

Digital trends in Asia and the Pacific 2021

Information and communication technology trends and developments in the Asia-Pacific region, 2017-2020



Digital trends in Asia and the Pacific 2021

Information and communication
technology trends and
developments in the Asia-
Pacific region, 2017-2020



Acknowledgements

DISCLAIMER

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of ITU concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by ITU in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by ITU to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader.

The opinions, findings and conclusions expressed in this publication do not necessarily reflect the views of ITU or its membership.

ISBN

978-92-61-33251-8 (Paper version)

978-92-61-33261-7 (Electronic version)

978-92-61-33271-6 (EPUB version)

978-92-61-33281-5 (Mobi version)



Please consider the environment before printing this report.

© ITU 2021

Some rights reserved. This work is licensed to the public through a Creative Commons Attribution-Non-Commercial-Share Alike 3.0 IGO license (CC BY-NC-SA 3.0 IGO).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited. In any use of this work, there should be no suggestion that ITU endorse any specific organization, products or services. The unauthorized use of the ITU names or logos is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the International Telecommunication Union (ITU). ITU is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition". For more information, please visit <https://creativecommons.org/licenses/by-nc-sa/3.0/igo/>

Abstract

This report provides an overview of trends and developments in ICT infrastructure, access and use in Asia and the Pacific, which includes 38 Member States and is home to a population of 4.2 billion people. It highlights changes in information communication technology (ICT) adoption since the last World Telecommunication Development Conference in 2017 (WTDC-17) and during the COVID-19 pandemic, tracks the evolution of regulation, and reviews progress and challenges in implementing the ITU regional initiatives for Asia and the Pacific. Its objective is to serve as a reference for the ITU membership in reviewing progress and identifying ICT development priorities in Asia and the Pacific.

Table of Contents

Abstract.....	iii
1. Overview	1
2. Digital trends in Asia and the Pacific	3
2.1 Mobile market developments.....	5
2.2 Satellite broadband developments	8
2.3 Fixed broadband market	11
2.4 Internet access, use, skills and gender.....	18
2.5 ICT prices.....	22
2.6 Communication revenue and investment	24
2.7 Digital service trends	26
2.8 Developments in cybersecurity	28
2.9 ICT infrastructure developments and integrated technologies	31
2.10 Impact of COVID-19 on digital development	33
3. Regulatory trends in Asia and the Pacific.....	37
3.1 New collaborative regulatory paradigm	38
3.2 The G5 Benchmark for regulatory excellence	40
3.3 Maturity of ICT regulatory frameworks in the Asia-Pacific region.....	42
3.4 Economic contribution of broadband, digitization and ICT regulation in the Asia-Pacific region.....	45
4. Opportunities and challenges in digital transformation	49
4.1 Developments under the regional initiatives for the Asia-Pacific region.....	50
4.2 Regional initiatives: Areas of progress.....	51
4.3 Regional initiatives: Challenges.....	56
5. Conclusion.....	57
References.....	58

List of tables and figures

Figures

Figure 1: Global ICT indicators per 100 inhabitants/per cent (where available), 2019 and 2020, and compound annual average growth rate (CAGR) (where available), 2017-2019/2017-2020	1
--	---

Figure 2: Accelerating the impact of COVID-19 on digital transformation.....	2
Figure 3: Key ICT statistics, Asia-Pacific region, 2017-2019	5
Figure 4: Mobile cellular subscriptions, 38 Asia-Pacific countries, 2019	6
Figure 5: Active mobile broadband subscriptions per 100 inhabitants, 35 Asia-Pacific countries, 2019	7
Figure 6: Satellite broadband subscriptions, Asia-Pacific region, 2018-2019	9
Figure 7: Fixed broadband subscriptions per 100 inhabitants, Asia-Pacific region, 2019	11
Figure 8: kbit/s per Internet user, most recent year (2017, 2018 or 2019), and CAGR, 2015-2019, Asia-Pacific region.....	13
Figure 9: Household access, individuals using the Internet, total and by gender, Asia-Pacific region and the world	18
Figure 10: Percentage of individuals using the Internet in the Asia-Pacific region, most recent year (2017, 2018 or 2019)	19
Figure 11: Proportion of households with Internet access, Asia-Pacific region, most recent year (2017, 2018 or 2019).....	20
Figure 12: Individuals using the Internet by gender in selected countries in the Asia-Pacific region (most recent year).....	21
Figure 13: Basic, standard and advanced ICT skills, selected countries in the Asia-Pacific region, 2017-2019.....	22
Figure 14: Mobile-data prices as a percentage of GNI p.c., and monthly data allowance, Asia-Pacific region, 2019	23
Figure 15: Fixed broadband prices as a percentage of GNI p.c., and download speeds and caps, Asia-Pacific region, 2019	24
Figure 16: Total telecommunication investment and revenue by country (where available), in millions of USD, Asia-Pacific region, 2019	25
Figure 17: Level of telecommunication investment as a share of telecommunication revenue by country, Asia-Pacific region, 2018	26
Figure 18: Movement between EGDI groups from 2018 to 2020 (number of countries).....	26
Figure 19: Heatmap of national cybersecurity commitment based on the ITU GCI 2018.....	29
Figure 20: Landscape for artificial intelligence, IoT and cloud technologies in the Asia-Pacific region	32
Figure 21: Evolution of the generations of ICT regulation, Asia-Pacific region, 2007-2019	43
Figure 22: Economic impact of fixed and mobile broadband and digitization, 2019.....	46
Figure 23: Regional initiatives – Areas of progress	52

Boxes

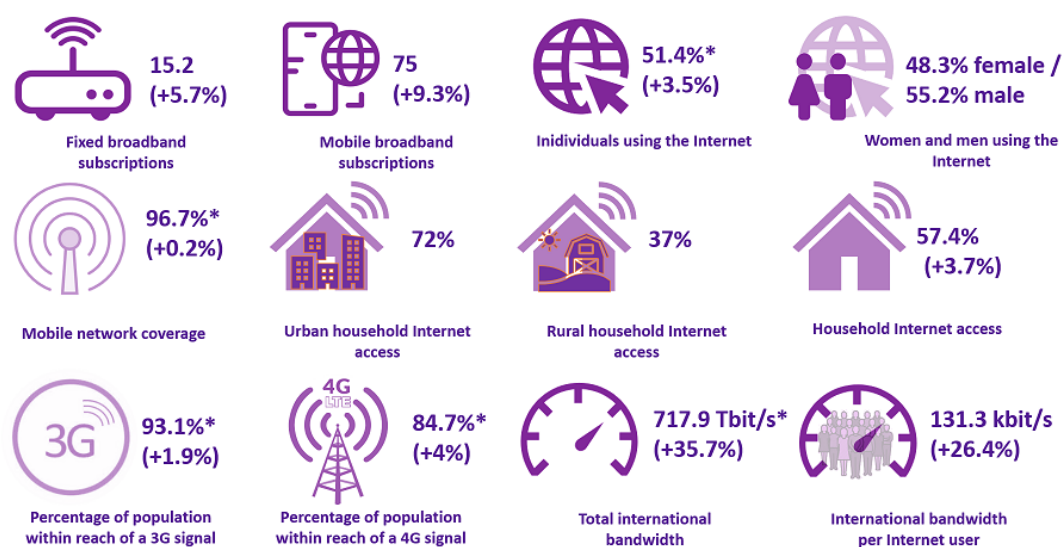
Box 1: Progress through the right policies – The case of Myanmar.....	7
Box 2: Satellite connectivity solutions for small island developing States (SIDS).....	10

Box 3: Access to international connectivity in the Asia-Pacific region.....	14
Box 4: Mapping of ICT connectivity in Pakistan and Afghanistan.....	16
Box 5: ITU definition of different ICT skills levels.....	22
Box 6: Measuring ICT prices at ITU.....	24
Box 7: ITU Global Cybersecurity Index: Asia-Pacific region - A closer look.....	30
Box 8: The impact of COVID-19 on digital development in Asia and the Pacific.....	34
<i>Box 9: ITU initiatives to help mitigate the impact of COVID-19.....</i>	<i>37</i>
Box 10: Collaborative regulation - A forward-looking concept.....	39
Box 11: ITU G5 Benchmark in a nutshell	41
Box 12: Voices from the region - Pakistan on the journey towards collaborative regulation	44
Box 13: Digital Regulation Platform	45
Box 14: COVID-19 regulatory framework initiatives for the Asia-Pacific region	47
Box 15: Asia-Pacific regional initiatives - Definition and objectives	51
Box 16: Asia-Pacific Regional Initiative 3 (ASP RI 3): Infrastructure - Continued demand and progress in relation to spectrum management	55

1. Overview

While COVID-19 has dominated the headlines throughout 2020, the consistent development and deployment of information and communication technology (ICT) infrastructure and its concomitant services has meant a continued trend towards digital transformation for societies, businesses and governments alike. Since the last World Telecommunication Development Conference in 2017 (WTDC-17), ICTs have continued to spread. ITU data show that, in 2019, Internet use surpassed the 50 per cent mark (51.4 per cent globally by the end of 2019), 75 per cent of the total world population had an active mobile broadband subscription, and fixed broadband subscriptions had grown to just over 15 per cent. Over 57 per cent of households today have Internet access at home. Moreover, given the increase in demand for data due to increasingly bandwidth-intensive services, international bandwidth has, on average, grown at a compound annual growth rate (CAGR) of 36 per cent between 2017 and 2020, with a CAGR for international bandwidth per Internet user of 26 per cent between 2017 and 2019. Yet the digital divide persists. While almost all urban areas in the world are covered by a mobile broadband network, many gaps persist in rural areas. The gender divide remains a reality, with still fewer women than men benefiting from Internet use (Figure 1).

Figure 1: Global ICT indicators per 100 inhabitants/per cent (where available), 2019 and 2020, and compound annual average growth rate (CAGR) (where available), 2017-2019/2017-2020



*2020 estimate

Source: Based on the ITU World Telecommunication/ICT Indicators (WTI) Database, 2017, 2019 and 2020, where available

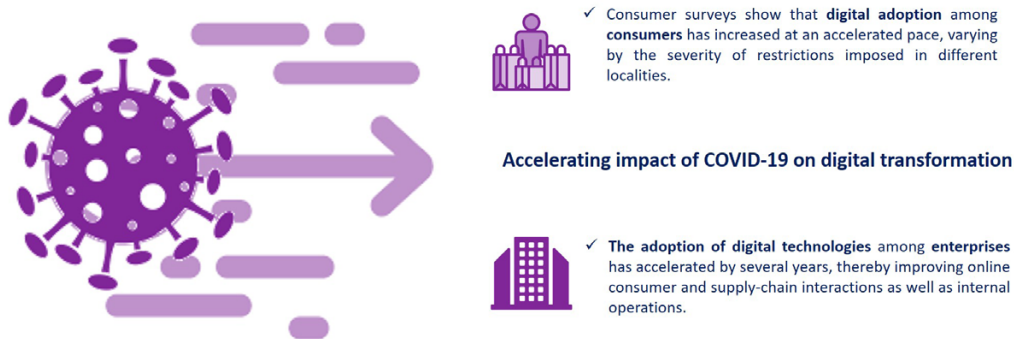
As most countries across the world grapple with the effects of the COVID-19 pandemic, the role of ICTs and digital services and the digital infrastructure on which these depend has become central to continued economic and societal activity and to lessening the pandemic impact. The Economic Experts Roundtable organized by ITU in June 2020 concluded that countries with top connectivity infrastructure could mitigate up to half of the negative economic shock of the pandemic.¹ Overall, one of the responses to the pandemic has been to accelerate digital

¹ The Economic Experts Roundtable was held on 26 June 2020. See: <https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx>.

transformation, as businesses move towards distributed models of employment and digital delivery of services and products. Individuals are foregoing travel and socializing and turning to digital entertainment and communication platforms and, increasingly, to e-commerce. Schools are moving to online learning and digital classrooms, and governments are increasingly relying on data on citizens, health, and economic indicators to establish policies.

While research on the contribution of digitization to softening the impact of pandemics is limited, emerging evidence is compelling about its accelerating effects across all areas of people's lives and sectors of the economy. For example, surveys show that the COVID-19 pandemic has pushed consumers and businesses alike to adopt digital services and technologies, thus accelerating digital transformation in consumer behaviour and business activity by several years (Figure 2).

Figure 2: Accelerating the impact of COVID-19 on digital transformation



Source: ITU, based on insights from 2020 McKinsey consumer and enterprise surveys, available at <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights>²

Generally, the pandemic has forced a greater demand for digital reliance across the board, and this outcome is likely to be here to stay in the “new normal”, as the utility of more abundant data and the ever-lower cost of using those data influence how entrepreneurs, policy-makers and professionals make decisions. The pandemic, however, is just one driver of current trends. Climate responsibility, continued economic development, demographic shifts and social well-being are also key drivers in ensuring that no one is left behind.

In the light of these global trends, policy development that is focused on inclusion, access, security, skills and sustainability in terms of emerging technologies and their benefits is poised to become one of the defining characteristics of the 2020s. This is mirrored in the ITU thematic priorities for the Asia-Pacific region, which remain highly relevant going forward.³ Addressing the special needs of least developed countries (LDCs), small island developing States (SIDS), including Pacific Island countries, and landlocked developing countries (LLDCs), harnessing ICTs to support the digital economy and an inclusive digital society, fostering the development of infrastructure to enhance digital connectivity and the creation of enabling policies and regulatory environments, and contributing to a secure and resilient environment are all key to achieving

² <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/europes-digital-migration-during-covid-19-getting-past-the-broad-trends-and-averages>; <https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/a-global-view-of-how-consumer-behavior-is-changing-amid-covid-19>; and <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever>
³ <https://www.itu.int/en/ITU-D/Regional-Presence/asiapacific/Pages/default.aspx>

the United Nations Sustainable Development Goals (SDGs) and 2030 Agenda for Sustainable Development. The Asia-Pacific region has the opportunity to showcase different approaches to pandemic management and disaster recovery with the help of digital applications, digital services and generated data, and the underlying digital infrastructure. For example, during the COVID-19 crisis, the Governments of the Republic of Korea and Singapore effectively adopted digital technologies in innovative ways to contain the spread of the virus, supported by learnings from previous crises and an adequately designed enabling policy and regulatory environment.⁴ This can help guide and inform policy development and implementation for future crises.

Artificial intelligence, the Internet of things, cloud computing, distributed ledger technology, 5G, precision medicine, drones, geographic information systems (GIS), satellite technologies, autonomous mobility and many more evolving technological arenas will shape the future of the world, including Asia and the Pacific. Ultimately, at the heart of this historical transformation, ICT infrastructure is the predominant enabler – along with fit-for-purpose policy – of the future competitiveness and innovation of Asia and the Pacific. We cannot lose sight of the fact that improving ICT infrastructure is more than a goal for governments, service providers and consumers; far more than simply facilitating mobile and broadband connections, improving ICT infrastructure allows for global supply chain integration, the innovative use of critical health information, greater scale and scope of financial services, improved livelihoods for agriculture stakeholders, and the opportunity for citizens to improve their options in the workforce. It also helps governments to improve efficiency and enhance their public service delivery outreach, allows for the enhancement of digital trade, and enables students to gain skill sets previously unavailable to them, among many more positive externalities that are changing the course of history. Indeed, it will be history that looks back at this early era of technological development to see how policies and governance approaches reinforced the resilience, sustainability and responsiveness of societies, while assessing for risks, building confidence, protecting consumers and enabling positive outcomes for citizens.

2. Digital trends in Asia and the Pacific⁵

The Asia-Pacific region⁶ has a population of 4.2 billion and 38 Member States, including 14 classified as SIDS and 11 classified as LDCs. It is one of the world's most diverse regions and home to economies that are at the top of digital economy and societal developments worldwide and that are also global leaders in high-speed Internet access and usage. At the same time, the region is extremely diverse in terms of income distribution, population size and the geographical features of countries, ranging from rugged mountainous areas in the Himalayas to isolated islands in the Pacific. It includes some of the world's most populous countries, such as China, India, Indonesia, Pakistan and Bangladesh, and some of the smallest countries on the planet,

⁴ <https://www.oecd.org/coronavirus/policy-responses/tracking-and-tracing-covid-protecting-privacy-and-data-while-using-apps-and-biometrics-8f394636/>; <https://www.brookings.edu/techstream/how-surveillance-technology-powered-south-koreas-covid-19-response/>; <https://www.prnewswire.com/news-releases/south-koreas-kt-develops-ai-based-covid-19-research-301115452.html>

⁵ Mostly 2019 data with some 2020 preliminary data/estimates. Disaggregated data will be reported when available and relevant (gender, age, rural/urban). Asia-Pacific averages vs global will be reported when relevant.

⁶ This document uses the ITU Asia-Pacific region as defined under ITU country classifications, see: <https://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx>. Where data were only available for a subset of countries, this is indicated.

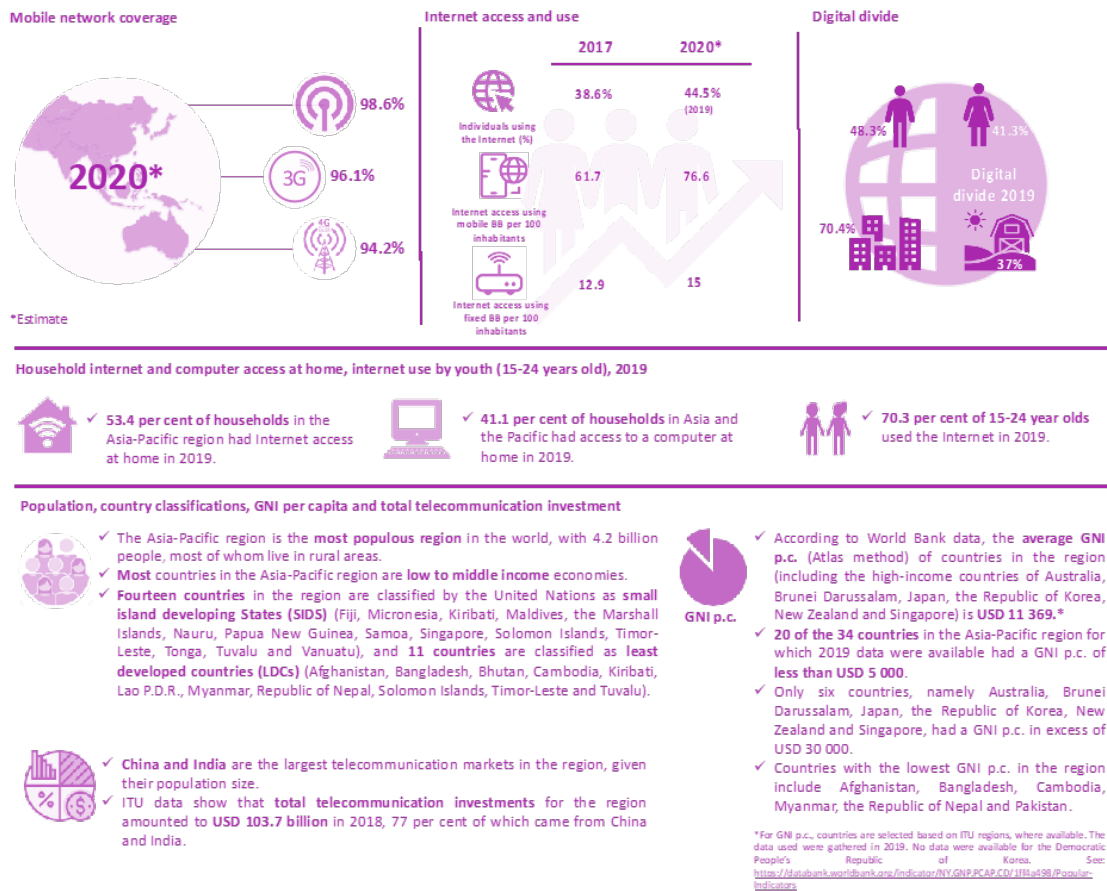
especially the SIDS in the Pacific with populations of less than 12 000, such as Nauru and Tuvalu. ICT uptake therefore also differs considerably among economies in the region, and Internet usage rates range from more than 90 per cent in the advanced economies to less than 15 per cent in the region's least developed economies.

Over the last four years, the region has seen continued growth in most areas of ICT infrastructure, access and use. Mobile cellular coverage in Asia and the Pacific, referring to the percentage of the population that lives within reach of a mobile cellular signal, is estimated by ITU to be close to 100 per cent. Just over 96.1 per cent of the population is now within reach of a 3G signal, and 94.2 per cent is within reach of a long-term evolution (LTE) mobile broadband signal. This is remarkable: only one decade ago, in 2011, some countries in the region, such as Myanmar, had no 3G or 4G infrastructure in place. Today, 94.1 per cent of Myanmar's population is within reach of a 3G signal and 75 per cent is within reach of an LTE mobile broadband signal, with 92.7 active mobile broadband subscriptions per 100 inhabitants.

