguable that many government processes are almost entirely based on information management processing storage and publishing. It is critical that governments investigate and adopt a proactive footing for the adoption of digital technologies that enable the cost of government services to be reduced over time. This is not only because efficiency is desirable in its own right, but also because there are a range of government funded activities which are extremely resistant to increases in productivity in general and increases in labour productivity in particular.

This tendency for productivity in government services to lag productivity in the private sector was first noted by US economist William Baumol who noted that there were large differences in productivity improvement across industries in the modern economy. He observed, for example, for string players are required to play a Beethoven string quartet today as was the case in the 19$^{th}$ century. Many services that are often government funded such as education and health care require relatively high labour inputs and are not as amenable to labour productivity increases as for example private sector manufacturing. Therefore, over time as real incomes increase in the public sector needs to compete with the private sector to attract labour, the relative cost of providing government services will tend to rise. Digital technologies offer an important opportunity to offset the labour productivity challenges of the private sector.

Again, the more cost-effective delivery of government services will benefit consumers the most, or in this case, citizens. Digital governments will enable their citizens to have better cheaper and easier access to a wide range of government services and information. This will inevitably lead to more of a 'self-service' delivery model but this does not mean that consumers overall will not be

able to access government information and services more easily overall and in the non-digital world.

Such developments do, however, raise issues of digital literacy, access and the digital divide. Governments need to ensure that they continue to operate systems and services that enable non-digital access to essential services for those with insufficient skills or access to use digital channels.

Another obvious but sometimes overlooked benefit of digital government is that, if governments can operate services at lower cost it will be possible for these cost savings to be passed on at least in part to citizens in the form of lower taxation past, thus, a move to efficient digital government has the potential to increase real after-tax incomes.

There are other significant issues in relation to digital government for example security and privacy including the potential of governments to use access to citizens' digital information to subvert democratic political processes.

Beyond these general high-level comments, there is an enormous literature on opportunities for innovation in digital government which includes ideas such as government opening access to anonymized datasets for use by the private sector both by individuals and corporations. This is a field which remain an ongoing and open-ended area for innovation and development.

### DIGITISATION AND THE INDIVIDUAL

As in the previous cases above, the transition to the digital economy and society presents gains, losses, opportunities and risks. The sum of the effects of digitisation on individual lives is complex and ambiguous but is, nonetheless driven, by the idea of improved living standards in the broader sense.

The digitally connected world enables individuals to more easily communicate with each other. Communication is not only one-to-one, but also one-to-many and many-to-one and, in this way, communication blurs with the traditional concept of publishing. Consumers have cheaper faster access to a broad range of information on which to base decisions and choices. Consumers also have access to much larger catalogues of digital content for example movies, television shows and music and as well, access to new kinds of content such as podcasts, user generated content, instructional videos on YouTube.

Nonetheless, paradoxes arise in the individual's experience of the digital economy and society which are fundamental and intrinsic to digitisation and connectivity. For example, the flipside of enhanced connectivity, communication and increased capacity for sharing is inevitably some loss of privacy. Also, an increased use of digital channels for communication which displaces face-to-face communication appears to have significant deleterious effects on the skills for social interaction[3].

The principle of consumer sovereignty asserts that consumers know their own best interests and should be left alone to pursue them. The evidence suggests overwhelmingly that consumers and citizens have enthusiastically embraced the digital world. While consumer sovereignty is an accepted fundamental principle of market-based economies, there are broadly accepted limits or exceptions. The state intervenes in many instances to limit access to dangerous substances, for example, access to alcohol by children. The state also intervenes in relation to complex products such as pharmaceuticals to protect consumers.

Recently, particularly in Europe, there has been significant state intervention to protect individuals' privacy and misuse of their data.[4] In the longer term, other negative consequences for individuals of the digital world may become apparent and governments need to be alert to

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3 www.heysigmund.com/an-unexpected-cost-of-living-in-a-digital-world/

4 EU *General Data Protection Regulation* which came into force on 25 May 2018.

wear further interventions may be required. In general though, the digital era has fully arrived and interventions are likely to be marginal in nature rather than deflecting now deeply entrenched trends.

## DIGITISATION AND INSTITUTIONS

'Institutions' is a somewhat ambiguous term but is a concept that has large significance for the ways in which economies and societies evolve and for the path that improvements in living standards take in various nations. There is a branch of economics – 'institutional economics – entirely devoted to study of how institutions influence economic development. Within the framework of institutional economics, institutions include not only the arms of the state such as the courts, reserve banks, and regulatory organisations, but also state processes such as democratic political processes and, in addition, social conventions such as, for example, a tendency for a particular culture to be thrifty or not. Particularly over the long-term, such institutions have profound impacts on the economic development path of nations. If for example the rule of law is weak and the enforcements of contracts is ineffective, investment will be suppressed productivity will be stagnant and economic development slow.

An important development in the evolution of Western societies was the sharing of power between various groups. This sharing of power included democratic processes themselves, which granted executive power to elected representatives, the offsetting power of the courts and judiciary and the importance of 'the fourth estate' – the various organisations which make up what is now typically called 'the media'.

It is only recently that the extent to which the transition to a digital economy and society disrupts these institutions has become better understood. We now understand, for example, that the structure of the newspaper publishing industry arose from a particular set of technologically driven cost structures that led to a relatively large scale oligopolistic or monopolistic market structure in which these large publishing companies were required to ensure veracity of their content or face legal consequences. It is only after the relative decline of the publishing industry in the recognition of the problem of 'fake news' that the importance of these structures become more apparent in the need for analogous mechanisms in the digital publishing world become more obvious.

These changes are also made more obvious the role of responsible publishing as core democratic processes. Global elections especially since 2016 have now brought home to governments and regulators the importance of increased regulatory oversight in the digital economy.

It is often claimed that technology moves faster than the regulators. To some extent, this is inevitable – regulators can't be expected to respond to something that hasn't happened yet – but the idea that regulators will always be responding insufficiently to technological change can easily be overstated. For example, if the basic principle of Section 230 of the US *Communications Decency Act* – that platform providers are not publishers and are not responsible for the content of their users – were substantively overturned, this would mark a substantive and permanent change in the digital landscape.

Overall, regulatory and institutional responses to the digital economy and society are one of the most important areas for government focus in maximising the opportunities and limiting the risks and harms in the transition to digital world.

Policy design principles are at hand for regulators to help develop an understanding of new technology paradigms and guide them towards appropriate regulation. Led by these principles, regulators can fine- tune their regulatory response, ensuring optimal impact on the market. The recent GSR-19 identified the key design principles to respond to new technology paradigms and business models stemming from collaborative regulation as detailed in Exhibit 5 below.

### Exhibit 5: Core design principles for collaborative regulation[5]

- **To achieve digital transformation, policy and regulation should be more holistic.** Cross-sectoral collaboration along with revisited regulatory approaches such as co-regulation and self- regulation, can lead to new forms of collaborative regulation based on common goals such as social and economic good, and innovation.
- **Policy and regulation should be consultation and collaboration based**. In the same way digital cuts across economic sectors, markets and geographies, regulatory decision making should include the expectations, ideas and expertise of all market stakeholders, market players, academia, civil society, consumer associations, data scientists, end-users , and relevant government agencies from different sectors.
- **Policy and regulation should be evidence-based:** Evidence matters for creating a sound understanding of the issues at stake and identifying the options going forward, as well as their impact. Appropriate authoritative benchmarks and metrics can guide regulators in rule-making and enforcement, enhancing the quality of regulatory decisions.
- **Policy and regulation should be outcome-based:** Regulators need to address the most pressing issues, for example market barriers and enabling synergies. The rationale for any regulatory response to new technologies should be grounded in the impact on consumers, societies, market players and investment flows as well as on national development as a whole.
- **Policy and regulation should be incentive-based:** Collaborative regulation is driven by leadership, incentive and reward. Regulators should keep a wide array of investment incentives at hand to provide impetus for markets to innovate and transform while maximizing benefits to consumers.
- **Policy and regulation should be adaptive, balanced and fit for purpose:** Regulation-making is about flexibility – continually improving, refining, and adjusting regulatory practices. The balance in regulatory treatment of new services is more delicate than ever. A close, continuous link to markets and consumers is important to get digital on the right glide path to achieving social and economic goals.
- **Policy and regulation should focus on building trust and engagement:** Collaborative regulation provides the space for co-creating win-win propositions, working towards regulatory objectives while increasing the engagement of industry. Trust becomes the foundation of the regulatory process, underpinning the growth of digital.

5 ITU, GSR-19, *Fast Forward Digital Connectivity for all*, July 2019, page 1

# 3 Digital infrastructure: what is it and why do nations need it?

## 3.1 What is digital infrastructure?

Digital infrastructure is the key to enabling the benefits of the digital economy and society. Digital infrastructure is the physical hardware and associated software that enables end-to-end information and communications system to operate. Digital infrastructure includes:

- Internet backbone including national and trans-oceanic fibre cables;
- Fixed broadband infrastructure such as analogue coaxial and optic fibre cable networks;
- Mobile communications infrastructure and networks including FWA, transmission towers, radio and optic fiber backhaul networks;
- Broadband communications satellites;
- Data and cloud computing facilities;
- End user equipment such as mobile handsets, PCs, modems and local Wi-Fi and Bluetooth networks;
- Software platforms including computer and mobile device operating systems as well as application programming interfaces; and
- Network edge devices such as sensors, robots, autonomous and semiautonomous vehicles, and other Internet of things facilitating devices and software.

**Exhibit 6 Digital infrastructure**


**Source: Windsor Place Consulting, 2019**

At any point in time, different parts of the system a digital infrastructure will be at different stages of development compared to other parts and bottlenecks will be being experienced at various points. This means that areas of priority development will shift around the network as technologies change and network build-outs and upgrades occur. For example, as greater

numbers of mobile communications towers are established, the demand for backhaul fibre will increase. Another example is the need to replace legacy copper networks with fibre networks as consumers demand faster and higher speed broadband services which are beyond the capacity of copper to provide.

Private sector communications companies can be expected to undertake much of the work associated with developing the network but governments have an important role to play in:

- setting the broader strategic context for digital economy and society development including areas such as spectrum policy, skills development, digital literacy, access for less advantaged groups and so on
- developing effective pro infrastructure deployment regulatory frameworks
- directly investing or undertaking private public partnerships to deploy major digital infrastructure systems.

While it is almost impossible to completely 'future proof' digital infrastructure systems and strategies, governments need to be alert to evolving technologies in order to optimise their infrastructure development pathways. Forward-looking spectrum policy is a critical area in which governments need to incorporate expectations about the capabilities of emerging wireless technologies.

## 3.2 Developing an optimal infrastructure development strategy

It is obvious that the quality, quantity and extent of digital infrastructure plays a decisive role in a nation's capacity to realise the benefits of the digital economy and society. The problem of digital infrastructure strategy, however, is much more complex than simply defining the characteristics of what type of digital infrastructure a country requires at a particular point in time. What is required is a dynamic infrastructure deployment strategy that takes into account:

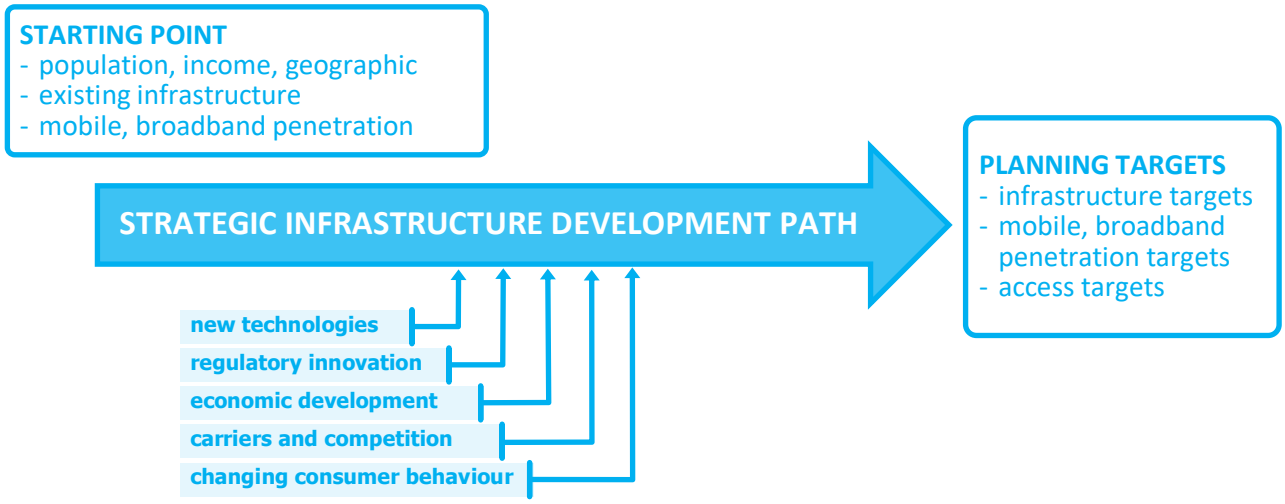
- each country's history and current circumstances
- average levels of per capita income and likely levels of average revenue per user
- current and possible future regulatory settings
- population, country size including geographic characteristics
- the state of communications technology and its expected development pathway.

Such a dynamic infrastructure deployment strategy will consider all of these factors and chart a pathway to best practice infrastructure for each particular country over the relevant planning period. This deployment strategy should be thought of as an evolutionary path from the present to a future planning horizon (see Exhibit 7).

While the optimal infrastructure development path will be different for each nation, we can broadly characterise these development pathways for developed and emerging nations. Exhibit 8 shows a typical development path for developed and emerging nations. Developed and emerging nations have very different starting points: develop nations have much greater fixed network infrastructure, higher levels of income, more capital for investment and better developed regulatory systems and structures.

A critical point to emphasise is that emerging nations are making major investments and infrastructure in an entirely different historical and technological context from the developed nations. Develop nations have been making investments in telecommunications infrastructure for over a century and much of this investment was in the form of last mile copper infrastructure. It is often pointed out that developing nations have been able to 'leapfrog' almost entirely the era of fixed line infrastructure deployment. While this idea may have been relatively true in the period when mobile voice was the predominant service, this era has undoubtedly finished.

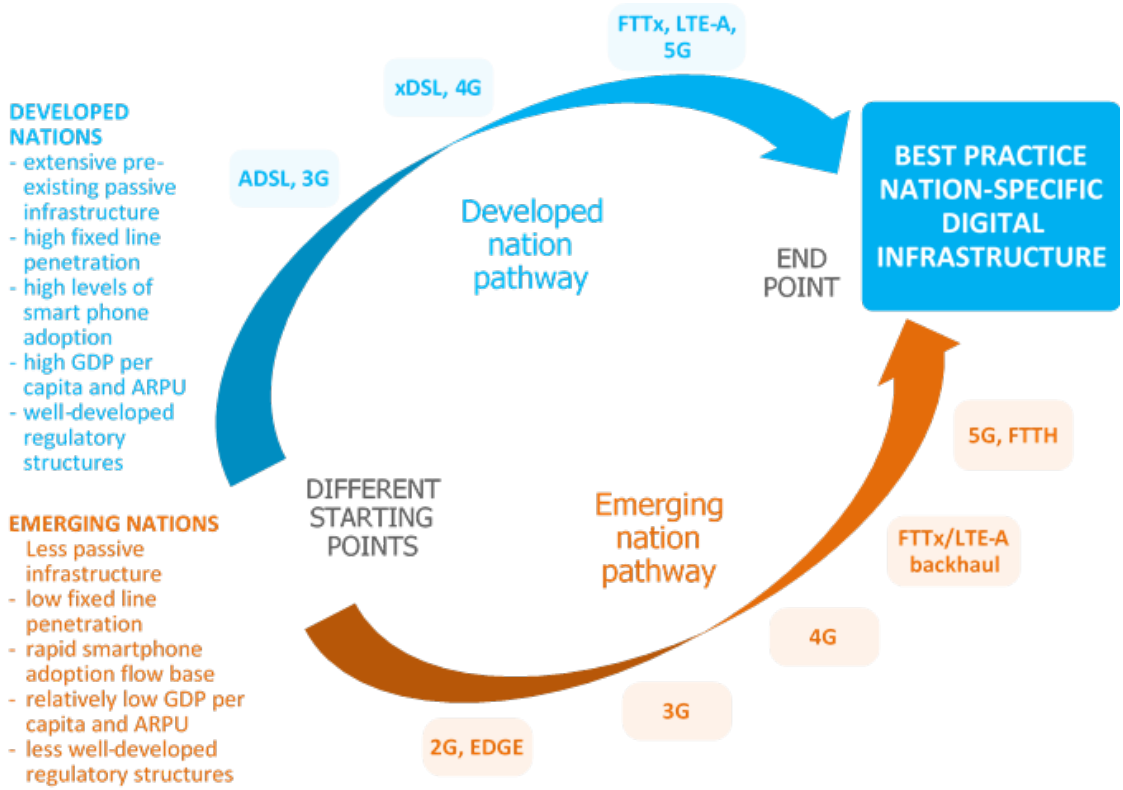
**Exhibit 7 Factors influencing the optimal strategic infrastructure development path**




**Source: Windsor Place Consulting, 2019**

Reliable fast mobile broadband will be a key enabler of Asia-Pacific high-growth cities and this will require large investments in fibre for backhaul and national backbone networks. The need to significant fibre investment will grow as the capacity of customer wireless networks continues to increase through 4G LTE and 5G technologies without which the performance of these customer access networks will be compromised by congestion in backhaul.

**Exhibit 8 Developed and emerging national pathways to best practice digital infrastructure**




**Source: Windsor Place Consulting, 2019 updated from 2016**

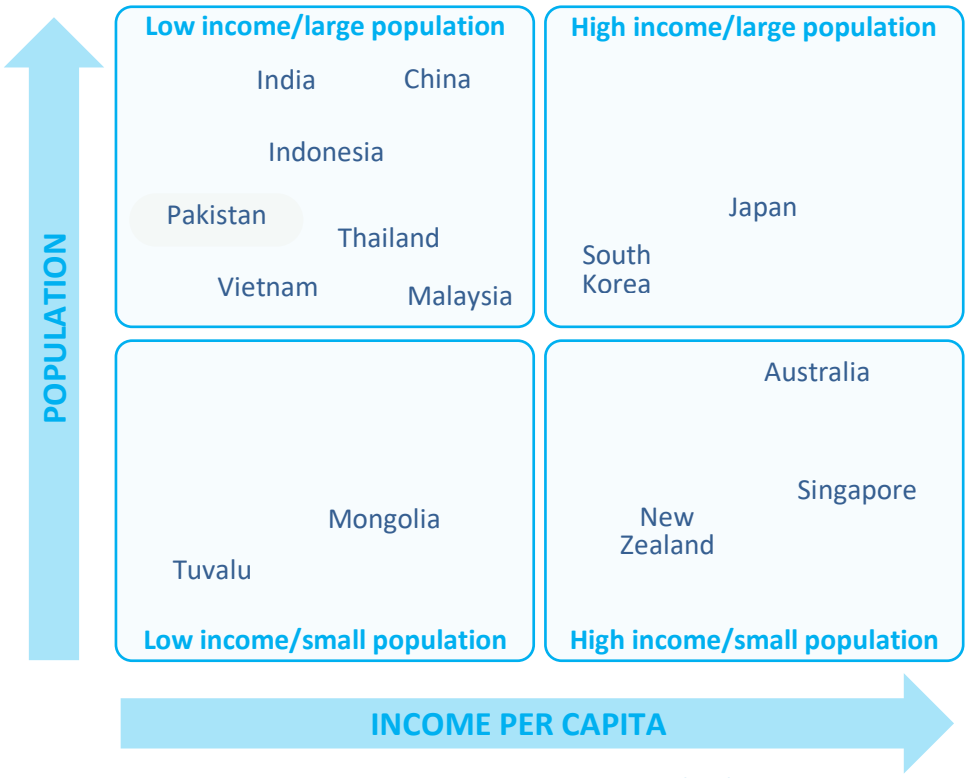
# 4 Asia-Pacific and the digital economy and society

## 4.1 Asia-Pacific diversity and common challenges

The Asia-Pacific region is characterised by the extreme diversity of its constituent nations. It contains the world's two 'population giants', China and India, each with over 1.3 billion people, as well as the tiny Pacific Island countries such as Samoa and Tonga (with populations of 200,874 and 100,651 respectively). The total population of the region is over 4 billion making it by far the world's most populous regional grouping.

Asia-Pacific contains economically advanced nations such as Singapore, Australia, Japan and New Zealand as well as emerging countries with very low GDP per capita. The region contains three of the 10 largest countries in the world by area: China, Australia and India as well as some of the smallest countries in the world including: Maldives, Marshall Islands, Tuvalu and Nauru.

**Exhibit 9 Diverse characteristics of nations in the Asia-Pacific region**




**Source:** Windsor Place Consulting, based on IMF data for GDP (PPP) per capita, Wikipedia for population data

Exhibit 10 provides GDP (PPP) per capita, population and ITU ICT Development Indexes for Asia-Pacific countries. Macau and Singapore have the highest per capita income of Int$116,808 and Int$100,345 respectively and Afghanistan the lowest at Int$2,017. South Korea has the highest IDI at 8.85 closely followed by Japan at 8.43. Within Asia-Pacific there are many countries with IDIs in the range 2 to 3. It is worth noting that the total population of the countries in Exhibit 10

is 4.16 billion persons. This represents around 54% of current global population of 7.7 billion persons[6]

### Exhibit 10 Asia-Pacific countries, population, IDI and GDP (PPP) per capita ($US)

| Country/Region | GDP (PPP) capita (Int$)[7] | Population | ITU IDI |
|---|---|---|---|
| Afghanistan | 2,017 | 31,575,018 | 1.95 |
| Australia | 52,373 | 25,350,900 | 8.24 |
| Bangladesh | 4,620 | 166,510,000 | 2.53 |
| Bhutan | 9,540 | 741,672 | 3.69 |
| Brunei Darussalam | 79,530 | 421,300 | 6.75 |
| Cambodia | 4,335 | 16,289,270 | 3.28 |
| China | 18,110 | 1,397,220,000 | 5.60 |
| Fiji | 10,234 | 884,887 | 4.49 |
| Hong Kong | 64,216 | 7,482,500 | 8.16 |
| India | 7,874 | 1,346,890,000 | 3.03 |
| Indonesia | 13,230 | 268,074,600 | 4.33 |
| Iran | 19,557 | 82,428,000 | 5.58 |
| Japan | 44,227 | 126,230,000 | 8.43 |
| Kiribati | 2,086 | 120,100 | 2.17 |
| Korea, Republic of | 41,351 | 51,811,167 | 8.85 |
| Lao P.D.R. | 7,925 | 7,123,205 | 2.91 |
| Macau | 116,808 | 653,100 | 7.80 |
| Malaysia | 30,860 | 32,715,500 | 6.38 |
| Maldives | 21,760 | 378,114 | 5.25 |
| Mongolia | 3,718 | 3,256,340 | 4.96 |
| Myanmar | 6,511 | 54,339,766 | 3.00 |
| Nepal | 2,905 | 29,609,623 | 2.88 |
| New Zealand | 40,135 | 4,961,460 | 8.33 |
| Pakistan | 5,680 | 204,578,000 | 2.42 |
| Philippines | 8,936 | 107,600,000 | 4.67 |
| Samoa | 5,890 | 200,874 | 3.30 |
| Singapore | 100,345 | 5,638,700 | 8.05 |
| Solomon Islands | 2,242 | 680,806 | 2.11 |
| Sri Lanka | 13,397 | 21,670,112 | 3.91 |
| Thailand | 19,476 | 66,360,342 | 5.67 |
| Timor-Leste | 5,242 | 1,348,132 | 3.57 |
| Tonga | 6,111 | 100,651 | 4.34 |
| Vanuatu | 2,862 | 304,500 | 2.81 |
| Viet Nam | 7,510 | 95,354,000 | 4.43 |

**Sources:** **GDP/capita: International Monetary Fund (2018) World Economic Outlook Database, April 2019**
**ITU IDI: Measuring the Information Society Report 2017 - Volume 1. 2017 ITU IDI values are not available for Marshall Islands, Micronesia, Nauru, Papua New Guinea, Tuvalu, People's Democratic Republic of Korea**

Exhibit 11 shows GDP per capita and IDI in graphical form. The chart shows that the substantial majority of Asia-Pacific countries have a PPP GDP per capita of less than Int$20,000 and an ITU IDI of less than six.

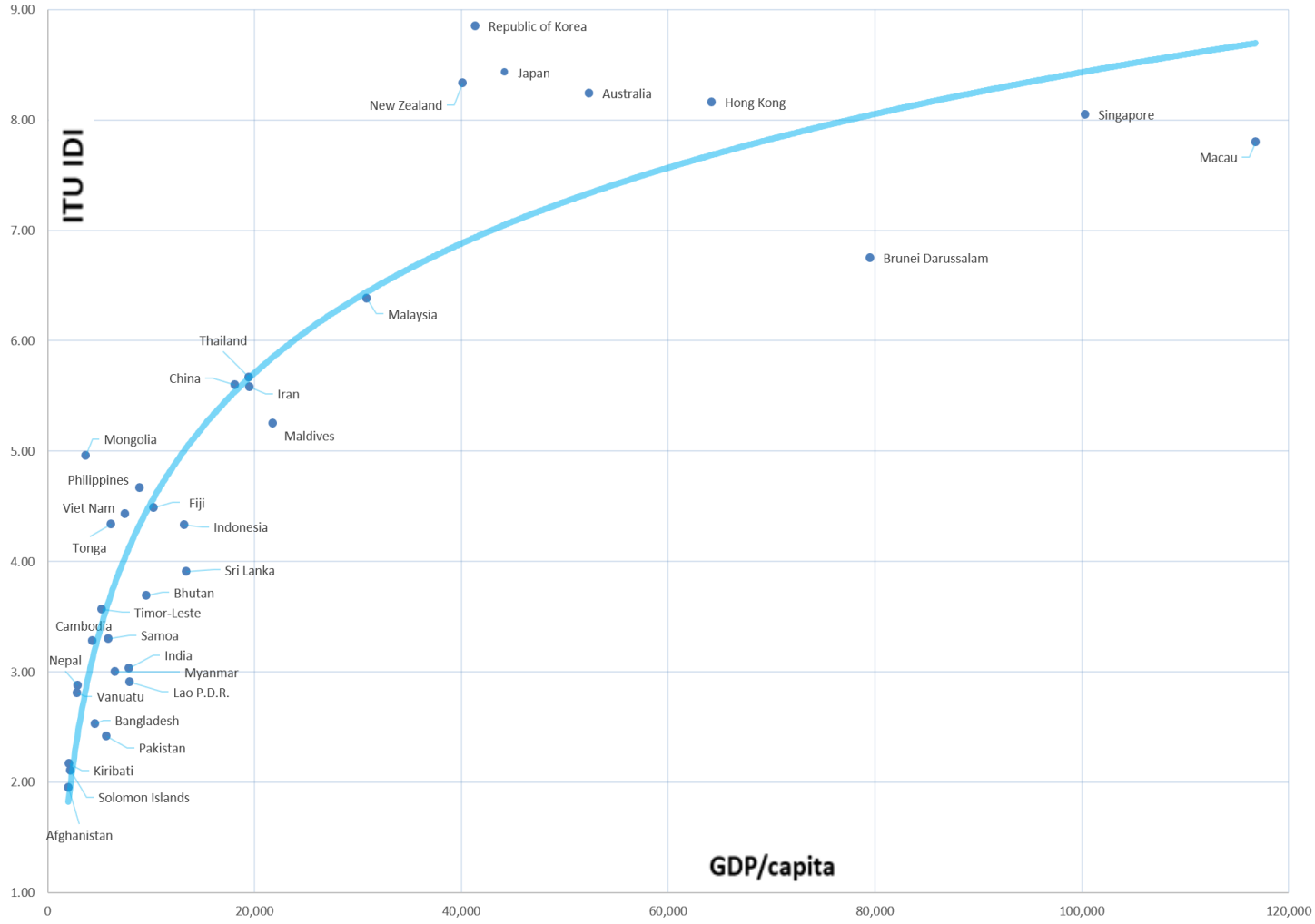
Given this high level of diversity in relation to income economic development and IDI rankings, statements about digital infrastructure development and required policy and regulatory

6 https://en.wikipedia.org/wiki/World_population

7 Int$' denotes The Geary–Khamis dollar, more commonly known as the international dollar (Int$), is a hypothetical unit of currency that has the same purchasing power parity that the U.S. dollar had in the United States at a given point in time (see https://en.wikipedia.org/wiki/International_United_States_dollar)

developments will necessarily be high level initially and in providing more detail, it will be necessary to discuss Asia-Pacific countries in categories such as those shown in Exhibit 9 above.

**Exhibit 11 ITU and GDP (PPP) per capita in Asia-Pacific region**




**Sources:** **Windsor Place Consulting based on data from GDP/capita: International Monetary Fund (2018) World Economic Outlook Database, April 2019 and ITU IDI: Measuring the Information Society Report 2017 - Volume 1**

## 4.2 Improving digital performance in Asia Pacific: significant progress but some way to go

While many Asia-Pacific nations face the enormous challenge of growing from a low base in terms of GDP per capita, there are many indications of the regions rapid progress.

Exhibit 12 shows 'Asia and Pacific' growing faster than any other region in terms of mobile cellular subscriptions per 100 inhabitants. In 2018 this figure for Asia-Pacific is approaching the Americas and Europe and will likely reach parity soon, a significant milestone.

**Exhibit 12 Mobile-cellular subscriptions per 100 inhabitants, by region, 2005–2018***

**Source:** ITU Measuring the Information Society Report 2018 – Vol 1

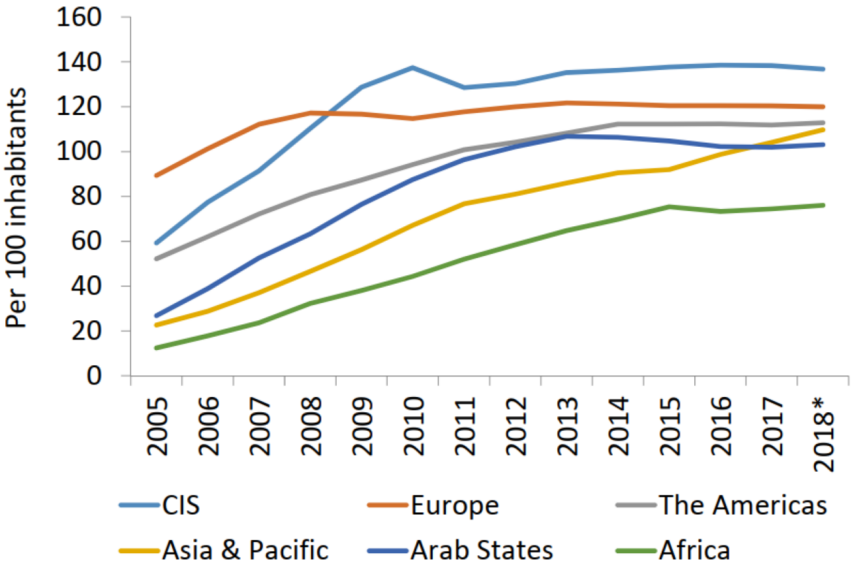
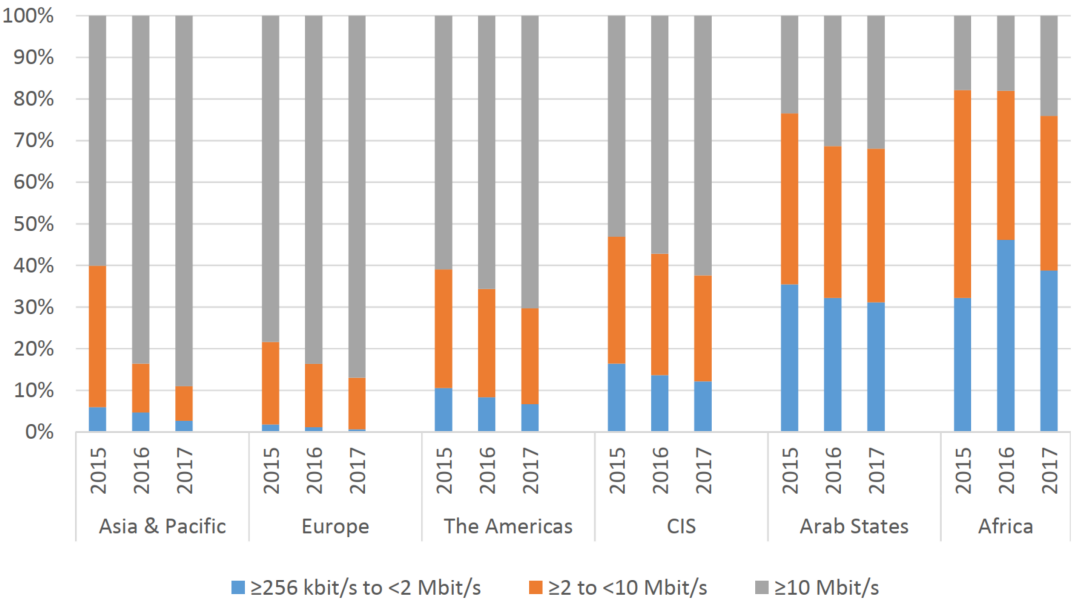



Exhibit 13 provides a breakdown of fixed broadband subscriptions by speed and shows that Asia-Pacific is a region has the highest proportion of fixed broadband with speeds greater than 10 Mb per second. Although the penetration of fixed broadband subscriptions remains relatively low in Asia-Pacific, since 2014 (Exhibit 14) it has been growing at a faster rate than the world on average. These outcomes point to the improving quality of Asia-Pacific infrastructure and the growing demand for high speed fixed broadband connections that support sophisticated economic activity in Asia-Pacific global cities.

**Exhibit 13 Fixed-broadband subscriptons by speed, by region, 2015–2017**

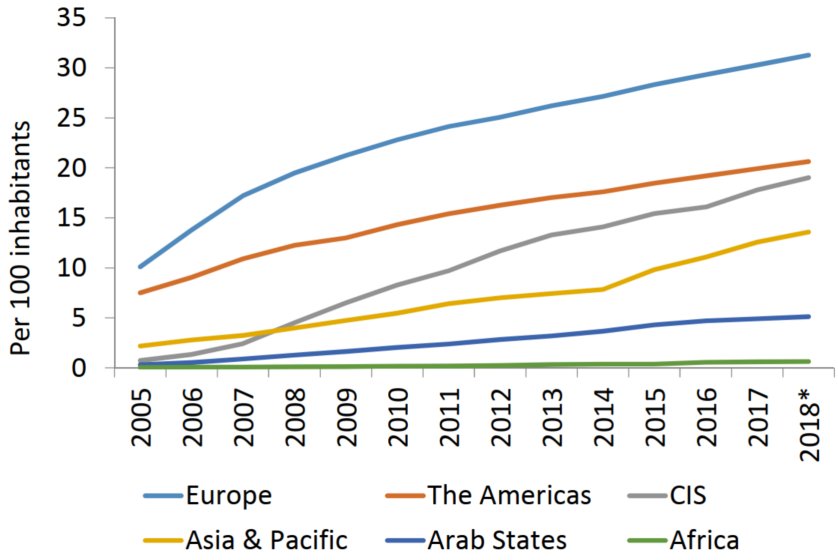



**Source:** ITU Measuring the Information Society Report 2018 – Vol 1

At the same time, the relatively low absolute level of cellular subscriptions per 100 people reflects the fact that a significant proportion of the Asia-Pacific population has low to very low incomes and are not able to afford mobile phones and subscription costs. This may also reflect relatively low cellular network coverage levels in rural and remote regions particularly in Asia-Pacific countries where urbanisation is still relatively low.

These considerations point to the need for affordable wireless connectivity in developing Asia-Pacific countries and the ongoing pressure to extend network coverage beyond population centres. These objectives are not easily reconciled with the need, especially in relatively low income countries, to attract foreign capital for infrastructure investment. The various trade-offs between service affordability, rates of return, the need to attract capital, and the need to generate competition exemplify the nature of the challenges to governments and regulators in encouraging ongoing infrastructure deployment in Asia-Pacific.

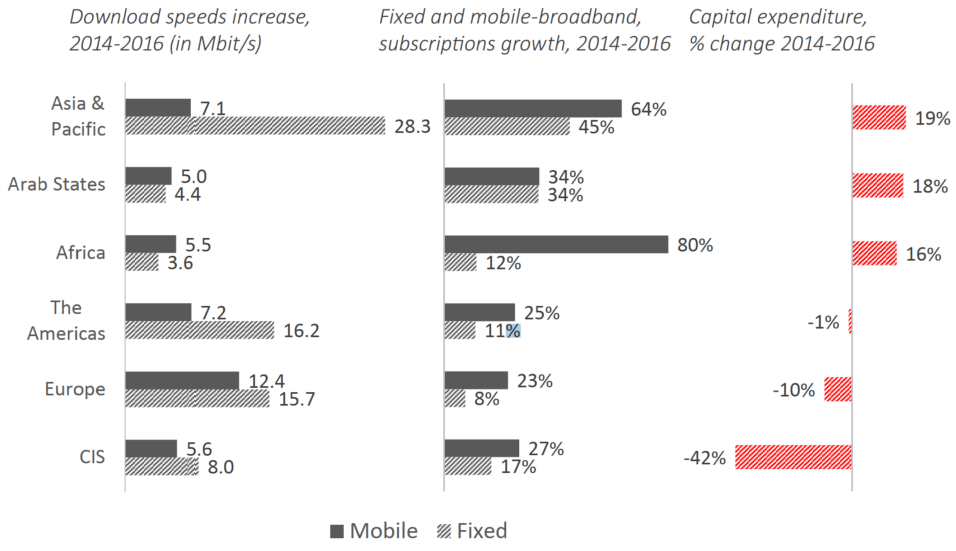
**Exhibit 14 Mobile-cellular subscriptions per 100 inhabitants, by region, 2005–2018***




**Source:** ITU Measuring the Information Society Report 2018 – Vol 1

Exhibit 15 also reinforces the theme of 'significant progress but still some way to go'. It shows that Asia-Pacific has experienced very rapid improvements in download speed performance and both fixed and mobile broadband subscriptions. It also shows that the region has had the strongest growth in capital expenditure globally.

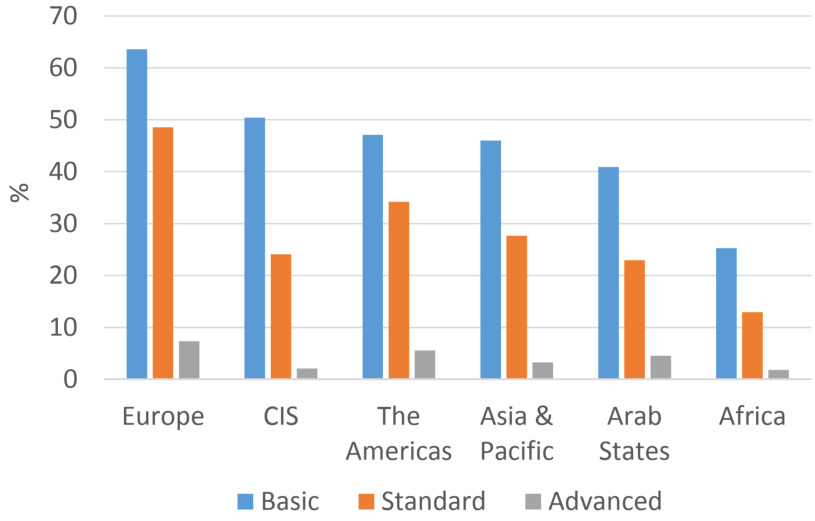
**Exhibit 15: Regional growth in mobile download speeds, mobile-broadband subscriptons and capex, 2014-2016**




**Source:** ITU Measuring the Information Society Report 2018 – Vol 1

Turning to digital skills, Exhibit 16 shows that Asia-Pacific is performing relatively well given the relatively early stage of economic development of many of its constituents. It is the third ranked region in the world standard digital skills and fourth for advanced with its basic skill levels been roughly equivalent to the Americas.

**Exhibit 16 Percentage of individuals with ICT skills, by region, 2017**




**Source:** **ITU Measuring the Information Society Report 2018 – Vol 1**

While these statistics indicate substantial progress for the Asia-Pacific region as a whole, it is worth mentioning the significance of China in any overall statistical reporting for the region. With its rapid economic development of the last two decades, including rapid deployment of infrastructure of all kinds, China has, in effect, significantly lifted the digital performance of Asia-Pacific as a whole. This needs to be kept in mind when assessing the performance of less advanced and lower income per capita countries such as those in the left corner of Exhibit 11.

## 4.3 Steps to the Asia-Pacific digital economy: diversity, disparities and development

The enormous diversity of the Asia-Pacific region is primarily the result of the large differences is the stages of economic development in each country. This means that attempting to generalise about communications infrastructure development for the region as a whole is unproductive. Exhibit 11 is suggestive of a 'digital divide' to some extent, with countries like Singapore, Hong Kong, Australia, New Zealand and Republic of Korea having high GDP per capita and a high ITU IDIs. As pointed out above, the significant majority of Asia-Pacific countries have a PPP GDP per capita of less than Int$20,000 in these countries face a significantly different development and infrastructure strategy problem to the higher income countries.

Notwithstanding the significant differences between developed and developing Asia-Pacific nations, characterising them as a 'digital divide' maybe somewhat counter-productive. There is nothing intrinsic to developing nations which prevents them from further developing their digital economies although the challenges are significant and different from those facing developed countries. It may be more productive think in terms of a 'digital continuum' from least digitally developed to most digitally developed. This perspective does not see the challenges as intrinsic or insurmountable, but rather emphasises the need for developing nations to adopt as soon as possible are well-informed digital development strategy. Such a strategy must have as a central pillar a digital infrastructure strategy.