The percentage of individuals using the Internet increased from 38.6 per cent in 2017 to 44.5 per cent by the end of 2019, with households that have Internet access at home increasing from 47.9 per cent in 2017 to 53.4 per cent by the end of 2019. Both fixed and mobile broadband markets have shown growth over the last four years, with active mobile broadband subscriptions outpacing fixed broadband subscriptions. A significant gender gap and a rural/urban divide persist, however. In 2019, only 41.3 per cent of women used the Internet, compared with 48.3 per cent of men. Moreover, only 37 per cent of rural households had access to the Internet in 2019, compared with almost twice this figure (70.4 per cent) of urban households (Figure 3). In the 15 to 24-year-old age group, 70.3 per cent used the Internet in 2019, similar to the world average of 69 per cent (Figure 3).⁷

⁷ ITU, "Measuring digital development: Facts and figures 2020", <https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>

Figure 3: Key ICT statistics, Asia-Pacific region, 2017-2019

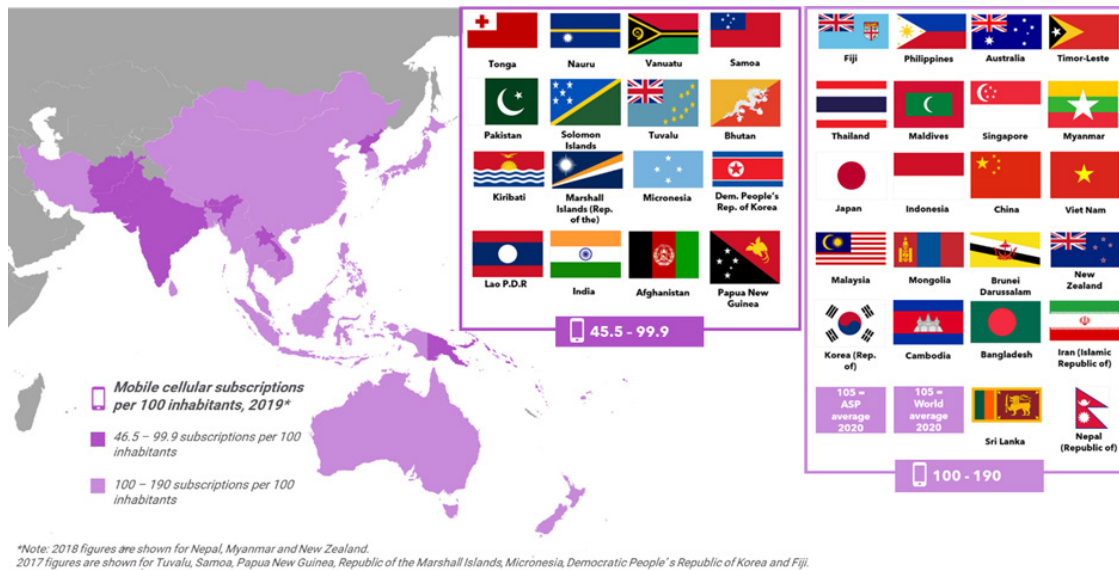


Source: ITU WTI Database and World Bank data (for gross national income (GNI) data)

2.1 Mobile market developments

The Asia-Pacific mobile markets are fairly advanced, with mobile cellular subscriptions far in excess of 100 per 100 inhabitants in 22 out of the 38 countries for which data were available. In 16 countries, subscription rates are less than 100 per 100 inhabitants, with 7 countries between 70 and 95.5 subscriptions per 100 inhabitants, including Bhutan (95.5), Nauru (94.6), Vanuatu (88.4), India (84.3), Pakistan (76.4), Solomon Islands (71.4) and Tuvalu (70.4). Countries with subscription rates per 100 inhabitants of between 45 and 60 include Samoa (63.6), Lao P.D.R. (60.8), Tonga (59.4), Afghanistan (59.3), Papua New Guinea (47.6) and Kiribati (46.5) (Figure 4). Only three countries, namely the Marshall Islands, Micronesia and the Democratic People's Republic of Korea have subscription rates per 100 inhabitants of less than 30. For the Asia-Pacific region, the 2020 average subscription rate was estimated by ITU at 104.6 per 100 inhabitants, which is just short of the world average of 105 subscriptions per 100 inhabitants.

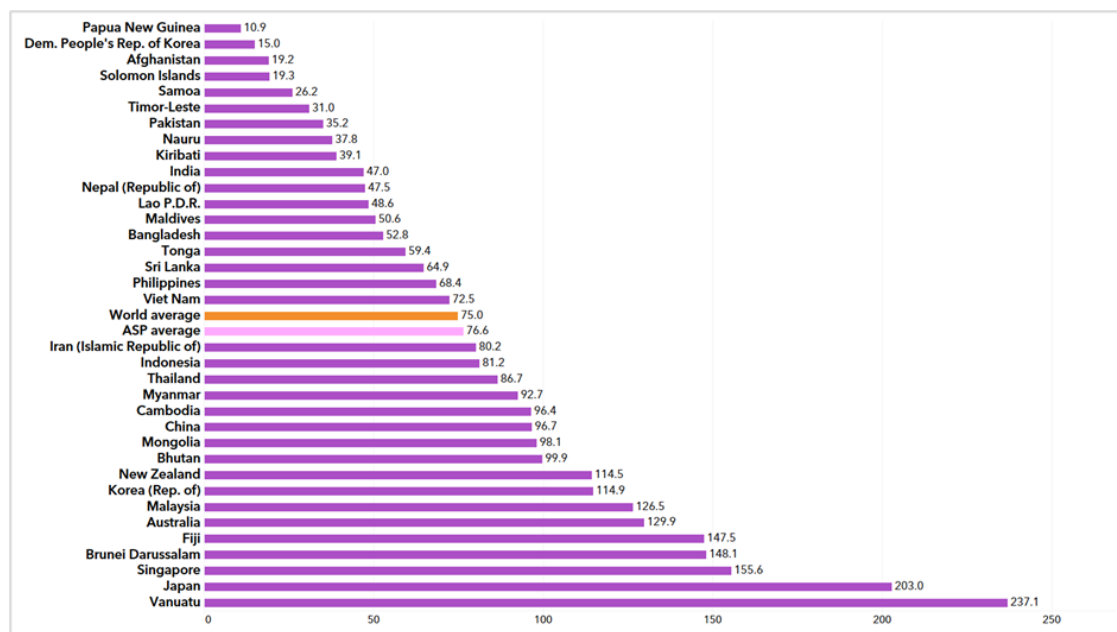
Figure 4: Mobile cellular subscriptions, 38 Asia-Pacific countries, 2019



Source: Based on the ITU WTI Database, July 2020 edition

Active mobile broadband subscriptions per 100 inhabitants are estimated by ITU to have reached 76.6 per 100 inhabitants in 2020, outstripping the world average of 75 per 100 inhabitants by 1.6 subscriptions per 100 inhabitants. One fourth of countries in the Asia-Pacific region for which data were available, including Vanuatu, Japan, Singapore, Brunei Darussalam, Fiji, Australia, Malaysia, the Republic of Korea and New Zealand, have mobile broadband subscription rates in excess of 100 per 100 inhabitants, with Vanuatu (237.1) and Japan (203) being significant outliers (Figure 4). Countries that lie below the world average but have in excess of 30 subscriptions per 100 inhabitants include Viet Nam, the Philippines, Sri Lanka, Tonga, Bangladesh, Maldives, Lao P.D.R., the Republic of Nepal, India, Kiribati, Nauru, Pakistan and Timor-Leste. Samoa, Solomon Islands, Afghanistan, the Democratic People’s Republic of Korea and Papua New Guinea are trailing behind (Figure 5).

Figure 5: Active mobile broadband subscriptions per 100 inhabitants, 35 Asia-Pacific countries, 2019



Source: Based on the ITU WTI Database, *2020 estimate. Note: As no data were available for 2019 for the following countries, 2017 or 2018 values have been used instead: Democratic People's Republic of Korea (2017), Fiji (2018), Nauru (2017), the Philippines (2017), and Samoa (2017).

Box 1: Progress through the right policies - The case of Myanmar

In 2011, when 4G had already been deployed by several countries, Myanmar had limited availability of voice services, which were based only on the global system for mobile communication (GSM) standard. The cost of a SIM card was several hundred United States dollars (USD), and the number of mobile subscriptions was around 1.24 million, in a country with a population of around 54 million.

Realizing the potential of ICTs to improve people's lives and to create opportunities for business and for society at large, the Government of Myanmar decided to change its policies by opening up the market to private sector investment. Initially, two new technology-neutral licences and associated radio-frequency spectrum assignments suitable for both GSM and 3G services were awarded to Norway's Telenor and Qatar's Ooredoo following a bidding process. This was innovative in the sense that the operators were given a clear roadmap for introducing mobile broadband quickly if they wanted to. In fact, Ooredoo did not launch any GSM services, instead launching 3G directly. By using the so-called "beauty contest" method to allocate spectrum - in which certain parameters and coverage obligations were outlined - Myanmar clearly sent the message that its priority was the long-term goal of connecting its citizens.

Further deregulation and competition

Myanmar followed this up with further deregulation and competition in the telecommunication sector. An important aspect that helped Myanmar introduce further competition was reserving some spectrum in the lower frequency bands for future allocation to new operators.

Within a few years, this allowed Mytel - an operator backed by the Myanmar Government and Viet Nam's largest telecommunication company, Viettel - to enter the market, taking the total number of operators to four, including the incumbent operator, the State-owned Myanmar Posts and Telecommunications (MPT).

The country also worked on other aspects, such as improved international connectivity, as well as plans for deploying fibre-optic cable networks and spectrum roadmaps, all of which gave investors confidence in the long-term availability of spectrum, associated backhaul and backbone infrastructure.

Cost of a SIM card drops to less than USD 1

Deregulation and competition resulted in a massive drop in the price of subscription and usage charges. Along with the increased network coverage, this played a major role in the phenomenal increase in the number of subscriptions per 100 inhabitants. By 2018, the number of cellular mobile subscriptions reached 61.14 million, which was more than the country's population. Consumers in Myanmar now have access to 4G services with speeds that are better than in many other countries in the region, and a 5G roadmap is being developed. Myanmar's path towards digital transformation highlights the fact that technologies, when combined with the right policies, can lead to real change and development.

However, voice connectivity alone, or for that matter basic broadband connectivity, is not enough. The main aim is to bring about a meaningful change through digital transformation. This still requires policies related to areas such as right of way, taxation and infrastructure sharing, to name but a few. The success of basic connectivity will prepare the country for the next step of addressing the challenges of developing a complete ecosystem through the whole-of-government approach. In fact, connectivity and ICTs are mere tools - real change can only occur if we have the right policies in all areas where these tools are used. There are other case studies around the world which prove that, with the right kind of policies, the wheel of development can spin much faster.

Source: Adapted from <https://news.itu.int/how-myanmars-policies-accelerated-digital-development/>

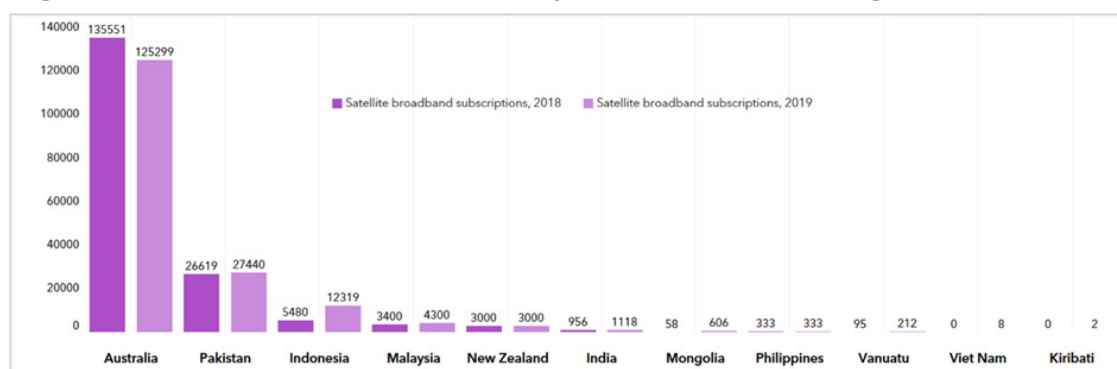
2.2 Satellite broadband developments

Satellite broadband and satellite connectivity solutions in the Asia-Pacific region offer an effective means to close the digital divide, address remaining connectivity gaps and provide effective solutions in emergency situations, as natural hazards affect the region. Small island

States, especially in the South Pacific, are disproportionately represented among high-risk countries, such as Vanuatu and Tonga; however, Japan also often ranks high in terms of risk. These islands are highly exposed to extreme natural events which include the rise in the sea level as a result of global warming. Many of the small island States have limited financial resources and have contributed little to causing climate change, and yet they are the most affected by its consequences (see Box 2 for examples of recent satellite connectivity initiatives across a number of small island States).

Satellite broadband is available in the Asia-Pacific region to provide affordable broadband connectivity for underserved communities in remote and rural areas. The benefits of Internet access in rural areas are well documented; research by the World Bank has found that improved Internet access could bring in more than 5 billion dollars to the economy in the Pacific alone and could create close to 300 000 new jobs by 2040.⁸ ITU data for satellite broadband subscriptions,⁹ however, are available for a small subset of countries only, with the biggest markets including Australia, Pakistan, Indonesia, Malaysia and New Zealand. Most of the markets show a small increasing trend for the period 2018-2019 (Figure 6).

Figure 6: Satellite broadband subscriptions, Asia-Pacific region, 2018-2019



Source: ITU, based on the ITU WTI Database. Note: The 2017 figure was used for New Zealand for 2019.

⁸ World Bank, "Pacific Possible: Long-term Economic Opportunities and Challenges for Pacific Island Countries", 2017, www.worldbank.org/pacificpossible

⁹ "Satellite broadband subscriptions" refers to the number of satellite Internet subscriptions with an advertised download speed of at least 256 kbit/s. It refers to the retail subscription technology and not the backbone.

Box 2: Satellite connectivity solutions for small island developing States (SIDS)

The ITU Asia-Pacific region includes 14 SIDS¹ with vastly distributed and relatively thinly populated remote islands that are vulnerable to frequently recurring natural hazards and that lack access to a stable electricity supply. This poses challenges to providing a reliable telecommunication infrastructure as a foundation for economic development. To meet such challenges, new connectivity solutions using satellites are being implemented across a number of islands in partnership with ITU, and these are sometimes the only way to connect to the Internet.

In 2014, following the Special Pacific ICT Ministerial Forum held in Nouméa, New Caledonia, in 2011, ITU, along with its partners, initiated the Pacific Satellite Connectivity and Development of Emergency Telecom project to develop low-cost, reliable, diverse satellite communications capacity for the socio-economic development of the Pacific Islands region, utilizing unused satellite capacity. Support was provided to Micronesia, Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Tonga, Tuvalu and Vanuatu.

In **Tonga**, engineers from the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications installed Ku-band satellite connectivity equipment at Niuatoputapu High School. Extensive planning went into this challenging installation due to the extreme remoteness of Niuatoputapu Island, which required long journeys by boat from the main Tongatapu Island.

In **Samoa**, five Ku-band satellite terminals were built to allow remote schools to develop functional computer laboratories, which were inaugurated by the Minister of Communications and Information Technology in 2019. In addition, in March 2020, **ITU and Kacific Broadband Satellites Group** (Kacific) joined forces to provide affordable access to online education tools for children using **Kacific1**, a high throughput, next-generation geostationary satellite operating in the Ka-band frequency spectrum that covers approximately 600 million people in Asia and the Pacific. Users are able to access the Internet from Kacific1 with small, low-cost and maintenance-free satellite dishes, which can be transported to remote locations by boat, car or even on foot. The dishes require only low levels of electric power to operate and can easily be solar-powered.

In **Vanuatu**, Kacific presently supplies connectivity to the Vanuatu Inter-Island Telemedicine and Learning (VITAL) Network, which has connected clinics in remote communities and has already saved several lives in emergency situations by connecting nurses to specialist doctors in urban hospitals. Kacific1 will widely expand these types of applications across Asia and the Pacific.

¹ These include Fiji, Kiribati, Maldives, the Marshall Islands, Micronesia, Nauru, Papua New Guinea, Samoa, Singapore, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

In **Timor-Leste**, Kacific powers digital health care, where it has connected 75 clinics to improve the distribution of vital medicines, equipment and patient information nationwide.

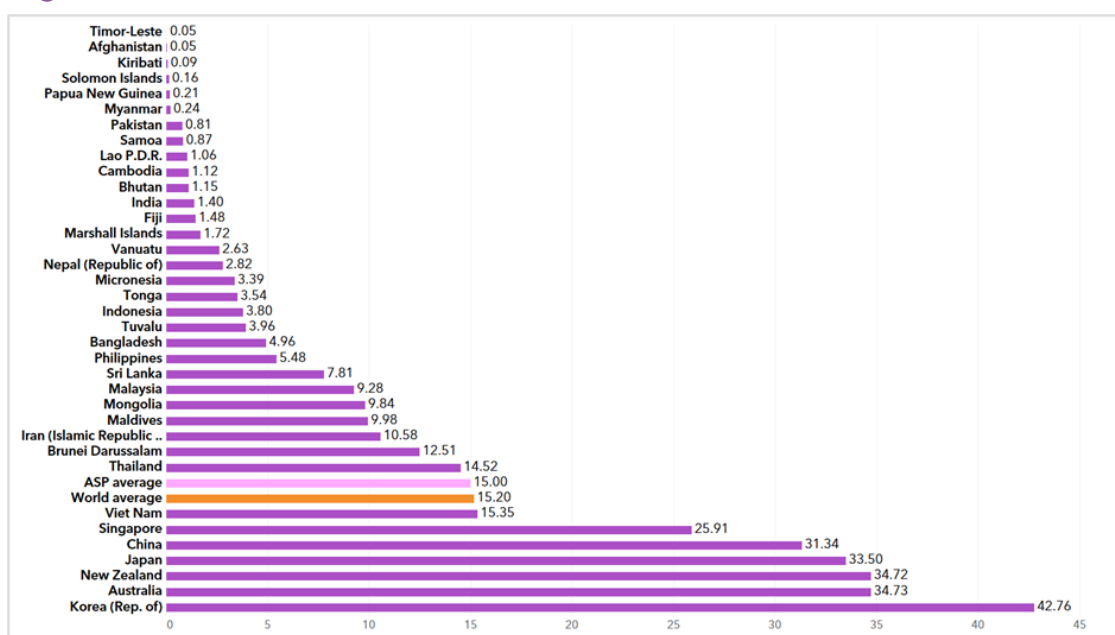
In **Papua New Guinea**, the ICT regulator, the National Information and Communications Technology Authority (NICTA), has installed Ku-band terminals in rural secondary schools, using solar-powered solutions to counter the lack of a stable electricity supply. The systems are now being used by the schools and surrounding communities, thus creating a rural e-community centre.

Source: <https://www.satelliteevolutiongroup.com/magazines/Americas-August2020/content/Digital%20Issue%20download.pdf> and <https://news.itu.int/how-kacific-works-to-boost-connectivity-in-pacific-island-states/>

2.3 Fixed broadband market

Compared with other regions, Asia and the Pacific has great potential to develop the market for fixed broadband. ITU estimated an average fixed broadband penetration level of 15 subscriptions per 100 inhabitants for Asia and the Pacific in 2020, a figure that is almost on a par with the global average of 15.2 subscriptions per 100 inhabitants. Within the region, most countries have a level of fixed broadband penetration lower than the global average (Figure 7). Seven countries, including the Republic of Korea, Australia, New Zealand, Japan, Singapore, China and Viet Nam, have reached fixed broadband subscriptions rates of more than 15 subscriptions per 100 inhabitants (Figure 7).

Figure 7: Fixed broadband subscriptions per 100 inhabitants, Asia-Pacific region, 2019



Source: ITU, based on the ITU WTI Database, *2020 estimate. Note: As no data were available for 2019 for the following countries, 2017 or 2018 values have been used instead: New Zealand (2018), Tuvalu (2017), Micronesia (2017), the

Republic of Nepal (2018), the Marshall Islands (2017), Fiji (2018), Samoa (2017), Myanmar (2018) and Papua New Guinea (2017).

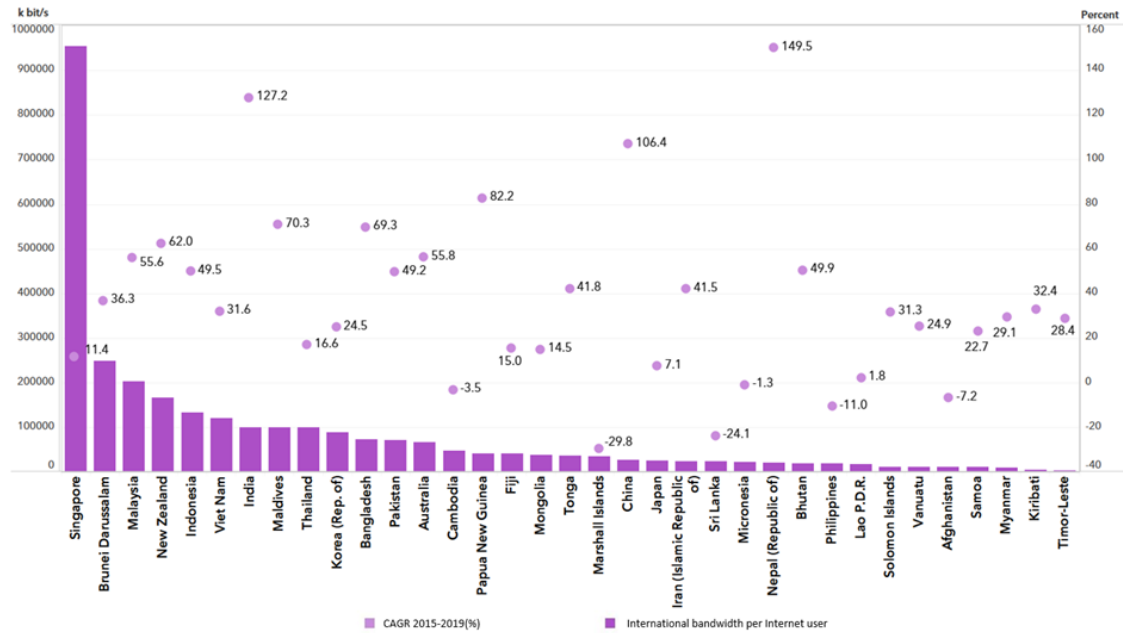
Between 2015 and 2019, most countries in the region increased their fixed broadband subscription rates. Myanmar experienced the strongest growth during this period with a CAGR in fixed broadband subscriptions per 100 inhabitants of 56.7 per cent, followed by Lao P.D.R. (49 per cent), the Republic of Nepal (36 per cent), Sri Lanka (27.1 per cent), Afghanistan (26 per cent) and Indonesia (25.3 per cent). Other countries that achieved a CAGR above 10 per cent between 2015 and 2019 include Cambodia (20 per cent), Maldives (18 per cent), the Philippines (17.8 per cent), Viet Nam (16.7 per cent), Vanuatu (13.5 per cent), Thailand (12.5 per cent), Bangladesh (12.2 per cent) and Brunei Darussalam (10.8 per cent). Fixed broadband subscriptions declined during the period 2015-2019 in Bhutan (-26 per cent), Timor-Leste (-10.3 per cent), Samoa (-10.3 per cent) and Solomon Islands (-9.8 per cent), as well as in Kiribati (-4.1 per cent), Pakistan (-2.5 per cent), Malaysia (-2.1 per cent), Tuvalu (-1.2 per cent) and Singapore (-0.6 per cent). This declining trend reflects a shift away from fixed broadband to mobile broadband services among existing subscribers, while new subscribers prefer mobile broadband services.¹⁰ Overall, the fixed broadband market in the Asia-Pacific region still has significant potential for expansion.