In the next section we discussed in more detail common and distinct challenges for developed and less developed nations.

# 5 Digital challenges for governments in Asia-Pacific

The large differences between Asia-Pacific countries that we have noted above makes it difficult to meaningfully describe the digital challenges that a common the region. It is more fruitful to describe some common challenges for the categories of countries described in Exhibit 9.

Notwithstanding the diversity within Asia-Pacific, the region's nations face the same generic challenge: *how to manage the ongoing development of the ICT industries within their jurisdictions in order to promote long run economic development and growing living standards*. Common challenges that Asia-Pacific nations experience in achieving this objective are discussed next.

## 5.1 Common characteristics and challenges

### SETTING OF BROADBAND TARGETS

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 in Exhibit 17 below. The report also highlights that based on data for 196 countries, as at 2018, 159 countries have adopted a broadband plan or strategy or are planning to.[8] This is a huge increase from 2006 when only 31 countries had such broadband plans.

**Exhibit 17: Broadband Commission 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 |

**Source: Broadband Commission, 2018**

8 National Broadband Plan or strategy includes: a plan, strategy or policy specific to broadband; digital plan, agenda, strategy or policy; ICT plan, strategy, or policy; or a communication plan, strategy, or policy. See Broadband Commission for Sustainable Development, *The State of Broadband: Catalysing sustainable development,* September 2018, page 36

These targets which intended to be both aspirational and achievable should also be embraced by the Asia-Pacific region. In doing so they ought to adopt a digital agenda or strategy to achieve such targets. Such strategies will require all stakeholders to commit to them and to take positive actions towards their achievement.

There is also considerable value especially in Asian markets with large urban areas (with generally lower costs of provisioning) to set even more challenging targets for high speed Internet access (ie gigabit access). For example, ASEAN markets could have common broadband objective in major urban areas such that there is universal residential broadband of 30Mbps and mandate all households in major urban areas should be connected by 100Mbps broadband services with the capability to upgrade to further by 2025. FWA for regional and rural customers should also be a policy priority because reusing existing wireless networks and tower resources could reduce the costs of broadband construction and provide affordable Internet access to regional and rural populations.

It is also critical that broadband services be affordable especially for whom live in rural areas and income below the poverty line. 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 for fixed services. Affordability is particularly problematic for many Asia-Pacific countries given their relatively low GDP and GNI per capita. The ITU's objective of 25 percent more affordable of Internet access compared to 2017 and 3 percent of average monthly income for the entry level broadband service in developing countries by 2023 are achievable with effort of all sector stakeholders. Entry-level broadband services should be made even more affordable in developing countries with the pricing of such services, falling to less than 2 percent of monthly gross national income per capita by 2025.

Further, governments in all countries should enable environments ensuring accessible telecommunications and ICTs for person with disabilities and gender equality in Internet usage and mobile phone ownership.

Although the licensing schedule of 3G and 4G services varied from country to country across Asia-Pacific, facilitating 5G deployment forward (including making key IMT spectrum available) and encouraging its deployment by MNOs is a must. While some countries are aiming for timeline of 2021, all countries, depending on demand, should aim to their licensed MNOs to deploy 5G by 2023 to 2025 in line with their national aspirations.

## THE DEMAND FOR BANDWIDTH ALWAYS GROWS

A defining characteristic of the digital economy and society is increasing connectivity and bandwidth. There is the ongoing interplay between bandwidth supply and demand. Each time there is an improvement in the quality, capacity and availability of broadband, new opportunities emerge to make use of this improved connectivity. There are many historical examples of this phenomenon:

- in the mid-90s, development of ADSL technology made broadband connections possible over existing copper telephone lines to households which led to the explosion in access to the World Wide Web and the dot com boom which encouraged the development of new higher-bandwidth services
- in the mid-2000 3G and 4G connectivity made the era of the smart phone possible by providing widespread mobile access to data – consumers quickly responded, demanding more sophisticated bandwidth hungry mobile applications
- over the past decade up to 2019, improvements in household broadband speeds and data allowances, associated with fibre reaching or coming closer to homes, have enabled the TV streaming revolution.

There is no obvious end in sight to this process. For example, new 5G technology is desirable because of its very low latency is a requirement for enabling autonomous vehicles and complex time-critical telepresence applications such as remote surgery. Thus, each generation of new broadband technology enables new digitally based economic activity, enables new business models, and creates the increasing national competitiveness that drives economic growth and rising living standards. The challenge for governments is to design policy and regulation that encourages sufficient investment in digital infrastructure to ensure that the nations digital services remain globally competitive. This is an on-going process.

### BALANCING THE NEED FOR COMPETITION AGAINST THE NEED FOR OPERATOR MARGINS TO FUND INVESTMENT

Governments and regulators everywhere face the problem of how to create a regulatory environment that promotes profitability in telecommunications carriers in order to encourage ongoing infrastructure development while at the same time maintaining a competitive tension in telecommunications markets so that carriers remain focused on delivering benefits to consumers.

Both profitability and competitive tension are necessary to encourage investment; profitable operators that face no competition have little incentive to undertake investment. The popularity of over-the-top (OTT) services has further complicated regulation because these services have diverted operator profits to OTT technology platform operators and arguably weakened operator market power.

Technological change continuously creates pressure for regulatory innovation. For example, in the early 2000's policy of 'unbundling the local loop' was a response to the rapidly rising importance of household broadband and the need to ensure that this new market was not overly monopolised by pre-existing fixed line monopolists. This policy had the effect of increasing competition, lowering prices and greatly accelerating household uptake of broadband.

Ideally, regulators should seek to allow operators to create margins sufficient for ongoing infrastructure investment but to encourage enough competitive tension such that excessive or monopolistic profits are generally not available.

### BALANCING EQUITY AND EFFICIENCY OBJECTIVES: SMART CITIES AND RURAL COVERAGE

All governments also face the problem of how to balance the need to focus telecommunications investment where it will have the greatest impact on economic growth against the need to bring telecommunications services to groups in rural and remote regions. These groups are usually relatively disadvantaged in economic terms and therefore, to some extent, this policy challenge involves seeking to balance between efficiency and equity policy concerns.

The equity efficiency trade-off often involves a trade-off between investment in cities and investment in regional areas. This is always a difficult trade-off to navigate because cities are the engines of modern economic growth and they require highly reliable high-speed high-capacity communications networks to enable them to function properly.

At the same time, communications technologies are particularly economically empowering for remote communities and can bring transformational benefits to them. A critical dynamic concerning this trade-off is the process of rapid urbanisation that is occurring throughout Asia-Pacific.

Cities are driving economic growth because they enable the deep specialisations which drive competitive advantage in the modern connected global economy. Therefore, cities that are growing strongly increase average incomes, provide jobs for rural workers who move to cities and also provide increased opportunities for rural workers to enter the market economy by supplying urban consumers thereby increasing rural incomes.

These economic development processes emphasise the need to deliver high-speed reliable connectivity to cities as a priority in order to encourage the economic growth that will benefit all citizens in the longer run. To support the high levels of economic activity that occur in large

cities, ICT infrastructure must provide fast, reliable data services that have sufficient capacity to avoid contention problems in periods of peak demand.

One of the core ideas associated with the concept of the digital economy is the 'smart city'. As defined by the UNECE and ITU through a multi-stakeholder approach involving over 300 international experts:

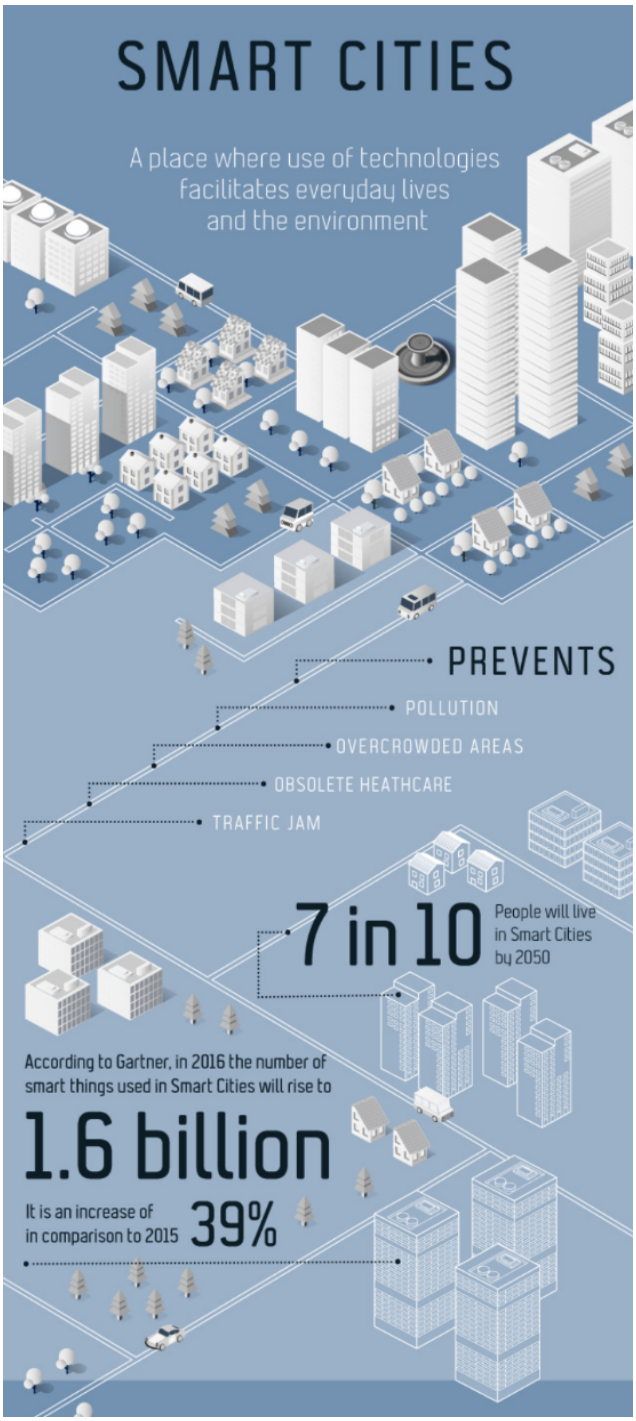
> *A smart sustainable city is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects*
> .[9]

Smart cities use deeply embedded digital technology to achieve highly efficient operation both from an economic and an environmental perspective. Smart cities also use a range of distributed information systems and applications to optimise the provision of services to residents achieving a high level of fiscal efficiency as well.

Concept of smart cities is dependent on deeply embedded digital infrastructure at every level. The Internet of things is a central concept. In smart cities digital sensors will be everywhere; analysing traffic flows, measuring air quality optimising heating and cooling of buildings, ensuring efficient energy use and generation and so on. Sensors will report their data to a network of cloud-based interacting distributed applications all designed for efficiency and service delivery optimisation.

The concept of smart cities emphasises the importance of the trade-offs between equity and efficiency and city and rural investments in infrastructure.

**Exhibit 18 Smart cities and digital technologies**




Source: www.dailyinfographic.com/smart-cities-are-the-future

9 www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx

In an effort to work towards the goal of making "cities and human settlements inclusive, safe, resilient and sustainable" (SDG 11), the ITU and UNECE launched the "United for Smart Sustainable Cities" (U4SSC) in May 2016.[10] The UN4SSC is a global smart sustainable city initiative, supported by 14 other United Nations agencies, programmes, funds and secretariats, and provides an international platform for information exchange, knowledge sharing and partnership building.

The key objectives of the U4SSC include generating guidelines, policies and frameworks for the integration of ICTs into urban operations, based on the SDGs, international standards and urban key performance indicators (KPIs), and helping to streamline smart sustainable city action plans, and establish best practices with feasible targets that urban development stakeholders are encouraged to meet.[11]

Part of the U4SSC's work focuses on accelerating job creation by enabling new business opportunities and encouraging the creation of small and medium-sized enterprises (SMEs) in smart sustainable cities through the adoption of appropriate policies and inclusion of innovative technologies including Internet of Things (IoT), blockchain, and artificial intelligence (AI).

Currently, the U4SSC is working on guidelines on tools and mechanisms to finance SSC projects; guidelines on strategies for circular cities; a city science application framework; guiding principles for artificial intelligence in cities; and blockchain in cities, *inter alia*.[12]

### OPTIMAL IMT SPECTRUM MANAGEMENT

The basic principle of spectrum management is that spectrum should be managed so that it creates the maximum long-term benefit to society. The factors that determine what spectrum allocation is optimal, however, are highly dynamic. The primary dynamics arise from changes in technology and changes in consumer behaviour.

As previous generations of technology, for example, analogue TV, 2G and 3G, the spectrum that was previously allocated to them needs to be closed down, re-organised, consolidated and re-allocated. This is a complex and time consuming process and one that must be undertaken continuously.

The transition from 2G/3G services to 4G/5G services requires a rethinking in relation to the optimal spectrum allocation processes for International Mobile Telecommunications (IMT) spectrum.[13] While 5G NR technology supports bandwidths 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 and 100 MHz, dual connectivity and carrier aggregation, larger block sizes are preferred to obtain the maximum benefit from the new technology. Further, except for sub-1 GHz spectrum, 5G NR is also based on TDD technology.

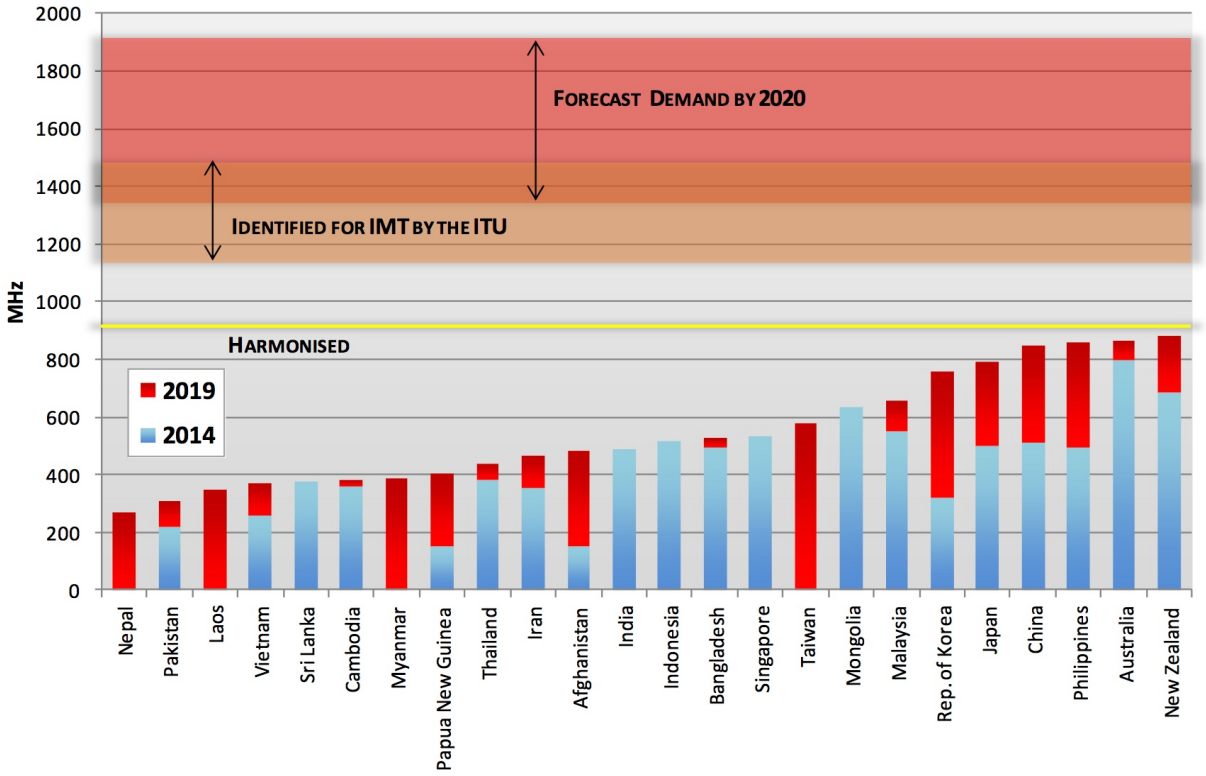
Countries that have not yet allocated a number of spectrum bands (eg like 2.6 and 3.5 GHz) should therefore take such factors into account rather than following the traditional approach which resulted in MNOs each having fragmented IMT spectrum holdings over a number of bands. This is inefficient and means more costly capex and opex. Countries that have already allocated most IMT spectrum banks will need to over time, with spectrum trading, and licence renewals etc will move to such approach but it will take some time.

It is also critically important that the total amount of IMT spectrum made available in a market for mobile operators is also increased (and priced reasonably) given operators need a portfolio of IMT spectrum. As shown in Exhibit 19 below, while progress has been made since 2014, there is

[10] www.unece.org/fileadmin/DAM/hlm/projects/SMART_CITIES/U4SSC-brochure.pdf, page 2.
[11] www.unece.org/fileadmin/DAM/hlm/projects/SMART_CITIES/U4SSC-brochure.pdf, page 4.
[12] www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx
[13] www.itu.int/ITU-D/tech/MobileCommunications/Spectrum-IMT.pdf

a considerable amount of spectrum which is reserved for IMT usage in Asia-Pacific markets that has not yet been allocated.

**Exhibit 19: Spectrum licensed for IMT services in selected ITU Region 3 markets**




**Source:** LSTelcom, Analysis of the World-Wide Licensing and Usage of IMT Spectrum, 5 April 2019, page 16

In particular there are benefits from assigning (i) the 700 MHz band (APT700) and (ii) the 3.5 GHz band (3.3-3.8 GHz) which is a core spectrum band for 5G deployment.

Firstly, in many countries in Asia-Pacific, significant work remains to be done to secure the benefits of the 'digital dividend' in the 700 MHz band. Following the initial step of conversion to digital television, spectrum bands must be cleared, the Asia-Pacific Telecommunity ('APT') APT700 band plan needs to implemented, and the provisioning of wireless broadband services using the digital dividend spectrum must be rolled out. There are considerable and compelling benefits for most Asia-Pacific countries to deploy APT700 including improved wide and indoor coverage, increased wireless broadband speeds and more efficient IoT deployments. The ability of mobile operators to quickly utilise 700 MHz spectrum in their service provisioning due to their modern LTE networks will have material benefits in terms of operator capex and opex.[14] Such spectrum in isolation or in combination with other IMT spectrum bands can also be used to provide FWA services to customers including in regional and rural areas.

Secondly, many Asia-Pacific national regulators have either assigned the 3.5 GHz spectrum for mobile or have started preparations to do so. There is also a rapidly growing ecosystem of devices, setting the stage for successful rollouts. Due to its propagation characteristics and the

14 GSMA, *Securing the digital dividend across the entire ASEA: A report on the status of the implementation of the APT700 band for ATRC*, paper by Windsor Place Consulting August 2018.

potential for large contiguous bandwidths, the 3.5 GHz band is an ideal frequency band for 5G as it is able to provide both capacity (the amount of data traffic it can support) and coverage (the distance the radio signals travel). High-speed enhanced mobile broadband services need to be capable of delivering peak download speeds of at least 20 Gbps, a reliable 100 Mbps user experience data rate in urban areas, and 4ms latency. The 3.5 GHz band will be key for delivering eMBB and to enable good 5G service performance, 80-100 MHz of 3.5 GHz spectrum per mobile network operator is optimal.[15] The 2.6 GHz band (especially if TDD Band 41) is an another excellent choice for Asia-Pacific nations wishing to deploy 5G early and efficiently.

### IMPROVING 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.*[16]

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 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 both fixed, FWA and 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.

Subject to domestic telecommunications law requirements, markets which do not currently mandate broadband quality of service/quality of experience (QoS/QoE) provided to consumers and enterprises should:

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15 There are some challenges in certain areas of Asia-Pacific (eg ASEAN) to make this spectrum band available. See GSMA, *Roadmap for C-band Spectrum in ASEAN*, by Plum Consulting and Windsor Place Consulting, August 2019.