The availability of international bandwidth continues to be an important area for policy and investment – most urgently felt during the COVID-19 pandemic – especially given the rising amount of data-intensive applications, digital services, adoption of cloud-based technologies and the increasing numbers of Internet users desiring better international connectivity. This is particularly important in the Asia-Pacific region, where 14 ITU Member States are classified as SIDS and therefore face significant challenges regarding access to international capacity, which impacts network resilience (see boxes 3 and 4 for further details on international connectivity in the Asia-Pacific region). In recent years, the Asia-Pacific region has seen significant growth in international connectivity. Total international bandwidth in the region has almost tripled over the last four years from 118 Tbit/s in 2017 to 301 Tbit/s in 2020. At the individual user level, there were 73.1 kbit/s per Internet user in the Asia-Pacific region in 2017 and 110.9 kbit/s in 2019, compared with 131.3 kbit/s per Internet user globally.

At the country level, the number of kbit/s per Internet user has increased across all the countries for which data were available for 2019, with the exception of Cambodia, the Marshall Islands, Sri Lanka, Micronesia and Afghanistan. More than half of the countries shown in Figure 8 had CAGRs in excess of 20 per cent, with some outliers well in excess of 100 per cent, including the Republic of Nepal with 149.5 per cent, India with 127.2 per cent and China with 106.4 per cent.

¹⁰ https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2020.xlsx

Figure 8: kbit/s per Internet user, most recent year (2017, 2018 or 2019), and CAGR, 2015-2019, Asia-Pacific region

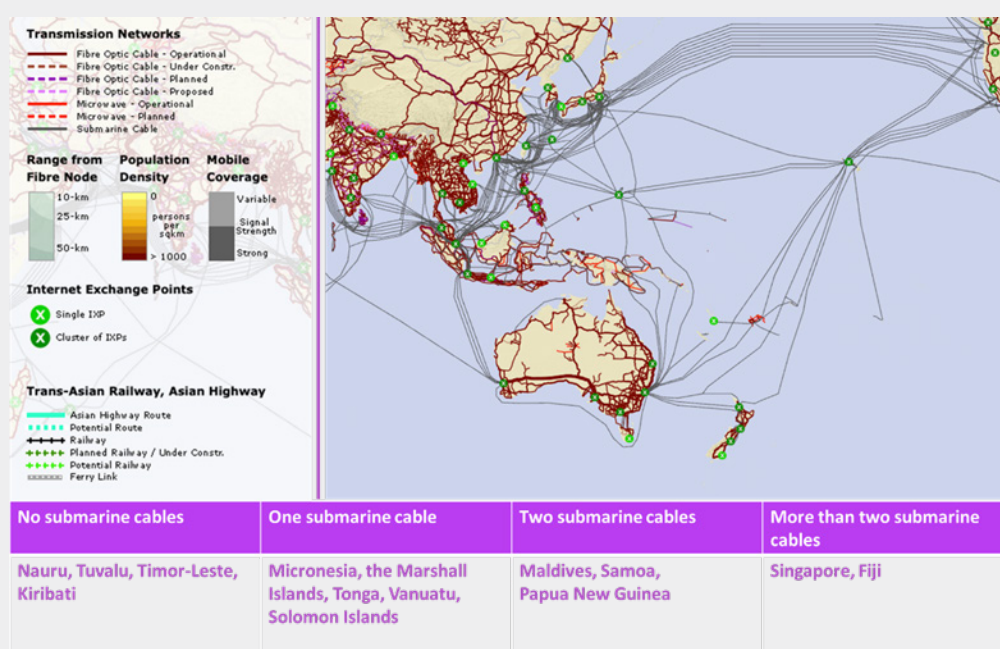


Source: ITU, based on the ITU WTI Database, 2020

Box 3: Access to international connectivity in the Asia-Pacific region

To ensure that improved and high-speed broadband is available across the Asia-Pacific region, access to international connectivity is key. Progress has been made in this regard. The 2019 ITU report “Small Island Developing States (SIDS) and ICT: Mid-term review of the Samoa pathway” shows that the number of undersea cables connecting relevant SIDS in particular has increased.¹ All but four Asia-Pacific SIDS (including Micronesia) were connected to at least one submarine cable network in 2020. Solomon Islands is the most recent of the SIDS to obtain an undersea submarine connection (February 2020), and Kiribati is scheduled to have undersea cable connectivity by 2021.²

Overview of undersea cables in SIDS, most recent year



Source: ITU Report, “Small Island Developing States (SIDS) and ICT: Mid-term review of the Samoa pathway”, 2019; and ITU Interactive Transmission Map, <https://www.itu.int/itu-d/tnd-map-public/>

¹ ITU, “Maximizing availability of international connectivity in the Pacific”, 2018, https://www.itu.int/pub/D-PREF-BB.GDI_AP-2018
² <https://www.micttd.gov.ki/projects/kiribati-connectivity-project>

ITU data show that improved SIDS connectivity has provided the foundation to boost Internet take-up, with the percentage of individuals using the Internet having increased from 46 per cent in 2017 to 52.4 per cent in 2019 and that of active mobile broadband subscriptions having increased from 44.8 per cent in 2017 to 54 per cent in 2020.

Satellite connectivity is key for ensuring redundancy and can also be more economical for operators that cannot obtain cost-based rates from submarine cable wholesalers. However, satellite connectivity also remains very important where SIDS have no submarine cable access, such as in Nauru, Timor-Leste and Tuvalu, or where large segments of the population live far from submarine landing stations. Spurred by continual advances in technology, a number of satellite projects are under way to make satellite connectivity faster and cheaper, including the ITU Pacific Satellite Connectivity Project in partnership with Kacific, the aim of which is to connect remote and rural island communities with reliable and affordable Internet with speeds of up to 60 Gbit/s.¹

¹ <https://news.itu.int/how-kacific-works-to-boost-connectivity-in-pacific-island-states/>

Box 4: Mapping of ICT connectivity in Pakistan and Afghanistan

There are many other ongoing efforts to improve connectivity in the Asia-Pacific region that include the improvement of access to international connectivity. For example, the ITU Regional Office for Asia and the Pacific undertook a comprehensive mapping of the ICT connectivity situation in **Pakistan** and **Afghanistan** to examine the state of digital connectivity across the country and to identify key infrastructural factors affecting access to and adoption of digital technologies for e-commerce, trade, and international, cross-border and transit traffic, as well as other related activities.

Afghanistan

Although Afghanistan continues to be confronted by numerous challenges, largely due to the material effects of many years of war and civil strife, there have been some successes in the country's efforts to rebuild infrastructure and create a functional telecommunication sector. Telecommunication services now cover over 90 per cent of the population. Some other key successes in this sector include the following:

- The mobile market in Afghanistan is highly competitive, with five operators. In 2019, the price of Afghan Internet protocol transit capacity varied. The 3G mobile broadband service was launched in March 2012: as of December 2020, there were 5 429 677 subscribers of 3G services and approximately 1.24 million subscribers of 4G services. There is 4G coverage in only 16 provinces and 3G coverage in all 34 provinces (mainly in the provincial capital), according to data provided by the mobile operators and endorsed by the Afghanistan Telecom Regulatory Authority (ATRA).
- There are few broadband fixed subscriptions owing to limited availability and high costs.
- Internet service providers (ISPs) in Afghanistan play a key role in the provision of fixed broadband access to users. There were 60 registered ISPs as of November 2020.
- In 2020, Afghanistan's fibre-optic backbone network covered most of the provinces. An increase in the bandwidth import on a year-to-year basis has been observed. Afghanistan's import was 106 346 Mbit/s in 2018, 156 623 Mbit/s in 2019 and 190 460 Mbit/s in 2020.
- The National Internet Exchange of Afghanistan (NIXA) was established in 2019. ATRA is planning to establish six additional Internet exchange points. Locating the Internet exchange in Kabul has already spurred competition a little; consumer prices have dropped; operational costs have been reduced; reliability and redundancy have improved slightly; and a small amount of new local Internet bandwidth has been created for sale to consumers.

- 23 (out of 34) provincial capitals and over 70 major districts have been connected and made operational for broadband connectivity.
- International connectivity has been established with neighbours, including:
 - Pakistan at two points – Torkham and Spin Boldak
 - Tajikistan at Sherkhan Bandar
 - Uzbekistan at Hairatan
 - Turkmenistan at two points – Aqina and Turghundi
 - Islamic Republic of Iran at Islam Qala.

Pakistan

The mobile sector has continued to lead the proliferation of telecommunication services in Pakistan since deregulation of the telecommunication sector and the first mobile spectrum auction in 2004. Some of the key figures are as follows:

- The total number of cellular subscribers reached 170 million by the end of 2020. Almost half are 3G/4G users. Mobile teledensity reached 81 per cent by October 2020. In spite of this above-average performance, there are still some remote and mountainous areas which lack mobile phone coverage. Pakistan's mobile sector is highly competitive due to the presence of four operators, which offer very competitive and affordable packages with a view to user requirements. All the operators regularly design/redesign packages to suit the requirements of individuals from different segments of society and geographical areas.
- As per estimates by the Universal Service Fund (USF) of Pakistan, less than 10 per cent of mobile towers in Pakistan have fibre connectivity for backhaul. Mobile network operators (MNOs) rely heavily on point-to-point microwave (MW) links, which suffer from lower bandwidth. The key reasons for preferring MW over fibre are acquisition problems and the high cost of right of way, especially in urban areas (up to 75 per cent of the total cost of backhaul fibre deployment, according to one estimate). In another preliminary study conducted in 2019, USF estimated that almost half (3 140 out of 6 061) of the union councils¹ were without fibre-optic connectivity.
- A total of more than 244 895 km of metro/access fibre has been laid so far. Most of it partially covers major cities only. There is a need to rapidly increase fiberization all over the country.
- Currently Pakistan has cross-border connectivity with China, India and Afghanistan.
- Pakistan is linked to the world through six undersea cables, managed by Pakistan Telecommunication Company Limited (PTCL) and Transworld Associates (TWA). In future, one more undersea cable, part of the Pakistan and East Africa Connecting Europe (PEACE) network, is expected to connect Pakistan with East Africa and Europe.

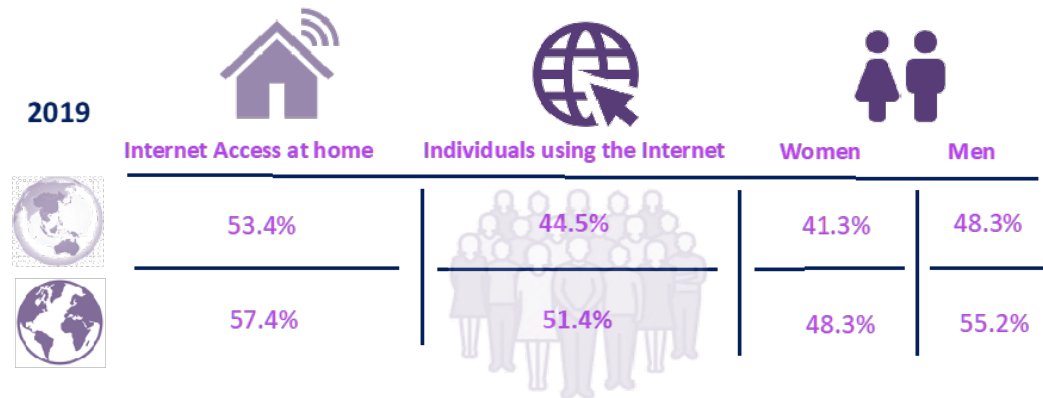
Source: ITU Regional Office for Asia and the Pacific

¹ A union council forms the second tier of local government and fifth administrative division in Pakistan, having an area consisting of one or more revenue estates. Its structure and responsibilities differ between provinces and territories.

2.4 Internet access, use, skills and gender

Asia and the Pacific is lagging behind in Internet access at global level. ITU estimated that 53.4 per cent of households had Internet access in 2019, compared with 57.4 per cent globally. The proportion of individuals using the Internet in 2019 totalled 44.5 per cent in Asia and the Pacific and 51.4 per cent globally (Figure 9).

Figure 9: Household access, individuals using the Internet, total and by gender, Asia-Pacific region and the world

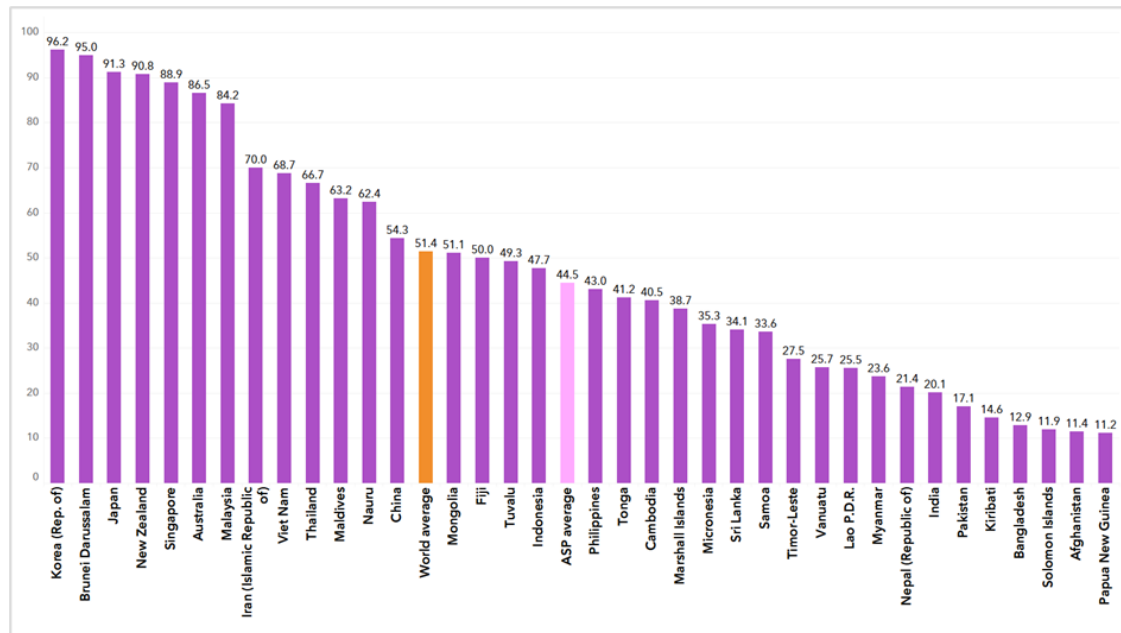


Source: Based on the ITU WTI Database 2020, *2020 estimate

The percentage of individuals using the Internet has increased in almost every Asia-Pacific country during the period 2017-2019, but rates vary significantly.¹¹ In total, in just under 50 per cent of countries for which data were available for the most recent years (2017, 2018 and 2019), the proportion of individual Internet users was above the regional average of 44.5 per cent. In four countries, namely the Republic of Korea, Brunei Darussalam, Japan and New Zealand, more than 90 per cent of individuals used the Internet, and in three countries, namely Singapore, Australia and Malaysia, individual Internet use was in excess of 80 per cent. In 19 countries, the percentage of individuals using the Internet during the study period was below the regional average of 44.5 per cent. In just over one third of countries, the percentage of individuals using the Internet was above the world average of 51.4 per cent (Figure 10). Overall, there is significant potential to develop individual Internet use, and there is room for improvement in relation to the key drivers of access to connectivity, devices and demand.

¹¹ It should also be noted that, for most countries, data were available for 2017 only. Therefore, percentages presented in Figure 10 may underestimate the actual number of Internet users to date.

Figure 10: Percentage of individuals using the Internet in the Asia-Pacific region, most recent year (2017, 2018 or 2019)

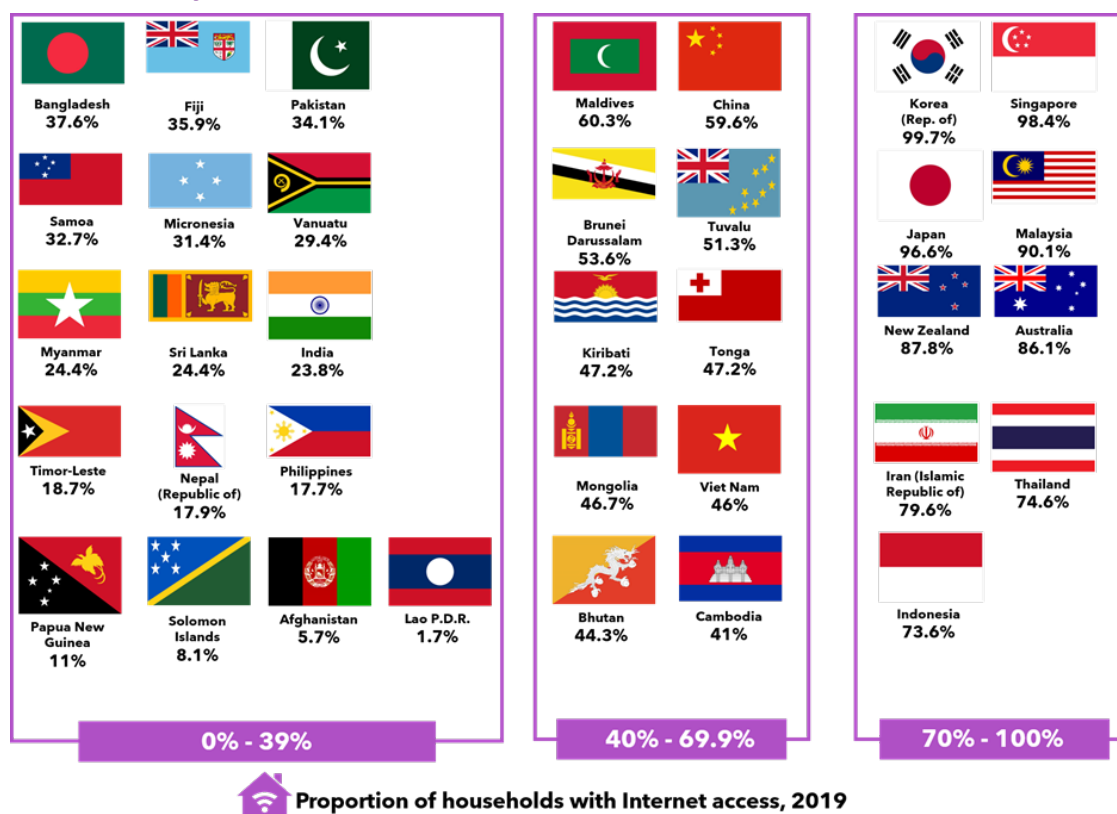


Source: ITU, based on the ITU WTI Database 2020. Data for 2019 were available for the following countries only: Bangladesh, Brunei Darussalam, Indonesia, the Republic of Korea, Malaysia, Mongolia, Pakistan, the Philippines, Singapore, Thailand and Viet Nam.

One way to access the Internet is from home. ITU data show that the number of households with access to the Internet in Asia and the Pacific increased from 47.9 per cent in 2017 to 53.4 per cent in 2019, but still falls short of the world average penetration of 57.4 per cent.¹² Taking a closer look at the individual country level, of the 35 countries for which data were available, less than one-third had penetration rates of household Internet access above the world average. Almost 70 per cent of the countries had a proportion of households with Internet access below the world average, with seven countries showing penetration rates of below 20 per cent (Timor-Leste, the Republic of Nepal, the Philippines, Papua New Guinea, Solomon Islands, Afghanistan and Lao P.D.R.) (Figure 11).

¹² It should be noted that for most countries, data were available for 2017 and 2018 only. Therefore, the figures as presented in Figure 11 may underestimate the actual number of households with Internet access.

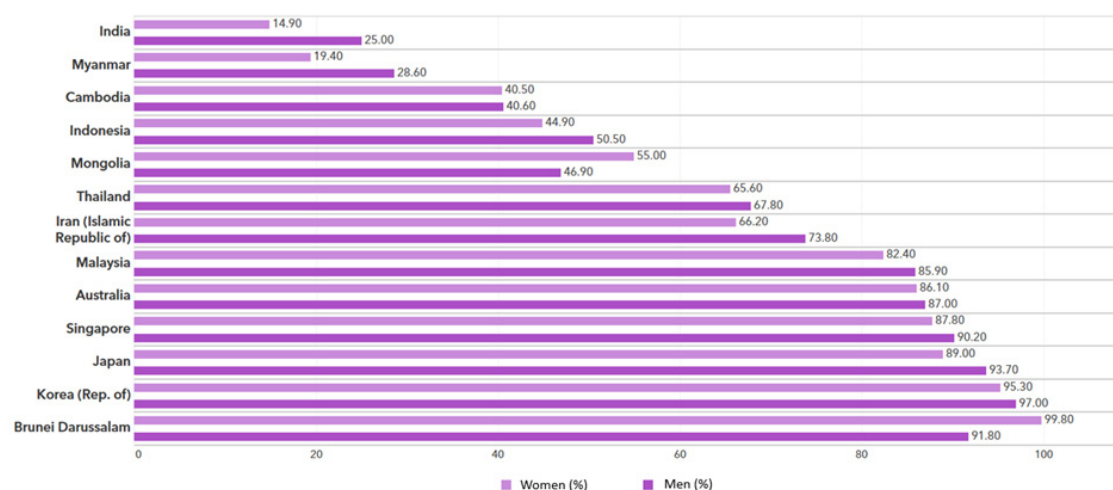
Figure 11: Proportion of households with Internet access, Asia-Pacific region, most recent year (2017, 2018 or 2019)



Source: ITU, based on the ITU WTI Database, 2020. Data for 2019 were available for the following countries only: Bangladesh, Brunei Darussalam, Cambodia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore and Thailand.