16 www.itu.int/rec/T-REC-E.800-200809-I

1. impose new technical standards addressing QoS/QoE and/or

2. (ii) impose a requirement for licensed operators to publish information on the QoS/QoE of their broadband services.[17]

It is also important that achieved broadband speeds is consistent with the actual broadband speed advertised by the operators and ISPs. in a range of global markets including Germany For example, many European countries request that bandwidth maintenance rate (availability) must reach 90% or above. In Germany, Bundesnetzagentur provides software tools to help end users measuring their connection rates. If the speeds in 90% tests do not reach the advertised speeds, subscribers can sue its carrier for contract breach. In Australia, in May 2019 the ACCC issued updated its industry guidance on broadband speed claims[18] and previously (in 2017 and 2018) accepted court-enforceable undertakings from 8 internet service providers who admitted they likely misled consumers about broadband speeds and offered to compensate affected consumers.[19] The ACCC has also launched the Measuring Broadband Australia program to assess the quality of Australian broadband. [20]

## ADDRESSING LEGACY 2G/3G SERVICES

### Overview of legacy switch-off issues

Exhibit 20 (over) summarises the current Asia-Pacific 2G and 3G country and MNO switch-off dates which have been publicly announced thus far. However, regional regulators should be aware that all MNOs have internal plans or are assessing their plans for such switch-offs. It is also expected that as a number of MNOs/countries deploy 5G the number of announcements concerning the switch off of legacy 2G/3G networks will increase in the next 12 months. It is too expensive for MNOs to own and operate (including provide spares, staffing etc) for 2G, 3G, 4G and 5G networks concurrently. As such, some rationalisation is needed.

In the Asian region, Australia, Japan, Macau, New Zealand, Singapore, South Korea, and China, Taiwan have joined the United States and other countries in switching off their 2G networks in making a transition to 3G/4G and future 5G services. In Thailand, the switch off of 2G services by October 2019 was announced in December 2018.

In a further step, China, Taiwan (on 31 December 2018) switched off its 3G services as well – this will see the country move to a 4G only environment. In other global markets, especially those where there is a high M2M usage, the decision has been taken to switch off 3G services first rather than 2G services. In such markets, especially in Europe the switch off dates for various networks of the MNOs is between 2022 and 2025.

### Key drivers of legacy network switch-off

Decisions by MNOs to close legacy networks is driven by a number of reasons, including the higher spectral efficiency of 4G/LTE, and being able to use the freed-up frequencies to increase (i) wireless broadband coverage (eg like LTE900) and (ii) bandwidth speeds through carrier aggregation. 4G/LTE networks also offer significantly higher network efficiency/lower network capex and opex costs compared with either 2G or 3G networks.

While there are some examples in Asia or regulator mandated/managed technology switch-offs in the majority of country markets it is up to MNO to make a decision as to when to switch off legacy networks subject to coverage and other requirements. Consistent with having technology

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17 For example, see the Measuring Broadband Australia program provides information on the real-world performance of broadband plans which is updated every quarter. Refer to www.accc.gov.au/consumers/internet-landline-services/broadband-performance-data

18 www.accc.gov.au/publications/broadband-speed-claims-industry-guidance

19 www.accc.gov.au/consumers/internet-landline-services/broadband-speeds

20 www.measuringbroadbandaustralia.com.au

neutral IMT spectrum allocations, the decision to switch off 2G and 3G services should be a commercial one best left to the MNOs.

### Exhibit 20: Asia-Pacific 2G and 3G country and MNO Switch-off dates

| Country | 2G Switch Off | Operator v Regulator mandated | 3G Switch Off | Operator v Government mandated | More details |
|---|---|---|---|---|---|
| **Australia** | June 2018 | Operator initiated | Pro-gressive | Operator initiated | Telstra and Vodafone have begun phasing out their 3G connectivity with Telstra switching off 3G on its 2100 MHz network on 25 March 2019, but 3G will continue to work for the time being on the 850 MHz network. Vodafone will switch off 3G on its 2100 MHz through 2019. |
| **China** | | | 2020 | | China Mobile is expected to complete closure of its 3G network by 2020. |
| **Japan** | March 2011 | Operator initiated | | | |
| **Macau, China** | August 2019 | Approved by regulator | | | In April 2019, CTT approved a plan for Macau's three MNOs to finally switch off their 2G networks. They had stopped offering GSM-based 2G services for domestic users in mid-2015, but maintained services for roaming PRC visitors. |
| **New Zealand** | | Operator initiated | | | Spark and 2degrees shut down their 2G network in 2012 and 2018 respectively. Vodafone has not announced plans to switch off 2G. |
| **Singapore** | April 2017 | Regulator mandated | | | Singapore's three mobile operators shut down their 2G networks in April 2017 after a three-week switch off process. |
| **South Korea** | 2G CDMA – March 2012 | Regulator mandated | Q1, 2017 for LGPlus | | SK Telecom CDMA network is scheduled to switch off on 31 December 2019. LGPlus is 4G only after switching off its 3G network in early 2017 |
| **Taiwan, China** | July 2017 | Government mandated | Dec 2018 | Government mandated | |
| **Thailand** | October 2019 | Regulator encouraged but NBTC Board has left to the MNOs | | | |

**Source: Windsor Place Consulting, May 2019**

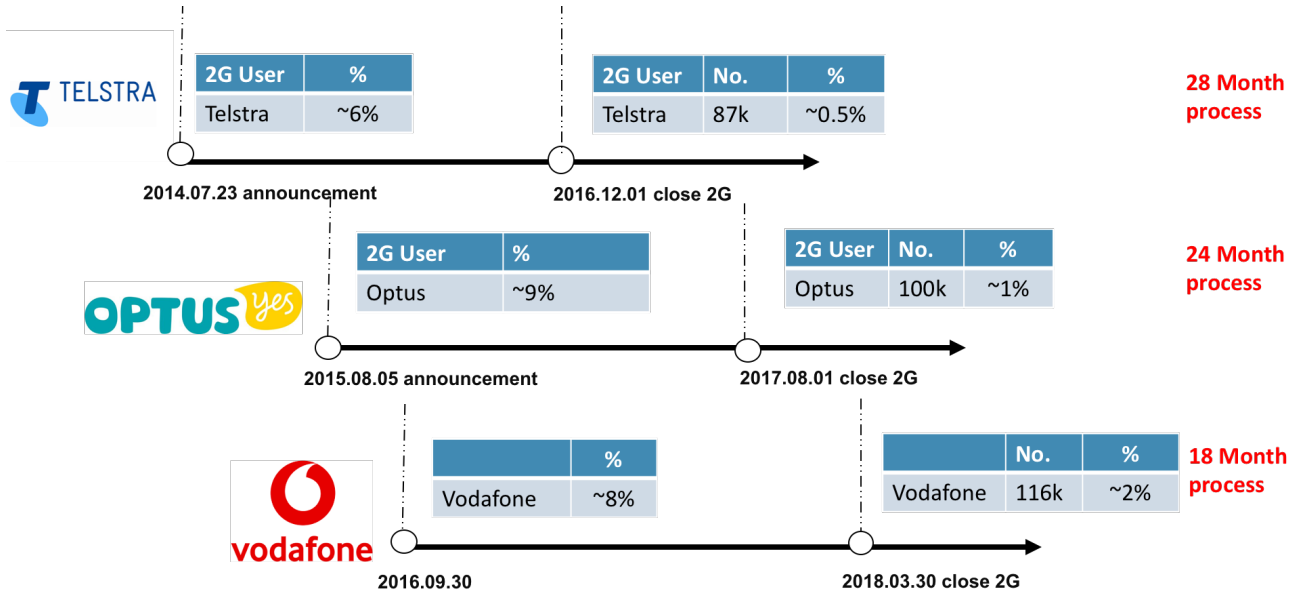
Requiring the continuing operation of a legacy network involves considerable opex costs to an MNO and also involves opportunity costs – the spectrum and capital in the legacy network cannot be optimally utilised. As such the Asia-Pacific regulators should not preclude moves by the MNOs to switch off legacy networks but instead they ought to be encouraged. This can be done for example, by encouraging LTE900 as Myanmar is doing by allocating some E-GSM spectrum (up to 2 x 2.5 MHz) for 5 years to its MNOs to move their 2G customers to this spectrum while deploying LTE in other 900 MHz spectrum.

MNOs need low sub-1 GHz spectrum like APT700 in order to optimally deploy robust VoLTE services especially in relation to in-building coverage. In the interim, voice calls will use circuit switch fall back (CSFB) to the 2G/3G networks where necessary (ie where there is no LTE coverage or VoLTE has not been deployed). The release of the 700 MHz will assist with deployment of VoLTE and hence will accelerate the switch off of legacy 2G and 3G services.

### Regional 2G switch-off examples

Looking at two regional examples in Australia and Singapore who have already switched off 2G services we see that MNOs typically wish to switch off 2G services when they fall below 10 percent of their user base. In Australia as the customer base differed between the 3 operators and as such it made sense for different 2G network switch off dates as shown in Exhibit 21 below. However, in Singapore as the user base across all 3 MNOs was relatively consistent a common 2G switch off date agreed with the IMDA (over 21 months) was the optimal approach.

### Exhibit 21: Australian operators announce 2G network closure when 2G user <10 percent




Source: Industry and media sources

While most MNOs in a particular country follow a particular path of all MNOs say switching 2G or 3G but there are exceptions like the Netherlands. In that case T-Mobile Netherlands (approximately 25 percent market share) has announced it is switching off its 2G network in November 2020 while Vodafone (15-20 percent market share) is switching off its 3G network in January 2020 and KPN (30-35 percent market share) is also switching of its 3G network in January 2022 but retaining 2G. In essence, the timing and type of legacy network switch off in all markets is a competitive issue. The preference of the MNO depends on a range of its own internal metrics including *inter alia* its spectrum holdings, age and depreciation of networks (and ability to upgrade), customer base and device profile.

Given the recommendation that such changes to be MNO determined but with very clear requirements on communication/advertising with their customers on likely switch off dates, as well as schemes to promote migration etc (see Exhibit 22).

**Exhibit 22: Suggested MNO actions are announcement of 2G switch off**

<table>
<tr><th>MARKETING</th><th colspan="2">User Analyse and Provide Specific Solutions for Different Customers</th></tr>
<tr><td>Advertising – Posters and TV commercials  </td><td>Legacy 2G Terminal User<br><br>- Special Offer</td><td>Business Plan<br><br>- Account manager contact directly</td></tr>
<tr><td>Informing through SMS and calls  </td><td colspan="2">Dual SIM Card User<br><br>- Provide list of compatible UE and software upgrade solution</td></tr>
</table>

**Source: Vendor sources**

From a policy perspective it is critical that network coverage does not fall as a result of the switch-off of legacy technology and a section(s) of society (eg due to device costs or similar) or specific areas of the country are disenfranchised. This has adverse political as well as economic implications.

## 5.2 Challenges for emerging Asia-Pacific nations

In addition to these common challenges, emerging Asia-Pacific nations face additional challenges in deploying digital infrastructure and embracing the digital economy and society.

### ATTRACTING FOREIGN CAPITAL FOR INFRASTRUCTURE INVESTMENT

This is an ongoing challenge for all emerging economies, not just in the telecommunications sector but also in other industries as well. Emerging nation telecommunications markets typically have low ARPUs which limits the attractiveness of investment to foreign capital sources.

It is not only regulatory settings for telecommunications that influence the attractiveness of a particular country to foreign investors, but also general economic settings such as taxation levels, rule of law and the quality of monetary and fiscal policy. Some governments have seen telecommunications as an opportunistic source of taxation revenue. If governments believe that telecommunications critical to economic growth, excessive taxation is almost always counter-productive. It will lower returns and therefore attractiveness to foreign investors and it will usually result in some increased costs due to taxation being passed on to consumers which will impede adoption and penetration of digital technologies.

Examples of the types of financial and other assistance that Asia-Pacific countries have provided in order to facilitate digital infrastructure in their markets are various and include direct subsidies, taxation incentives, low interest loans etc. Countries in the Asian region have also introduced further sector competition in both fixed and wireless services. These measures are summarised in Exhibit 23 below. A specific case study of Thailand's Digital Economy 4.0 is contained in **Exhibit 23** (over).

## Exhibit 23: Examples of financial and other assistance to the deployment of digital infrastructure in Asia-Pacific

| Lever | Benefits | Examples |
|---|---|---|
| **Direct Government Subsidy** | Provides investment in areas where private investors choose not to invest | **Australia**: USD34.7 billion for national NBN + wireless/satellite for rural areas<br>**China:** By 2020, 98 percent of total 122,900 listed poor villages across the country will be covered by broadband in accordance with China's 13th Five-Year Plan (2016-2020). From late 2015, China started 3 pilot telecommunication service projects with an investment of over 40 billion yuan (USD6 billion). The subsidy rate is 30 percent.<br>**India**: As part of the BharatNet project, tariffs reduced by up to 75% for operators purchasing optical fibre; USD519K to private telcos to set up WiFi in rural areas<br>**Malaysia**: National Fibre Connectivity Plan (NFCP) launched in 2019<br>**Thailand:** USD160 million investment in Digital Park Thailand; matching grant/fund for innovation investment<br>**Singapore**: Consortium named OpenNet was formed to design, build and operate NGN infrastructure. The Government supporting this with up to SGD750 million.<br>**NZ**: USD1.1 bn investment into Ultra-Fast Broadband initiative<br>Fiji: Grant of FJD3M to allow Fiji National University to connect to submarine cable AARNet linking to North America |
| **Corporate Income tax benefits** | Incentivise investment | **Thailand**: 8-yr corporate tax waiver and 50% reduction for another 5 years (EEC) with potential of 15-yr waiver<br>Fiji: 10-year tax exemption for ICT operators operating within Kalabu Tax Free Zone between 2007 and 2016; 13-year tax exemption for new operators from 2009 |
| **Low interest loans** | Reduce the cost of borrowing for investment | **Japan**: Bank of Japan interest rates are at -0.1% proving source of funding<br>South Korea: USD1.76 billion in low-cost loans for infrastructure |
| **Indirect subsidy/ Master development support** | Minimise or substitutes Government subsidy | **Australia**: Monthly charge of AUD7.30 (AUD8 by 2022) on carriers with active fixed-line superfast broadband service to go towards expanding coverage in regional Australia.<br>South Korea: Public Procurement Innovation program where government enters into agreements with businesses to develop and supply new services and products |
| **New licensing** | Introduces new competition | **Singapore**: Government (IMDA) granted fourth telco license to TPG in auction 2016 New Entrant Spectrum Auction.<br>Philippines: Certificate of Public Convenience and Necessity (CPCN) granted to DITO Telecommunity (formerly Mislatel) allowing it to become the 3rd telecoms operator. |

**Source: Windsor Place Consulting research, July 2019**

## Exhibit 24: Case study: An example of Government Incentives Driving the Digital Economy – Thailand 4.0

Over the past 4 decades, Thailand has undergone sustained economic grow and has reduced poverty significantly to 11% in 2014, down from 67% in 1986, to achieve upper-middle income status.

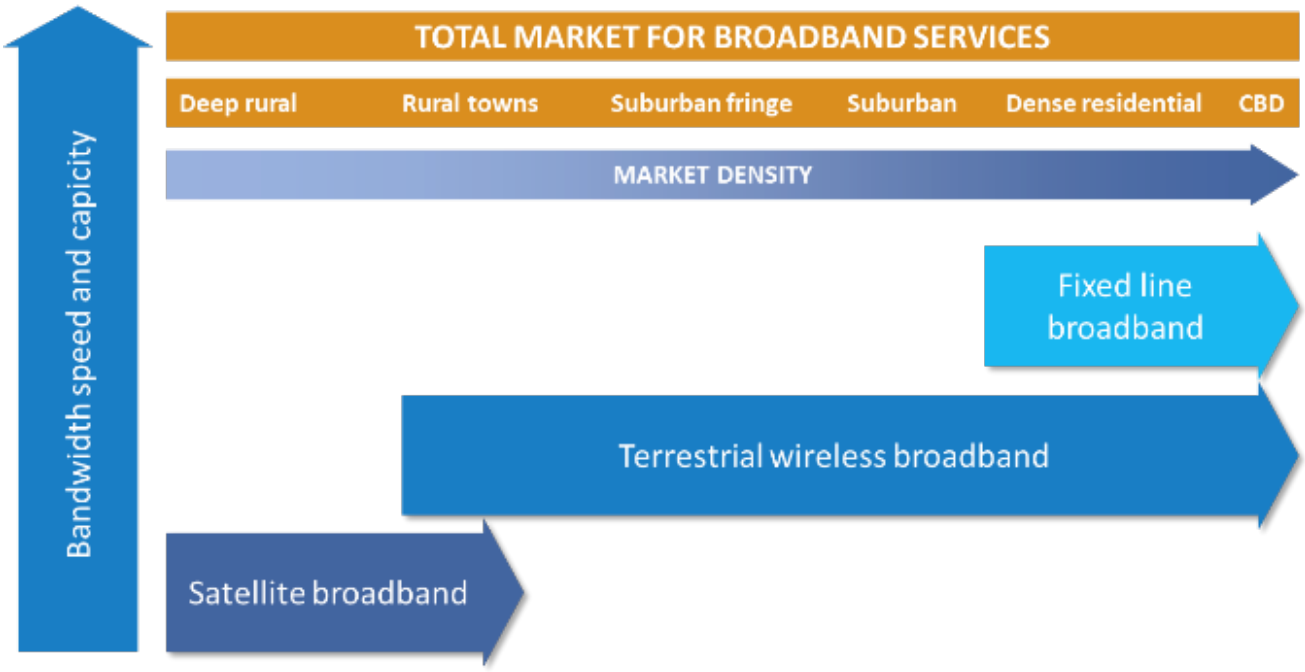
The government is now focused on the next stage of long-term growth with a transformation plan labelled Thailand 4.0, which is focused on developing its digital economy, inter alia. A key piece of Thailand 4.0 is the Eastern Economic Corridor ('EEC'), which hopes to develop Thailand's eastern provinces into a leading ASEAN economic zone. The government expects that USD43 billion will be required for the realization of the EEC, which is estimated to complete by 2021. This funding will come from a mix of state funds, public-private partnerships (PPPs), and foreign direct investment (FDI).

In relation to government incentives, investors within the three provinces comprising the EEC are being offered an 8-year corporate income tax waiver plus a 50% reduction in corporate income tax over a period of five. Personal income tax at a rate of 17% for certain specialists and the opportunity for grants/funds for innovation investments to be matched are also being offered. Furthermore, the government is also offering other non-tax incentives such as increased ease and efficiency in obtaining visa and work permits; long-term leases for land (50 years, with an option to renew for 49 years); the right to be exempted from the exchange control law; and to use foreign currency for payment of goods and services between business operators.

**Sources: Government of Thailand and press reports**

It is also optimal that there be multi-modal competition between fixed, wireless and satellite technologies in order to secure technological and service competition as highlighted in Exhibit 25 below. This will drive the both extended and high speed digital infrastructure.

**Exhibit 25: Broadband market delivery modes**




**Source:** **Windsor Place Consulting, 2016**

## MOBILE 'LEAPFROGGING' AND THE IMPORTANCE OF BUILDING MOBILE AND FIXED BROADBAND INFRASTRUCTURE SYNERGISTICALLY

In the mid-1990s, when the Internet was initially achieving mass market penetration, one of the critical differences between developed and emerging economies was the enormous difference in landline penetration. Fortunately for developing nations, the mobile phone boom was occurring at the same time and this enabled the often-cited 'mobile leapfrogging' phenomenon on which enabled emerging economies to achieve rapid mobile voice communication quickly at much lower costs than would have been possible if fixed networks systems were required.

This proved to be even more fortunate during the 2000's as mobile data services expanded rapidly. While initially, this development offered the prospect of developing nations also achieving a 'broadband leapfrogging', this idea is proving less viable as demand for broadband capacity, speed, reliability and non-contention rise. Wireless for 'last mile' connectivity for residences and businesses will provide an important route to improving national digital performance in the short to medium term. Increasingly, however, developing nations will need to focus their attention on deploying fibre for:

- connectivity to the Internet backbone;
- national long-haul connectivity;
- backhaul from wireless nodes; and
- fibre to the enterprise, to high density residential buildings and eventually residential sites generally in suburban areas.

Notwithstanding enormous potential of 5G technologies, is now the case that 'mobile alone is not enough'. In fact, 5G deployments will require extensive fibre links to wireless sites in order to maximise the potential of the technology. The emerging paradigm for efficiency is optimise

deployment of fibre to the end user where possible and, otherwise, extend fibre as close to end users as possible supplemented by fast wireless broadband technologies: 4G LTE and 5G. FWA technologies like WTTx[21] are being deployed in markets like Sri Lanka and the Philippines as an affordable fibre replacement.

Critical to this strategy is efficient long-term spectrum allocation and management. In particular contiguous blocks of spectrum allocated to 4G and 5G achieves highly efficient use of spectrum as discussed in section 6.1 above.

Further, this strategy requires minimising inefficient bureaucratic processes associated with approvals for fibre and wireless tower deployments.

### DRIVING DIGITAL GOVERNMENT INNOVATION

Particularly in developing Asia-Pacific nations, the importance of governments acting as an early adopter and exemplar digital technologies is difficult to overstate. In developing nations, incomes are lower and government services typically more difficult to access than in advanced nations. The availability of government information and services online is an important means by which effective access can be made available to broader populations. Furthermore, low incomes can mean that individuals are reluctant to adopt new technologies and the availability of government services provides another incentive to become a user of digital technologies.

To maximise access, it is important that governments ensure that services and apps are available on wireless platforms as well as via standard web browsers.