In terms of the digital divide, there is still a gender gap in the Asia-Pacific region; while it is decreasing and is ahead of regions such as the Arab States and Africa, it is still lagging behind the world average. While, on average, 41.3 per cent of women and 48.3 per cent of men used the Internet in Asia and the Pacific in 2019, globally 48.3 per cent of women and 55.2 per cent of men used the Internet that year. Data also show that, in Asia and the Pacific, more men than women were using the Internet in 11 of the 13 countries in 2019 for which data were available (Figure 12). The digital divide was most pronounced in India, Myanmar, Indonesia and the Islamic Republic of Iran, where differences in usage varied between 5 and 10 percentage points. In Mongolia and Brunei Darussalam, the digital divide is also pronounced, but in reverse: more women than men are using the Internet, with a difference of 9 percentage points in both countries. Countries that are almost at parity (equal to or less than two percentage points difference) include Cambodia, Australia and the Republic of Korea.

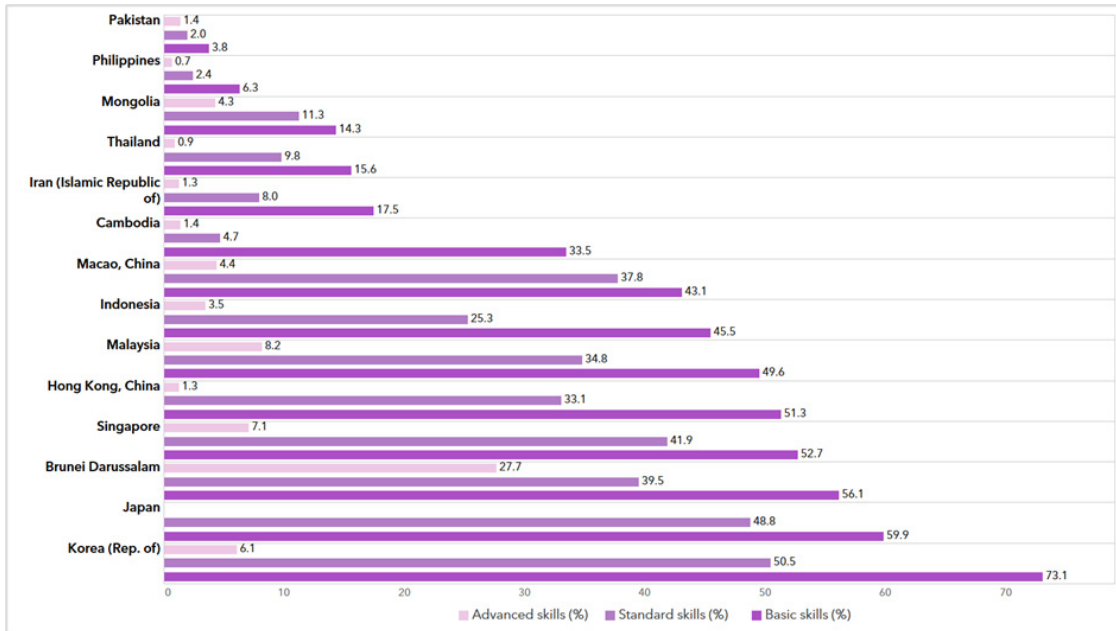
Figure 12: Individuals using the Internet by gender in selected countries in the Asia-Pacific region (most recent year)



Source: Based on the ITU WTI Database, 2020

The levels reached in basic, standard and advanced ICT skills over the last three years vary significantly across a sample of the Asia-Pacific countries shown in Figure 13, with the Republic of Korea topping the chart by far for both basic and standard skills. Countries including Japan, Brunei Darussalam, Singapore and Hong Kong (China) show basic skills levels above 50 per cent, with Malaysia, Indonesia and Macao (China) not trailing far behind with levels above 40 per cent. Cambodia shows basic skills levels above 30 per cent (see Box 5 for definitions of skill levels). Countries with basic skills levels between 10 per cent and 20 per cent include the Islamic Republic of Iran, Thailand and Mongolia, with the Philippines and Pakistan lagging behind with skills levels across all categories of less than 10 per cent. All countries for which data were available have advanced skills of less than 10 per cent, with the exception of Brunei Darussalam, which shows the highest advanced level at 27.7 per cent (Figure 13).

Figure 13: Basic, standard and advanced ICT skills, selected countries in the Asia-Pacific region, 2017-2019



Source: Based on the ITU WTI Database

Box 5: ITU definition of different ICT skills levels

For each economy, the value for **basic skills** is the average value of the available recent data for the following four computer-based activities: copying or moving a file or folder; using copy and paste tools to duplicate or move information within a document; sending e-mails with attached files; and transferring files between a computer and other devices.

The value for **standard skills** is the average value of the available recent data for the following four computer-based activities: using basic arithmetical formulae in a spreadsheet; connecting and installing new devices; creating electronic presentations with presentation software; and finding, downloading, installing and configuring software.

The value for **advanced skills** is the value for writing a computer program using a specialized programming language.

Source: ITU

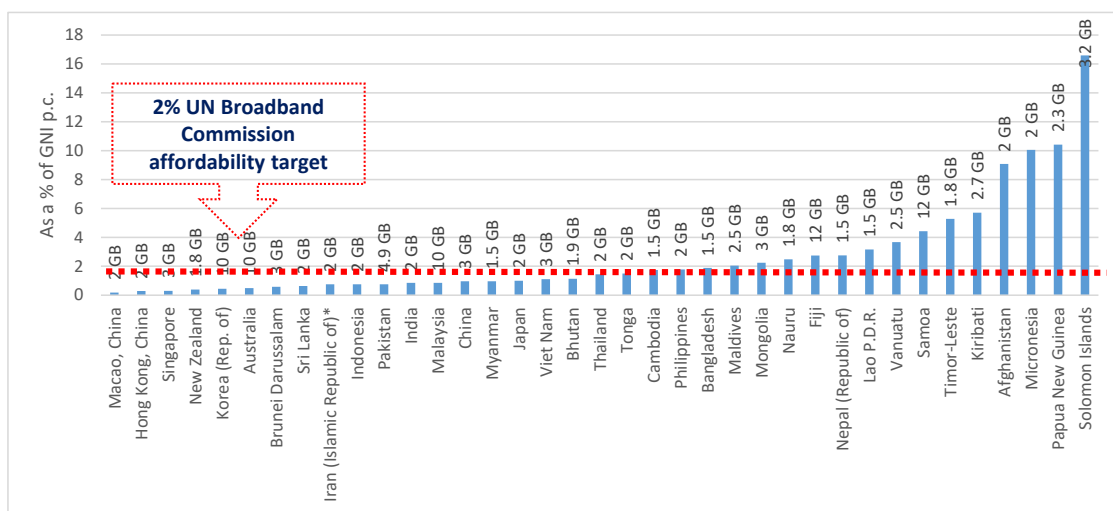
2.5 ICT prices

ITU data show that telecommunication and ICT services are becoming more affordable and prices have generally followed a downward trend over the last four years across the world, including for mobile voice, mobile data and fixed broadband services. Asia and the Pacific is a very diverse region, with a mix of high-income developed countries, emerging economies and developing countries, including a number of LDCs. Consequently, at the regional level, Asia and the Pacific's affordability is mixed, with a number of countries such as China at the

forefront of very low prices below 1 per cent of gross national income per capita (GNI p.c.), and a few countries exhibiting prices above 15 per cent of GNI p.c. The ITU report “[Measuring Digital Development: ICT Price Trends 2019](#)” provides a detailed examination and discussion of ICT price trends.

In relation to mobile-data prices, in 16 economies, led by Macao (China) and Hong Kong (China), the price of a mobile-data basket was below 1 per cent of GNI p.c. In three countries, it was above 10 per cent. In the Republic of Korea, Australia and Malaysia, the prices below 1 per cent of GNI p.c. also come with a monthly data allowance of 10 GB, which is five times the 2 GB median data allowance in the region (Figure 14).

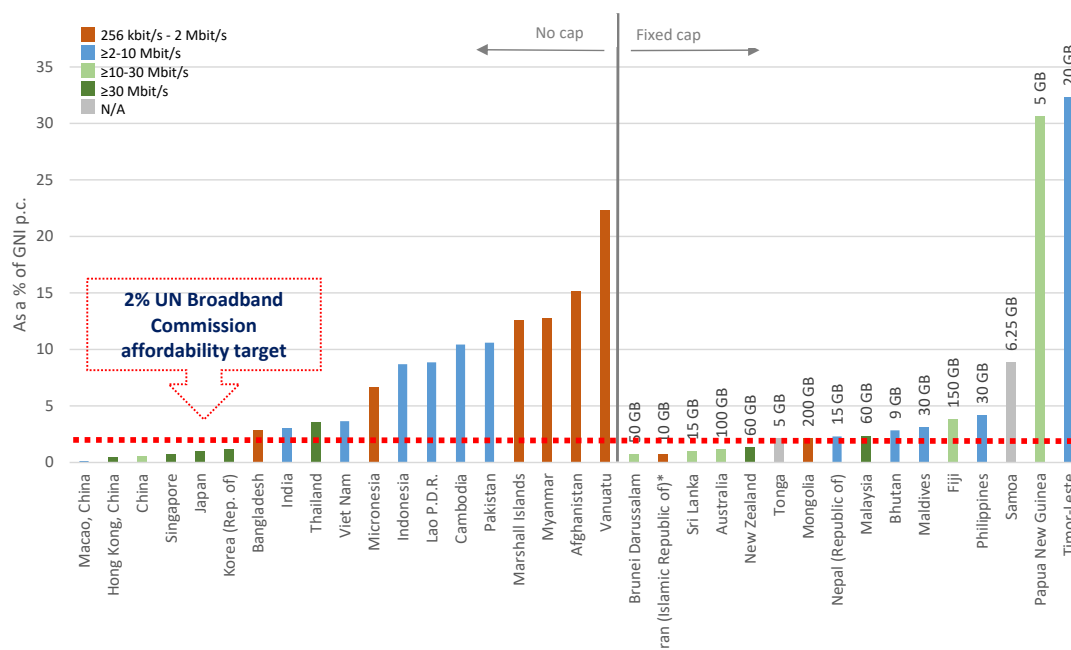
Figure 14: Mobile-data prices as a percentage of GNI p.c., and monthly data allowance, Asia-Pacific region, 2019



Source: ITU, adapted from “[Measuring digital development: ICT price trends 2019](#)”

The affordability of fixed broadband is also mixed. In 11 economies, fixed broadband baskets cost less than 2 per cent of GNI p.c., while the advertised download speeds of those plans were 10 Mbit/s or above. At the same time, in the four countries that offered unlimited access for prices above 10 per cent of GNI p.c., namely the Marshall Islands, Myanmar, Afghanistan and Vanuatu, advertised download speeds were below 2 Mbit/s (Figure 15).

Figure 15: Fixed broadband prices as a percentage of GNI p.c., and download speeds and caps, Asia-Pacific region, 2019



Source: ITU, adapted from "Measuring digital development: ICT price trends 2019"

Box 6: Measuring ICT prices at ITU

ITU and its partners and stakeholders devote considerable time and effort to developing and refining their price methodologies, in particular through the Expert Group on Telecommunication/ICT Indicators. ITU maintains a set of different price baskets to reflect different usage patterns and behaviours. In 2017, ITU updated and adjusted its price baskets to reflect current developments in the fixed and mobile broadband markets. The price baskets cover three different technologies: mobile voice, mobile data and fixed broadband.

In addition, the 2017 revision introduced combined data-and-voice baskets in a first attempt to monitor the prices of bundled services, which is now a very common commercial practice.

The ITU mobile-data-and-voice baskets include voice, text messages and data for two different consumption levels. The low consumption basket includes 70 voice minutes, 20 SMSs and 500 MB of broadband data, while the high consumption basket includes 140 voice minutes, 70 SMSs and 1.5 GB of broadband data.

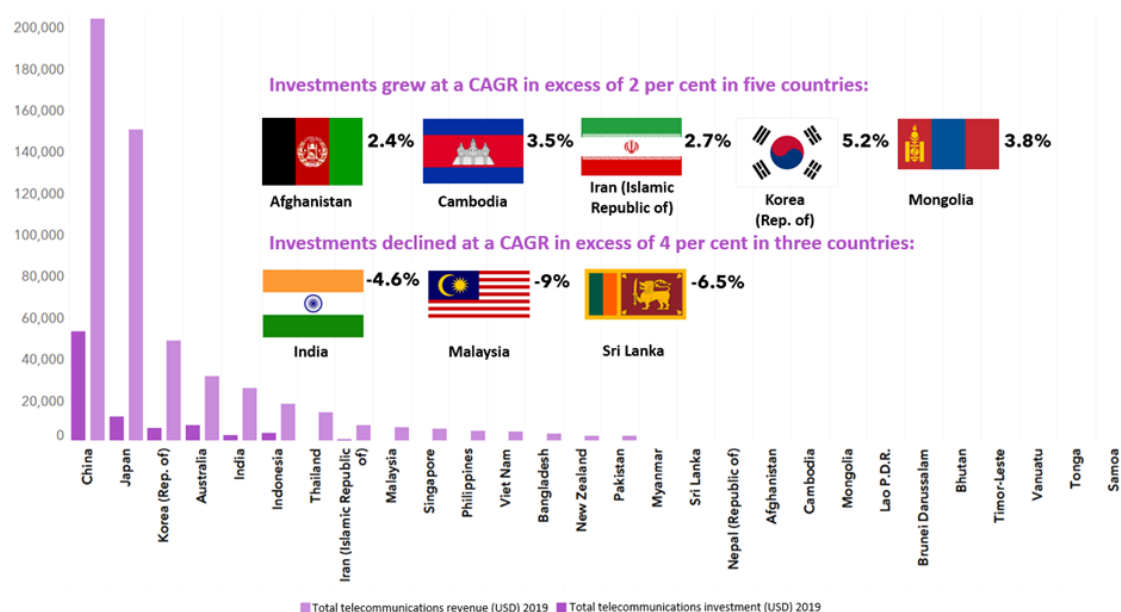
Source: From ITU, "Measuring digital development: ICT price trends 2019"

2.6 Communication revenue and investment

In the Asia-Pacific region, ITU estimates that total telecommunication investment in 2018 amounted to USD 103.7 billion, or 28.9 per cent of all telecommunication revenue for the region. Total telecommunication revenue increased between 2018 and 2019 in the eight countries in

the region for which data were available, namely Bangladesh (compound annual growth rate of 4.3 per cent), Bhutan (9.9 per cent), Sri Lanka (4.7 per cent), Timor-Leste (4.4. per cent) and Viet Nam (4.1 per cent), followed by Indonesia, the Islamic Republic of Iran, Sri Lanka and Thailand, each of which had a compound annual growth rate of between 1 and 3 per cent. Total annual telecommunication investment increased in the same period in Afghanistan, Cambodia, China, the Islamic Republic of Iran, the Republic of Korea, Mongolia and Pakistan. For the same period, revenue decreased in Afghanistan, Australia, Brunei Darussalam, Cambodia, China, India, the Republic of Korea, Malaysia, Mongolia, Pakistan and Viet Nam, and investment decreased in Australia, Bangladesh, Bhutan, Brunei Darussalam, India, Kiribati and Sri Lanka (Figure 16).

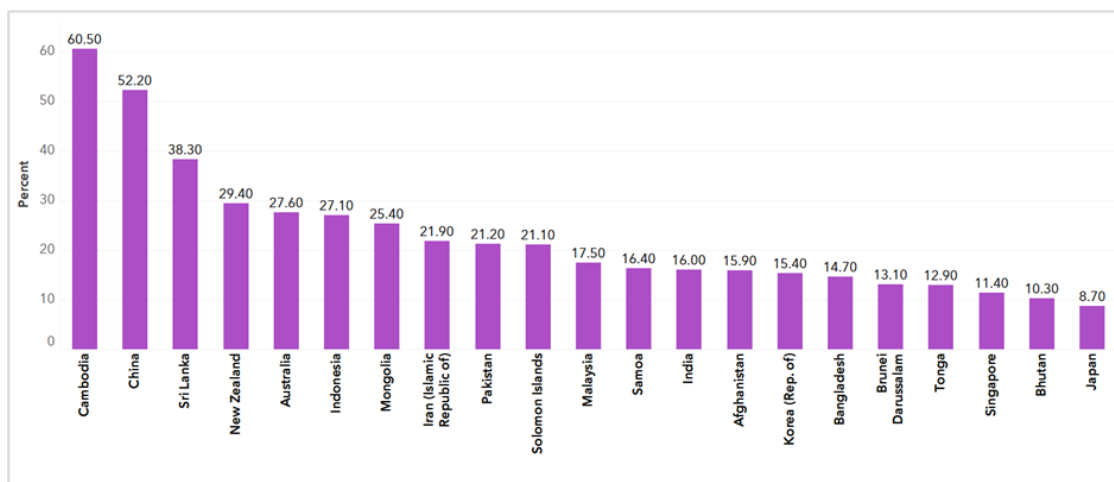
Figure 16: Total telecommunication investment and revenue by country (where available), in millions of USD, Asia-Pacific region, 2019



Source: Based on ITU WTI Database. No 2019 data were available for Japan (2018), Lao P.D.R. (2015), Myanmar (2018), the Republic of Nepal (2015), New Zealand (2018), Philippines (2015), Samoa (2015), Singapore (2018) or Tonga (2018).

The level of investment as a share of revenue was highest in Cambodia with 60.5 per cent. For eight countries, the level of investment as a share of revenue was 20-30 per cent, namely Sri Lanka (38.3 per cent), New Zealand (29.4 per cent), China (27.8 per cent), Australia (27.6 per cent), Indonesia (27.1 per cent), Mongolia (25.4 per cent), the Islamic Republic of Iran (21.9 per cent), Pakistan (21.2 per cent) and Solomon Islands (21.1 per cent). The lowest levels of investment as a share of revenue were found in Hong King (China) and Japan, with 8.1 per cent and 8.7 per cent respectively (Figure 17).

Figure 17: Level of telecommunication investment as a share of telecommunication revenue by country, Asia-Pacific region, 2018



Source: Based on ITU WTI Database, 2020

2.7 Digital service trends

Digital economy services have grown as governments and enterprises adopt national digital strategies, policies and plans. The 2020 E-Government Development Index (EGDI) survey shows positive growth in such services, as countries increase their EGDI rankings (Figure 18).

Figure 18: Movement between EGDI groups from 2018 to 2020 (number of countries)



Source: 2018 and 2020 United Nations E-Government Surveys.

“Asia is home to countries with some of the highest EGDI rankings, such as the Republic of Korea (2nd), Singapore (11th) and Japan (14th) but also includes countries with significantly lower rankings, including Lao P.D.R. (167th), Afghanistan (169th), Yemen (173rd) and Democratic People’s Republic of Korea (187th).”¹³

¹³ 2020 United Nations E-Government Survey, [https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020UN%E-Government%20Survey%20\(Full%20Report\).pdf](https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/2020UN%E-Government%20Survey%20(Full%20Report).pdf)

The United Nations roadmap for digital cooperation further emphasizes the importance of using digital public goods to unlock the full potential of digital technologies and data in attaining the SDGs, in particular for low- and middle-income countries.¹⁴

Digital services remain a priority area for ITU members in the Asia-Pacific region. Both in the digital services and application programme provided for under WTDC-17 Output 4.2 and in the Asia-Pacific Regional Initiative 2 on harnessing ICTs to support the digital economy and an inclusive digital society, the aim is to improve the capacity of the ITU membership to leverage new technologies and telecommunication/ICT services and applications to accelerate their economic and social development. Despite significant efforts to promote ICT-enabled solutions for development, stakeholders often implement and develop solutions in a “siloeed” manner, which leads to significant duplication and fragmentation of efforts and affects resource effectiveness. The aim of the joint project Mainstreaming ICT for SDG (ICT4SDG), developed by ITU and the Digital Impact Alliance, is to address existing challenges by adopting a whole-government approach to meeting the SDGs. In addition, specialized toolkits, blueprints and programmes have been created to build sectoral strategies and support their implementation by helping ITU members use digital services and applications (such as the Be He@lthy, Be Mobile initiative in collaboration with the World Health Organization (WHO), the e-agriculture partnership with the Food and Agriculture Organization of the United Nations (FAO), the Giga initiative in collaboration with the United Nations Children’s Fund (UNICEF), and the smart village platform, which is being adapted to smart islands).

ITU helps its members and partners in the Asia-Pacific region in various areas: developing national strategies and action plans (e.g. digital government in Pakistan, Papua New Guinea and Vanuatu, and digital agriculture in Afghanistan, Cambodia, Pakistan and Mongolia); conducting studies (e.g. the study on the state of the digital divide in Thailand, which identified key infrastructure factors affecting access to and adoption of e-learning and other digital technologies in schools); supporting solutions (e.g. digital government in Bhutan and digital agriculture in Papua New Guinea); and holding forums and training sessions on digital government, digital transformation, cross-sectoral skills and technological applications for delivering digital services. Given the cross-sectoral nature of such services, ITU has developed strategic partnerships to meet the needs of its members. Its partners include United Nations sister agencies (WHO, UNICEF, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Capital Development Fund (UNCDF), the United Nations Development Programme (UNDP), the International Labour Organization (ILO) and the World Bank), regional organizations (the Asia-Pacific Telecommunity, the Asia-Pacific Network Information Centre and the Pacific Islands Telecommunications Association), regulators (the National Broadcasting and Telecommunications Commission of Thailand), donor agencies and national governments. Two projects are currently being carried out: the Support to Rural Entrepreneurship, Investment and Trade in Papua New Guinea programme, funded by the European Union and implemented by FAO, ITU, ILO, UNDP and UNCDF; and the Asia-Pacific Regional Initiative 2 on harnessing ICTs to support the digital economy and an inclusive digital society, supported by the Australian Government. Supporting countries in developing their national strategies, implementing pilot solutions where strategies are being developed and promoting the smart village and smart island platforms remain important areas of work.

¹⁴ <https://www.un.org/en/content/digital-cooperation-roadmap/>

2.8 Developments in cybersecurity

Cybersecurity is key to trusted and sustainable digital transformation. This is particularly evident during situations of crisis such as the COVID-19 pandemic, during which many organizations have moved their activities and communication online and cyber-defences have been lowered as focus shifts to the health crisis. According to an assessment of the global landscape of COVID-19 cyberthreats conducted by the International Criminal Police Organization (INTERPOL), cyberthreats have increased significantly across all cybercrime domains, including in the form of online scams and phishing, data-harvesting malware, disruptive malware/ransomware, and attacks aimed at exploiting the vulnerabilities of systems, networks and applications used by businesses, governments and schools to support staff who are now working remotely.¹⁵

ITU estimates that, at the end of 2019, the global cost of cybercrime was USD 2 trillion. Fit-for-purpose cybercrime legislation, strategies and frameworks, as well as computer emergency response teams (CERTs) and relevant capabilities, awareness and capacities, are therefore key to sustainable economic and socio-economic development.

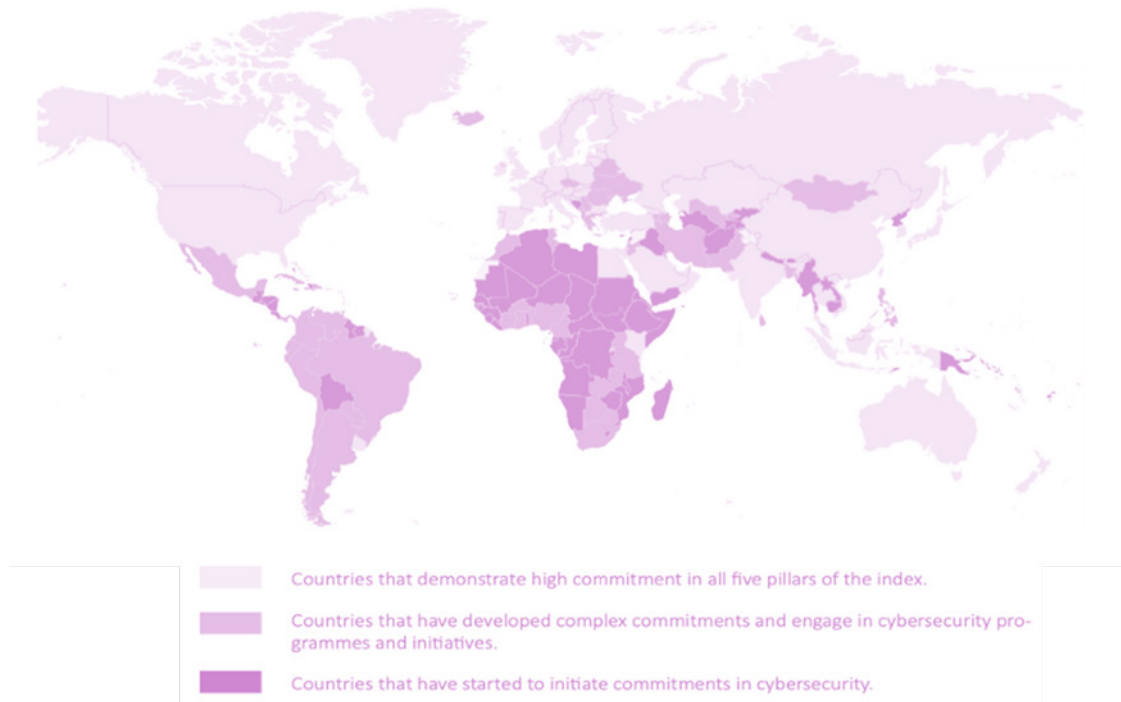
Since 2015, ITU has maintained the Global Cybersecurity Index (GCI) to measure the commitment of each ITU Member State to cybersecurity across five pillars (see Box 7 for a description of these pillars).¹⁶ The GCI is an ITU initiative that involves experts from different backgrounds and organizations. The Asia-Pacific region is mixed in its commitment to ensuring that ICTs are used safely and securely, and it outpaces all other regions in cybercrime preparedness and commitment across all GCI cybercrime pillars. The GCI 2018 shows that 11 countries in the region (Australia, China, India, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, Singapore, Thailand and Viet Nam) fall into the high commitment category, while eight countries (Bangladesh, Brunei Darussalam, the Islamic Republic of Iran, Mongolia, Pakistan, the Philippines, Samoa and Sri Lanka) fall into the medium commitment category. The remaining 17 countries fall into the low commitment category (Figure 18). Singapore, Malaysia and Australia obtained the top three overall GCI scores in the Asia-Pacific region and featured among the top 11 countries globally (Figure 19).¹⁷

¹⁵ <https://www.interpol.int/en/content/download/15217/file/Global%20landscape%20on%20COVID-19%20cyberthreat.pdf>

¹⁶ <https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx>

¹⁷ GCI 2018, p. 30, https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf

Figure 19: Heatmap of national cybersecurity commitment based on the ITU GCI 2018

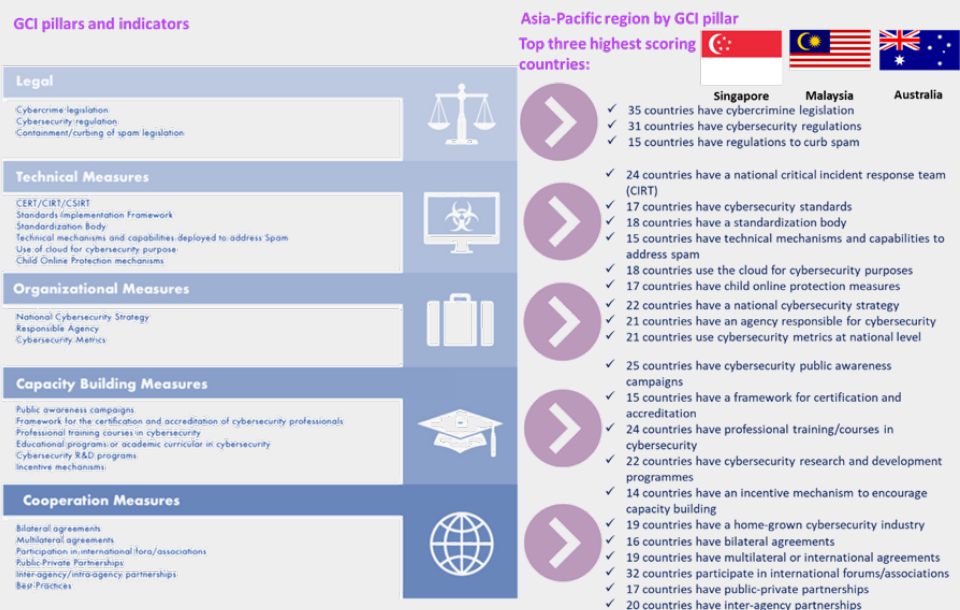


Source: ITU, based on data from ITU GCI

Box 7: ITU Global Cybersecurity Index: Asia-Pacific region - A closer look

The **objective of the GCI** is to measure each ITU Member State's level of commitment to cybersecurity across five main areas: **legal, technical, organizational, capacity building and cooperation**. The GCI can help countries identify areas for improvement, motivate action to improve relative GCI rankings, raise the level of cybersecurity worldwide, identify and promote best practices and foster a global culture of cybersecurity.

The Asia-Pacific region shows mixed GCI scores across the five pillars, as shown below.



Selected country case studies by GCI pillar:



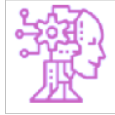
Source: ITU, based on data from ITU GCI 2018

2.9 ICT infrastructure developments and integrated technologies

While ITU does not, at this time, collect data for indicators on emerging technologies such as the application of artificial intelligence, the status of the Internet of things (IoT) (except for machine-to-machine (M2M) SIM cards) or developments in relation to cloud technologies, such technologies form an increasingly important area of ICT development that is thriving through the work of all three ITU Bureaux. As infrastructure evolves around the world, it is likely to accommodate co-dependent hardware and software. Figure 20 provides an overview of the landscape for artificial intelligence, IoT and cloud technologies in the Asia-Pacific region.

Figure 20: Landscape for artificial intelligence, IoT and cloud technologies in the Asia-Pacific region

Artificial intelligence landscape



- ✓ The Asia-Pacific region is well represented among the global leaders in the artificial intelligence landscape, including global champions such as China and aspiring leaders such as Japan, the Republic of Korea and Singapore, all of which are investing heavily in building artificial intelligence ecosystems.
- ✓ The areas that shape and frame national approaches and policies to artificial intelligence in Asia and the Pacific include infrastructure, access to data, skills and human capital, trust and partnerships, and ecosystem and entrepreneurship. Large and small players, such as China and Singapore, are setting out clear national artificial intelligence strategies, covering investment and regulatory frameworks, to accompany their expanding infrastructure.
- ✓ Artificial intelligence is becoming a key topic for security and defence policy-makers in Asia and the Pacific, as illustrated by the discussions of the topic at the Shangri-La Dialogue and the Xiangshan Forum.
- ✓ China is the global frontrunner in artificial intelligence development, deployment at scale and research investment, driven by vast amounts of data and the demand for efficiency gains in consumer-focused services and automation opportunities. Adequate government support and a national artificial intelligence strategy are behind the rise in a sustainable number of industrial ecosystems, with both small-and medium-sized enterprises, in addition to orchestrators such as Alibaba, Tencent and Haier, ready to participate in the artificial intelligence ecosystem.
- ✓ Smaller-scale experimental artificial intelligence projects to foster homegrown artificial intelligence capabilities are surfacing in many countries, sectors and industries in the region, such as finance, health care, retail, transport, manufacturing and agriculture – strategic industries that together drive the economic dynamism of both emerging and mature regional economies. Projects include collaborative public-private partnerships in Indonesia, Malaysia, Viet Nam, Thailand, the Philippines and India. More coordinated local and national strategies can be found in Australia, New Zealand and the Republic of Korea. However, while many countries recognize the potential of artificial intelligence, they often lack the critical infrastructure and scale to properly capitalize on the benefits.
- ✓ MarketWatch is forecasting the artificial intelligence chipset market size in the Asia-Pacific region to expand at a CAGR of 40 per cent through 2026.
- ✓ Asia-Pacific companies and research institutes (from China, Japan and the Republic of Korea) dominate the ranking of patent applicants in artificial intelligence, holding 16 of the top 30 positions.

Sources: <https://www.bcg.com/en-ch/publications/2020/europe-can-catch-up-in-ai-but-must-act-today>; <https://www.iicom.org/iic-reports/>; <https://www.mckinsey.com/featured-insights/china/artificial-intelligence-implications-for-china>; <https://thediplomat.com/2021/01/artificial-intelligence-collaboration-in-asia-security-landscape/>; <https://www.forbes.com/sites/insights-lbma/2020/05/21/where-asia-is-taking-the-world-with-ai/>; <https://www.marketwatch.com/press-release/apac-artificial-intelligence-chipsets-market-to-hit-us40-billion-by-2026-2020-12-01>; and https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf

IoT landscape



- ✓ Deeply linked to artificial intelligence, the Internet of things (IoT) is the vehicle for the development of edge technology and distributed sensor networks that feed data to artificial intelligence systems.
- ✓ The IoT market in the Asia-Pacific region has been forecast at over USD 400 billion through 2025, driven by logistics, manufacturing, agricultural and retail opportunities. As of late 2020, roughly 40 per cent of Asia-Pacific companies were already using some form of IoT, and over 80 per cent were launching or accelerating IoT projects in response to the COVID-19 pandemic. There is, however, high variability across the Asia-Pacific nations.
- ✓ The GSM Association predicts that government stimulus and the rise of smarter, more connected cities will lead to a 38 per cent increase in the share of global IoT revenue by 2025.
- ✓ IoT development globally is increasing concerns over governance gaps, especially given the challenges of network interoperability and security. Such gaps include the regulation of smart contracts, IoT-enabled business models, supply chain tracking and cyberliability.

Sources: <https://www.globenewswire.com/news-release/2020/03/05/1995775/0/en/Asia-Pacific-IoT-Markets-to-2025-A-424-Billion-Projected-Market-Assessment-with-Growth-Opportunities-in-Agri-IoT-Retailing-and-Smart-City-Programs.html>; <https://futureiot.tech/apac-companies-fast-track-iot-projects-amid-covid-19/>; https://www.gsma.com/iot/gsma_events/thrive-asia-pacific-2020/; and http://www3.weforum.org/docs/WEF_Global_Technology_Governance_2020.pdf

Cloud computing technologies



- ✓ The global fall in cloud computing prices – as a key utility for IoT infrastructure – will have an impact on the accelerated development of IoT network development and operation. In addition, this provides an opportunity for the integrated use of AI, interconnecting the three technology areas.
- ✓ The Asia-Pacific cloud market could more than double to nearly USD 300 billion in the next five years, driven by multi-cloud connectivity and edge computing demand. The broad cloud computing ecosystem across the Asia-Pacific region is diverse and complex, placing significant pressure on companies in navigating and selecting services and components.
- ✓ Cloud services across the Asia-Pacific region continue to be dominated by Chinese and American firms, split equally among the top six providers. The overall market is saturated. Global competitors for Asia's data are building data centres in the region in order to comply with global data sovereignty requirements.

Sources: <https://datacenternews.asia/story/apac-cloud-market-to-grow-117-in-five-years-report>; <https://futureiot.tech/iot-ai-and-edge-computing-projects-face-complex-ecosystem/>; <https://www.capacitymedia.com/articles/3826371/aws-and-alibaba-lead-cloud-market-in-asia-pacific>; and <https://www.globenewswire.com/news-release/2020/01/13/1969747/0/en/Cloud-Computing-in-Asia-Pacific-to-2023-Telco-Cloud-Offers-Best-Practices-Case-Studies-Market-Opportunities-Recommendations.html>

2.10 Impact of COVID-19 on digital development

The COVID-19 pandemic has accelerated digital development. While research on the contribution of digitization to mitigating the impact of pandemics is limited, compelling evidence is emerging of its positive effects. For example, anecdotal evidence published by ITU in its report “Measuring digital development: Facts and figures 2020” reflects the impact that the pandemic has had on individuals’ online activities.¹⁸ Moreover, the accelerated adoption of digital services has triggered innovation, shifting traditional services to digital platforms (e.g. virtual meetings), fast-tracking the widespread adoption of new means of service delivery (e.g. online shopping) and mainstreaming new service applications. These trends have been observed in both the public and the private sectors; governments in the Asia-Pacific region have continued to adopt digital transformation and digital economy plans, improve public service delivery and support the ecosystem, while the private sector is fast moving to a “new normal”. In a survey conducted by McKinsey & Company,¹⁹ executives said that companies digitized many activities 20-25 times faster during the COVID-19 pandemic. Moreover, in its 2020 compendium of digital government initiatives in response to the COVID-19 pandemic, the United Nations Department of Economic and Social Affairs highlighted the agility and flexibility that digital infrastructure and platforms provide in addressing multiple SDGs, including emergency responses.²⁰ Initiatives covered information sharing, e-participation, e-health, e-business, contact tracing, social distancing, virus tracking, working and learning from home, digital policy and partnerships.

¹⁸ <https://www.itu.int/en/ITU-D/Statistics/Pages/ff2020interactive.aspx>

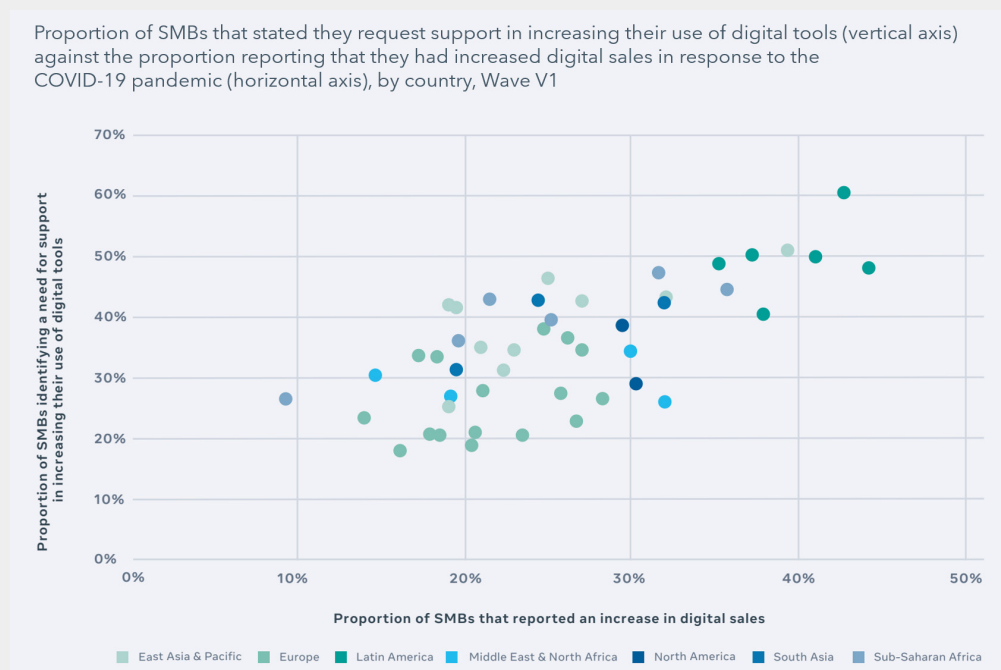
¹⁹ <https://www.mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/a-pandemic-digital-silver-lining-companies-digitized-many-activities-20-to-25-times-faster-during-covid-19>

²⁰ <https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2020-Survey/UNDESA%20Compendium%20of%20Digital%20Government%20Initiatives%20in%20Response%20to%20the%20COVID-19%20Pandemic.pdf>

Box 8: The impact of COVID-19 on digital development in Asia and the Pacific

In the Asia-Pacific region, the impact of the COVID-19 pandemic has been severe, particularly for small and medium-sized businesses (SMBs), which represent a large proportion of businesses across the region. A survey of 30,000 businesses across 50 countries conducted by Facebook, the Organisation for Economic Co-operation and Development (OECD) and the World Bank found that, in South Asian countries, 46 per cent of SMBs surveyed were closed at the time of the survey, with Bangladesh (50 per cent) and India (47 per cent) particularly affected.¹ By comparison, 18 per cent of businesses in countries in East Asia and the Pacific were closed: only 10 per cent of businesses in Japan and the Republic of Korea were closed, and 31 per cent in Singapore.

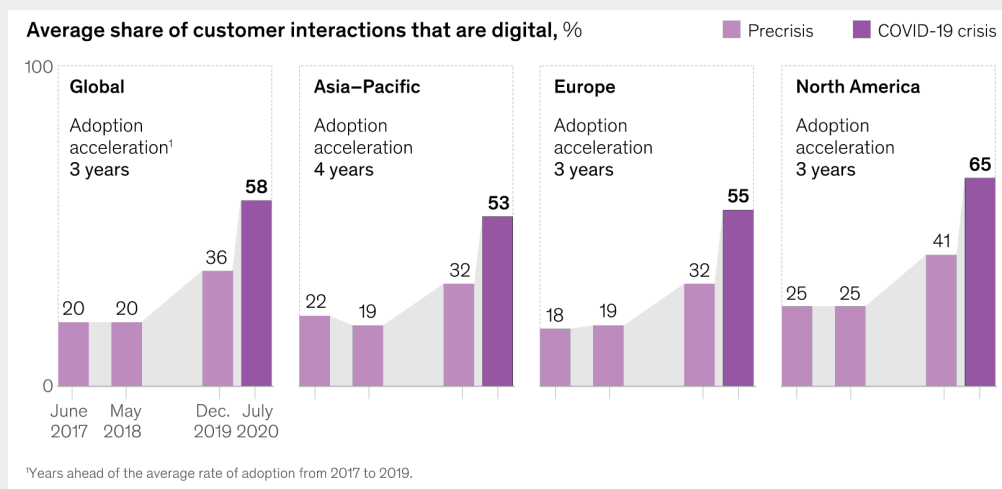
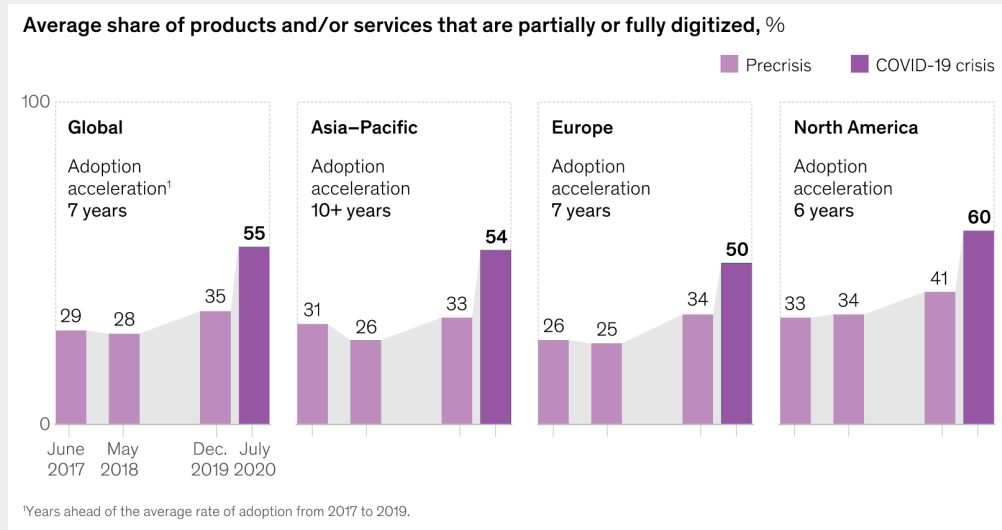
The survey showed that SMBs recognized the value of adopting digital tools to mitigate the impact of lockdowns on business activity and to adapt to new ways of working after the pandemic. It also recorded the proportion of SMBs that had increased their digital sales in response to the COVID-19 pandemic. The proportion of SMBs across East Asia and the Pacific and across South Asia that had required support to increase their use of digital tools was slightly higher than the proportion of SMBs that had achieved an increase in digital sales, as shown in the graphic below.