It is also important to recognise likely flow on effects from more widespread adoption of the government services. Growing the number of online services and apps will increase the number of regular users of such services which will, in turn, attract the attention of local innovators and entrepreneurs and increase the viability of local digital products.

Use of digital technologies in government needs to be not only user facing, but also extend fully into the execution of government processes and management. Just as digital technologies offer the prospect of enhanced productivity in the private sector, they offer the same in the public sector. Governments can create ‘anchor services’ which change public perceptions, increased skill levels, attract more capable application developers and raise overall digital performance.

### LOCAL DIGITAL INNOVATORS AND CONTENT PRODUCERS

The digital economy and society is not only about making the private and public sectors more efficient, it is also about creating entirely new businesses and industries. United States has benefited enormously from the growth of its ‘Big Tech’ companies – Apple, Amazon, Google, Facebook and others – which now dominate the list of highest valued companies in the world.

While the US dominates the big Tech platforms, there remain many opportunities for local technology entrepreneurs. Facebook has developed a global and dominant social media platform but many marketplaces are defined by national, or even local geographic boundaries or by culture and language – markets for job vacancies, for example, tend to be mostly national. Under the right conditions, there is likely to be a viable market for local services and content.

There are many things governments can do to foster the development of local digital innovators and content producers including establishing incubators and accelerators the digital businesses, building digital skill curricula at schools and universities, and creating educational facilities for business and entrepreneurialism. Governments also need to ensure that the economic fundamentals are correct: that income and capital gains tax rates are not excessively punitive, contracts and business processes are supported by legal system and so on.

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21 https://carrier.huawei.com/en/solutions/maximizing-network-value/wttx-instant-fiber-1st-step-for-home-broadband

# 6 Promoting increased deployment of communications infrastructure

Deploying telecommunications infrastructure is complex, expensive and risky. It is relatively obvious why this activity is complex and expensive but it is less obvious why it is also risky. Operators must forecast likely demand for network services in the face of uncertain future consumer behaviour, unknown behaviour of competitors and difficult to predict technological change. The rapid pace of technological change accelerates obsolescence and makes long-term planning inherently more difficult.

If governments want to accelerate the rate of infrastructure deployment in the face of these types of challenges, they need to ensure that unnecessary obstructions are removed and that other barriers such as approval processes do not unnecessarily retard investment and rollout. This is not to say that appropriate approval processes are not necessary – they clearly are. But governments need to avoid unnecessarily burdening operators with costs and delays which will discourage investment.

Building on the overview of the previous sections, this section provides a more detailed discussion of the types of policies that Asia-Pacific governments can employ to achieve higher rates of digital infrastructure development.

## 6.1 Improving processes to obtain rights of way

Many governments in the Asia region have prioritised for broadband infrastructure development in fixed and wireless network infrastructure in rural areas. This focus reflects the low population densities in non-urban areas resulting in sub-commercial markets from the perspective of operators. Governments also recognise, however, the need to encourage infrastructure deployment in urban areas in order to facilitate national economic development.

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.

In many jurisdictions 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 Infrastructure Sharing

Globally, the provision and operation of towers and associated infrastructure for telecommunications services is dominated by telecommunications operators. Operators typically own and operate their own towers, often outsourcing or contracting their construction to meet their own commercial and operational needs.

Asia-Pacific markets including India, Indonesia, Malaysia, Vietnam etc are seeing the emergence of separate towerco companies. Competition between operators and towercos makes it more likely that capital will be available for infrastructure investment and that the market for tower services will be competitive. Towercos have an incentive to host the equipment of as many operators as will maximise their profits. Operators, on the other hand, may have an incentive to block other operators in order to maximise market share and ensure that the quality of their services are competitive with, in relative terms, other operators.

**Exhibit 26: Potential benefits based on scope of sharing**

| | | Limited<br>*Reactive, focused on BAU sharing opportunities, fibre swaps* | Tactical<br>*Proactive approach, co-build fiber, collaboration in the form of JVs- Build To Suit, colocaton* | Structural<br>*TowerCo, multiple tenancies, MOCN type arrangements, fiber co-build, NetCo for 5G* |
|---|---|---|---|---|
| Passive (Towers) | Tenancy Ratio | 1 to 1.4 | 1.4 to 2.0 | >2.0 |
| | Operating Model | BAU | Selective JV | Multiple operator TowerCo |
| | OPEX Savings (1) | 5 -10% | 10 -15% | 20 - 30%(2) |
| | CAPEX Savings | 5 - 10% | 10%(3) | 20% -30%(3) |
| Active | Operating Model | No sharing | MORAN | MOCN |
| | OPEX Savings | - | 10 - 20%(4) | 30 - 40% |
| | CAPEX Savings | - | 10 - 15% | 30 - 40%(5) |
| Fiber | Operating Model | Lease, Swaps | Consolidate capacities | NetCo/Co-build/DSO JV |
| | OPEX Savings 5) | - | 30 - 50% | 40 - 60% |
| | CAPEX Savings(5) | 5 -10% | 30 - 50% | 40 - 60% |

**Regulatory environment needs to support structural collaboration to drive improved ROIC and enhance industry competitiveness**

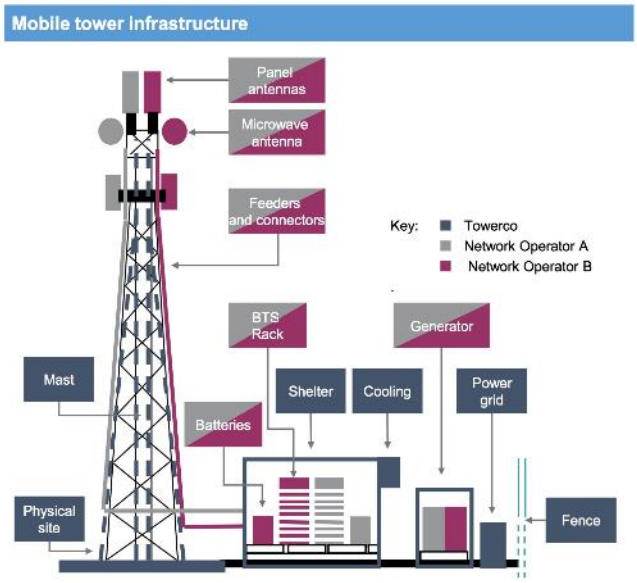
1. Largely due to shared rentals, O&M costs
2. Savings on OPEX, decommissioned sites, New Site Build
3. Shared new site build
4. Savings on OPEX largely energy cost, active O&M
5. Depending on the model and the number of partners

**Source: AT Kearney, 2019**

Policy which mandates tower sharing for all tower infrastructure has the potential to improve competition and accelerate service rollout. Such policy needs to be approached carefully, however, since it may also create disincentives to operators to invest in tower infrastructure.

It is important to note that, in relation to mobile networks, infrastructure sharing is mostly based on commercial agreements rather than on a specific regulatory mandate.[22] A summary of the various responsibilities between MNO and towercos is depicted in Exhibit 27.

### Exhibit 27: Typical responsibility schematic between MNO and towercos




| | Area | Tower Company | Network Op |
|---|---|---|---|
| Assets | Wireless equipment | | ✓ |
| | Antennas | | ✓ |
| | Civil works | ✓ | |
| | Tower | ✓ | |
| | Shelters | ✓ | ✓ |
| | Power supply | ✓ Grid power supply Air-conditioning | ✓ Generator and batteries |
| | Fences | ✓ | |
| Contracts | Ground lease | ✓ | |
| | Access management | ✓ | |
| | Operations and maintenance | ✓ Infra operations and maintenance | ✓ Active operations and maintenance |
| | Energy supply | ✓ | ✓ |

**Source: EWIA, September 2017**

This can best be summarised in the ITU's regulatory approach to tower regulation and the promotion of infrastructure sharing particularly passive infrastructure (see Exhibit 28).

### Exhibit 28: ITU's regulatory approach to towers and promotion of infrastructure sharing

The ITU focus is on the various ways in which government regulatory authorities can encourage passive infrastructure sharing for the facilitation of network rollout.23 This includes allowing or mandating the sharing of infrastructure by mobile operators, as well as the promotion of independent tower companies, which may provide the whole or a substantial proportion of network infrastructure. In some cases, the entry of independent tower companies will require amendments to the existing licensing framework. Regulatory measures to promote passive mobile sharing include:

- **Optional sharing**: In many cases operators will voluntarily opt to share infrastructure in order to reduce costs. This is a less interventionist approach than mandatory sharing (discussed below). Self-regulatory bodies such as operator associations may encourage sharing through the establishment of uniform conditions for site sharing, as well as communicating with government authorities. The government must provide guidance on the types of sharing allowed, and may encourage sharing by allowing access to state-owned facilities, as well as providing financial incentives for sharing such as tax concessions.
- **Mandatory sharing**: Operators are required to share sites or facilities on request. This should be implemented with clear policy objectives in mind, for example certain geographic or population coverage targets or addressing competition issues. The authority needs to develop criteria for determining those facilities subject to sharing, the setting of tariffs and other conditions, access to

22 ITU, *All about infrastructure sharing*, 2018. Available at www.itu.int/en/ITU-D/Regulatory-Market/Documents/Infrastructure_portal/All_About_InfrastructureSharing_2018.pdf

23 www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR08/discussion_papers/Camila_session4.pdf

technical site information and conditions for the negotiation of sharing agreements between operators (e.g. time limits).

- **Dispute resolution mechanisms**: The government may provide independent dispute resolution bodies to arbitrate on issues relating to access negotiations or agreements. The body must be independent of any interested parties.
- Continued:
- **Licensing conditions and local authorities**: In most countries the installation of masts and towers is dealt with by local authorities, which require permits for the construction of various mobile infrastructure. It may be possible for central authorities to develop rules or guidelines to be followed by local authorities to ensure the efficient rollout of infrastructure and to minimise disputes between operators/tower providers and local authorities.

Site sharing agreements between operators may be unilateral, bilateral or multilateral. They may be concern an individual site or provide a framework for multiple sites or all sites in a geographic region. Site sharing agreements do not generally restrict competition as operators retain independent control of their respective networks and services. However, governments should ensure such agreements do not include exclusivity clauses, and leases should allow other operators to place equipment on the site without requiring further consent from the real estate owner.

The ITU also highlights ways in which governments can address legal issues relating to tower ownership, and particularly the need to avoid ownership by accession by owners of land containing tower structures. In certain jurisdictions, particularly those with a civil law system, towers and masts may be deemed to be owned by the land or building owner, meaning operators/tower providers must take often costly precautions (i.e. obtaining a right of superficies) to avoid losing title to their infrastructure. Governments may avoid such legal uncertainty by providing laws or regulations that prevent accession of telecommunications infrastructure.

Beyond tower sharing, there is also considerable economic value in sharing in-building risers and similar. f markets endorse a common standard for FTTH deployment (including engineering design, implementation and acceptance standards) for new community and residential buildings (ie greenfields) and mandating all new built and refurbished residential buildings should be equipped FTTH facilities especially in urban cities will greatly extend the available widespread of high speed digital infrastructure.

## 6.3 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 keep to a minimum.

Infrastructure approval guidelines would provide a common reference point for all stakeholders involved in the infrastructure approval process. Such guidelines 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.

Guidelines should take into consideration the different land law systems in each jurisdiction (see **Appendix A** for an overview of land law systems present in the Asia Pacific region). The guidelines should set out a generic set of practices and procedures that need to be observed in the application approval process. They typically 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.

Some examples of regulatory guidelines that concern processes for deploying and sharing telecommunications infrastructure are those from India and Japan. These are outlined in the following Exhibit.

The adoption of guidelines would create a common understanding of the approval process and would promote non-discriminatory practices. The guidelines would also provide the basis on which the regulator could plan meetings with stakeholders involved in the approval process with a view to ensuring a better understanding of the objectives, practices and requirements of infrastructure approvals.

## 6.4 One Stop Centre Approval Process

It is further proposed that the infrastructure approval guidelines would 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 29 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 the regulator on behalf of applicants.

**Exhibit 29: 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.[24] 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.[25] 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.

## 6.5 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.

24 www.gsma.com/publicpolicy/wp-content/uploads/2012/07/BSL-Report-2013-Update_121813.pdf

25 www.eett.gr/opencms/export/sites/default/EETT_EN/Publications/Newsletter/2012/32.pdf

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 databases are a requirement for creating a 'dial before you dig' organisation. These 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. An example of 'dial before you dig' advertising is shown in Exhibit 30.

Another important benefit of infrastructure databases is that they enable coordinated collaborative construction and development of infrastructure assets. For example, national backbone fibre can be laid down in association with the construction of rural roads resulting in significantly lower costs than if these were undertaken independently at different times.

**Exhibit 30: Example of dial before you dig advertising from Australia**


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

There would also be considerable value in Asia-Pacific countries to mandate that all municipal and utility infrastructure as well as public property should be opened to all operators for the deployment of digital infrastructure. Future civil work should design and deploy telecommunication ducts and open to all operators. Cross-ministerial communication to ensure the maximum of cross-sector infrastructure sharing should be supported. The lease price of public infrastructure could be regulated to minimize broadband deployment cost.

## 6.6 Infrastructure for 5G

When developing a strategy, it is important to consider the implementation of the 5G wireless system. 5G wireless systems are the next upgrade of wireless technology, offering higher speeds, greater capacity and better reliability.

To deploy this technology at the relatively high frequencies that will be used in urban areas, infrastructure called small cells, must be used. Small cells, which generate less power, collect and transmit the signals in a short range from one another and require collocating the cells on other infrastructure. This means that they will be many more installations per unit area than were necessary for 4G rollout. To make it economically feasible for wireless companies to deploy 5G small cell wireless facility deployment will require streamlined approval and permit processes for rights of way and relatively low application fees.

Exhibit 31 sets out customised suggestions for Asia-Pacific in relation to 5G deployment challenges while Exhibit 32 details the challenges of 5G deployment in Australia with the number of tower sites increasing by almost 4 times.

## Exhibit 31: 5G Deployment challenges

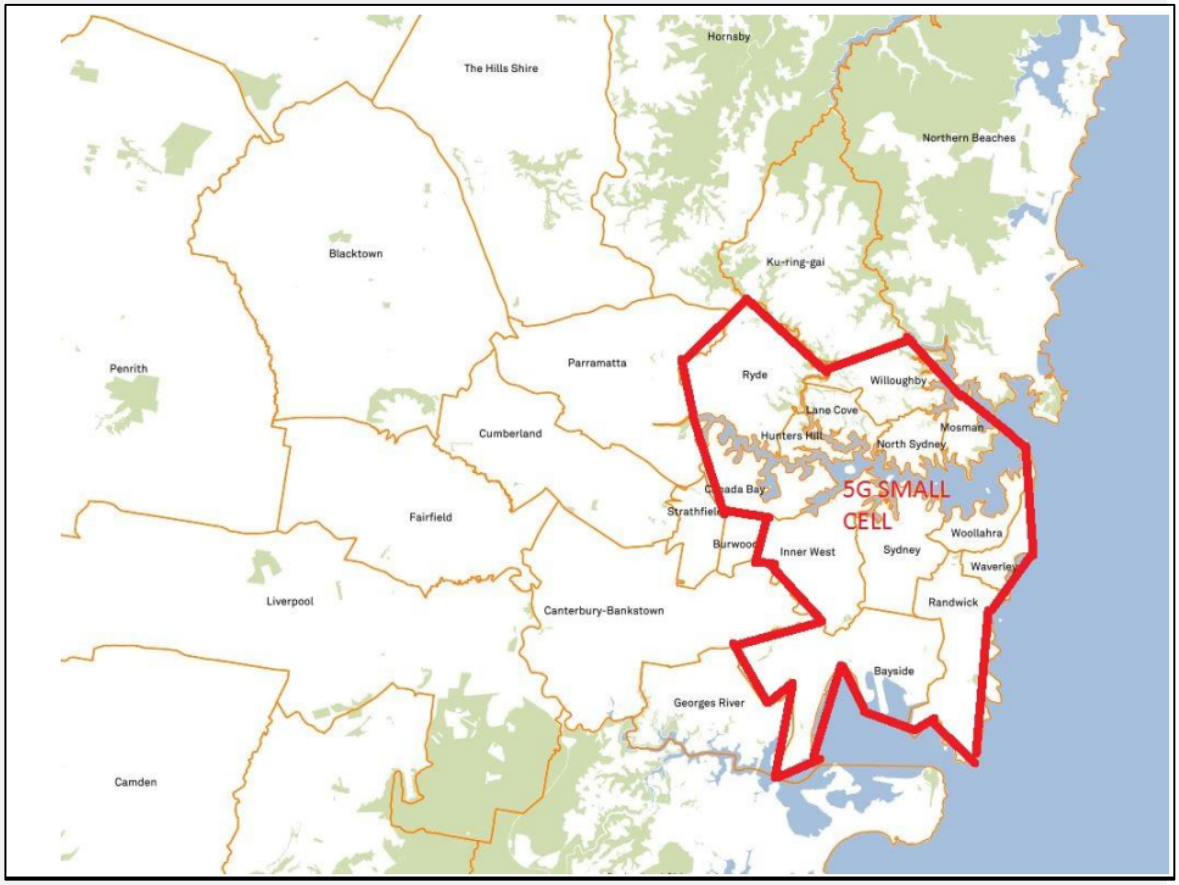
| Summary | Customised suggestions for Asia-Pacific |
|---|---|
| **Investment case** | Policymakers may consider undertaking their own independent economic case assessment of the commercial viability of deploying 5G networks while in the interim facilitating 4G network deployment and where appropriate 2G/3G switchoff |
| **Harmonize spectrum** | Regulators should allocate/assign globally harmonized 5G spectrum including 3.5 GHz, mmWave, 2.6 TDD GHz, 2.3 GHz, 700 and 600 MHz |
| **Spectrum roadmap** | Regulators should adopt a spectrum roadmap and a predictable roadmap renewal process |
| **Spectrum sharing** | Regulators may consider allowing sharing to maximize efficient use of available sharing spectrum, particularly to benefit rural areas |
| **Spectrum pricing** | Regulators may consider selecting spectrum award procedures that favour investment (As opposed to auction returns) |
| **Sub-1 GHz spectrum** | Policymakers should consider supporting the use of affordable wireless coverage (eg through the 700 & 600 MHz bands) to reduce the digital divide |
| **Fibre investment incentives** | Policymakers, where the market has failed, may consider stimulating fibre investment and passive assets through PPPs, investment funds and the offering of grant funding, etc. |
| **Fibre tax** | Policymakers may consider removing any tax burdens associated with deploying fibre networks to reduce the associated costs |
| **Copper to fibre** | Policymakers may consider adopting policies/financial incentives to encourage migration from copper to fibre & stimulate deployment of fibre |
| **Wireless backhaul** | Wireless Operators may consider a portfolio of wireless technologies for 5G backhaul backhaul in addition to fibre, including point-to-multipoint (PMP), microwave and mmWave radio relays, satellites etc |
| **Access/sharing of passive infrastructure** | Policymakers may consider allowing access to government-owned infrastructure such as utility poles, traffic lights and lampposts to give wireless operators the appropriate rights to deploy electronic small cell apparatus to street furniture. And Regulators may consider continuing to elaborate existing duct access regimes to encompass 5G networks allowing affordable fibre deployments |
| **Access costs** | Policymakers/Regulators may consider ensuring reasonable fees are charged to operators to deploy small-cell radio equipment |
| **Asset database** | Policymakers may consider holding a central database identifying key contacts, showing assets such as utility ducts, fibre networks, CCTV posts, lampposts, etc. This will help operators cost and plan their infrastructure deployment more accurately |
| **Wayleaves (ROW)** | Policymakers may agree upon standardized wayleave agreements to (rights of way) reduce cost and time to deploy fibre & wireless |
| **5G test beds** | Policymakers to encourage 5G pilots and test beds to test 5G technologies, & use cases, and to stimulate market engagement |

**Source: ITU, Setting the Scene for 5G: Opportunities & Challenges, 2018**

## Exhibit 32: Australia 5G deployment case study

The transition to 5G networks in New South Wales (NSW) requires a fundamental change in radio access network design and a significant growth in the number of sites, as demonstrated in Figure 1 below. This example covers the local government areas (LGAs) around Sydney – Sydney, Woollahra, Waverley, Randwick, Bayside, Inner West, Canada Bay, Ryde, Hunters Hill, Lane Cove, Willoughby, North Sydney and Mosman. These LGAs have a combined landmass of 295 square kilometres.

**Map of proposed LGA in Sydney**




**Source: Optus**

Legacy and current radio design (3G and 4G) provide services primarily through a layer of macro and micro towers on buildings. These sites, primarily utilising low and mid band spectrum, provide mobile wireless services. Under this model of radio design, the landmass of the LGAs are covered by around 400 sites. In contrast, a 5G radio design is based primarily on small cells that can be placed onto existing fixtures such as light posts, street signs, and utility poles. The features of 5G such as low latency and very high throughput require a dense radio network, utilising low to high bandwidth spectrum.