Source: Facebook/OECD/World Bank, "The Future of Business Survey", 2020

¹ Between May and October 2020, the Future of Business Survey, an ongoing data collection collaboration between Facebook, the OECD and the World Bank, took a monthly pulse of how SMBs have navigated the COVID-19 pandemic via a repeated cross-section. The survey collected data from more than 150 000 business leaders in over 50 countries across six waves. See: <https://dataforgood.fb.com/global-state-of-smb>

A survey published by McKinsey & Company in October 2020 explored the extent to which companies had reached the technology tipping point.¹ The survey found that responses to COVID-19 had accelerated the adoption of digital technologies by several years, in particular in interactions with consumers and supply chains through online channels and internal operations. The survey showed that the greatest impact was felt in the Asia-Pacific region, with customer adoption accelerating by 4 years and business digitization for products and/or services by 10+ years, as shown below.



Source: McKinsey & Company, "How COVID-19 has pushed companies over the technology tipping point - and transformed business forever", 2020

¹ McKinsey & Company, "How COVID-19 has pushed companies over the technology tipping point - and transformed business forever", 2020, <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever>

At the same time, the COVID-19 pandemic has also laid bare underlying systemic weaknesses, in particular the persistent digital divide. The challenges in addressing the digital divide experienced in the Asia-Pacific region have been compounded by the COVID-19 pandemic and its negative

impact on society and the economy. The COVID-19 crisis has not only highlighted the critical role of ICT in the continued functioning of society and economy, but it has also accentuated the clear digital inequalities both between and within countries. The economic fallout of the COVID-19 pandemic includes a considerable disruption and contraction in economic activity, a steep decline in government and business revenues, increased unemployment and the loss of livelihoods for countless informal daily wage earners. Several Asia-Pacific countries have already announced a range of unprecedented policy measures to stem the decline and eventually stimulate economic recovery. Further efforts will be needed to ensure that such measures and recovery plans are not only focused on reviving economic growth in the short term, but rather they are in line with long-term, inclusive, sustainable, resilient and low-carbon pathways.

The role played by digital technologies in mitigating the impact of the COVID-19 crisis has re-emphasized the importance of digital infrastructure, not only in terms of universal access and digital inclusion, but also other attributes such as quality, resilience, security and affordability. The increased reliance on digital infrastructure and services during the COVID-19 lockdown has been unprecedented, as has the response of the ICT sector. ICT sector policy-makers, regulators, industry members and academics have together helped meet expectations.

Box 9: ITU initiatives to help mitigate the impact of COVID-19

In the discussion paper on the economic impact of COVID-19 on digital infrastructure published during the 2020 Global Symposium for Regulators, ITU found that, in the medium term (i.e. by 2021), countries with top connectivity infrastructure could mitigate up to half of the negative economic impact of the COVID-19 pandemic.¹ However, there are also factors that limit the capacity of digitization to improve social and economic resilience. These include the digital divide, in addition to demand-side barriers such as limited affordability and digital illiteracy. Furthermore, the paper emphasizes that the benefits of digital infrastructure in dealing with the pandemic are limited to those industries that are well on their way to digital transformation, such as logistics. To address these barriers and increase the mitigation value of digitization, the paper makes a number of recommendations, stressing that the digital infrastructure sector needs to re-examine some of the fundamental premises of the digital sector held before the COVID-19 pandemic, such as:

- **concrete, actionable measures** in the telecommunication sector to enable private operators to provide universal access to quality digital infrastructure networks for all and support the development of a digital economy;
- **adoption of a much broader, holistic view by governments** of investment in high-speed broadband networks, considering the economic, social and environment/climate benefits and costs of investment;
- **possible adjustment of regulatory frameworks** to stimulate investment while maintaining a sensible level of competition, shifting from a purist to a pragmatic viewpoint on State-aid regulations;
- **harnessing the opportunity to use the COVID-19 pandemic as a catalyst** for the adoption of digitization in sectors where it had not occurred before, especially in more business-oriented applications.

ITU has called into life various COVID-19 initiatives, activities and partnerships to help understand the impact of the crisis and develop guidance for countries, including [Connect2Recover](#), the Global Network Resiliency Platform [REG4COVID](#), the [World Summit on the Information Society \(WSIS\) ICT Case Repository](#) and [CYB4COVID](#). Partnerships include the ad hoc group on digital technologies for COVID health emergency under the ITU/WHO Focus Group on artificial intelligence for health, in addition to the Agenda for Action developed by the United Nations Broadband Commission for Sustainable Development. For more information, see: <https://www.itu.int/en/Pages/covid-19.aspx>.

¹ <https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx>

3. Regulatory trends in Asia and the Pacific

The right regulatory framework is key to successful, inclusive and sustainable digital transformation that minimizes unwanted consequences for market structures and consumers. As the COVID-19 crisis has laid bare, inequalities are increasing within and between countries, not least because current governance and regulatory frameworks and their implementing mechanisms are

failing to deliver more equitable outcomes. As the pace of digital transformation accelerates, the formulation of effective regulatory approaches has therefore become critical. Through complementary ITU regulatory metrics, such as the [ICT Regulatory Tracker](#) and the [Benchmark of Fifth Generation Collaborative Regulation \(G5 Benchmark\)](#),²¹ ITU has identified the broad tracks for regulatory reform and has pinpointed how countries can accelerate progress towards the next regulatory generation.

3.1 New collaborative regulatory paradigm

A new regulatory paradigm has emerged – the “gold standard” for collaboration among regulators and policy-makers²² – that seeks to fast forward digital transformation for all. This new paradigm is embodied in collaborative regulation (see Box 10 for a definition of the general concept), in which a broad and diverse range of stakeholders must be engaged in informed, evidence-based rule-making and decision-making that keeps both the social and the economic impact in mind, with priority granted to the latter. Collaborative regulation applies readily to multiple areas of regulatory work, including infrastructure sharing and co-deployment, and can substantially benefit from the introduction and effective use of collaborative governance and data-driven regulatory instruments.

ITU forged the concept of “collaborative regulation” in 2016 and has since tested it annually at the Global Symposium for Regulators (GSR). While the concept continues to evolve, in 2020 it can best be cast as a framework for discussing the evolution of regulatory patterns and policies, while charting the way ahead towards digital transformation for industry and regulators as one constituency.

²¹ Note: The term “G5” used in relation to the benchmark should not be confused with “5G”, which refers to wireless technology.

²² <https://www.itu.int/en/mediacentre/Pages/PR06-2020-Global-ICT-Regulatory-Outlook-G5-Benchmark.aspx>

Box 10: Collaborative regulation - A forward-looking concept

What is collaborative regulation?

Collaborative regulation, or 5th generation regulation (G5), is a broad notion that ITU has defined based on the concept of generations of ICT regulation. It marks a fundamental shift in the way that regulation is executed, providing a holistic policy ground and bringing together a variety of stakeholders, from policy-makers, single-sector and cross-sector regulators to market players of any size. It also shifts regulatory focus onto behaviours and the impact on markets and development.

Collaborative regulation puts a new emphasis on consumer benefits and protection and leverages the resources of government institutions and industry to deliver them through organic consultation, collaboration and conciliation. Collaborative regulation is driven by leadership, incentive and evidence rather than by command-and-control schemes. The concept also refers to the set of new tools used by regulators to tackle issues related to digital transformation and the data economy.

Why do we need collaborative regulation?

All roads now point to more collaboration, better channels and more bandwidth. However, while the case for collaboration is irrefutable, progress has been stalled by power battles, lack of resources and misconceptions. Sound progress towards inclusive, collaborative regulation is needed for the good of all users of digital services, both now and in the future. This need is borne out by four fundamentals:

- **Digital transformation is a game changer, especially in “the new normal” amid the COVID-19 pandemic**

ICTs have become the foundation for every economic sector and a *sine qua non* of business performance, national growth and, more recently, resilience. Regulators need to ensure that regulation achieves its objectives in the most effective and efficient manner, in particular ensuring network resilience and enhancing both the capacity and coverage of networks without imposing disproportionate, redundant or overlapping burdens on the market.

- **The new digital world needs a new take on regulation**

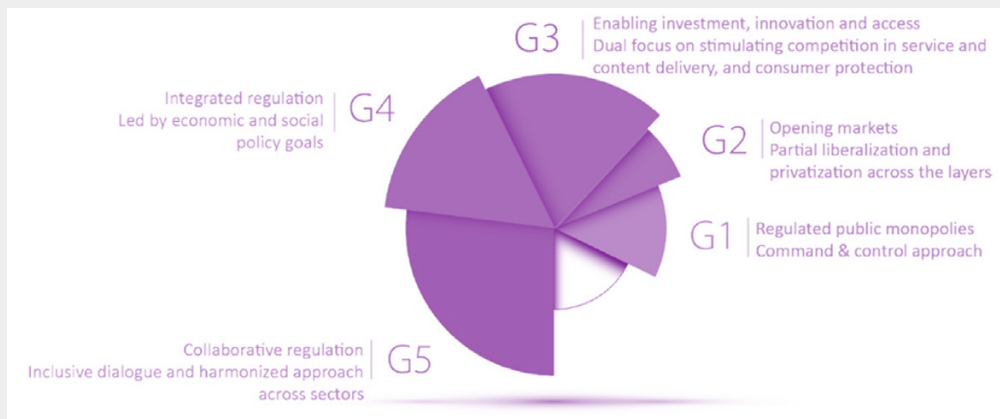
ICTs can dramatically transform education, health care, environmental management, agriculture, trade and entrepreneurship, the provision of government services and much more. For this to happen, enabling policies and regulatory frameworks and the right networks and services need to be put in place.

- A holistic and harmonized approach can deliver a greater impact**

Silo-style regulation of the ICT sector is not viable in the digital world. Collaborative regulation mirrors the interplay between digital infrastructure, services and content across industries and national borders. It also allows for the harmonization of rules and ensures consistent implementation of policy and regulatory frameworks that have evolved independently in many sectors over the years.
- Development and inclusion have become a primary focus of regulation**

Collaborative regulation is people-centred regulation; it looks at sustainability and long-term gains as opposed to industry profit maximization and exclusive economic growth. Champions of collaborative regulation are also engaged in connecting marginalized individuals, persons with disabilities, low-income communities, communities challenged by educational impoverishment, and remote or isolated populations that may also lack basic infrastructure such as electricity. There is therefore a need to be much more innovative and collaborative in the approach to policy-making.

The five generations of ICT regulation: A conceptual framework



Source: ITU, 2020

3.2 The G5 Benchmark for regulatory excellence

To afford perspectives both on the regulatory road already travelled and on future pathways, ITU developed the **G5 Benchmark** based on GSR Best Practice Guidelines²³ and ITU research and analysis. First conceptualized in 2019 to set out new goals for regulatory excellence, the benchmark is built around an extensive and varied set of indicators and will soon cover all ITU Member States.²⁴ The indicators are clustered into three tracks: collaborative governance, policy design principles and the G5 toolbox. The cross-sector regulatory frameworks captured through the various indicators are pivotal in creating a digital marketplace that is inclusive, sustainable and pro-development and that forms a cornerstone of digital transformation. Box

²³ See in particular the GSR Best Practice Guidelines on fast forward digital connectivity for all (2019) and on the gold standard for digital regulation”, (2020), which set out key principles and recommendations regarding regulatory thought leadership for digital transformation.

²⁴ The G5 Benchmark will be expanded to cover all ITU Member States, leveraging the new refined methodological framework. A new edition will be released ahead of the World Telecommunication Development Conference in 2021 (WTDC-21).

11 sets out the G5 Benchmark in a nutshell. More in-depth information on the G5 Benchmark can be obtained in the [Global ICT Regulatory Outlook 2020 report](#).

Box 11: ITU G5 Benchmark in a nutshell

What is it?

The G5 Benchmark is a new tool for policy-makers and regulators. It fast tracks collaborative, cross-sector regulation, which is the best and quickest means of leveraging digital transformation for the benefit of everyone. It uses a brand-new three-lens approach, which focuses on collaborative regulation and offers surprising, high-value insights. The G5 Benchmark is the new gold standard for collaboration among regulators.

What does the G5 Benchmark do?

It is a powerful, straightforward tool that makes sense of shifts in regulatory frameworks as policy-makers and regulators navigate a complex digital landscape. It delivers on additional aspects of high value for policy-makers and regulators, by:

- setting new goals for regulatory excellence;
- highlighting shortcomings in the pursuit of the SDGs and proposing solutions;
- diving deep into policy trends;
- enriching global policy debate.

Why is the G5 Benchmark different?

First, it uses a brand-new three-lens approach, which has a laser-sharp focus on collaborative regulation. Second, three features combined make it especially powerful:

1. *Scope*: Most ITU Member States; all regions; 2018-2019 data.
2. *Ease-of-use*: Straightforward methodology; three regulatory tracks and easy-to-measure indicators; policy-makers can check and update country data, compare with others and run "what-if" projections; easy interplay with the ICT Regulatory Tracker; easy assessment of cross-sector regulatory frameworks and quick identification of "win" opportunities.
3. *Objectivity*: Built on latest data; factual evidence.

What is the three-track approach and why is it important?

The G5 Benchmark is built with simplicity to cut through complexity. It uses three regulatory tracks, or “lenses”, which together focus on the DNA of G5 collaborative regulation:

1. *Collaboration*: The defining feature of G5 regulation, this lens focuses on the breadth and depth of cross-sector collaboration between the ICT regulators and their peers.
2. *High-level principles*: This lens focuses on the use of policy principles (which are increasingly replacing rules in policy design).
3. *G5 regulatory toolbox*: This lens focuses on the use of reimagined, innovative policy instruments that “switch on” the digital economy.

Why is the G5 Benchmark especially important at this time?

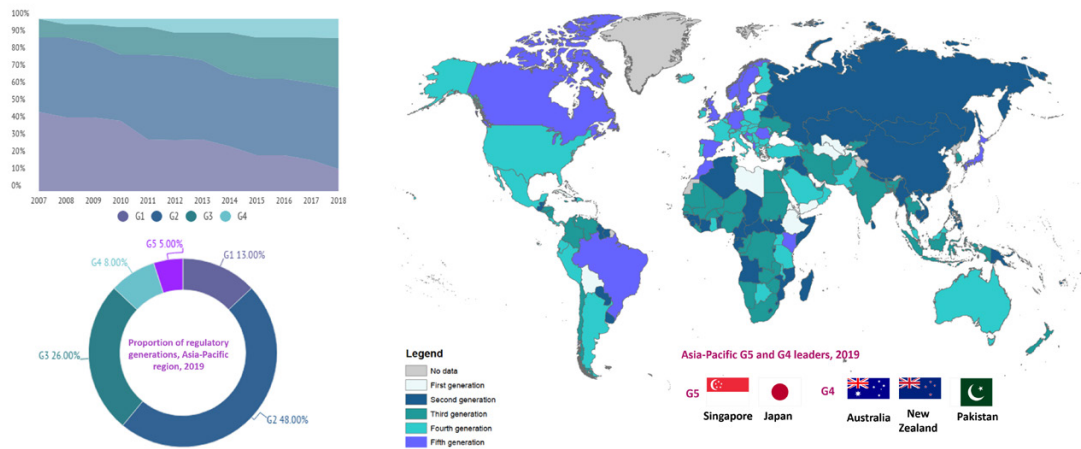
1. *Regulation is changing as digital markets mature*. Economies undergoing digital transformation in this decade follow a very different path to those followed previously.
2. *Existing metrics do not tell the whole story*. The Benchmark’s three clear regulatory tracks present new perspectives and new insights that were previously not apparent.
3. *High-level policy design principles are fully taken on board*. Regulation is multi-layered and complex in our digital age, and rules are increasingly giving way to principles.
4. *Collaboration among sector/multi-sector regulators*. Collaboration, the defining feature of G5 regulation, is essential for relevance, coherence and impact.
5. *A benchmark is worth a thousand words*. Policy-makers need a tool that simply and quickly evaluates and models regulatory set-up and tools by comparing apples with apples.

Source: ITU 2020

3.3 Maturity of ICT regulatory frameworks in the Asia-Pacific region

The Asia-Pacific region presents one of the most diverse ranges of countries in terms of regulatory maturity. There has been limited adoption of the new regulatory paradigm thus far, with only five countries - one in 10 - having attained G4 or G5 status. Singapore is the highest-ranking non-European country for collaborative regulation, ranking third worldwide. The list of leading non-European G5 regulators also includes Japan (16th worldwide), which is followed by three G4 countries, namely Australia, New Zealand and Pakistan (Figure 21).

Figure 21: Evolution of the generations of ICT regulation, Asia-Pacific region, 2007-2019



Source: Based on ITU data, 2020

No new countries have succeeded in attaining G4 status since 2012. Australia and Singapore were the first to achieve G4 status in 2008. Over the past dozen years, the number of G1 and G2 regulators has almost halved, from over 90 per cent in 2007 to 53 per cent in 2019. Today, G3 countries are four times more common than in 2007, representing 37 per cent of the region. Eight in ten countries in the Asia-Pacific region are in either G2 and G3, compared to an almost equal number of countries in the least developed (G1) and most developed (G4 and G5) generations of regulation. Sub-regions diverge in their levels of maturity: while a third of the countries in East Asia and the Pacific have G1 status, no countries in South Asia have G1 status and over half have G2 status. A third of South Asian countries have G3 status, compared with nearly 40 per cent for the rest of the region.

At global level, ITU analysis shows that, while digital has been gaining ground and shaping regulatory responses, too few countries have yet achieved the maturity needed to trigger its multiplier effect on development and digital transformation, with 9 out of every 10 countries still regulating ICTs as a separate economic sector. However, a vanguard of 8 per cent of countries now have holistic, forward-looking regulatory frameworks in place, enabling digital transformation across their economies. More information and a deep dive into country analysis can be found in the [ICT Regulatory Tracker](#) and the [Global ICT Regulatory Outlook Report 2020](#).

Further insights into regional markets, regulatory and tariff policy trends are available on the ITU data portal, the [ICT Eye](#). Regional data are based on official national statistics provided by administrations of ITU Member States through ITU regular surveys, and include ICT statistics, institutional frameworks and governance, market structure, universal access and service policies and price regulation.

Box 12: Voices from the region - Pakistan on the journey towards collaborative regulation

In an effort to better understand how regulators are mastering the journey towards collaborative regulation, ITU undertook primary research based on five questions sent to regulators. This box highlights the experience of the Pakistan Telecommunication Authority:

- **What is the single most difficult challenge in moving towards collaborative regulation?**
Compliance with government procedures while maintaining a balance between operator incentives and consumer rights.
- **Who are your key counterparts/interlocutors?**
Government ministries and agencies active in the ICT sector, telecom operators and consumers.
- **What are the top three most important actions a regulator can undertake?**
 1. Working with policy-makers on policy guidelines that enable innovation and technology adoption;
 2. Starting to collaborate with a wide network of stakeholders, including regulators and operators;
 3. Building institutional capacity and skilling up regulatory professionals.
- **What is the single most important lesson learned moving forward with a collaborative regulatory approach?**
Progress towards integrated and collaborative regulatory regimes is heavily dependent upon effective stakeholder coordination.
- **What piece of advice can you give to regulators engaging on a journey towards digital regulation?**
Use the bottom-up approach, build consensus among stakeholders and learn from regional and international best practices.

Source: Pakistan Telecommunication Authority

Box 13: Digital Regulation Platform

ITU collects significant information across various domains, including regulatory governance, competition, access for all, consumer affairs, spectrum management, trust and safety, emerging technologies, emergency communications and technical regulation. To provide an easy-to-access gateway to this wealth of information, ITU and the World Bank launched the [Digital Regulation Platform](https://www.digitalregulation.org) in 2020, which provides a repository of practical guidance and best practice for policy-makers and regulators across the globe who are concerned with harnessing the benefits of the digital economy and society for citizens and businesses. The content provides an update on the basics of ICT regulation in the light of the digital transformation that is sweeping through many sectors. It also includes new regulatory aspects and tools for ICT regulators to consider when making regulatory decisions.

There have been various developments throughout the Asia-Pacific region across a number of areas. With regard to digital regulation and the restructuring of regulatory authorities with the jurisdictional scope to oversee such issues, between 2017 and 2019 the Australian Competition and Consumer Commission conducted an inquiry to assess the impact on competition in the media and advertising sectors of digital search engines, social media platforms and other digital content aggregation platforms (collectively called digital platforms).¹ Rather than recommending the creation of a new regulatory body specifically to oversee these services, the commission recommended supplementing the mandates of existing regulatory agencies to include digital services. This case study demonstrates how and why the inquiry was framed to cover digital platforms within the context of competition, and what led the Government to abstain from creating a new digital platforms-specific regulator.

Since 2015, the Indian Government and the Telecom Regulatory Authority of India have been investigating ways to regulate over-the-top service providers. The difficulties that they have encountered despite their extensive efforts, exemplified by the fact that no regulations have yet been issued, serve as a caution to others seeking to regulate over-the-top applications. The ongoing debate has surrounded two issues in particular: net neutrality and regulatory balance.²

Source: ITU-World Bank Digital Regulation Platform, www.digitalregulation.org

¹ Australian Competition and Consumer Commission, "Digital Platforms Inquiry: Final Report", <https://www.accc.gov.au/system/files/Digital%20platforms%20inquiry%20-%20final%20report.pdf>

² <https://digitalregulation.org/regulation-of-ott-services-in-india/>

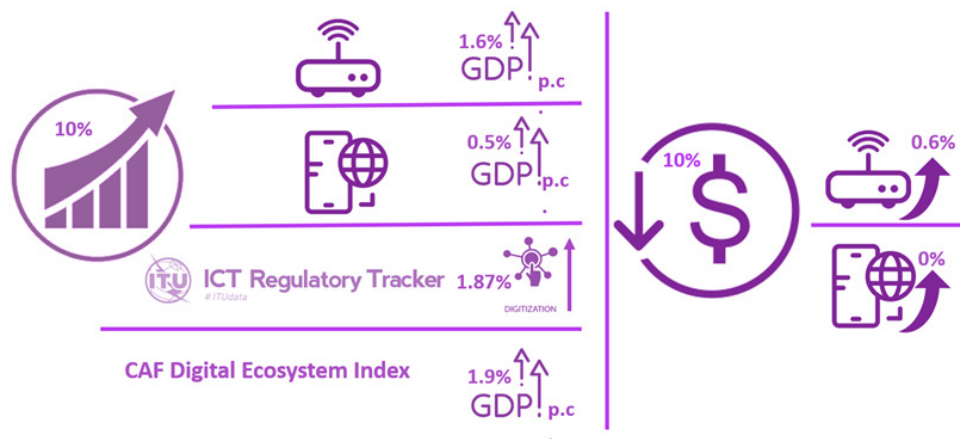
3.4 Economic contribution of broadband, digitization and ICT regulation in the Asia-Pacific region

It is without doubt that broadband, digitization and ICT regulation contribute to economic and socio-economic development across the Asia-Pacific region. ITU recently conducted a study on the economic contribution of broadband, digitization and ICT regulation, including econometric modelling for the Asia-Pacific region, which measured the impact of fixed and mobile broadband and digital transformation on the economy as a whole in the region, as

well as in how far institutional and regulatory variables contribute to the development of the digital ecosystem.²⁵

The results of the study, as summarized in Figure 22, reveal that a 10 per cent increase in mobile and fixed broadband penetration in the Asia-Pacific region would yield an increase of 0.5 per cent and 1.6 per cent in GDP per capita respectively. A 10 per cent decrease in the price of fixed and mobile broadband would boost fixed broadband adoption by 0.6 per cent but would not have an impact on mobile broadband adoption. Moreover, the report also validated the positive impact of the policy and regulatory component in the region, suggesting that an increase of 10 per cent in the ICT Regulatory Tracker yields a 1.87 per cent increase in digitization. In turn, a 10 per cent increase on the Digital Ecosystem Development Index managed by the *Corporación Andina de Fomento* (Andean Development Corporation, CAF) results in a growth of 1.9 per cent in GDP per capita.

Figure 22: Economic impact of fixed and mobile broadband and digitization, 2019



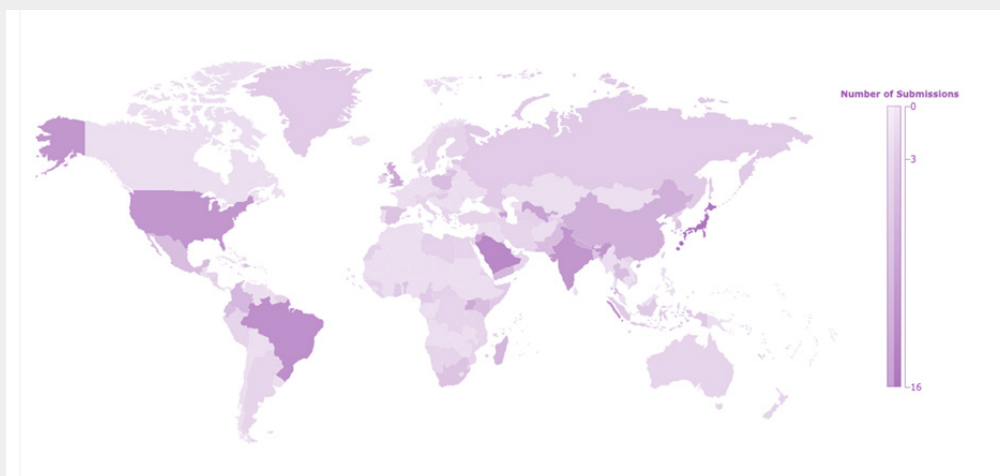
Source: Adapted from: ITU, "The economic contribution of broadband, digitization and ICT regulation: Econometric modelling for the Asia-Pacific region", 2019

²⁵ https://www.itu.int/pub/D-PREF-EF.BDT_AP-2019

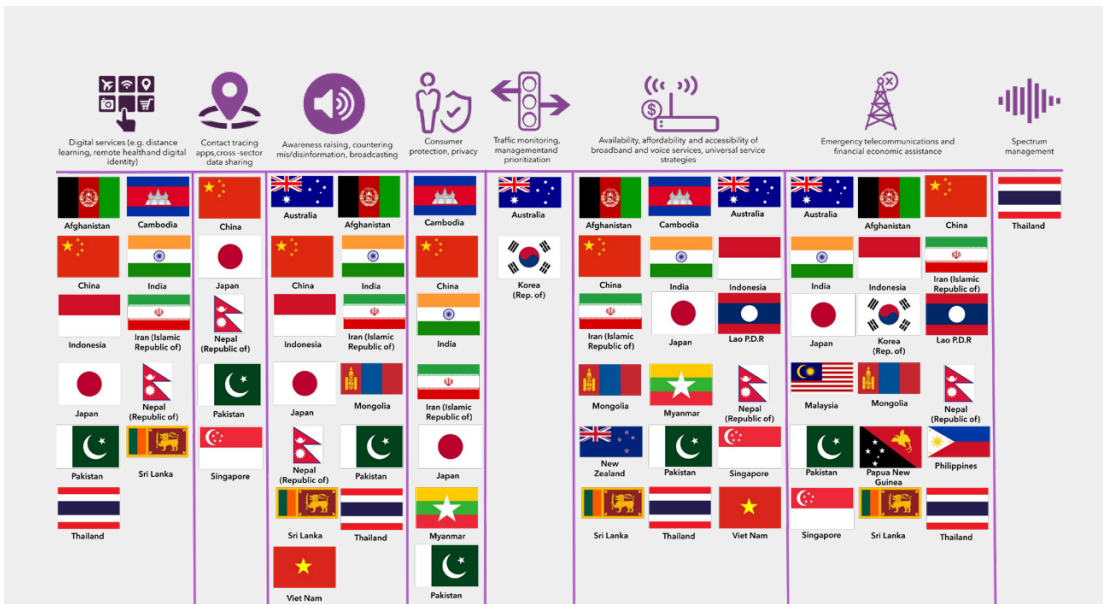
Box 14: COVID-19 regulatory framework initiatives for the Asia-Pacific region

The COVID-19 outbreak has led to significant disruptions in economic activity, which has had an impact on all industries, albeit at differing levels. To mitigate the impact of the pandemic, different ICT stakeholders have implemented a number of emergency steps and initiatives in the areas of consumer protection, traffic management and prioritization, broadband availability, affordability and accessibility, emergency telecommunications, universal service strategies, quality of service and quality of experience. These responses include increasing broadband capacity and speeds, providing free services to customers, providing information services on COVID-19, managing networks, allowing more flexible use of international mobile telecommunications (IMT) spectrum, providing free access to online learning resources, easing regulatory requirements on licensees, providing new fixed wireless access networks, addressing misinformation in relation to COVID-19, developing contact tracing and subsidizing broadband services.

To provide easy access to this information, ITU created the Global Network Resiliency Platform (REG4COVID), where ICT regulators, policy-makers and other interested stakeholders can [share information](#) and [view initiatives and measures](#) introduced around the world to help ensure communities remain connected during the COVID-19 crisis. The map below provides an overview of the number of submissions made to the platform by different countries.



In the Asia-Pacific region, around 40 per cent of countries have made submissions to the platform, with China, Indonesia, India, Afghanistan, Australia, Japan, the Islamic Republic of Iran, Pakistan and Thailand having submitted more than two initiatives across four or more different areas, as shown below.



Source: Based on data from ITU, <https://reg4covid.itu.int/>

The following measures were taken by governments and regulators to help mitigate the impact of the pandemic:¹

- In the **Republic of Nepal**, the Government is playing a key supporting role. During the pandemic, people have migrated to digital platforms in all areas, including education, health, banking and business. The Nepal Telecommunications Authority has created the Rural Telecommunication Development Fund to reduce the digital divide by establishing Wi-Fi hotspots and supporting broadband penetration in government schools, rural schools, municipalities, etc.
- In **India**, the Government has developed open source applications through which messages can be sent to target groups with a view to combating COVID-19. Other steps taken by the Government to enhance digital connectivity include infrastructure-sharing policies, the delicensing of 600 MHz spectrum for Wi-Fi, particularly in rural areas, and the introduction of right-of-way policies to help telecommunication service providers gain timely access to resources at a reasonable price. Steps have also been taken to enhance regional connectivity among members of the Association of South-East Asian Nations (ASEAN) using very-small-aperture-terminal geostationary satellites, with the help of national and international long-distance operators.
- In **Afghanistan**, right-of-way regulations are already in place, infrastructure sharing is allowed, and the Government is in the process of reviewing the licensing regime. Presently, most activities are paper-based; the primary goal is therefore to become a smart regulator and to shift to a paperless scenario through the digitization of processes and approval mechanisms.

¹ ITU, "Digital Transformations for Digital Economics @COVID-19: South Asia: GSR-20 Regional Regulatory Roundtable - Outcome report", July 2020, https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Documents/Web-Dialogue-30.07.20_Outcome-Report_Final.pdf

- In **Thailand**, the National Broadcasting and Telecommunications Commission has worked with five telecommunication service providers to provide an extra 10 GB free of charge to mobile phone users currently on Internet packages of no more than 10 GB, to automatically upgrade to 100 Mbit/s all fixed broadband users currently on speeds below 100 Mbit/s for 30 days from 10 April 2020, and to offer 100 minutes of voice calls for 45 days free of charge for mobile users, valid for one number per operator.

Industry stakeholders have been very active in implementing emergency responses to mitigate the impact of the COVID-19 pandemic. A recent GSR discussion paper explores and summarizes the types of responses by industry stakeholders.¹ The tables below, taken from this report, show selected responses by operators and content and online service providers.

Exhibit 5: Common short-term Initiatives by operators		Exhibit 6: Selected COVID-19 related initiatives by content and online service providers	
Initiative	Description	Initiative	Description
Additional data allowances	Many fixed operators, MNOs and wholesale providers have offered to provide their customers with additional data allowances as businesses and schools across the world transition to working remotely, due to the spread of the COVID-19 virus.	Lifting time limits in video calls	Zoom has lifted time limits on its video calls for the free versions in China, as well as for schools in Japan, Italy, and the United States, by request.
Increasing broadband speeds	Operators have upgraded Internet speeds - including transmission and backhaul capacity - to better accommodate the unprecedented number of people working and learning from home.	Reducing network demands	Netflix and Youtube (Google) reduced the resolution of their video content to assist in reducing the peak network demands on fixed and mobile networks experiencing additional COVID-19 demand.
Relaxing of payment terms	Operators have relaxed payment terms including downgrade plans/vouchers, payment of monthly invoices, and prepaid voucher validity dates.	Developing new technology	Apple and Google announced their partnership to develop a contact tracing technology to reduce the spread of COVID-19. The two companies have launched a comprehensive solution that includes application programming interfaces (APIs) and operating system-level technology to assist in enabling contact tracing. Given the urgent need, this solution is being implemented in two steps while maintaining strong protections around user privacy.
Providing free services	MNOs have also commenced a variety of other initiatives for their customers, many at no extra cost. These include free access to networks and waiving overcharge fees.	Range of free services including but not limited to:	Microsoft is offering anyone its premium version of Teams for free for six months and has lifted existing user limits on its free version. The premium Teams product was already available for no extra cost to those who pay for the Office Suite, and Teams had already been free for many schools.
Free access to online learning/education resources	In order to support distance learning and home-schooling during school closures, access to remote learning opportunities and educational platforms has been made available at no cost by a number of operators.		Google announced that it would offer its enterprise videoconferencing features – for example, larger meetings of up to 250 people and the ability to record – for free to G Suite and G Suite for Education customers until 1 July 2020.
Free access to health/government information	Operators are providing free access to information available on government and social welfare websites, as well as to websites containing health information relevant to the coronavirus crisis.		LogMeIn is making "Emergency Remote Work Kits" available for free for three months. Those kits are designed for non-profit organizations, schools, and health care organizations that are not already customers. The kits include GoToMeeting, GoToWebinar – where users can host presentations for up to 3 000 users – and LogMeIn, which provides remote desktop access from numerous devices.
Facilitating mobile money transactions	Telecommunication companies (and banks) are encouraging consumers to avoid cash payment in favour of digital transactions to prevent the spread of COVID-19.		Cisco is offering the free version of its Webex service with no time restrictions. In addition, it will allow up to 100 meeting participants and has added toll-free dial-in features with a 90-day licence for businesses that are not already customers.
Going digital in terms of recharges etc.	MNOs have facilitated prepaid mobile recharges being made online rather than through physical scratch cards etc. to improve connectivity during any lockdowns.		Slack already offers a free tier, but the company is offering live Q&A and webinars to get the influx of new users up to speed.

Source: ITU REG4COVID database and selected industry sources, 2020

Source: ITU REG4COVID database and selected industry sources, 2020

¹ ITU, "Pandemic in the Internet Age: communications industry responses", GSR-20 Discussion Paper, June 2020, <https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx>

4. Opportunities and challenges in digital transformation

To harness opportunities and meet the challenges of digital transformation, the ITU Telecommunication Development Bureau (BDT) fosters international cooperation and solidarity in the delivery of technical assistance and in the creation, development and improvement of telecommunication and ICT equipment and networks in developing countries. The ten areas of action (also referred to as "thematic priorities") of the ITU Telecommunication Development Sector (ITU-D) and BDT guide and shape their work and contribute to achieving their objectives. These priorities cover the areas of capacity development, cybersecurity, digital inclusion, digital innovation ecosystems, digital services and applications, emergency telecommunications, environment, network and digital infrastructure, policy and regulation, and statistics. Across these areas, many initiatives, projects and programmes are conducted that take the shape of






direct technical assistance to Member States or capacity-building initiatives such as events or workshops, often in collaboration with other stakeholders such as Sector Members, academia or other international organizations.

4.1 Developments under the regional initiatives for the Asia-Pacific region

A number of initiatives have been launched across the Asia-Pacific region under the chapeau of the ITU-D thematic priorities. These initiatives are fully aligned with, and implemented under, the ITU regional initiatives for the Asia-Pacific region. As illustrated in Box 15, there are five regional initiatives for Asia and the Pacific, which cover: addressing the special needs of LDCs, SIDS, including Pacific Island countries, and landlocked developing countries (LLDCs); harnessing information and communication technologies to support the digital economy and an inclusive digital society; fostering the development of infrastructure to enhance digital connectivity; enabling policy and regulatory environments; and contributing to a secure and resilient environment. These initiatives have been supported by projects funded by the Australian Department of Infrastructure, Transport, Regional Development and Communications, the European Union, the Ministry of Science and ICT of the Republic of Korea, the National Broadcasting and Telecommunications Commission of Thailand and the Bill and Melinda Gates Foundation. In addition, ITU works closely with partners from ITU Member States, United Nations agencies, development banks, regional organizations, industry members, service providers, Asia-Pacific centres of excellence and other stakeholders involved in the implementation of the initiatives.

Box 15: Asia-Pacific regional initiatives - Definition and objectives

The **five Asia-Pacific regional initiatives (ASP RI)** contained in the Buenos Aires Action Plan issued at WTDC-17 provided the roadmap for the ITU regional presence in Asia and the Pacific. The initiatives provide all stakeholders with a path for developing ICTs in agreement with governments. The five priority areas agreed by the region, and on which ITU focuses its activities, are: addressing the special needs of LDCs, SIDS, including Pacific Island countries, and LLDCs; harnessing information and communication technologies to support the digital economy and an inclusive digital society; fostering the development of infrastructure to enhance digital connectivity; enabling policy and regulatory environments; and contributing to a secure and resilient environment.

	<p>ASP RI 1: Addressing special needs of LDCs, SIDS, including Pacific Island countries, and LLDCs: Objective: To provide special assistance to LDCs, SIDS, including Pacific Island countries, and LLDCs in order to meet their priority telecommunication/ICT requirements.</p>		<p>ASP RI 4: Enabling policy and regulatory environments Objective: To assist Member States in developing appropriate policy and regulatory frameworks, fostering innovation, enhancing skills, increasing information sharing and strengthening regulatory cooperation, thereby contributing to a supportive regulatory environment for all stakeholders.</p>
	<p>ASP RI 2: Harnessing ICTs to support the digital economy and an inclusive digital society Objective: To assist Member States in utilizing ICTs to reap the benefits of the digital economy and in addressing the human and technical capacity challenges of bridging the digital divide.</p>		<p>ASP RI 5: Contributing to a secure and resilient environment Objective: To help Member States develop and maintain secure, trusted and resilient networks and services and address challenges related to climate change and disaster management.</p>
	<p>ASP RI 3: Fostering development of infrastructure to enhance digital connectivity Objective: To assist Member States in the development of telecommunication/ICT infrastructure to facilitate the provision of related services and applications.</p>		

Source: ITU Regional Office for Asia and the Pacific, "Report on the implementation of regional initiatives by ITU from 2019 to 2020"

Source: ITU Regional Office for Asia and the Pacific, "RDF Report on the implementation of regional initiatives by ITU from 2019 to 2020"

An overview of ITU initiatives, projects and activities can be found in the [RDF Report 2020 on the implementation of regional initiatives by ITU from 2019 to 2020](#), published by the ITU Regional Development Forum for Asia and the Pacific. A detailed description of all initiatives undertaken by the ITU Regional Office for Asia and the Pacific can be found on its [website](#).

4.2 Regional initiatives: Areas of progress

The Asia-Pacific region has made significantly progress in all areas covered by the ITU regional initiatives. The most notable improvements are listed in Figure 23.

Figure 23: Regional initiatives – Areas of progress

**ASP RI 1 –
Special
assistance for
SIDS, LDCs and
LLDCs**



- ITU assisted Member States in the areas of **digital services strategy development, applications, awareness raising and digital skills**. Assistance was provided to **Afghanistan** (government applications) **Bhutan** (government applications), **Cambodia** (e-agriculture), **Mongolia** (e-agriculture), **Papua New Guinea** (e-agriculture and e-government) and **Vanuatu** (e-government) with the aim of facilitating the development of cross-sectoral strategies and action plans.
- Pacific Island countries improved connectivity through a satellite connectivity project (2014-2020) that gave communities experience of e-services (health, education, finance) while enhancing resilience to disaster.
- Expert assistance was provided in response to requests for **digital infrastructure planning** from **Afghanistan** (broadband connectivity options, spectrum management), **Fiji** (spectrum management), **Tonga** (spectrum management), **Solomon Islands** (spectrum management), **Mongolia** (spectrum management, IPv6), **Vanuatu** (broadcasting master plan, spectrum management) and **Samoa** (Internet exchange points). This tailored technical support helped improve national capacities to address priority concerns.
- Five countries (**Afghanistan, Papua New Guinea, Samoa, Solomon Islands** and **Vanuatu**) strengthened their disaster planning capacities, while timely emergency telecommunication support was provided to Papua New Guinea, Solomon Islands and Vanuatu during disasters.
- Assistance was provided in areas of national cybersecurity strategy (**Fiji, Kiribati, Solomon Islands**) and CIRTs (**Samoa, Papua New Guinea, Vanuatu, Tonga**) to improve cybersecurity preparedness and response.

**ASP RI 2 –
Digital
economy and
inclusive
digital society**



- Support was provided to six countries to improve their national capacities to develop cross-sectoral plans and strategies for digital government and digital agriculture. A national study on mapping the digital divide in the education sector was conducted to enhance knowledge sharing among stakeholders in the education and ICT sectors in **Thailand**.
- Through its partnership with UNICEF in the Giga initiative, ITU enhanced awareness of the importance of connecting all schools by 2030 among the initiative's 140 participants. A regional **feasibility study on Giga implementation** is also being undertaken in **Bhutan, Bangladesh, Mongolia, Pakistan, Papua New Guinea** and **Vanuatu**.
- The ITU **smart village blueprint** is being customized for implementation in **Vanuatu** with ITU assistance. A smart village/smart islands programme is being developed in response to requests from interested Member States (**Indonesia, Fiji, Papua New Guinea**).
- More than 1 400 participants increased their awareness and developed their capacities in the area of **IoT and smart sustainable cities** through various forums (**Brunei Darussalam, Viet Nam**) and training sessions.
- **Digital skills development:** More than 1 100 participants developed digital skills through training sessions and workshops.
- Launched in 2020, the revised **ITU Child Online Protection Guidelines** were incorporated into cybersecurity training during Girls in ICT Day in **Thailand**.
- There are three **digital transformation centres** in the Asia-Pacific region: *Balai Pelatihan dan Pengembangan Teknologi Informasi dan Komunikasi* (BPPTIK) in **Indonesia**, the University of Technology (UNITECH) in **Papua New Guinea** and the Department of Information and Communications Technology in **the Philippines**. These centres trained more than 36 000 participants.
- Knowledge-sharing products were published (FAO-ITU **E-agriculture in Action** series), and forums on the application of ICTs in agriculture were held (Digital Agriculture Solutions Forum).

**ASP RI 3 –
Infrastructure to
enhance digital
connectivity**



- ITU continues to update the **ITU Interactive Transmission Map** for the Asia-Pacific region (over 1 million km of network data in place) using the latest information on national and international backbones, mobile connectivity, Internet exchange points and other infrastructure details. The study on maximizing the availability of international connectivity in the Pacific (2018), developed in partnership with the Pacific Islands Telecommunications Association and with support from the Department of Infrastructure, Transport, Regional Development and Communications of Australia, is also being updated.
- **Emerging technologies** remain a key area in which skills must be developed. Through some 30 sessions, more than 1 400 participants received training on emerging technologies (such as 5G, IoT, blockchain, broadband and artificial intelligence), standardization, conformity and interoperability, and IPv6.
- **The Unified Sign-On (USO) 2.0 approach**, developed in cooperation with ITU, was endorsed by ministers from ASEAN member States and is expected to accelerate the development of the digital economy, in particular for LDCs in the region, by improving connectivity and access.
- ITU provided dedicated support to **improve spectrum management frameworks** in **Brunei Darussalam** (IMT-2020), **Solomon Islands** (type approval for short-range device), **Fiji** (national frequency allocation strategy), **Tonga** (national frequency allocation table), **Mongolia** (spectrum pricing), **Vanuatu** (radio licensing regime) and **Viet Nam** (amendment of national frequency legislation). In addition, specialized training was conducted in **Lao P.D.R.** (automation of national spectrum management).
- Through regional and national activities, more than 2 800 participants received awareness and training on **spectrum issues**.