Australia is currently deploying 5G networks in the 3.5 GHz band, with 26-28 GHz spectrum planned to be made available soon. 5G will require many more sites than current networks. For example, Ericsson has shown that to offer 1 Gbps speeds, cells would have a coverage area of around 200 to 300 metres. This analysis implies that to provide 5G services to the limited number of dense metro LGAs listed above, a mobile operator would need to deploy up to 1,500 small cells to cover an area of less than 300 square kilometres. This is a fundamental re-design of current radio networks, which provides services in these LGAs with around 400 sites.

In light of the above, Optus argues in its recent submission to the NSW's Independent Pricing and Regulatory Tribunal (IPART) that costs in relation to rental arrangements for mobile towers should be kept at a reasonable rate. Under the proposed rates included in the IPART Issues Paper (and assuming that the rates apply to all sites), annual rental charges for the small number of LGAs would increase from AUD15.2 to AUD57 million. Optus cautions that such an increase in the cost to deploy sites is prohibitive and likely to delay or prevent the deployment of 5G in the Australian State of NSW.

In more general terms, Singtel Optus is calling for significant changes to the regulatory regime to facilitate 5G network deployment.

Some countries notably the United States have been addressing 5G deployment issues with the passage of the Streamline Small Cell Deployment Act (see Exhibit 33).

### Exhibit 33: USA's STREAMLINE Small Cell Deployment Act

**Accelerating 5G Development in the USA**

The US aims to lead the world in 5G deployments. In order to achieve this legislation in respect of small cell infrastructure has been enacted in many states and draft legislation has been considered at the national level. Each local government and state government regulates wireless deployments differently and therefore wireless carriers are facing barriers. In the US, small cell wireless facility deployment requires streamlined federal, state and local permitting. To make it economically feasible for wireless companies to deploy the technology across communities, consistent rights-of-way processes, application timelines and other siting and application fees, application review timelines and appeals processes are required.

**State Legislation**

Twenty-three states across the country have enacted bills that would create a uniform permitting and regulatory framework to support 5G network deployments. These laws all take into consideration the unique circumstances of their state and local environment, but baseline principles can be established and are consistent with wireless industry standards, including streamlined applications to access public rights-of-way, caps on costs and fees and streamlined timelines for the consideration and processing of cell siting applications.

**Proposed Federal Action – STREAMLINE Small Cell Deployment Act**

In June 2019, to help bolster the roll-out of 5G networks across the U.S., and ensure the U.S. leads the world in 5G deployments, the STREAMLINE Small Cell Deployment Act ('Act') was introduced into the Senate. This Act was commended by the Federal Communications Commission ('FCC') as it "demonstrates bipartisan support for fee limits, timelines, and other reforms that are key to accelerating the build out of 5G infrastructure".

*"If passed, their work to modernize our country's approach to small cells would notch another solid win for the U.S. in the race to 5G." – FCC Commissioner Brendan Carr26*

The legislation updates the Communications Act to better reflect developing technology and facilitate the rapid deployment of 5G networks to meet consumer demand by setting reasonable standards for public review of infrastructure siting while recognizing the unique challenges for small municipalities.

**Key provisions of the STREAMLINE Small Cell Deployment Act**

Reasonable process and timeframe guidelines specific to small cell applications for state and local consideration:

- Permits must be approved or denied on publicly available criteria that are reasonable, objective, and non-discriminatory.
- Small cell applications may be denied or regulated for objective and reasonable structural engineering standards, safety requirements or aesthetic or concealment requirements.
- Applications must be acted on no later than 60 days for requests to collocate equipment and 90 days for other requests.
- Flexibility and additional time is allowed for small municipalities (fewer than 50,000 residents).
- Empowers the Federal Communications Commission (FCC) to grant flexibility by issuing a one-time 30-day waiver of the timeframes required for action upon a request by a state or local government.

**Requirements for reasonable state and local fees for processing applications:**

- Fees must be publicly disclosed, competitively neutral, technology neutral, non-discriminatory and based on actual and direct costs (including, for example, costs for maintenance and inspections).[27]

26 www.fcc.gov/document/commissioner-carr-statement-senate-streamline-act

27 www.thune.senate.gov/public/index.cfm/press-releases?ContentRecord_id=7C537587-0FA3-4CDD-B62A-F39A560D2F78

## 6.7 Infrastructure Approval

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 keep to a minimum.

Infrastructure approval guidelines would provide a common reference point for all stakeholders involved in the infrastructure approval process. Such guidelines 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.

Appendix B: *Draft Facilitating Telecommunications Rights of Way Regulations* contains draft guidelines that may be implemented in order to regulate the establishment of underground and over ground telecommunications infrastructure in a particular jurisdiction. The guidelines aim to create a common understanding of the requirements and the overall process for obtaining approval from the relevant authority prior to the installation and deployment of such telecommunication infrastructure. The table in Appendix A should be referred to in order to modify the guidelines where appropriate, according to the different land law systems in the Asia Pacific region.

The guidelines provide for the following provisions in order to set out a generic set of practices and procedures that must be observed in the application approval process:

- The procedures for obtaining permission from the relevant authority to establish telecommunications infrastructure;
- The necessary supporting information concerning each application;
- The timelines that must be observed for considering each application;
- The obligations of licensees in undertaking work;
- The powers of the relevant authority to supervise the work; and
- The right of the relevant authority to seek removal of the telecommunications infrastructure.

The guidelines also take into account the following considerations:

- The possibility of waiving the requirement to obtain permission from the relevant authority for the establishment of low-impact facilities;
- Additional requirements imposed by local laws that apply in each jurisdiction; and
- Dispute resolution procedures for disputes arising out of the guidelines, consistent with the relevant National Telecommunications Law.

In creating provisions for the above, the guidelines aim to be a comprehensive reference point that licensees and other stakeholders can refer to when contemplating the infrastructure approval process in a specific jurisdiction. They are consistent with global practices on infrastructure approval guidelines as shown in Exhibit 34. Like the examples from India and Japan, the guidelines promote non-discriminatory practices, and provide for a simplified, transparent process for deploying telecommunications infrastructure.

### Exhibit 34: 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 incentives 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. 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.

### Exhibit 35: Infrastructure Guidelines India and Japan

**India: Indian Telegraph Right of Way Rules 2016**

India's Department of Telecommunications introduced the Indian Telegraph Right of Way Rules 2016 that regulate the establishment of underground (optical fibre) and overground (mobile tower) infrastructure in the country. These rules provide a framework for licensees to make an application to the appropriate authority for permission to install the two types of structures. The application needs to contain certain information and supporting documentation. The authority must examine the application with reference to the parameters identified in the rules.

An authority is required to approve or reject an application within 60 days. A rejection from the authority must be accompanied by the reasons for such rejection, as well as provide an opportunity for the licensee to be heard. Failure to respond to the application within the timeframe provided means that permission will be deemed as granted. The authority may supervise the construction work to ascertain if the conditions attached to the permission are observed, as well as impose additional reasonable conditions. The licensee also has certain obligations with respect to undertaking work as described in Rules 7 and 11. A dispute between the licensee and the authority will be determined within 60 days by an officer designated by the Central Government.

The new rules have been well-received by the telecommunications industry. Mr Balaji, Chairman of the National Council on Telecommunication and Convergence, has commented that the Right of Way Rules '…will help the telecom sector to lay fibre and install towers in all parts of the country with ease, thereby quickly rolling out mobile broadband for all...' The Associated Chambers of Commerce and Industry of India also considers the rules as a major step in Ease of Doing Business in India's Telecommunications Sector.

**Japan: Guidelines for Use of Poles, Ducts, Conduits and Similar Facilities Owned by Public Utilities**

The Ministry of Internal Affairs and Communications in Japan established the Guidelines for Use of Poles, Ducts, Conduits and Similar Facilities Owned by Public Utilities to provide a managerial standard for the authorization and arbitration of negotiations on rights-of-way. The Guidelines came into force in April 2001 and provide standard procedures to be followed by approved telecommunications carriers and facilities holders. These procedures facilitate the installation of lines and promote the deployment of fibre-optic networks that are essential for building ultra-high-speed Internet. Under the Guidelines, a facilities holder must respond as promptly as possible to a carrier's application for a survey of facilities. An application for the use of facilities shall be approved unless the listed circumstances in Article 3 exist. A facilities holder must notify the carrier in writing or by email of reasons why the application was rejected. If an application is approved, the leasing period is generally five years. The original cost of facilities usage charges is calculated by adding a total of outside capital costs, equity capital costs, and tax on profit to the depreciation expenses and maintenance and operating costs.

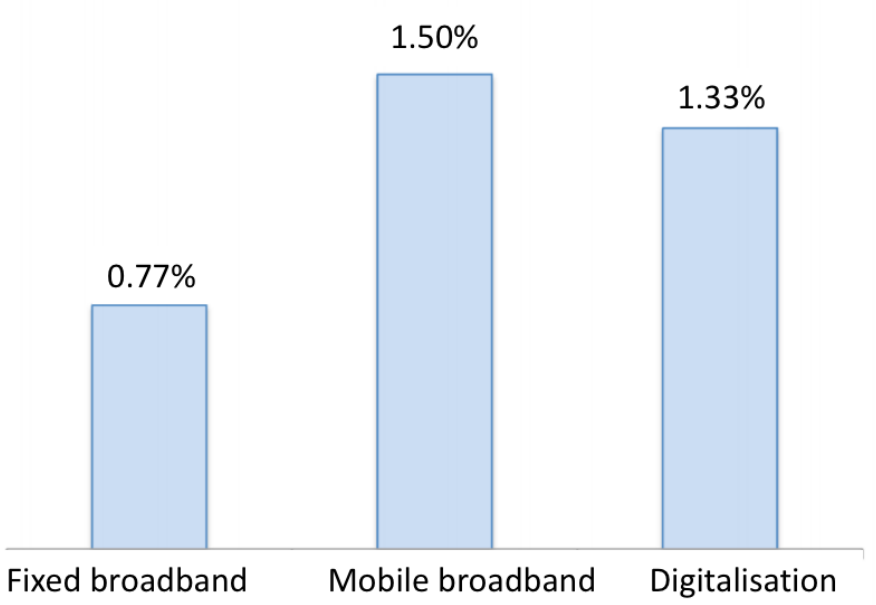
If a facilities holder receives or expects to receive routine and repeated applications from a carrier for the use of service lines using optical fibre, it should endeavour to simplify and streamline the procedure for receiving these facilities. The facilities holder or those it designates must also provide the design and execution of work on installing or maintaining a carrier's telecommunications line facilities to ensure security and prevention of accidents. Carriers also have specific obligations when using the facilities, as detailed in Article 10.

# 7 Digital challenges to regulators

## 7.1 Existing and future digital challenges for governments in Asia-Pacific

The current and future challenges for Asia-Pacific Governments and their respective regulators are myriad. The high and growing importance to of ICT, broadband and related technologies results in sector policy being critical to national economic performance and competitiveness. An ITU study entitled *The economic contribution of broadband, digitization and ICT regulation*,[28] released in late 2018, provides additional evidence of the contribution of broadband and digital transformation to the economy and the impact of institutional and regulatory variables to the development of the digital ecosystem. The economic benefits accruing to emerging markets in Asia-Pacific of increases in mobile broadband penetration and overall improvements in a range of sector measures (ie digitalisation[29]) are even greater (see Exhibit 36).

**Exhibit 36: ITU Comparison of the economic impacts of broadband and digitalisation due to a 10 percent increase in penetration etc**




**Source: ITU, 2018**

National broadband policy including the various policy approaches taken to broadband coverage, bandwidth and affordability are therefore central to Government policy in Asia-Pacific and indeed globally. If Governments do not have the necessary monies to subsidise rural and regional network deployment then there is a need to encourage and facilitate private investment on network expansion and reduce construction cost to enhance broadband affordability. This is especially a challenge in rural and other non-economic areas. Innovative thinking including how can innovative public -private partnerships, financing mechanisms and use of technologies and non-traditional market players (e.g. community networks) can help to close the digital access gap.

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28 See www.itu.int/en/ITU-D/Regulatory-Market/Documents/FINAL_1d_18-00513_Broadband-and-Digital-Transformation-E.pdf

29 The digital ecosystem development index was based on 64 indicators, for 75 developed and developing countries and emerging economies and includes inter alia institutional and regulatory pillars, connectivity, infrastructure, competition, digital human capital and digital industries. See ITU study, page 19.

In addition to policy prescriptions, in Asia-Pacific, depending on the market, there is a need for regulatory reform and amendments to sector legislation (ie amendments to the applicable Telecommunications Law). Such amendments include, but are not limited to:

- The establishment and maintenance of independent regulatory bodies consistent with WTO trade commitments but also to ensure that sector regulation is done on a fair, non-discriminatory basis especially if the Government is a shareholder in sector licensees;
- Inclusion of open access, improved facilitating telecommunications rights of way regulation, infrastructure sharing, FTTH pre-deployment and QoS/QoE as all discussed earlier in this paper; and
- Updating of outdated Telecommunication Law and legacy subsidiary regulation including regulatory measures focusing on inter alia PSTN, ISDN, copper cables, narrowband services etc.

In order for Governments, Ministries and sector regulators to develop and apply best practice regulation requires strong regulatory skillsets and capabilities to regulate the sector and promote the digital economy. Such skillsets and capabilities include economics, financial analysis, content regulation, cybersecurity, law, competition analysis, taxation and cross-government experience. Given the pace of change in the industry there is a need for timeliness in regulator decision making. This is best done by having key elements in regulations and decrees rather than legislation which is much harder to adjust and change. Regulators need excellent presentation and narrative skills to quickly and succinctly explain technical and spectrum management issues to other Government Ministries and the relevant Minister/s. In many cases part of Government need capability building to respond the digital transformation.

Regulatory staff and teams also need to have processes of keeping current in relation to emerging technologies and international industrial standards; create exchanging opinions and ideas on new regulatory issues. ICT data and statistics collection should be more up to date and extensive including for example, including using crowd sourcing and other techniques which are available. Generally better quality information and knowledge will result in improved policy making, regulatory decision making and increases in efficiency, etc.

Strong collaborative regulation is also important as telecommunications sector regulators do not control all of the regulatory tools and/or have a legislative mandate to regulate certain aspects . Addressing need for cross- sectoral collaboration and how and what enabling environment and collaborative regulatory measures the regulator can create to facilitate achieving SDGs was a topic of discussion at the recent ITU GSR-19. Exhibit 37 (over) details the core of collaborative regulation best practice.

**Exhibit 37: The core of collaborative regulation best practice**

| Tool | Key Description |
|---|---|
| **Space for digital experimentation:** | From temporary licences to new technologies' pilots to regulatory sandboxes, a range of tools and techniques can be used to create a dynamic regulatory environment in which digital market failures and opportunities have space and flexibility to address present and future challenges. Such methodologies can also be employed to design strategies to enhance digital applications and skills. |
| **A pro-competition frameworks for the digital transformation** | Such frameworks should consider longer value chains, more diverse market players, services and devices, stakeholder partnerships and digital infrastructure layers, and ultimately, their impact on markets and consumers and Internet neutrality. Nonetheless, excessive and unwieldy regulation must be avoided. |
| **Regulatory incentives** | These can create a positive market dynamic and improve market outcomes with less regulatory effort. |
| **Stakeholder engagement vehicles,** | such as public hearings, high-level roundtables and expert workshops, hackathons, can allow pooling resources and expertise to inform major regulatory decisions. |
| **Robust and enforceable mechanisms for consumer protection** | Such mechanisms ought to include a set of rules on data protection, privacy and data portability as well as accessible mechanisms for consumer redress are essential to support the digital transformation in economic sectors across the board and ensure consumers' interests are safeguarded. |
| **Market-based and dynamic mechanisms for spectrum management** | Such mechanisms can allow for flexible, simplified and transparent use of scarce radio frequencies, also promoting technology neutrality. - |
| **Regulatory Impact Assessment (RIA)** | Enhanced with new benchmarks and data analysis, RIA allow for better decision making and should be introduced as a regular practice before major regulatory decisions are made as well as throughout the lifecycle of regulation |
| **Agile data-driven monitoring solutions** | Solutions based on standards for the interoperability of data systems and tools among regulators and market players, can facilitate market oversight in areas such as quality of service and experience, and regulatory compliance. |
| **Diversified mechanisms for consumer engagement and feedback** | Diversified Mechanisms multiply the regulatory inputs and allow for fine-tuning regulatory policies and their implementation. |
| **Effective channels for dynamic collaboration among regulatory authorities** | Effective collaborative channels such as with the ICT, financial and competition authorities as well law enforcement agencies and the judiciary, are necessary to ensure coherent and reasonable regulations across economic sectors. Regulatory sandboxes involving multiple regulators can incubate key cross-sector regulations, such as for digital financial inclusion. |
| **Regional and international cooperation** | Defining regulatory rules on cross-border issues can ensure consistency, predictability and fluidity of digital markets and will catalyse the deployment of region-wide and global digital infrastructure, from fire backbones to submarine cables to mobile networks and satellite connectivity. |
| **Regulatory expertise** | This needs to be developed continuously to integrate new technologies, competencies and skills and allow for data and evidence-based decision-making. |

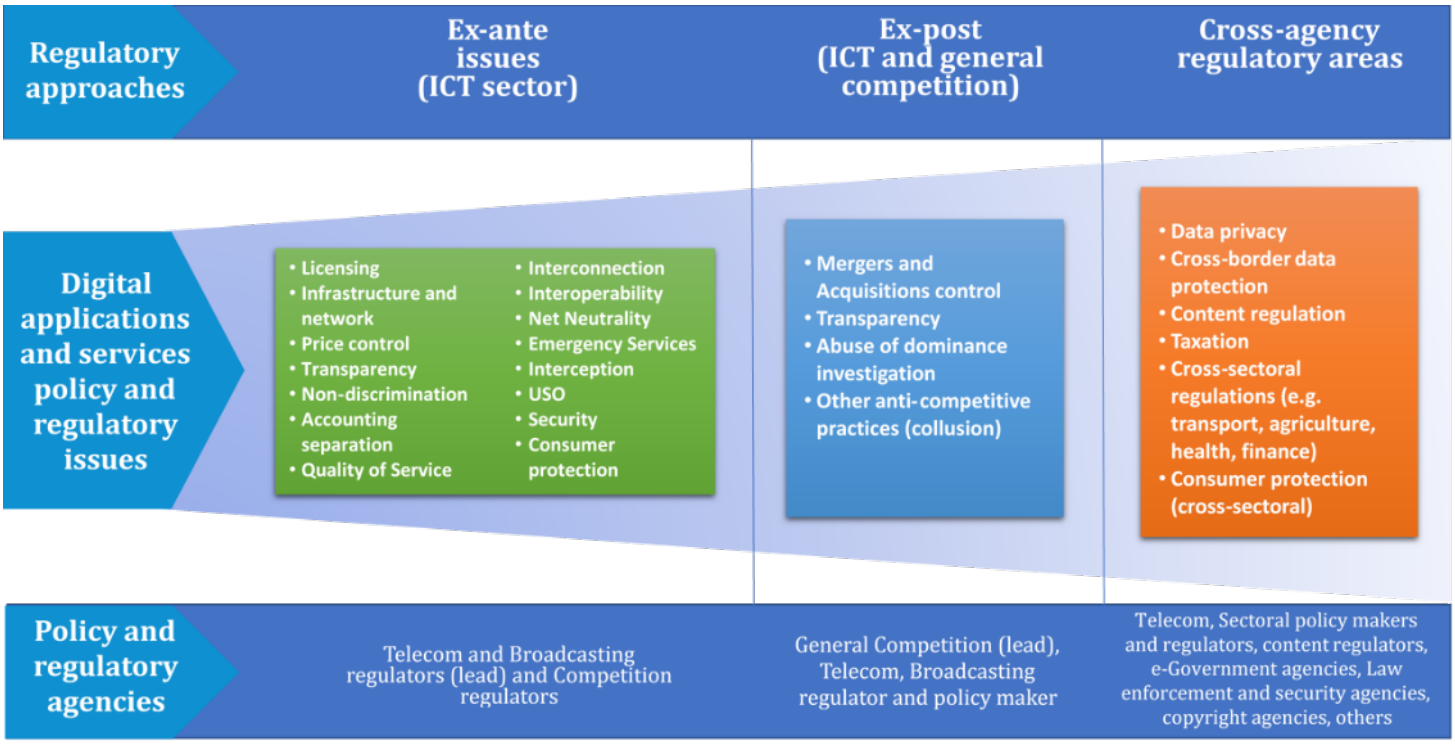
**Source: ITU, Global Symposium for Regulators, GSR-19, Fast Forward Digital Connectivity for all, July 2019, page 3**

## 7.2 Regulatory changes in relation to the regulation of online services

Beyond the scope of this paper which focuses on digital infrastructure, there is a global trend of heightened levels of regulatory and enforcement activity in relation to digital platforms (otherwise known as over the top (OTT) service providers) which need to be well understood by Governments and industry regulators (see Exhibit 38 over). Examples include:

- The recent UK Competition Markets Authority's "*Online Platforms and Digital Advertising Market Study"* announced on 3 July 2019;[30]
- The US Department of Justice's review into Big Tech's market power opened on 24 July 2019;[31]
- The European Commission's recent announcement that it will work closely with the US Federal Trade Commission on investigations of abuse of dominance by certain digital platforms; and
- In June 2019, the Australian Competition and Consumer Commission (ACCC) published its report of the "*Digital Platforms Inquiry*" which highlights the need for reform in regulating digital platforms, which includes OTTs.

**Exhibit 38: Regulatory and legislative responses to digital applications and services**




**Source: ITU, 2018**

In particular, the comprehensive ACCC report recommended increased regulation of digital platforms with significant online dominance such as Google and Facebook. The 23 recommendations in the Inquiry have an overall aim of ensuring that the process of competition and interactions with consumers and businesses are fair, transparent and accountable. Ultimately, government regulation of digital platforms needs to strike balance between 2 important considerations namely (1) encouraging innovation and promoting free services

30 Refer to www.gov.uk/cma-cases/online-platforms-and-digital-advertising-market-study

31 Refer to www.nytimes.com/2019/07/23/technology/justice-department-tech-antitrust.html

accessible to citizens; and the potential detriments and responsibilities that can arise from digital platforms obtaining increased economic or social power and continuing largely self-regulated.

At the G20 meeting in Japan held in June 2019, the G20 leaders published a *"Statement on Preventing Exploitation of the Internet for Terrorist and Violent Extremism Conductive to Terrorism (VECT)"*[32] which compels social networks to step up the ambition and pace of their efforts to prevent abhorrent content from being streamed, uploaded, or re-uploaded. The leaders also recognized their own critical responsibility of ensuring the security of their citizens by preventing and combatting terrorism in all its forms.

Prior to this on 16 May 2019, in Paris, 17 countries (including 4 Asia Pacific countries) and 8 tech companies[33] agreed on a text designed to eliminate terrorist and violent extremist content online, in the wake of the terrorist attacks at two Christchurch mosques, an atrocity which was both planned online and livestreamed on Facebook. Among a range of other things it commits the signatories to take transparent, specific measures seeking to prevent the upload of terrorist and violent extremist content and to prevent its dissemination on social media and similar content-sharing services, including its immediate and permanent removal, without prejudice to law enforcement and user appeals requirements, in a manner consistent with human rights and fundamental freedoms.

Reforms are also occurring in relation to the applicable taxation regimes which apply in the sector. In contrast to the obligations imposed on national operators, global online service providers and services are often not subject to the same taxation on revenue and profits. Often having their principal place of business and registered office in the USA or a low-income tax country or haven, online service providers are able to put in place international tax optimization strategies given the variation in regimes applied by different countries in this regard.

The strategies that exploit the difference in treatment of economically equivalent transactions between jurisdictions are known as base erosion and profit shifting ('BEPS'). As at March 2019, 129 countries were members of BEPS including many Asia-Pacific countries.[34] The OECD estimates that between 4-10 percent of global revenue from corporate income tax is lost through BEPS by multinational enterprises, including a majority of online service providers. The overall effect of this type of tax planning is to erode the corporate tax base of many countries in a manner that is not intended by domestic policy. This sort of activity also undermines the fairness and integrity of. tax systems, alongside voluntary compliance by all tax payers. It is not fair that many domestic market players in Asia Pacific do not face a level playing field.

In addition, in the European Union, and range of individual countries including Australia, the United Kingdom and France are reforming the taxes paid in relation to digital services. For example, the legislation providing for a digital services tax in France was passed on 11 July 2019 by the Senate of the French Parliament. French President Emmanuel Macron signed the tax into law on 24 July 2019, and it was published in the official gazette on 25 July 2019. The law imposes a 3 percent tax on companies with digital revenue of at least €750 million worldwide and €25 million in France.

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32 Refer to www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t1677403.shtml

33 **Country Signatories:** *Australia*, *Canada*, *European Commission*, *France*, *Germany*, *Indonesia, India*, *Ireland*, *Italy*, *Japan*, *Jordan*, *The Netherlands*, *New Zealand*, *Norway*, *Senegal*, *Spain*, *Sweden*, and *United Kingdom*. **Company Signatories:** *Amazon*, *Daily Motion*, *Facebook*, *Google*, *Microsoft*, *Qwant*, Twitter and YouTube.

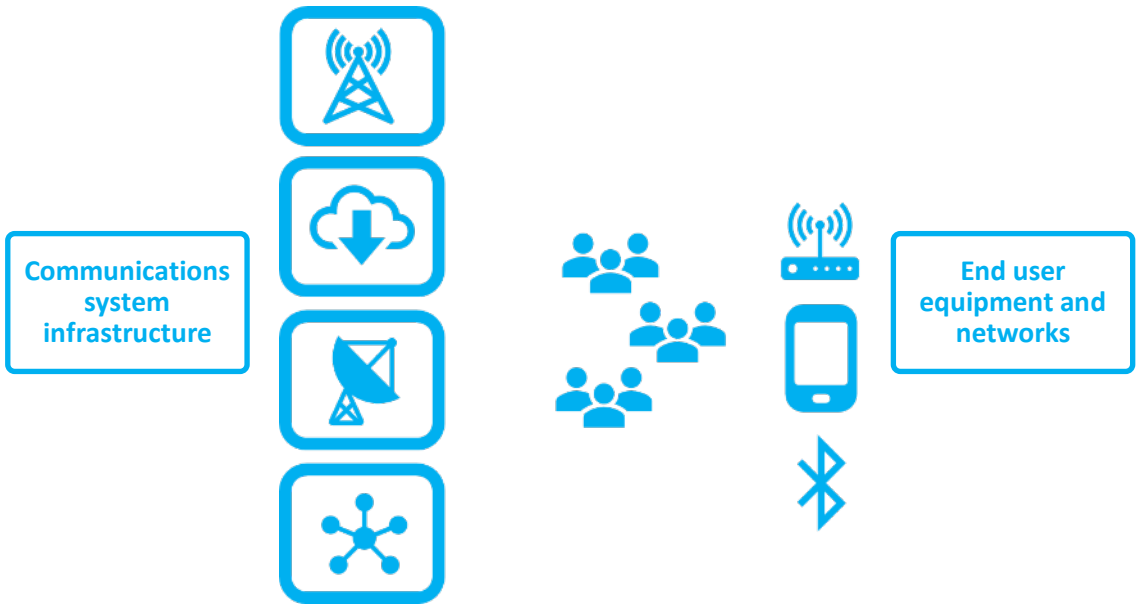
34 Refer to www.oecd.org/tax/beps/

# 8 Conclusions and Recommended regulatory policies and measures in order to ensure optimal national outcomes

Digital infrastructure is the key to enabling the benefits of the digital economy and society. Digital infrastructure is the physical hardware and associated software that enables end-to-end information and communications system to operate. Digital infrastructure includes:

- Internet backbone including national and trans-oceanic fibre cables;
- Fixed broadband infrastructure such as analogue coaxial and optic fibre cable networks;
- Mobile communications infrastructure and networks including FWA, transmission towers, radio and optic fiber backhaul networks;
- Broadband communications satellites;
- Data and cloud computing facilities;
- End user equipment such as mobile handsets, PCs, modems and local Wi-Fi and Bluetooth networks;
- software platforms including computer and mobile device operating systems as well as application programming interfaces; and
- network edge devices such as sensors, robots, autonomous and semiautonomous vehicles, and other Internet of things facilitating devices and software.

**Exhibit 39 Digital infrastructure**



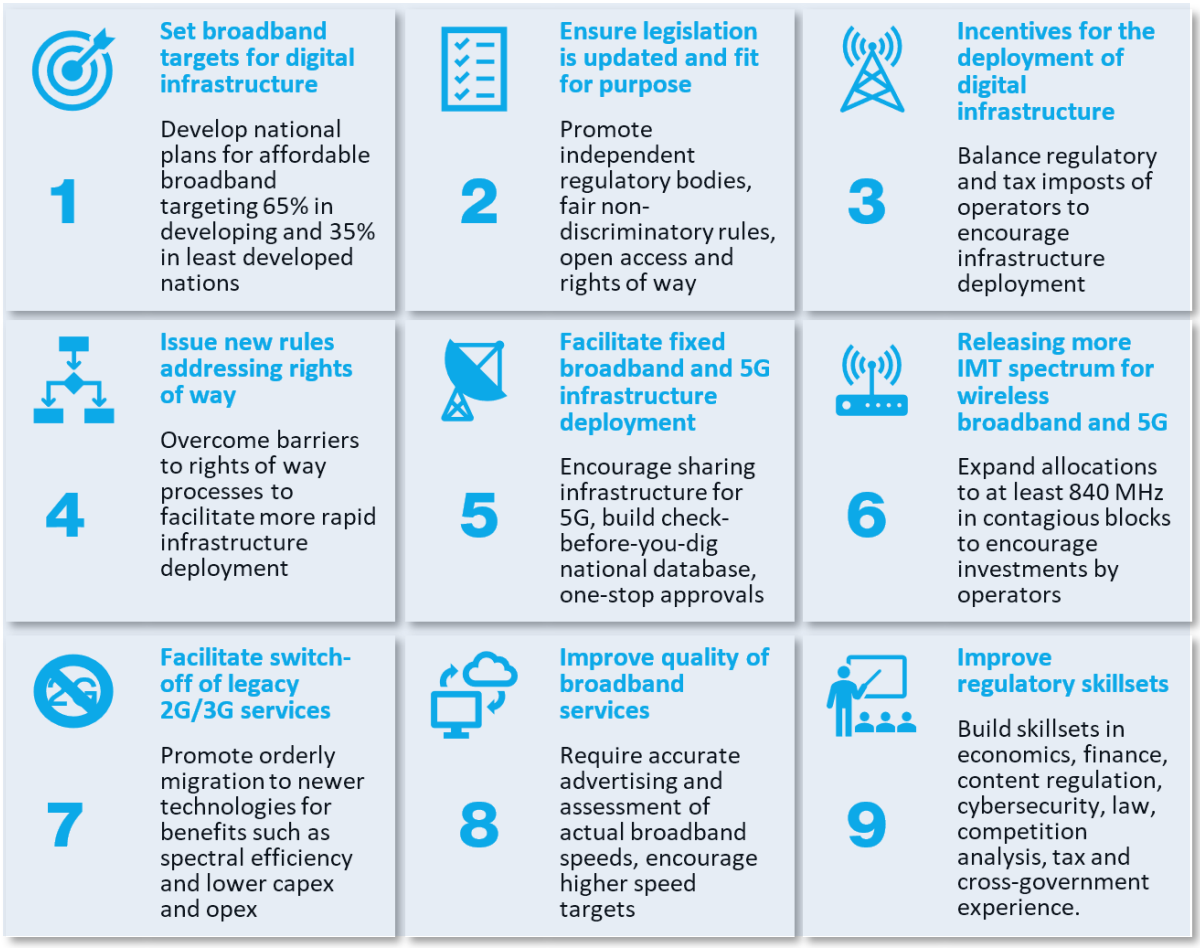

**Source: Windsor Place Consulting, 2019**

It is obvious that the quality, quantity and extent of digital infrastructure plays a decisive role in any nation's capacity to realise the benefits of the digital economy and society. Improving on digital infrastructure in order to secure the maximum benefits of the digital economy and society is the central focus of this ITU Discussion Paper on Digital Infrastructure Policy and Regulation in Asia-Pacific Region.

The key recommended regulatory policies and measures needed to ensure optimal national outcomes are summarised in Exhibit 40 below (and detailed in section 1 of this report). They include specific recommendations on *inter alia* :

- The key challenges and bottlenecks to the deployment of digital infrastructure identified in this Paper;
- Driving national competitiveness and productivity in emerging Asia-Pacific markets;
- The need for flexible sector legislation and regulation to respond to quick moving industry and technology. In addition, there is a need for agile regulation which facilitates partnering with the industry playing a collaborative / facilitator role.

**Exhibit 40: Nine key recommendations supported in this Discussion Paper**




The final comment is that open competition is the best mechanism to ensure affordability and quality of broadband services. Regulatory measures should be carefully enforced to ensure sufficient and fair competition to avoid market monopoly and oligopoly, in the same time also protect private sector investment on the digital infrastructure. Regulation on network wholesale prices may be required but heavy-handed regulatory control on retail prices, especially price floor regulation is typically unnecessary and may be counter-productive.

# 9 Appendix A: Asia-Pacific Land Laws

| Country | Land Law System | Comments |
|---|---|---|
| **Afghanistan** | Customary law/ Deed registration | As of 2015, only an estimated 10% of rural property and 30% of urban property owners have official deeds given by a court or the government. Many people use an informal system that relies on customary law.<br><br>Acquiring and registering a deed is costly and difficult. Additionally, a title or registration of title is no guarantee of establishing ownership and obtaining land rights. Title deeds may be registered with numerous institutions at several locations, creating significant opportunities for fraud and corruption with multiple titles being registered at different locations for the same or overlapping areas of land |
| **Australia** | Torrens system | |
| **Bangladesh** | Informal settlement/ formal registration | Titling and registration of land ownership is set out in the Transfer of Property Act 1882 and Registration Act of 1908. However, land rights are insecure in large measure because of an inefficient, expensive, and corruption-prone system of land titling and registration.<br><br>The majority of urban residents access land through the informal market where land rights are neither registered nor transferred according to the requirements of the law, or by squatting on public land. |
| **Brunei Darussalam** | Torrens system | |
| **Cambodia** | Hard title/Soft title | The majority of property in Cambodia is legally held under a soft title; 70% of properties in urban areas and 82% in rural areas are still on 'soft title' |
| **China** | Usufruct land rights | All land within urban areas is owned by the state while land within rural areas is owned by collectives for the exclusive purpose of agriculture<br><br>While land itself cannot be owned by private individuals, use of the land can be granted based on usufruct land rights. This essentially involves private entities or individuals being granted the use of land for a given period of time |
| **Fiji** | Torrens system | |
| **India** | Deeds registration system/ cadastral-based records of land rights | India has a dual land recordkeeping system that includes national and state laws governing a deeds registration system and state-level laws establishing cadastral-based records of land rights for revenue purposes. Together, they form a fairly comprehensive, decentralized and functional land recordkeeping system.<br><br>However, the parallel systems are inefficient, as the records maintained by the two systems are sometimes inconsistent. The land records maintained do not constitute land title, only evidence of title. Overall, this dual system often does |

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| | | little to enhance tenure security and, in some cases, actually renders land tenure less secure. The system often presents an inaccurate picture of landholdings on the ground, due to a large number of unrecorded transactions |
| **Indonesia** | Adat land (customary land)/Certified land | Although Article 56 of the BAL recognizes the continuing validity of rights derived from adat, or customary law, the right-holder cannot register the right – and the right is not fully recognized by the state – until he or she purchases a stipulation as required by the National Land Agency, confirming that the land is not state land. Thus, although the right originates in adat law, in existence since well before the creation of the Indonesian state in 1947, BPN officials impose a presumption that all unregistered land is state land until proven otherwise[35] |
| **Iran** | Torrens system | |
| **Japan** | Deeds registration system | Unlike registration systems in some countries, such as the Torrens system, a registered owner is not always the true owner, and accordingly an investigation of rights is necessary before acquisition<br><br>Land and buildings are also treated separately with respect to the tenure/ownership, which means, for example, that a<br><br>parcel of land and a building on such land can be owned by different persons or entities. |
| **Kiribati** | Customary law | Almost all of the land in Kiribati is owned by indigenous people. Foreigners are not allowed to own land in the country. Leasing of land is hard because ownership disputes among the claimants as owners are hard to resolve. |
| **Lao P.D.R** | Usufruct land rights/ Customary law | Land is owned by the 'national community'. Although it is impossible for any individual or entity, Lao or foreign, to 'own' land, individuals and entities can be granted 'land use rights' that are akin to freehold ownership or 'usufructs', a civil law concept granting long-term rights to use land for productive activities<br><br>Rural families and communities may also hold land pursuant to informal or customary rules. Customary land tenure systems, consisting of local informal rules developed over time for the allocation and management of local land, vary by ethnic group. Under such rules, community authorities assign some agricultural land to individuals and manage unassigned land and resources as common community property. |
| **Malaysia** | Torrens system | Regulation of land laws are found in multiple legislative instruments (1) National Land Code 1965; (2) National Land Code (Penang and Malacca Titles) Act 1963; (3) Sarawak Land Code; and (4) Sabah Land Ordinance.<br><br>The legislations are supplemented by various subsidiary legislations made by the States in Malaysia to regulate matters specific to a particular State |

35 https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_Indonesia_Profile_0.pdf

| | | |
|---|---|---|
| **Maldives** | Private ownership ('amilla bin') and state ownership ('bandaara bin') | Private ownership is where individuals or entities have purchased<br><br>land from the state. State ownership is where the state has granted usage rights to individuals or entities for the occupation of the land. Where a bandaara bin is granted to a party, the usage rights over the bandaara bin is unlimited and can even be passed through<br><br>inheritance, as if it was owned outright by the deceased |
| **Marshall Islands** | Customary law | Land rights are based in custom which gives rise to uncertainty about land use rights. Custom principles are often not publicly known to all interested parties because they are not written and recorded. |
| **Mongolia** | Acquiring a fully marketable title requires that a plot first be privatized, and then registered. | Land usually is owned by the government, whereas the title to the land belongs to an individual holding possession right, and the building on top of the land may be owned by another individual. 'Immovable property' is, as its name indicates, property that cannot be moved, an important distinction in a country populated by nomads. Essentially, it refers to buildings and houses.<br><br>The land registration process in Mongolia reportedly requires five steps, an average of 11 days, and costs approximately 2% of the overall value of the property. In practice, however, the process suffers from confusion, inefficiency, and corruption |
| **Myanmar** | Myanmar is the ultimate owner of land but the government or a company may acquire or temporarily occupy land for public purposes | |
| **Nauru** | | The lands are distinguished between the coconut land and the phosphate land. The coconut land is synonymous with residential and house are built under the coconut trees. On the other hand, the phosphate land, located at the topside is not for residential or building purposes.<br><br>Land in Nauru is typically owned by individuals or by groups of landowners. The land is leased for a specific time period either for general, commercial or development purposes. Lease arrangements are common with the landowners and the government or through corporate. Foreigners or non-Nauruans are not entitled to own lands. |
| **Nepal** | Digitization process for land records | Although Nepal has implemented a digitization process for land records, many registrations and transfers are still recorded in paper form. The records are vulnerable to loss, destruction, and distortion and misinformation. An estimated 48% of all landholdings are registered in Nepal, but the records often go back decades and are not considered reliable. An integrated system is not yet in place<br><br>Foreigners cannot own or rent land in Nepal. Foreigners may acquire land in the name of a business entity registered in Nepal; however, they may not acquire land as |

| | | |
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| | | personal property. However, it is widely believed that foreigners own and rent land on the informal market |
| **New Zealand** | Torrens system | |
| **Pakistan** | Informal settlement/ unregistered ownership | Freehold land in Pakistan tends to be retained by families and passed inter-generationally by inheritance. Ownership is rarely registered. Despite formal laws mandating registration, incentives for registering land are weak or nonexistent and procedures complicated and lengthy. Land is typically titled in the name of the head of household or eldest male family member of an extended family |
| **Papua New Guinea** | Torrens system | |
| **Philippines** | Torrens system | |
| **Samoa** | Torrens system/Customary law | The Land Titles Registration Act of Samoa adopts the Torrens registration of title system (passed in 2008)<br><br>The government emphasises that the LTRA 2008 'continues present law allowing the registration of customary land. However, this Act was described as "controversial" and has caused a wide outcry from the Samoan community, fearing that they would lose their customary land |
| **Singapore** | Torrens system | The Land Titles Ordinance of 1956 |
| **Solomon Islands** | Customary law/usufruct rights | Most land in Solomon Islands is still held under customary tenure, where every member of a landholding entity, such as a tribe, clan, or family, is vested with the rights to use and access it. Non-owners usually have limited rights (usufruct rights), such as right of use, easement, or right of way. However, most land within the Honiara town boundary is government land held mainly as public land. Public land can be leased for either residential or commercial purposes |
| **Sri Lanka** | Registration of title system | A title registration system was introduced under the Registration of Title Act No. 21 of 1998 but this has not progressed as intended. This Act was put in place to address the problems with the deeds registration system<br><br>Under this system, certainty of ownership of a land is guaranteed by the government, taking away repeated examinations of the past title. Therefore, title registration is expected to minimize land disputes and forgeries. |
| **Thailand** | Torrens system | |
| **Timor-Leste** | Customary law/lease concessions or special leases for foreigners | The vast majority of property is held customarily and at present there is little indication that most customary rights will face challenge. There are no reliable records regarding the amount of land leased and/or occupied by foreign entities, and the general state of the land administration records is poor<br><br>Only Timor-Leste citizens may own land and there is a question mark as to whether this extends to legal persons (corporations and other legal entities). However, Decree Law 19/2004 on State Property Administration/Leasing of State Property provides for lease concessions and special leases so that national or overseas entities have access to |

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| | | land, and so that State land can be used for commerce and industrial development |
| **Tonga** | Lease over land | Section 104 of the Constitution provides that all land in Tonga is vested in the Crown, and prohibits any person, including the Crown, from selling land. The effect of this provision is that only the Crown has freehold title to land in Tonga<br><br>A leasehold interest may arise in relation to Crown Land, land that forms part of a hereditary estate, or land that forms part of an allotment<br><br>Given that buildings are chattels, a lease over a parcel of land will not automatically encompass buildings situated on the land. It is, therefore, common practice for a lease to explicitly refer to both the land and the house<br><br>Unlike many countries in the Pacific, Tonga does not have a customary property law system that runs in parallel with statutory land law. |
| **Tuvalu** | Leasing of land from traditional native owners | The government of Tuvalu does not own land, it leases from the traditional native owners. Foreigners can also lease land from the natives. These owners however are having problems because rights of ownership have been uncertain. Family ownership was the common practice, but individual ownership has been introduced and has created confusion over the true owner/s of land. When an individual is the registered owner (usually the oldest male), the other members of their family group retain the right to access and use that piece of land. This right may be agreed amongst the family or allocated by the "owner". |
| **Vanuatu** | Torrens system | Title is guaranteed, and the Land Leases Act covers all aspects of ownership and registration, with the register being paramount. |
| **Viet Nam** | Allocation of land-use rights/ usufruct land rights | Households and organizations cannot own land, as it belongs to the people as a whole. However, following the 1993 Land Law, the state may either allocate land-use rights, or lease land to individuals, households and organizations, who thereby acquire usufruct rights. This right includes the right to receive a land-use right certificate (LURC), to lease out, exchange, mortgage and bequeath the use right, and to exclude others from the land<br><br>For firms and other organizations, state allocation continues to be a primary means for acquiring access to land |

# 10 Appendix B: Draft Facilitating Telecommunications Rights of Way Regulations

**Facilitating Telecommunications Rights of Way Regulations**
**[Country]**

**CHAPTER I**
**PRELIMINARY**

**1. Citation**

These Regulations may be cited as the "*Facilitating Telecommunications Rights of Way Regulations of [Country]*".