**ASP RI 4 –
Enabling
environment**



- **Supportive policy and regulatory environments** are key to resilient and secure digital infrastructure and to service delivery. Enhanced inclusive dialogue on priority issues in the ICT sector was held among regulators and policy-makers through established platforms (ITU-BTRC Asia-Pacific Regulators Roundtable, 2018; ITU-NBTC Asia-Pacific Regulators Roundtable, 2019; MIIT Seminar; Asia-Pacific Regional Development Forum).
- Cross-sectoral cooperation was strengthened through digital government (see ASP RI 2), digital agriculture (see ASP RI 2) and digital financial initiatives.
- More than 900 participants strengthened their **awareness and capacities regarding policy and regulatory areas**, including data protection, broadcasting, blockchain, universal access, big data, competition issues, ICT accessibility and regulatory enablers for digital transformation.

**ASP RI 5 –
Cybersecurity
and resilience**



- A repository of national **cybersecurity strategies** was compiled. It is currently available on the ITU website. Support in developing a cybersecurity strategy was provided to three countries.
- In 2019 and 2020, specialized assistance on **CIRT assessments** and skill building was provided to **Samoa, Vanuatu, Papua New Guinea** and **Tonga**, through a project supported by the Department of Infrastructure, Transport, Regional Development and Communications of Australia.
- More than 1 500 participants increased their **awareness** through workshops and training sessions.
- **E-waste** is another important area of focus for the region. ITU enhanced understanding of e-waste policies and management among 60 participants from **India**.
- Progress has been made in **emergency telecommunications**. Five countries (**Afghanistan, Papua New Guinea, Samoa, Solomon Islands** and **Vanuatu**) strengthened their disaster planning capacities, while timely emergency telecommunication support was provided to Papua New Guinea, Solomon Islands and Vanuatu during disasters.

Source: ITU Regional Office for Asia and the Pacific

Box 16: Asia-Pacific Regional Initiative 3 (ASP RI 3): Infrastructure - Continued demand and progress in relation to spectrum management

Under **ASP RI 3**, significant efforts have been made over the past three years to build capacities in spectrum management and radio frequency monitoring through dedicated national/sub-regional events and the regional centres of excellence programme. In a recent study, ITU members in the Asia-Pacific region indicated key areas for capacity building, in addition to the ones offered under the spectrum management training programme, including:

- The legal basis and regulatory framework for spectrum management
- Cross-border frequency management
- 5G implications for spectrum management
- Spectrum monitoring
- Spectrum management for satellite systems
- Advanced spectrum authorization regimes
- Socio-economic impact of spectrum regulation, and competition and consumer protection
- Conducting effective spectrum auctions
- Wireless telecommunication technologies
- Spectrum management for high frequency systems and science, maritime and amateur services
- Spectrum management for aeronautical, radiodetermination and military services
- Terrestrial TV broadcast planning and digital transition.

It was also indicated in the survey that there is more demand for group training, in which participants from different organizations come together over a period of two to five days for intensive training led by independent subject matter experts.

Spectrum management remains one of the areas of high demand from ITU members, and ITU is continuing its efforts to meet members' demands in this important area.

More than 1 100 participants were trained in areas such as the Spectrum Management System for Developing Countries (SMS4DC), spectrum monitoring, IMT-2020 (5G), human exposure to radio frequencies, spectrum management, traffic engineering and artificial intelligence. A training needs assessment is planned to identify key areas for building skills in spectrum management.

Regional forums on spectrum management (such as the Asia-Pacific Spectrum Management Conference held in 2019 and 2020) raised awareness among more than 1 600 participants about the outcomes of the World Radiocommunication Conference 2019, spectrum management practices and emerging issues. A regional radio seminar was planned for 2020. These activities were carried out in cooperation with the ITU Radiocommunication Bureau, regional organizations (such as the ITU-APT Foundation of India) and other partners (such as Forum Global).

Source: ITU Regional Office for Asia and the Pacific

4.3 Regional initiatives: Challenges

Although much progress has been made in the region, some long-standing challenges remain, and new challenges have emerged over the past three years. These challenges have been compounded by the COVID-19 pandemic, and they require concerted and focused action. The following key observations need to be addressed through ITU regional initiatives:

- While prices for ICT services have decreased, affordability remains an issue for both mobile and fixed broadband. Currently, mobile broadband services are more affordable than fixed broadband services; as the rollout of 5G services in the region expands, however, it will become important to monitor prices for faster 5G services and to ensure that the right regulatory steps are taken to allow people in the region to benefit from them.
- In many countries in the region there is a pronounced **gender gap**, which calls for urgent and targeted action to mainstream gender in policies, regulations and programmes to help address the digital divide and open up opportunities in education, employment and other services in the digital era.
- The region continues to be challenged by a significant **gap in capacities and skills**, which was accentuated during COVID-19 lockdowns. While digital literacy and skills are lacking among vulnerable groups, including older people and persons with disabilities, there is a growing global demand for ICT professionals in cybersecurity, big data and cloud computing, which has already triggered the migration of skilled labour from the region to Europe and North America.
- **Digital services** are on the rise in both the public and private sectors, especially since the COVID-19 lockdowns began. However, ministries and agencies are not necessarily coordinating with one another in the development and roll-out of digital services and related infrastructure, which has resulted in services and applications that are difficult to interface, data incompatibility and redundant investments in hardware, software and human resources. A whole-of-government approach is needed to foster synergies.
- There is a need for further cooperation to capitalize on **global and regional good** practices and lessons learned, deepen interoperability, strengthen data governance and prepare for the introduction of emerging technologies, such as artificial intelligence, IoT, cloud computing, blockchain and big data, while strengthening data privacy and security.
- The efficient management of sub-regional and national Internet traffic needs to be strengthened by setting up **Internet exchange points**. The improved Internet traffic management that these allow is expected to reduce latency, the trombone effect and the consumption of international bandwidth. Despite continued capacity-building endeavours, **migration from IPv4 to IPv6** remains a work in progress.
- **Emergency telecommunications** are high priority area for the Pacific, as the region remains highly prone to disasters. There is growing awareness among the Pacific Islands of the **need to ensure the resilience and security** of telecommunication networks. However, many countries still do not have emergency telecommunication, business continuity and backup plans.
- The Asia-Pacific region would benefit from global best practices and lessons learned in updating and upgrading ICT policies and regulations to accelerate digital transformation. Such good practices include updates to taxation and competition policies, the **whole-of-government approach**, consideration of various sectors' regulatory needs and requirements, infrastructure sharing, and coordination and cooperation with private sector and civil society organizations.
- The **licensing frameworks** in many countries in the region are still based on legacy telecommunications and require significant amendment to reflect advancements in technologies and to benefit from digital innovation.
- Several countries still lack a long-term **spectrum roadmap** that enables regional spectrum harmonization, without which ubiquitous interference-free connectivity will remain a challenge. Furthermore, technical skill development and knowledge sharing on

conformance and interoperability remain important to ensure economies of scale, which helps push down the price of ICT equipment while promoting the use of standardized equipment.

- **Cybersecurity** remains a major preoccupation for most countries in the Asia-Pacific region. In addition to policy frameworks, the capacities of in cyber incident response teams (CIRTs) need to be strengthened, especially in SIDS, LDCs and LLDCs, and measures need to be put in place to protect critical national infrastructure.
- While LLDCs continue to face unique ICT challenges, they also have the potential for enhanced **international connectivity**. They must rely on neighbouring countries for transit, however, as access to submarine cables and satellite communication services remains generally unaffordable in the Asia-Pacific region. Furthermore, for LLDCs prone to earthquakes that cause structural damage, ensuring the resilience and redundancy of networks is essential.
- Achieving **resilient middle mile and last mile connectivity** – a key step towards lowering the current digital gap – remains a challenge for most countries in the Asia-Pacific region. Metro fibre roll-out also presents a unique challenge in the adoption of next generation wireless technologies in urban areas.

5. Conclusion

While the Asia-Pacific region has seen continued growth in most areas of ICT infrastructure, access and use, many challenges persist that have been magnified by the COVID-19 pandemic. Mobile network coverage stands at 98.6 per cent, with both 3G and 4G mobile network coverage above 90 per cent. Internet use by individuals has grown from 38.6 per cent in 2017 to 44.5 per cent in 2019, 53.4 per cent of homes have access have Internet access, and 70.3 per cent of 15- to 24-year-olds are using the Internet.

ICT prices, while increasingly affordable, remain mixed, given the diversity of the region; countries such as China remain at the forefront, with prices below 1 per cent of GNI p.c., while other countries experience prices above 15 per cent of GNI p.c. While the digital divide persists, with only 37 per cent of rural households having access to the Internet in 2019 compared with 70.4 per cent of urban households, the gender gap has decreased, with a difference of only 7 percentage points remaining between women's and men's Internet use.

There is significant room for improvement in basic, standard and advanced ICT skills: the limited data available showed that, in the countries examined, advanced skills levels were below 10 per cent, with the exception of Brunei Darussalam (27.7 per cent). Most countries examined had achieved a basic ICT skill level of above 40 per cent, but great variation remained in standard and advanced skill levels.

Total telecommunication investment in the region amounted to USD 103.7 billion in 2019. The region has made significant progress in cybersecurity; 35 countries have cybercriminal legislation in place and 31 have cybersecurity regulations. With regard to ICT infrastructure developments and integrated technologies, there is still ample room for developing artificial intelligence capabilities and capacities, which can be fostered by advancing standardization to achieve the necessary scale.

The COVID-19 pandemic has had a profound impact on the Asia-Pacific region, having pushed consumers and businesses alike to adopt digital services and technologies and having

accelerated digital transformation in some areas of business by 4-10 years. Most network operators were able to cope with the increased demand on their networks, which provided a good stress test for the future and highlighted areas that required increased attention.

Positive ICT developments and trends have been underpinned and accompanied by steady improvement in regulatory frameworks, which are increasingly based on a new regulatory paradigm of collaborative regulation. Most countries (74 per cent) in the region are still classified as G2 and G3 regulatory framework countries, however.

Many projects, programmes and initiatives have been undertaken jointly by ITU-D and Member States across all five thematic priorities of the ITU Regional Office for Asia and the Pacific. Progress has been achieved in meeting the special needs of LDCs, SIDS, including Pacific Island countries, and LLDCs; harnessing information and communication technologies to support the digital economy and an inclusive digital society; fostering the development of infrastructure to enhance digital connectivity; enabling policy and regulatory environments; and contributing to a secure and resilient environment. The outlook for the Asia-Pacific ICT market is positive, but significant efforts are required to meet all the challenges identified and to build on the successes achieved thus far. The Asia-Pacific region and the ITU Regional Office for Asia and the Pacific stand ready to build on the progress achieved and to address all remaining challenges.

References

Australian Competition and Consumer Commission, "Digital Platforms Inquiry: Final Report", <https://www.accc.gov.au/system/files/Digital%20platforms%20inquiry%20-%20final%20report.pdf>

BCG, "Europe can catch up in AI, but must act - today", <https://www.bcg.com/en-ch/publications/2020/europe-can-catch-up-in-ai-but-must-act-today>

GSMA, "The State of Mobile Internet Connectivity 2019"

GSMA, "The Mobile Economy 2020"

World Summit on Information Society Stocktaking Platform, "Mid-term report: The coronavirus (COVID-19) response - ICT Case Repository"

ITU, "How broadband, digitization and ICT regulation impact the global economy: Global econometric modelling - Expert report", GSR-20 Discussion Paper, August 2020

ITU, "First overview of key initiatives in response to COVID-19", May 2020

ITU, "COVID-19 Initiatives, Partnerships and Activities", 9 September 2020.

ITU, "Pandemic in the Internet Age: Communications industry responses", GSR Discussion Paper, June 2020

ITU, "Economic impact of COVID-19 on digital infrastructure: Report of an economic experts roundtable organized by ITU", GSR-20 Discussion Paper, June 2020, <https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx>

ITU, "Last Mile Connectivity in the Context of COVID-19", REG4COVID Discussion Paper, November 2020

ITU, "The economic contribution of broadband, digitization and ICT regulation: Econometric modelling for the Asia-Pacific region", 2020

ITU, "Measuring digital development: Facts and figures 2019"

ITU, "Measuring digital development: Facts and figures 2020", <https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx>

ITU, "Measuring digital development: ICT price trends 2019", <https://www.itu.int/en/mediacentre/Pages/pr08-2020-Measuring-Digital-Development-ICT-Price-Trends-2019.aspx>

ITU, "Global ICT Regulatory Outlook 2020", <https://itu.foleon.com/itu/global-ict-regulatory-outlook-2020/home/>

ITU, "GSR 2019 Best Practice Guidelines: Fast forward digital connectivity for all", https://www.itu.int/en/ITU-D/Conferences/GSR/2019/Documents/GSR19BestPracticeGuidelines_E.pdf

ITU, "GSR 2020 Best Practice Guidelines: The gold standard for digital regulation", https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Documents/GSR-20_Best-Practice-Guidelines_Final_E.pdf

ITU Regional Development Forum: Asia-Pacific Region Online 2020, "The report on the implementation of regional initiatives by ITU from 2019-2020", https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2020/RDF2020/RDF%20report%20ASP%20R1-an-is_.pdf

ITU, "Asia-Pacific Regional Initiatives: Buenos Aires Action Plan 2018-2021", https://www.itu.int/en/ITU-D/Documents/RI_Asia-Pacific.pdf

ITU, "Developing spectrum management capacity across the Asia-Pacific Region", January 2021, <https://www.itu.int/en/myitu/News/2021/01/04/10/43/Spectrum-management-capacity-building-Asia-Pacific-Region>

Doreen Bogdan Martin (Director, ITU-D), "Connecting the unconnected", Satellite Evolution Americas, <https://www.satelliteevolutiongroup.com/magazines/Americas-August2020/content/Digital%20Issue%20download.pdf>

S. Ismail Shah (ITU Area Representative for Southeast Asia), "How Myanmar's policies accelerated digital development", <https://news.itu.int/how-myanmars-policies-accelerated-digital-development/>

ITU News, "How Kacific works to boost connectivity in Pacific Island States", 18 March 2020, <https://news.itu.int/how-kacific-works-to-boost-connectivity-in-pacific-island-states/>

ITU New Magazine, "Tech v COVID-29: Managing the crisis", <https://www.itu.int/en/myitu/Publications/2020/09/09/13/13/ITU-News-Magazine-No3-2020>

ITU Global Cybersecurity Index 2018, <https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx>

ITU World Telecommunication/ICT Indicators Database 2020, <https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx>

ITU Connect2Recover Initiative, <https://www.itu.int/en/ITU-D/Pages/connect-2-recover.aspx>

ITU Global Network Resiliency Platform (REG4COVID), <https://reg4covid.itu.int/>

World Summit on Information Society Stocktaking Platform, The Coronavirus (COVID-19) Response - ICT Case Repository, <https://www.itu.int/net4/wsis/stocktaking/Surveys/Surveys/Submit/15863048637525604>

ITU CYB4COVID, <https://www.itu.int/en/action/cybersecurity/Pages/CYB4COVID.aspx>

ITU ICT-Eye, https://www.itu.int/net4/itu-d/icteye#/_

ITU ICT Regulatory Tracker, https://www.itu.int/net4/itu-d/irt/#/tracker-by-country/regulatory-tracker/2018_

ITU Benchmark of Fifth Generation Collaborative Regulation (G5 Benchmark), https://itu.foleon.com/itu/global-ict-regulatory-outlook-2020/home/_

ITU, "Small island developing states (SIDS) and ICT: Mid-term review of the Samoa Pathway"

ITU Interactive Transmission Map, <https://www.itu.int/itu-d/tnd-map-public/>

ITU, "Maximizing availability of international connectivity in the Pacific", 2018, https://www.itu.int/pub/D-PREF-BB.GDI_AP-2018

International Institute of Communications, "Artificial Intelligence in the Asia-Pacific Region: Examining policies and strategies to maximise AI readiness and adoption", February 2020, <https://www.iicom.org/iic-reports/>

McKinsey & Company, "How COVID-19 has pushed companies over the technology tipping point - and transformed business forever", 2020, <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever>

World Bank, "Pacific Possible: Long-term Economic Opportunities and Challenges for Pacific Island Countries", 2017, www.worldbank.org/pacificpossible

McKinsey & Company, "Artificial intelligence: Implications for China", 2017, <https://www.mckinsey.com/featured-insights/china/artificial-intelligence-implications-for-china>

World Economic Forum, "Global Technology Governance Report 2021: Harnessing Fourth Industrial Revolution Technologies in a COVID-19 World", 2020, http://www3.weforum.org/docs/WEF_Global_Technology_Governance_2020.pdf

World Intellectual Property Organization, "WIPO Technology Trends 2019: Artificial Intelligence", https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf

Facebook/OECD/World Bank, "The Future of Business Survey", 2020, dataforgood.fb.com/global-state-of-smb

Office of the Director
International Telecommunication Union (ITU)
Telecommunication Development Bureau (BDT)
Place des Nations
CH-1211 Geneva 20
Switzerland

Email: bdttdirector@itu.int
Tel.: +41 22 730 5035/5435
Fax: +41 22 730 5484

Digital Networks and Society (DNS)

Email: bdt-dns@itu.int
Tel.: +41 22 730 5421
Fax: +41 22 730 5484

Digital Knowledge Hub Department (DKH)

Email: bdt-dkh@itu.int
Tel.: +41 22 730 5900
Fax: +41 22 730 5484

Office of Deputy Director and Regional Presence
Field Operations Coordination Department (DDR)
Place des Nations
CH-1211 Geneva 20
Switzerland

Email: bdtdeputydir@itu.int
Tel.: +41 22 730 5131
Fax: +41 22 730 5484

Partnerships for Digital Development Department (PDD)

Email: bdt-pdd@itu.int
Tel.: +41 22 730 5447
Fax: +41 22 730 5484

Africa

Ethiopia

International Telecommunication Union (ITU) Regional Office
Gambia Road
Leghar Ethio Telecom Bldg. 3rd floor
P.O. Box 60 005
Addis Ababa
Ethiopia

Email: itu-ro-africa@itu.int
Tel.: +251 11 551 4977
Tel.: +251 11 551 4855
Tel.: +251 11 551 8328
Fax: +251 11 551 7299

Cameroon

Union internationale des télécommunications (UIT)
Bureau de zone
Immeuble CAMPOST, 3^e étage
Boulevard du 20 mai
Boîte postale 11017
Yaoundé
Cameroon

Email: itu-yaounde@itu.int
Tel.: + 237 22 22 9292
Tel.: + 237 22 22 9291
Fax: + 237 22 22 9297

Senegal

Union internationale des télécommunications (UIT)
Bureau de zone
8, Route des Almadies
Immeuble Rokhaya, 3^e étage
Boîte postale 29471
Dakar - Yoff
Senegal

Email: itu-dakar@itu.int
Tel.: +221 33 859 7010
Tel.: +221 33 859 7021
Fax: +221 33 868 6386

Zimbabwe

International Telecommunication Union (ITU) Area Office
TelOne Centre for Learning
Corner Samora Machel and Hampton Road
P.O. Box BE 792
Belvedere Harare
Zimbabwe

Email: itu-harare@itu.int
Tel.: +263 4 77 5939
Tel.: +263 4 77 5941
Fax: +263 4 77 1257

Americas

Brazil

União Internacional de Telecomunicações (UIT)
Escritório Regional
SAUS Quadra 6 Ed. Luis Eduardo
Magalhães,
Bloco "E", 10^o andar, Ala Sul
(Anatel)
CEP 70070-940 Brasília - DF
Brazil

Email: itubrasilia@itu.int
Tel.: +55 61 2312 2730-1
Tel.: +55 61 2312 2733-5
Fax: +55 61 2312 2738

Barbados

International Telecommunication Union (ITU) Area Office
United Nations House
Marine Gardens
Hastings, Christ Church
P.O. Box 1047
Bridgetown
Barbados

Email: itubridgetown@itu.int
Tel.: +1 246 431 0343
Fax: +1 246 437 7403

Chile

Unión Internacional de Telecomunicaciones (UIT)
Oficina de Representación de Área
Merced 753, Piso 4
Santiago de Chile
Chile

Email: itusantiago@itu.int
Tel.: +56 2 632 6134/6147
Fax: +56 2 632 6154

Honduras

Unión Internacional de Telecomunicaciones (UIT)
Oficina de Representación de Área
Colonia Altos de Miramontes
Calle principal, Edificio No. 1583
Frente a Santos y Cía
Apartado Postal 976
Tegucigalpa
Honduras

Email: itutegucigalpa@itu.int
Tel.: +504 2235 5470
Fax: +504 2235 5471

Arab States

Egypt

International Telecommunication Union (ITU) Regional Office
Smart Village, Building B 147,
3rd floor
Km 28 Cairo
Alexandria Desert Road
Giza Governorate
Cairo
Egypt

Email: itu-ro-arabstates@itu.int
Tel.: +202 3537 1777
Fax: +202 3537 1888

Asia-Pacific

Thailand

International Telecommunication Union (ITU) Regional Office
Thailand Post Training Center
5th floor
111 Chaengwattana Road
Laksi
Bangkok 10210
Thailand

Mailing address:
P.O. Box 178, Laksi Post Office
Laksi, Bangkok 10210, Thailand

Email: ituasiapacificregion@itu.int
Tel.: +66 2 575 0055
Fax: +66 2 575 3507

Indonesia

International Telecommunication Union (ITU) Area Office
Sapta Pesona Building
13th floor
Jl. Merdan Merdeka Barat No. 17
Jakarta 10110
Indonesia

Mailing address:
c/o UNDP – P.O. Box 2338
Jakarta 10110, Indonesia

Email: ituasiapacificregion@itu.int
Tel.: +62 21 381 3572
Tel.: +62 21 380 2322/2324
Fax: +62 21 389 5521

CIS

Russian Federation

International Telecommunication Union (ITU) Regional Office
4, Building 1
Sergiy Radonezhsky Str.
Moscow 105120
Russian Federation

Email: itumoscow@itu.int
Tel.: +7 495 926 6070

Europe

Switzerland

International Telecommunication Union (ITU) Office for Europe
Place des Nations
CH-1211 Geneva 20
Switzerland

Email: euregion@itu.int
Tel.: +41 22 730 5467
Fax: +41 22 730 5484

International Telecommunication Union
Telecommunication Development Bureau
Place des Nations
CH-1211 Geneva 20
Switzerland

ISBN: 978-92-61-33261-7



9 789261 332617

Published in Switzerland
Geneva, 2021
Photo credits: Shutterstock