**2. Authorising Provisions**

These Regulations were enacted in accordance with [insert relevant provisions].

**3. Definitions**

(1) In these Regulations, the following expressions contained shall have the meanings given below:

(a) "Law" means the means the relevant National Telecommunications Law which includes provisions for Telecommunications Services.
(b) "Authority" means the body, company or institution that has control or management of Telecommunications Services.
(c) "Days" means calendar days.
(d) "Director General" means Director General of the Authority.
(e) "Facility" means any part of the infrastructure of a Telecommunications Network; or any line, equipment, apparatus, tower, mast, antenna, tunnel, duct, hole, pit, pole or other structure or thing used, or for use, in or in connection with a Telecommunications Network.
(f) "License" means an authorisation to provide Telecommunications Services granted under the Law.
(g) "Licensee" means a holder of a License.
(h) "Overground Facility" means a facility or a facility line established over the ground and includes posts or other above ground contrivances, appliances and apparatus for the purpose of establishment or maintenance of the facility.
(i) "Regulations" mean the *Facilitating Telecommunications Rights of Way Regulations of [Country].*
(j) "Telecommunications Network" means a network of telecommunications facilities, telecommunications equipment, computers, devices similar to computer, peripherals used in conjunction with them by means of wire or wireless communication technology

(k) "Underground Facility" means a facility or facility line laid under the ground and includes manholes, marker stones, appliances and apparatus for the purposes of establishment or maintenance of the facility.

(2) Words and expressions used and not defined herein shall have the meaning assigned to them in the Law.

**4. Application**

The Authority shall exercise the powers under these Regulations on an application for establishment and maintenance of an Underground or Overground Facility by Licensees holding a License entitling them to provide Telecommunications Services in [Country].

## CHAPTER II

## ESTABLSHMENT OF LOW-IMPACT FACILITIES

**5. Low-Impact Facilities**

(1) Subject to the additional requirements in Ch IV, a Licensee may establish an Underground or Overground Facility if the facility is a Low-Impact Facility without seeking permission from the Authority.

**6. Defining Low-Impact Facilities**

(2) Low-Impact Facilities include, but are not limited to:

(a) radiocommunications dishes not more than 1.2 metres in diameter;
    i. if attached to a supporting structure, the total protrusion from the structure is not more than 2 metres
(b) antenna poles that are not more than 2.8 metres long;
    ii. if the antenna is attached to a structure, the total protrusion from the structure is not more than 3 metres
(c) underground cabling and cable pits;
(d) in-building subscriber connection equipment;
(e) Facilities that were installed to provide telecommunication services in emergencies
(f) public payphones that are:
    i. used solely for carriage and content services; and
    ii. not designed for other uses (for example, as a vending machine); and
    iii. not fitted with devices or facilities for other uses; and
    iv. not used to display commercial advertising other than advertising related to the supply of standard telephone services

(3) The following cannot be Low-Impact Facilities:

(a) designated overhead lines;
(b) a tower that is not attached to a building;
(c) a tower attached to a building and more than 5 metres high;
(d) an extension to a tower that has previously been extended;
(e) an extension to a tower, if the extension is more than 5 metres high.

(4) The Director General may, by written approval, determine that a specified facility is a Low-Impact Facility.

(5) A Facility cannot be a Low-Impact Facility unless it is specified in these Regulations or approved by the Director General in writing.

Chapter II may be included if the Authority wishes to expediate the process for establishing low-impact facilities. This refers to telecommunications infrastructure which, because of their size and location, are considered to have a low visual impact and be less likely to raise significant planning, heritage or environmental concerns.

However, note that this Chapter is subject to the additional requirements set out in Chapter V. This means that although the Licensee no longer needs to obtain permission from the Authority prior to establishing the Low-Impact Facility, the Licensee may still need to obtain permission from the local government, for instance.

## CHAPTER III
## ESTABLISHMENT AND MAINTENANCE OF UNDERGROUND FACILITIES

### 7. Application by a Licensee

(1) A Licensee shall, for the purposes of establishment of a Facility under any immovable property vested in or under the control or management of the Authority, make an application to the Authority, supported by such documents in such form and manner as may be specified by Authority.

(2) The information along with supporting documents to be provided by the Licensee in the application made under sub-rule (1) shall include-

i. a copy of the License granted by the Authority;
ii. the details of the Underground Facility proposed to be laid;
iii. the mode of and the time duration for, execution of the work;
iv. the time of the day when the work is expected to be done in case the Licensee expects the work to be done during specific time of the day;
v. the details of expenses that the Authority will necessarily be put in consequence of the work proposed to be undertaken by the Licensee;
vi. the inconvenience that is likely to be caused to the public and the specific measures proposed to be taken to mitigate such inconvenience;
vii. the specific measures proposed to be taken to ensure public safety during the execution of the work;
viii. any other matter relevant, in the opinion of the Licensee, connected with or relative to the work proposed to be undertaken; and
ix. any other matter connected with or related to the work as may be specified, through the Law or any other applicable law.

Provided that the Licensee shall, while making the application, give a specific commitment on whether he undertakes to discharge the responsibility for restoration, to the extent reasonable and prudent, of the damage that the Authority shall necessarily be put in consequence of the work proposed to be undertaken.

The list of supporting documentation that a Licensee must submit to the Authority when making an application is broad. As per sub-rule (2) of Rule 7, in addition to the enumerated documents, the Licensee must also include 'any other matter connected with or related to the work as may be specified, through the Law or any other applicable law'. This is to ensure that the Authority has all the relevant information it needs to make an appropriate determination under Rule 8.

The broad requirements regarding supporting documentation are mirrored in Rule 11 for applications for establishing Overground Facilities.

(3) Every application under sub-rule (1) shall be accompanied with such fee to meet administrative expenses for examination of the application and the proposed work as the Authority may deem fit. Such a fee to meet administrative expenses shall not exceed [amount to be determined] per kilometre.

The capped administrative fee in sub-rule (3) ensures that administrative costs associated with the installation of telecom infrastructure are kept at a reasonable amount. This helps to facilitate the non-discriminatory basis on which Licensees are to be granted permission by the Authority.

Sub-rule (3) of rule 11 also requires a capped administrative fee for making an application to the Authority to establish Overground Facilities.

**8. Grant of Permission by the Authority**

(1) The Authority shall examine the application with respect to the following parameters, namely:

(a) the route planned for the proposed Underground Facility and the possible interference, either in the establishment or maintenance of such Facility, with any other public infrastructure that may have been laid along the proposed route;
(b) the mode of execution;
(c) the time duration for execution of the work and the time of the day that the work is proposed to be executed;
(d) the estimation of expenses that the Authority shall necessarily be put in consequence of the work proposed to be undertaken;
(e) the responsibility for restoration of any damage that the Authority may necessarily be put in consequence of the work proposed to be undertaken;
(f) assessment of measures to ensure public safety and inconvenience that the public is likely to be put to in consequence of the work proposed and the measures to mitigate such inconvenience indicated by the Licensee;
(g) any other matter, consistent with the provisions of the Law, these Regulations, or any other applicable law, connected with or relative to the establishment or maintenance of an Underground Facility.

(2) The Authority shall within a period not exceeding 60 days from the date of application made under rule 7-

(a) grant permission on such conditions including, but not limited to, the time, mode of execution, measures to mitigate public inconvenience or enhance public safety and payment of restoration charge, as may be specified, subject to the provisions of the Law, these Regulations, or any other applicable law; or
(b) reject the application for reasons to be recorded in writing.

(3) No application shall be rejected unless the applicant has been given an opportunity of being heard on the reasons for such rejection.

(4) The permission shall be deemed to have been granted if the Authority fails to either grant permission under clause (a) of sub-rule (2) or reject the application under clause (b) of sub-rule (2); and the same shall be communicated in writing to the applicant not later than 5 working days after permission is deemed to have been granted.

Rule 8 makes clear that strict timelines must be observed by the Authority in granting permission or rejecting an application. As per sub-rule (4), a Licensee's application will be deemed to have been granted if the Authority fails to issue a permission or rejection within the specified timeframe. This is to provide a framework for a speedy infrastructure approval process and improve ease of business overall.

The timelines requirements in granting permission are mirrored for Overground Facilities in Rule 12.

**9. Obligations of Licensee in Undertaking Work**

(1) The Licensee shall make the payment of expenses or submit the bank guarantee as determined by the Authority within a period of 30 days from the date of grant of permission and prior to the commencement of work of laying the Underground Facility.

(2) The Authority may, at its discretion, extend the said period for payment of expenses or submission of bank guarantee on an application made by the Licensee seeking such extension.

(2) The Licensee shall ensure that –

(a) prior to the commencement of work of laying the Underground Facility and at all times during the execution of work, the measures to mitigate public inconvenience and provide for public safety are implemented; and
(b) the work of laying the Underground Facility is carried out in accordance with the conditions specified in the grant of permission by the Authority

(3) The Licensee shall ensure provision of positional intelligence, through appropriate technology, of all Underground Facilities to enable the Authority to obtain real time information on its location.

Rule 11 creates obligations on Licensees for the benefit of the general community. In addition to obligations such as complying with conditions set by the Authority and making payment of expenses, Licensees are required to have regard to public inconvenience and public safety in undertaking work.

Some of these obligations on Licensees are mirrored in Rule 13 for Licensees who are establishing an Overground Facility.

**10. Powers of the Authority to Supervise the Work**

(1) The Authority may supervise the execution of work to ascertain if the conditions imposed in the grant of permission under clause (a) of sub-rule (2) of rule 8 are observed by the Licensee.

(2) The Authority may, on the basis of such supervision, impose such other reasonable conditions as it may think fit.

(3) If the Authority comes to the conclusion that the Licensee has wilfully violated any of the conditions for grant of permission under clause (a) of sub-rule (2) of rule 8, it may forfeit, in full or in part, the bank guarantee submitted by the Licensee and withdraw the permission granted to the Licensee, for reasons to be recorded in writing

(4) No action shall be taken under sub-rule (3) unless the Licensee has been given an opportunity of being heard.

Rule 10 empowers the Authority to supervise the work of Licensees in establishing and maintaining Underground Facilities. This power functions to help the Authority confirm that conditions on the grant of permission are met. It also empowers the Authority to take action if the Licensee has been found to wilfully violate any of these conditions. This power is important in ensuring that the Authority retains some control over the maintenance of Facilities even after permission has been granted to a Licensee.

Under Rule 14, the Authority also has power to supervise work in relation to Overground Facilities.

**CHAPTER IV**
**ESTABLISHMENT OF OVERGROUND FACILITY**

**11. Application by a Licensee**

(1) A Licensee shall, for the purposes of establishing an Overground Facility, upon any immoveable property vested in or under the control or management of the Authority, make an application, supported by such documents, to the Authority in such form and manner as may be specified by the Authority

(2) The information along with supporting documents to be provided by the Licensee in the application made under sub-rule (1) shall include-

i. a copy of the Licence granted by the Authority;
ii. the nature and location, including exact latitude and longitude, of post or other above round contrivances proposed to be established;
iii. the extent of land required for establishment of the Overground Facility;
iv. the details of the building or structure, where the establishment of the Overground Facility, is proposed;
v. the mode of and the time duration for, execution of the work;
vi. the inconvenience that is likely to be caused to the public and the specific measures proposed to be taken to mitigate such inconvenience;

vii. the measures proposed to be taken to ensure public safety during the execution of the work;
viii. the detailed technical design and drawings of the post or other above ground contrivances;
ix. certification of the technical design by a structural engineer attesting to the structural safety, of the Overground Facility;
x. certification, by a structural engineer, attesting to the structural safety of the building, where the post or other above ground contrivances is proposed to be established on a building;
xi. the names and contact details of the employees of the Licensee for the purposes of communication in regard to the application made;
xii. any other matter relevant, in the opinion of the Licensee, connected with or relative to the work proposed to be undertaken; and
xiii. any other matter connected with or related to the work as may be specified, through the Law or any other applicable law.

(3) Every application under sub-rule (1) shall be accompanied with such fee to meet administrative expenses for examination of the application and the proposed work as the Authority may, by general order, deem fit. The one-time fee, to meet administrative expenses, accompanying every application shall not exceed [amount to be determined].

**12. Grant of Permission by the Authority**

(1) The Authority shall examine the application with respect to the following parameters, namely:

(a) the extent of land required for the Overground Facility;
(b) the location proposed;
(c) the mode of and time duration for execution of the work;
(d) the estimation of expenses that the Authority shall necessarily be put in consequence of the work proposed to be undertaken;
(e) assessment of the inconvenience that the public is likely to be put to in consequence of the establishment or maintenance of the Overground Facility, and the measures to mitigate such inconvenience indicated by the Licensee;
(f) certification of the technical design by a structural engineer attesting to the structural safety of the Overground Facility;
(g) certification, by a structural engineer, of the structural safety of the building on which the post or other above ground contrivances is proposed to be established;
(h) any other matter, consistent with the provisions of the Law, these Regulations, or any other applicable law, connected with or related to the laying of Overground Facilities.

(2) Where the establishment of the Overground Facility renders the immoveable property, vested in the control or management of the Authority over which such Overground Facility is established, unlikely to be used for any other purpose, the Authority shall be entitled to compensation for the value of the immoveable property, either once or annually, assessed on such rates as that Authority may, by general order, specify.

(3) The Authority shall, within a period not exceeding 60 days from the date of application made under rule 11 –

(a) grant permission on such conditions including, but not limited to, the time, mode of execution, measures to mitigate public inconvenience or enhance public safety or

structural safety and payment of restoration charge or compensation , subject to the provisions of the Law, these Regulations, or any other applicable law; or

(b) reject the application for reasons to be recorded in writing

(4) No application shall be rejected unless the applicant Licensee has been given an opportunity of being heard on the reasons for such rejection.

(5) Permission shall be deemed to have been granted if the Authority fails to either grant permission under clause (a) of sub-rule (3) or reject the application under clause (b) of sub-rule (3) and the same shall be communicated in writing to the applicant not later than 5 working days after permission is deemed to have been granted.

(6) The Authority shall not charge any fee other than those mentioned under sub-rule (3) of rule 11 and clause (a) of sub-rule (3) from the Licensee for establishing an Overground Facility.

**13. Obligations of Licensee in Undertaking Work**

(1) The Licensee shall ensure that –

(a) prior to the commencement of establishment and maintenance of the Overground Facility and at all times, the measures to mitigate public inconvenience and ensure public safety, including structural safety of such Overground Facility are implemented; and

(b) the work of establishment and maintenance of the Overground Facility is carried out in accordance with the conditions specified in the grant of permission by the Authority.

**14. Powers of the Authority to Supervise the Work**

(1) The Authority may supervise the establishment and maintenance of the Overground Facility to ascertain if the conditions imposed in the grant of permission under clause (a) of sub-rule (3) of rule 12 are observed by the Licensee.

(2) The Authority may, on the basis of such supervision, impose such other reasonable conditions, as it may think fit.

(3) If the Authority comes to the conclusion that the Licensee has wilfully violated any of the conditions for grant of permission under clause (a) of sub-rule (3) of rule 12, it may withdraw, for reasons to be recorded in writing, the permission granted to the Licensee.

(4) No action shall be taken under this sub-rule unless the Licensee has been given an opportunity of being heard.

**CHAPTER V**
**ADDITIONAL REQUIREMENTS**

This Chapter should include any additional requirements related to the establishment of telecommunications infrastructure in the jurisdiction. For example:

- Local government laws may mandate specific requirements for the deployment of infrastructure requirements in their area

- If the country's land law recognises customary law, these local informal Regulations should be taken into consideration and incorporated in this Chapter. Note that customary laws can add uncertainty in the infrastructure approval process since such laws may not be written down or recorded, and ownership disputes may be difficult to resolve.
- The Chapter must detail if individuals and entities are to be granted usufruct land rights for occupation or use of land.

In determining the additional requirements relevant in a jurisdiction, please refer to the table in **Appendix A** which provides an overview of land law systems in the Asia Pacific region.

## CHAPTER VI
## RIGHT OF AUTHORITY TO SEEK REMOVAL OF UNDERGROUND OR OVERGROUND FACILITY

### 20. Right of the Authority to Seek Removal, etc.

(1) Where the Authority, having regard to circumstances which have arisen since the establishment of any Underground or Overground Facility vested in or under the control or management of the Authority, considers that it is necessary and expedient to remove or alter such Facility, it shall issue a notice to the Licensee, being the owner of such Facility, to remove or alter its location.

(2) On receipt of the notice under sub-rule (1), the Licensee shall, forthwith and within a period of 30 days, proceed to submit, to the Authority, a detailed plan for removal or alteration of such Underground or Overground Facility.

(3) The Authority shall, after examination of the detailed plan submitted by the Licensee under sub-rule (2), pass such orders as it deems fit.

(4) The Authority shall, having regard to emergent and expedient circumstances requiring the removal or alteration of such Facility, give a reasonable time of not less than 90 days to the Licensee for removal or alteration of such Facility.

(5) The responsibility and liability, including the cost thereof, for removal or alteration of such Facility shall be borne by the Licensee.

Rule 20 gives the Authority the power to seek removal of an Underground or Overground Facility. This allows the Authority to take into consideration matters that have arisen after permission has been grated and the Facility has been established, that make it so that the Facility needs to be removed or altered.

## CHAPTER VII
## DISPUTE RESOLUTION AND APPEALS PROCESS

### 21. Disputes between the Licensee and Authority

(1) Any dispute arising between a Licensee and the Authority in consequence of these Regulations, shall be referred to the Ministry within 30 days from the date on which the decision is made

(2) In respect of the appeal filed under sub-rule (1), the Ministry:

(i) shall make necessary investigations;

(ii) may approve, revise or cancel the decision of the Authority

### 22. Appealing to the Appeals Tribunal

(1) A Licensee who is not satisfied with the decision of the Ministry may appeal to the Appeals Tribunal within 45 days from the date the decision is made in accord with the procedure.

(2) The procedures associated with hearings, decisions, assigning duty and the formation of the Appeal Tribunal shall be consistent with Chapter XVII of the Law.

(3) The decision of the Appeals Tribunal shall be final and conclusive.

Chapter VII should be drafted in compliance with the dispute resolution process in the relevant National Telecommunications Law. As such, it should be modified according to the bodies, institutions, procedures and practices in a particular jurisdiction.

Chapter VII in these guidelines has been drafted with the assumption that there is an Appeals Tribunal established by the Law for telecommunications disputes. It also assumes a Ministry exists that manages the Authority with which the Licensee has a dispute.